U.S. Department of the Interior
Bureau of Land Management
Glenwood Springs Field Office
50629 Highway 6 & 24
Glenwood Springs, CO 81601

ENVIRONMENTAL ASSESSMENT

NUMBER: CO-140-05-113 EA

CASEFILE NUMBER: Lease C-58674, C-58675, C-58676, C-59629, C-60434, C-64189, C-64191, and C-64192

PROJECT NAME: Orchard Unit Geographic Area Plan (GAP)

LEGAL DESCRIPTION: Township 8S, Range 96W, Sections 3, 8-10, 14-21, 28 and 33, Sixth Principal Meridian

APPLICANT: EnCana Oil & Gas (USA)

FONSI
CO-140-2005-113 EA

EnCana Oil & Gas (USA) Inc.
Orchard Unit Geographic Area Plan

The environmental assessment and analyzing the environmental effects of the proposed action have been reviewed. The approved mitigation measures result in a Finding of No Significant Impact on the human environment. Therefore, an environmental impact statement is not necessary to further analyze the environmental effects of the proposed action.

DECISION RECORD

DECISION: It is my decision to approve the proposed action (Orchard Unit Geographic Area Plan) as written (except for the following specific pad location) in order to provide for the orderly, economical and environmentally sound exploration and development of oil and gas resources on valid oil and gas leases.

This decision does not modify any lease terms and stipulations attached to the specific leases involved. Updates and amendments to the Geographic Area Plan may be made over the course of the 2-3 year drilling program. Depending on the magnitude of the changes in the future, additional NEPA compliance documentation may be necessary if determined to be outside the scope of this analysis.

After reviewing the GAP and its various recommendations regarding the operator's development plan, any decisions regarding the A28OU pad will be deferred until the appropriate cultural resource survey, report and recommendations are submitted to the BLM, Glenwood Springs Field Office. At present, such work has not been thoroughly completed.

RATIONALE:
1. Approval of the proposed action is validating the rights granted with the federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.
2. The environmental impacts have been mitigated with measures outlined in the body of the Environmental Assessment or relate appendices listed below.

MITIGATION MEASURES: Various mitigation measures are included in the body of the Environmental Assessment, described within the operator-submitted Surface Use Plan (Appendix A) and itemized as Standard (GAP-wide) Conditions of Approval (Appendix B) or Site-Specific Conditions of Approval (Appendix C).

Copies of the Geographic Area Plan are available for review at the BLM Glenwood Springs Field Office, 50629 Highway 6 & 24, Glenwood Springs, Colorado 81601.

The decisions made in this plan are appealable when the Applications for Permit to Drill (APDs) are approved by this office. The required 30 day posting period for APDs was completed at the beginning of the GAP process. For further information on APD approval dates related to the GAP, periodic consultation with the BLM, Glenwood Springs office is recommended via following methods: phone (970) 947-2804 or e-mail jim_byers@blm.gov.

In accordance with 43 CFR 3165.3, you may request a State Director Review upon approval of APD(s) outlined in this GAP. This request must be submitted in writing within 20 business days from date of APD approval. The request should be sent to: Colorado State Director, 2850 Youngfield Street, Lakewood, Colorado 80215-7076. The decision of the State Director may then be appealed to the Interior Board of Land Appeals in accordance with 43 CFR 3165.4.

NAME OF PREPARER: Jim Byers, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL: _____ Authorized Officer

DATE SIGNED: 9/14/05

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TABLE OF CONTENTS

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PURPOSE AND NEED FOR PROPOSED ACTION

The purpose and need is to authorize the Application for Permits to Drill (APD) to provide for federal lease development that will in turn provide natural gas for commercial marketing to the public.

PROPOSED ACTION

Introduction

The Orchard Unit Geographic Area Plan (OUGAP) is a comprehensive and detailed plan that describes the EnCana Oil & Gas, (USA) Inc. (EnCana) proposed plan of development to drill and operate up to 65 natural gas wells in the Orchard Unit Geographic Area (OUGA), located approximately seven miles east of DeBeque, Colorado in Garfield and Mesa Counties. The OUGAP encompasses portions or all of 14 sections of surface land (approximately 5,320 acres) in Township 8 South, Range 96 West. **Figure 1** provides a project location map.

The vast majority of surface in the Project Area is under the jurisdiction of the Bureau of Land Management (BLM), Glenwood Springs Field Office. However, the Project Area includes 1,160 acres of split estate interest, where the surface is privately-owned, but the minerals are owned by the federal government. Finally, the Project Area includes 160 acres of private surface and minerals. Efforts have been taken to ensure acreage values cited are as accurate as possible in this EA, based on the available data.

EnCana proposes to use vertical and directional drilling technology to drill 65 natural gas wells from 7 new and 8 existing locations. As a result of using directional drilling technology for many of these wells, this plan would result in about 55 percent less surface disturbance than would be the case if all wells were vertically drilled from individual pads. EnCana proposes a 2- to 3-year phased drilling scenario that would:

- Expand eight existing pads by an average of one acre each;
- Develop 7 new well pads (4 to 9 acres of total disturbance each depending on topography and the total number of directional wells to be drilled at a given location);
- Upgrade 3.2 miles of existing two-track roads to access new well pads;
- Construct approximately 2.6 miles of new access roads to well pads;
- Drill up to 20 wells in 2005 (one vertical well and up to 6 directional wells at each pad) using one or two drill rigs;
- Drill up to 45 wells in 2006 and 2007, and possibly later in the future (one vertical well and up to 6 directional wells at each pad) using up to three drill rigs;

- Install gas and water pipelines to each location, mostly within access road rights-of-way (3.2 miles co-located with access roads, 2.8 miles not co-located with roads);

- Install production equipment (wellheads, separators/dehydration units, stock tanks, etc.) at each pad; and

- Operate and produce natural gas from up to 65 wells over the life of the project.

The exact number of wells drilled in any given year would depend on technical results and market performance.

Existing Surface Disturbance

At present, there are eight existing well pads in the Project Area, which occupy a total of approximately 29.4 acres. In addition to the existing pads, approximately 7 miles of existing access roads are present in the Project Area that were either built or widened by EnCana (occupying approximately 15.3 acres). There are also about 7.0 miles of narrow, semi-improved or primitive, two-track roads that occupy approximately 11.0 acres. In total, existing surface disturbance amounts to approximately 56 acres, or about 1.0 percent of the Project Area.

The following list of pads were approved and constructed as exploratory wells as allowed under Appendix B, Oil and Gas Environmental Impact Statement (BLM, 1999) with pad locations built along existing roads or deemed exploratory in nature by a BLM petroleum engineer:

L16OU (Orchard 16-12 well) drilled in 2003 and addressed in EA# CO140-02-095
N17OU (Orchard 17-14A well) drilled in 2003 and addressed in EA# CO140-03-088
J10OU (Orchard 10-10D well) drilled in 2004 and addressed in EA# CO140-03-097
E28OU (Orchard 28-5 well) drilled in 2004 and addressed in EA #CO140-04-003
F8OU (Keinath Federal 8-6 well) drilled in 2005 and addressed in EA#CO140-05-046
G18OU (Keinath Federal 18-8 well) drilled in 2005 and addressed in EA#CO140-05-046
F21OU (Orchardl 21-6 well) drilled in 2005 and addressed in EA#CO140-05-046
M17OU (Orchard 17-13 well) drilled in 2005 and addressed in EA#CO140-05-080

GAP EA Process and Intent

The GAP Environmental Assessment (EA) is intended to provide an assessment of the overall development scenario over a 2- to 3-year timeframe, instead of a case-by-case submittal of APDs. The intent of the GAP process is to address site-specific and cumulative environmental impacts associated with oil and gas development within a defined geographic area. In addition, the GAP process was created to propose mitigation for potential impacts to environmental resources, such as wildlife habitat and visual aesthetics that may occur within discrete ecosystems.

The result of the GAP is a reasonable foreseeable development (RFD) scenario proposed by the operator given the current market conditions and demand for natural gas, other constraints of the company, and by environmental constraints imposed by the BLM. If fully developed, this

proposal would result in up to 65 bottom-hole locations drilled at 15 surface locations (7 new locations and 8 existing pads that would be expanded). EnCana expects to drill up to 20 wells in 2005, and the remaining 45 in 2006 and 2007, and possibly carrying into 2008. The proposed location of surface facilities is shown on **Figure 2**. The total number of wells drilled would depend largely on factors out of EnCana's control such as geologic success, engineering technology, economic factors, availability of commodity markets, and lease and unit stipulations and restrictions.

The major elements of the GAP are described below under Development (Construction/Drilling/Completion), Production (Operation and Maintenance), and Abandonment and Reclamation. The proposed elements contain a standard Surface Use Plan (SUP) for gas well development. With BLM's approval, all measures discussed in the SUP would be implemented as part of the BLM's Proposed Action. Any deviations from the standard practices below are identified in site-specific conditions of approval.

I. DEVELOPMENT - CONSTRUCTION, DRILLING AND COMPLETION

Construction

During the first year of development in 2005, numerous construction activities would be completed. All of these activities could occur simultaneously. The following is a description of construction methods to be utilized for well pads, access roads, and gas gathering and produced water pipelines.

Well Pads

Well pads would be constructed from the native soil and rock materials present and leveled by standard cut-and-fill techniques using a bulldozer, grader, front-end loader, or backhoe. The pad would be constructed by clearing vegetation, stripping and stockpiling topsoil, and leveling the pad area using cut and fill techniques. All cut slopes associated with pad construction would be "step cut" and left rough to provide a seed catchment surface. Cut slopes required for pad construction would not be steeper than 1.5:1. The tops of the cut banks and pad corners may be rounded to improve the visual appearance.

Initially, the size of the newly-constructed pads would range from about 4 to 9 acres. Existing pads would be expanded by 1 acre or less to accommodate the additional wells proposed. At each pad, after all wells are drilled, completed, and production facilities are installed, interim reclamation activities would begin. Generally, cuts would be revegetated and fills would be recontoured to blend in with adjacent natural slopes and seeded to re-establish vegetative cover. These interim reclamation techniques would result in about a 60 percent reduction in surface disturbance that would remain over the long-term life of project (20 to 30 years). **Table 1** shows the size of the pads during drilling and completion activities and then after interim reclamation.

Reserve pits would be needed to contain drilling fluids. Given the variation in the size and dimensions of the well pads and the number of wells that may be drilled at any given location, the size of the reserve pits would vary. Generally, the reserve pits would be constructed to allow

for a minimum of two feet of free board between the maximum fluid level and the top of the berm for the containment of cuttings and drilling fluids. Pits would be designed to prevent all stormwater runoff from entering. A fence would be constructed around the perimeter of the reserve pit to prevent wildlife from entering the pit. The fence would remain until all wells have been drilled and completed. After each well is drilled, the fluids would be allowed to evaporate unless an alternative method of disposal is approved. Because multiple wells would be drilled at each pad, the pit would not be reclaimed until all wells have been drilled on each respective pad.

Part of EnCana's storm water management policy may include additional engineering measures which would be implemented to construct drainage systems and culverts in order to divert water flow away from the surface location, prevent erosion, and prevent sediment loading in waterways due to pad and/or road construction as needed.

Table 1. Orchard Unit Well Pad Descriptions

Pad	Surface Location Sec-Twp-Rge	Status	Existing Disturbance (acres)	New Short-term Disturbance (acres)	Long-Term Disturbance (acres)
F8OU	8-T8S-R96W	Existing	5.0	0.0	1.0
K9OU	9-T8S-R96W	Proposed	0.0	4.9	1.0
I9OU	9-T8S-R96W	Proposed	0.0	5.6	1.0
J10OU	10-T8S-R96W	Existing	3.0	1.0	1.0
F14OU	14-T8S-R96W	Proposed	0.0	6.0	1.0
G15OU	15-T8S-R96W	Proposed	0.0	6.1	1.0
H16OU	16-T8S-R96W	Proposed	0.0	5.0	1.0
L160U	16-T8S-R96W	Existing	2.5	1.0	1.0
C17OU	17-T8S-R96W	Proposed	0.0	5.5	1.0
M17OU	17-T8S-R96W	Existing	4.3	0.0	1.0
N17OU	17-T8S-R96W	Existing	3.1	1.0	1.0
G18OU	18-T8S-R96W	Existing	3.9	1.0	1.0
F21OU	21-T8S-R96W	Existing	4.5	0.9	1.0
A28OU	28-T8S-R96W	Proposed	0.0	9.2	1.0
E28OU	28-T8S-R96W	Existing	3.1	1.0	1.0
Total			**29.4**	**48.2**	**15.0**

Access Road Construction

In general, access to the OUGA would be from Interstate 70 at the DeBeque exit (Exit 62). Vehicles would then use various County (Mesa and Garfield) roads to reach the Project Area (described in more detail in the Transportation section).

Within the Project Area, the access road network would be extended from county roads, existing EnCana access roads, and other two-track roads that would be upgraded to provide access to the

proposed well locations, as shown on **Figure 2**. The roads would be constructed to meet the standards of the anticipated traffic flow and all-weather requirements. Prior to construction/upgrading, the roadway would be cleared of any snow cover and allowed to dry completely. Road construction or upgrading would not be allowed during muddy conditions. Should mud holes develop, they would be filled in and detours around them avoided.

Construction would include ditching, draining, crowning and capping or sloping and dipping the roadbed as necessary to provide a well-constructed and safe road. Roads would be constructed using standard equipment and techniques approved by the BLM. Bulldozers and/or road graders would first clear vegetation and topsoil from the ROW. The access roads would be constructed within a 60-foot overall working right-of-way. After construction, roads would occupy a 30-foot ROW with an 18-foot running surface, which could be wider at certain locations based on topography and side slopes. The average grade would be 10% or less, wherever possible. The 10% grade would only be exceeded in areas where physical terrain or unusual circumstances require it. Minimum horizontal curve radii would be 100 feet. Where terrain would not allow 100-foot curve radii, curve widening would be employed.

Roads would be constructed with appropriate drainage and erosion control features. Road drainage crossings would be of the typical dry creek drainage crossing type. Crossings would be designed so they would not cause siltation or the accumulation of debris in the drainage crossing, nor block the drainages. Water diversions including cut-outs would be placed at frequent intervals along access roads to prevent erosion of the drainage ditches by runoff as described in the BLM/USFS Surface Operating Standards for Oil and Gas Development, the “Gold Book” (BLM and USFS 1989).

Access road construction would include 2.6 miles of new roads (18.7 acres of surface disturbance) and upgrading of about 3.2 miles of existing two-track roads and trails (20.4 acres of new surface disturbance). In total, 5.8 miles of access roads serving the proposed well locations would require about 39.1 acres of new surface disturbance over the short-term. Following interim reclamation of the portion of the road ROW not required for project operation, the long-term surface disturbance that would remain over the life of the project would amount to approximately 18 acres.

All trees on the well pad locations, access roads, and proposed pipeline routes would be cut to a maximum stump height of six inches (6”), and then cut to 4-foot lengths and stacked off location. Trees would not be dozed off the location or access road, except on private surface where trees may be dozed. Trees may also be dozed on pipeline routes and then pulled back onto the right-of-way as part of final reclamation. Cut pinyon pine trees would either be mulched or disposed of to prevent the spread of the ips beetle. Root balls would be buried or placed off the locations, access roads, or pipeline routes and scattered back over the disturbed area as part of the final reclamation. Other vegetation, such as sagebrush and other shrubs, may be scattered off-site or placed on well pad fills to help visually screen the pads.

Gas Gathering and Water Pipeline Construction

A gas gathering and produced water pipeline network would be needed to gather and deliver gas off-site to existing EnCana trunk pipelines and transport produced water to an existing evaporation pond system outside the Project Area.

In total, 5.9 miles of pipelines would be installed as part of the Proposed Action. Approximately 3.1 miles would be co-located with access roads, while the remaining 2.8 miles would be built within their own ROWs. Natural gas gathered by the proposed project would then be transported to market via larger trunk pipelines operated by EnCana outside of the OUGA. In general, gas produced by wells on the eastern side of the OUGA would be gathered under natural pressure to the existing C10OU pad near the northeast corner of the OUGA and fed into an existing trunk pipeline. Gas produced on the western side of the OUGA would be fed into a planned trunk pipeline that would run parallel to the Excel Energy electric transmission line that runs along the northern edge of the OUGA. Compression requirements for this future pipeline have not been determined to date. Where co-located with roads, both pipeline types would be buried in the same trench within the access road ROWs, resulting in no additional surface disturbance. All vehicles and trenching equipment would use the access roads as construction ROWs in that case. For pipelines that would not be co-located with access roads, the construction ROW would not exceed 60 feet. Generally, a mile of pipeline would be constructed in four to six days.

All buried pipelines would be buried to a depth of 3 feet, except at road crossing where they would be buried to a depth of 4 feet. The pipeline trench would be excavated mechanically; pipe segments would then be welded together and tested, lowered into the trench, and covered with excavated material. Then, each pipeline would be pressure tested with fresh water and/or nitrogen gas to locate any leaks. Fresh water or nitrogen used for testing would be obtained off-site and transported to the testing location by truck. After testing, the water would be disposed of at EnCana's existing off-site evaporation pond facility, or discharged into surface water drainages if approved by the BLM and the State of Colorado. Nitrogen would be vented to the atmosphere if used instead of water.

Following completion of pipeline construction, pipeline location warning signs would be installed within 90 days after construction is completed. EnCana would then rehabilitate 30 feet of the pipeline ROW, leaving a 30-foot working surface. Finally, EnCana would condition these pipeline rights-of-way in a manner to preclude vehicular travel upon said rights-of-way, except for periodic access to pipeline drips and valves.

Total Surface Disturbance

Assuming all of the proposed facilities are constructed, approximately 107.9 acres of new surface disturbance would occur in the short-term (about 2% of the Project Area). Following interim reclamation of well pad, access road, and pipeline disturbance not required for operation, about 43.3 acres of surface disturbance would remain over the operational life of the project (about 0.8% of the Project Area). **Table 2** provides a summary of short- and long-term surface disturbance that would occur as a result of the Proposed Action.

Table 2. New Surface Disturbance Proposed under the Orchard Unit GAP

GAP Action	Short-Term Disturbance	Long-Term Disturbance
Well Pads	48.2 acres	15.0 acres
Access Roads	39.1 acres	18.0 acres
Gas/Water Pipeline ROW*	20.6 acres	10.3 acres
Total Acreage	**107.9 acres**	**43.3 acres**
Percent of Orchard Unit Geographic Area (5,320 acres)	2.0%	0.8%

* Pipelines that would not be buried within road ROWs

Drilling and Completion

EnCana's drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, and all applicable rules and regulations. New wells would be drilled to a depth of 7,200 to 10,000 feet. A natural gas well in this GAP would require about 12-15 days to drill and approximately 30-45 days to complete. As this is still an exploratory unit, one or two wells would be drilled on each of the proposed well pads in 2005. The 2006-2007 drilling programs would be developed based on the results of the 2005 program. Multiple well bores from a single pad would be drilled consecutively and completed during one period of development for that pad; this would minimize the amount of additional surface disturbance required for the additional wells. It is also possible that EnCana could drill fewer wells than those described in this GAP because of geologic and market uncertainties.

The drilling operation would be conducted in two phases. The first phase may use a small drilling rig to drill to a depth of approximately 600 – 1000 feet, or 50 feet below the base of any freshwater aquifers encountered. This surface hole would be cased with steel casing and cemented in place entirely from a depth of about 600 – 1000 feet up to ground level. This surface casing would serve the purposes of providing protection for any freshwater aquifers present and to contain pressure that may be encountered while drilling deeper. The BLM would be notified in advance of running surface casing and cement in order to witness these operations, if so desired. This part of the drilling operation would normally take 2 to 3 days to complete.

Prior to drilling below the surface casing, a Blowout Preventer (BOP) would be installed on the surface casing and both the BOP and surface casing would be tested for pressure integrity. The BOP and related equipment would meet the minimum requirements of Onshore Oil and Gas Order No. 2, and the BLM would be notified in advance of all pressure tests in order to witness these tests, if so desired. Following the use of the surface-hole rig, if used, a larger drilling rig would be used to drill to target depths of about 7,200 to 10,000 feet. A downhole mud motor may be used to increase penetration rate. The rig would pump drilling fluids to drive the mud motor, cool the drill bit, and remove cuttings from the wellbore. In order to achieve borehole stability, minimize possible damage to the formations, provide adequate viscosity to carry the drill cuttings out of the

wellbore, and reduce downhole fluid losses, various chemicals and certain materials may need to be added to the mud system.

For the directional wells, an S-shaped directional design would be used to reach the targeted bottom hole locations. In general, a target radius of 200 feet would be used. Specific directional plans for each well will be included with the APDs. Downhole operations would be done with tools to facilitate proper direction and path of the well.

All well pads would have a lined reserve pit to receive the drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals) and to contain drilling fluids carried over with the cuttings. No hazardous substances would be placed in this pit. Frac pits to contain water used in completion process would be planned for each new pad location in the GAP. Frac pits would be lined. Compliance with Onshore Order #1 would determine the timing and closure of frac pits. In instances where well drilling would occur in more than 1 drilling season on a pad, the frac pit will be drained dry prior to winter shutdown period or expiration of 90 day period, whichever occurs first.

After drilling the hole to the total depth, logging tools would be run in the well to evaluate the potential hydrocarbon resource. If the evaluation indicates adequate hydrocarbon resources are present and recoverable, steel production casing would be run and cemented in place in accordance with the well design, as approved by the BLM and any applicable COAs. The proposed casing and cementing program would be designed to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. The use of any isolating medium other than cement would receive approval prior to use.

After production casing has been cemented in place, the drilling rig would be removed and a completion rig would be moved in. Well completion consists of running a Cement Bond log to evaluate the cement integrity and to correlate the cased hole logs to the open hole logs, perforating the casing across the hydrocarbon producing zones, and stimulating the formation to enhance the production of oil and gas. The typical method used for stimulation consists of hydraulic fracture treatment of the reservoir, in which sand with fluid is pumped into the producing formation with sufficient hydraulic pressure to fracture the rock formation. The sand serves as a proppant to keep the created fracture open, thereby allowing reservoir fluids to move more efficiently into the wellbore.

II. PRODUCTION

Surface Facilities

Well locations would consist of wellheads, separation/dehydration units and aboveground condensate and produced water tanks with 300- to 600-barrel capacities. Multi-well locations would share production equipment whenever feasible to minimize surface occupancy/disturbance. All production equipment would be painted shale green to match the surrounding vegetation, and located to reasonably minimize visual impact. BLM would select the color for all facilities, including containment berms, at each site. The production equipment

would be fenced within a 45-foot by 25-foot area to prevent contact with wildlife/livestock at the surface owner's request. Telemetry equipment would be utilized to remotely monitor well conditions after a reasonable level of development. The use of telemetry would minimize traffic to and from the well locations. Automated tank gauging would also be employed to minimize the risk of spills.

Tank batteries would be placed within secondary containment to prevent the offsite migration of accidentally spilled condensate or produced water. Secondary containment would consist of corrugated steel containment berms or earthen berms. Compaction and construction of earthen berms surrounding the tank batteries would be performed to prevent lateral movement of fluids through the utilized materials. Secondary containment would be sized to contain a minimum of 110 percent of the storage capacity of the largest tank within the berm. All loading lines would be placed inside the containment berm.

Centralized compression would take place when possible to minimize the area impacted by compressor noise. If production requirements make on-site compression necessary, a Sundry Notice (Form 3160) would be submitted for approval to the Authorized Officer detailing specifications prior to installation of compressors.

Produced water may be confined to the reserve pit for a period of 90 days after initial production. The storage tanks would be installed next to the production facilities to contain produced water and condensate during the operational life of the wells. Produced water at well pads would be transported by pipeline to existing evaporation ponds in Section 36 in the Parachute Field, and/or trucked offsite to an approved disposal facility. Condensate would be transported to market by tanker trucks.

Interim Reclamation

After completion activities, EnCana would reduce the size of the well pad to the minimum surface area needed for production facilities and future workovers, while providing for reshaping and stabilization of cut and fill slopes. The cut and fill slopes would be reshaped to a maximum 2:1 slope. In brief, interim reclamation would be accomplished by grading, leveling and seeding as recommended by the BLM. Interim reclamation would reduce the disturbed area at each pad to approximately one acre after well development.

The following is a summary of interim reclamation activities that would take place immediately after well completion:

1. The well location and surrounding areas(s) would be cleared of all debris, materials, trash and junk not required for production. Other waste and spoil materials would be disposed of at a local landfill.

2. All pits, cellars, rat holes and other bore holes at drilling locations unnecessary for further lease operations, excluding the reserve pit, would be back-filled immediately to conform to surrounding terrain after the drilling rig is released. Pits, cellars and/or boreholes that remain on location would be fenced as specified for the reserve pit.

3. Any hydrocarbons in the reserve pit would be removed in accordance with 43CFR 3162.7-1. The reserve pit would then be completely dried and all cans, barrels, pipe, etc. would be removed. The liner would then be folded over into the pit and the pit would be backfilled with native soil/materials. The backfilling of the reserve pit would be done in such a manner that the mud and associated solids would be confined to the pit and not squeezed out and incorporated into the surface materials. There would be a minimum of three feet of cover (overburden) over the pit. When work is complete, the pit area would support heavy equipment without sinking.

4. Areas not necessary for production and future workovers would be reshaped to mimic the original landscape contour. Stockpiled topsoil would be redistributed and disked on the area to be reclaimed and re-seeded according to BLM recommendations.

Interim reclamation of the reserve pit and that portion of the location and access roads not needed for production facilities/operations would be reclaimed within ninety (90) days from the date of well completion, weather permitting. Dry/non-producing well locations would be plugged, abandoned and reclaimed within 90 days of well completion, weather permitting.

Some locations would require special reclamation practices. These practices could include hydromulching, straw mat application on steeper slopes, fertilizing, seed-bed preparation, contour furrowing, watering, terracing, water barring, and the replacement of topsoil. All reclamation efforts would employ seed mixes as approved by the BLM. Pads would be fenced for the first two growing seasons or until the seeded species have established to prevent livestock/wildlife grazing pressure. Noxious weeds that may be introduced due to soil disturbance and reclamation would be treated by methods approved by the BLM.

Road Maintenance

The access roads would be inspected by the BLM and, if necessary, maintained on a quarterly basis (at a minimum) to include such items as:

- Road surface grading and graveling;
- Relief ditch, culvert and cattle guard cleaning;
- Erosion control measures for cut and fill slopes and other disturbed areas;
- Road closures in periods of excessive soil moisture to prevent rutting caused by vehicular traffic;
- Road and slope stabilization measures as required until final abandonment and rehabilitation;
- Weed control; and
- Dust abatement (as often as determined necessary by BLM and EnCana).

Noxious Weed Management

Noxious weeds which may be introduced due to soil disturbance during construction activities would be monitored and treated over the life of the project by methods approved by the BLM Authorized Officer. An annual Pesticide Use Permit would be filed and placed on record with the BLM for treatment of noxious weeds.

Workovers / Recompletion

Periodically, the workover or recompletion of a well may be required to ensure that efficient production is maintained. Workovers can include repairs to the well bore equipment (casing, tubing, rods, or pump) the wellhead, or the production facilities. These repairs would usually be completed during daylight hours. The frequency of this type of work cannot be accurately projected because workovers vary well by well; however, an average may be one workover per well per year for a period of seven days. In the case of multi-well pads, space for equipment would usually be limited to the "in-use" (i.e., disturbed) area of the surface location, although it is possible that interim reclamation could be delayed by workover operations. In the case of a well recompletion, a reserve pit may have to be constructed.

III. FINAL ABANDONMENT AND RECLAMATION

Well and Pipeline Plugging and Abandonment

Upon abandonment, each borehole would be plugged, capped, and its related surface equipment would be removed. Subsurface pipelines would be plugged at specific intervals and site contouring would be accomplished using appropriate heavy equipment. All surface soil disturbances would be reseeded with native vegetation. The seed mix used would conform to the typical vegetation surrounding the specific well site and would be approved by the BLM.

A Sundry Notice would be submitted by the operator to the BLM that describes the engineering, technical, or environmental aspects of final plugging and abandonment. This notice would describe final reclamation procedures and any mitigation measures associated with the final reclamation performed by the operator. The BLM and Colorado Oil & Gas Conservation Commission (COGCC) standards for plugging would be followed. A configuration diagram, a summary of plugging procedures, and a job summary with techniques used to plug the well bore (e.g., cementation) would be included in the Sundry Notice.

Final Reclamation

All surface disturbances would be recontoured and revegetated according to an approved reclamation plan. Final well site reclamation would be performed and monitored in accordance with the 1998 Glenwood Springs Resource Area (GSRA) Reclamation Policy, including control of noxious weeds. Further information on reclamation standards is available in Appendix I of the 1999 Oil and Gas Leasing and Development EIS. One of the basic goals of the policy is to "establish desirable (seeded and native) vegetation to set the stage for the natural process to restore the site". Consequently, one of the goals of the Proposed Action is to accomplish as much

reclamation on each well pad during the life of the well as possible, even on those pads with a large final reclamation or "in use" area. Unreclaimed areas or reclaimed areas that do not meet the objective of three-to-four years of sustained reclamation (known as "operator complete") would undergo the reclamation re-treatment measures described in the Surface Use Plan (Appendix A). EnCana would also meet the BLM bonding requirements. Additional bonding would be provided for sites with extremely difficult reclamation conditions if repeated reclamation attempts have been unsuccessful, or final reclamation cannot be completed with standard reclamation measures.

EnCana would restore the well locations and access roads to approximately their original contours. During reclamation of these sites, fill material would be pushed into cuts and up over the backslope. No depressions would be left that would trap water or form ponds. Upon completion of backfilling, leveling and recontouring, the stockpiled topsoil would be evenly spread over the reclaimed areas(s). All disturbed surfaces would be re-seeded with a seed mixture to be recommended by the BLM. The seedbed would then be prepared by disking and then roller packing following the natural contours. Seed would be drilled on contours at a depth no greater than one-half inch (1/2"). In areas that cannot be drilled, seed would be broadcast at double the seeding rate and harrowed into the soil. Certified seed would be used whenever available. All seeding would be conducted after September 1 and prior to ground frost. Spring seeding would be conducted after the frost leaves the ground but no later than May 15th. If the seeding is unsuccessful, EnCana may be required to make subsequent seedings.

Reclamation would be considered successful when the objectives described in the GSRA Reclamation Policy are achieved. Re-vegetation would be considered successful if it meets the objectives set forth in the Conditions of Approval identified in Appendix E of the GSRA Oil & Gas Leasing & Development Draft Supplemental Environmental Impact Statement (DSEIS) (BLM 1998). To summarize the objectives in Appendix E of the DSEIS, re-vegetation would be considered successful when the following objectives are met:

- Immediate short term: Establishment of desirable perennial vegetation by end of the second growing season, capable of renewing itself.

- Acceptable establishment: Acceptable level of desirable vegetation by the end of the fifth growing season.

- Long-term establishment: Level of re-vegetation approximates the original pre-disturbed condition, in terms of canopy cover and species composition.

NO ACTION

The Proposed Action affects federal subsurface minerals that are encumbered with federal oil and gas leases granting the lessee a right to explore and develop the oil and gas leases in the OUGA. The No Action Alternative constitutes denial of the Proposed Action. Absent a non-discretionary statutory prohibition against drilling, BLM cannot deny the right to drill and develop the leasehold. Only Congress can completely prohibit development activities (Western Colorado Congress, 130 IBLA 244, 248, citing Union Oil Co. of California v. Morton, 512 F.2d

743, 750-51). Overall, the No Action Alternative has been considered but eliminated from detailed analysis due to the existing lease rights involved.

PLAN CONFORMANCE REVIEW

The Proposed Action is subject to and has been reviewed for conformance with the following plans (43 CFR 1610.5, BLM 1617.3):

- Glenwood Springs Resource Management Plan – approved January 1984;
    - Decision Number/Page: page 14 & Map 4
    - Decision Language: Continue to allow mineral exploration and development on lands not withdrawn for other uses or restricted to mineral activity.
- Oil and Gas Leasing and Development EIS – amended in November 1991;
- Colorado Standards and Guidelines; amended in November 1996;
- Oil and Gas Leasing and Development Final Environmental Impact Statement – amended in March 1999; and
- Fire Management Plan for Wildland Fire Management and Prescriptive Vegetation Treatment Guidance – amended in September 2002.

Standards for Public Land Health

In January 1997, the BLM Colorado State Office approved the Standards for Public Land Health. These standards address upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. Because a standard exists for these five categories, the impact analysis must address whether the Proposed Action or any alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions for that specific parameter.

A formal Land Health Assessment was completed on the lands affected by the actions addressed in this EA in 2000 (BLM 2000). Portions of these lands were found not to be meeting the standards. Specific concerns related to the condition of the sagebrush and pinyon-juniper habitats that comprise important big game winter range. Many sagebrush stands were in poor condition with old, decadent and severely hedged shrubs and little recruitment and establishment of younger age-class plants. In some sagebrush and pinyon-juniper stands, understory vegetation was lacking or was dominated by cheatgrass. Based on the findings of the Land Health Assessment, specific mitigation and reclamation practices would be required for the Proposed Action to move toward achieving conformance with the standards. Discussions of mitigation and reclamation practices that would be implanted as part of the Proposed Action to facilitate conformance with Public Land Health standards are presented below in individual resource sections.

Lease Stipulations

Each of EnCana's federal oil and gas leases includes stipulations intended to protect environmental resources present. **Appendix D** provides a summary of lease stipulations that would apply to the Proposed Action.

AFFECTED ENVIRONMENT / ENVIRONMENTAL CONSEQUENCES / MITIGATION MEASURES

Approving individual APDs, including APDs that are analyzed in Geographic Area Plan, is contemplated by the 1999 Oil and Gas Leasing and Development FSEIS (BLM 1999a), which addressed the environmental impacts of oil and gas development. Implementing the Proposed Action is consistent with the Preferred Alternative described in the FSEIS. The environmental impacts of the Preferred Alternative are described in the FSEIS and will not be repeated in this EA. Rather, discussion of the environmental impacts in this EA will be limited to site-specific information not included in the FSEIS. Descriptions of lands addressed in this EA and their associated leases (C-58674, C-58675, C-58676, C-59629, C-60434, C-64189, C-64191, and C-64192) are provided in Table 3 above. An analysis of adherence to the stipulations of the five leases C-55198, C-59629, C-58674, C-58675, C-58676, and C-64191 is included in the environmental consequences section. In some cases, the conclusions of the FSEIS will be summarized if necessary to address issues raised in scoping or to provide information necessary to the decision maker. In addition, the discussion of environmental impacts will be limited to those remaining after reviewing the APDs, the application and conformance of mitigation from the FSEIS, and any changes or additions to the proposal resulting from the on-site investigations. The APDs and subsequent review and adjustments result in on-the-ground requirements and development of site-specific and Standard Conditions of Approval (Appendix C) to provide the best location of the proposal to minimize impacts and accomplish the objectives of the Glenwood Springs Field Office Reclamation Policy.

CRITICAL ELEMENTS

AIR QUALITY

Lease Stipulations: None.

Affected Environment: National and Colorado Ambient Air Quality Standards (NAAQS and CAAQS) have been established for the purpose of protecting human health and welfare with an adequate margin of safety. For the pollutants associated with oil and gas operations, the NAAQS and CAAQS are identical. Criteria pollutants of concern for oil and gas operations include:

- Nitrogen Dioxide (NO_2);
- Carbon Monoxide (CO);
- Particulate matter less than 10 microns in effective diameter (PM_{10});
- Particulate matter less than 2.5 microns in effective diameter ($PM_{2.5}$); and
- Volatile Organic Compounds (VOCs).

If the ambient concentrations of criteria pollutants are less than the CAAQS, then existing air quality in the region is acceptable based on standards set for the protection of human health. Garfield and Mesa counties are designated as attainment areas, meaning that the concentration of criteria pollutants in the ambient air is less than the CAAQS. Representative monitoring of air quality in the general area indicates that the existing air quality is well within acceptable standards. **Table 4** provides a summary of representative air quality data for the OUGA and a comparison to the CAAQS.

Table 4. Existing Air Quality Summary for the Orchard Unit GAP

Pollutant	Averaging Period	Ambient Concentration[a] ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)
PM_{10}	24-hour	41	150
	Annual	15	50
$PM_{2.5}$	24-hour	7	65
	Annual	21	15
NO_2	Annual	18	100
CO	1-hour	1,248	40,000
	8-hour	1,248	10,000
VOCs	N/A	N/A	N/A
Ozone	1-hour	175	235
	8-hour	147	157

$\mu g/m^3$: micrograms of pollutant per cubic meter of ambient air
[a] Background concentrations provided by Nancy Chick, CDPHE

Environmental Consequences: The primary air pollutant emission sources for the Proposed Action would include those resulting from well development and well production. They include increased vehicle traffic and drilling activity during the development phase of the Proposed Action followed by continuous production-related emissions from dehydrators, condensate storage tanks, and associated heaters at the well pads. The development-related emission calculations, which include well pad, resource road, and pipeline construction, well drilling, and well completion, represent the maximum activity within the 2 to 3 year development phase. At full development, it is estimated that a total of 65 gas wells would produce an average of 20 million standard cubic feet per day (MMscf/day) of natural gas and approximately 200 barrels of condensate per day over the life of the wells.

Total estimated emissions for the Proposed Action are summarized in **Table 5**. Emissions resulting from well development activities can be categorized into three distinct phases: well pad, pipeline, and access road construction; well drilling; and well completion. During well development, vehicle tailpipe and fugitive dust emissions would increase within the OUGA. Emissions of NO_x and CO would result from vehicles transporting workers to and from the work site and from the transportation and operation of construction equipment. Fugitive dust concentrations would increase with vehicle traffic on unpaved roads and from wind erosion in areas of soil disturbance. Drill rig operations would result mainly in an increase of NO_x and CO

emissions. Emission rates were calculated using applicable EPA emission factors and anticipated level of operational activities, such as estimated vehicle trips, load factors, and hours of operation.

Table 5. Proposed Action Emission Summary

Pollutant	Construction and Well Development (tons/year)	Operations[1] (tons/year)				
		Production Heaters	Condensate Tank Flash	Well Pad Dehydration	Operations Vehicles	Total Operations
NO_X	169.2	6.1	0.0	0.0	0.0	6.2
CO	59.8	5.2	0.0	0.0	0.4	5.6
VOC	10.3	0.1	355.9	27.8	0.0	383.8
SO_2	2.9	0.0	0.0	0.0	0.0	0.0
PM_{10}	154.0	0.5	0.0	0.0	25.4	25.9
$PM_{2.5}$	26.7	0.5	0.0	0.0	3.9	4.4
Benzene	0.0	0.0	1.7	3.8	0.0	5.5
Toluene	0.0	0.0	0.0	5.5	0.0	5.5
Ethylbenzene	0.0	0.0	0.0	0.4	0.0	0.4
Xylene	0.0	0.0	0.0	2.8	0.0	2.8
n-Hexane	0.0	0.1	5.0	1.2	0.0	6.3
Formaldehyde	0.1	0.0	0.0	0.0	0.0	0.0

[1] Annual emissions associated with full-field development after construction

After the development phase is complete, the operation of the proposed GAP wells would primarily produce NO_x, CO, PM_{10}, VOC, and HAP emissions from the following sources:

- Production unit heaters, condensate storage tanks, and glycol dehydrator still vents located at the well pads;
- vehicle tailpipe sources; and
- road dust from operations and maintenance vehicles.

No substantial adverse impacts to air quality are predicted as a result of the Proposed Action. Ambient air concentrations were predicted using the Industrial Source Complex (ISC) computer dispersion model along with five years of representative meteorological data measured near Grand Junction, Colorado. Localized increases in NO_2, CO, and PM_{10} concentrations would occur near the well pads during construction and operations. However, as summarized on **Table 6**, these predicted ambient air impacts, plus background concentrations, would be well below all applicable federal and State of Colorado ambient air quality standards.

Any comparisons with Prevention of Significant Deterioration (PSD) increments are intended only to evaluate potential significance, and do not represent a regulatory PSD increment consumption analysis. PSD increment consumption analyses are typically applied to large

industrial sources during the permitting process, and are solely the responsibility of the State of Colorado and the Environmental Protection Agency.

Table 6. Predicted Orchard Unit GAP Criteria Pollutant Impacts

Pollutant	Avg. Period	Predicted Conc. ($\mu g/m^3$)	Predicted Conc. Plus Background ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)	% of CAAQS[1]	PSD Allowable Increment ($\mu g/m^3$)	% of PSD Increment[2]
NO_2	Annual	2	19	100	19%	25	8%
CO	1-hour	110	1,358	40,000	4%	None	NA
CO	8-hour	50	1,298	10,000	13%	None	NA
PM_{10}	24-hour	3	44	150	29%	30	10%
PM_{10}	Annual	1	16	50	32%	17	6%

[1] Concentrations as % of CAAQS include background plus predicted concentrations for each pollutant.
[2] Concentrations as % of PSD increment include predicted concentrations, excluding background, for each pollutant.

Two Class I airsheds, the Flat Tops Wilderness Area to the northeast, and the Maroon Bells Wilderness Area to the southeast, are within 50 miles of the OUGA. The potential effect on Air Quality Related Values (visibility and acid deposition) in Class I areas are considered in a comprehensive NEPA analysis. The BLM recently published the Roan Plateau Draft Environmental Impact Statement. The DEIS focused on oil and gas development in the Glenwood Springs Resource Area and predicted the cumulative effects from approximately 3,500 future wells. The analysis concluded that this level of development, along with other reasonably foreseeable pollutant sources, would have no adverse effect on Air Quality Related Values at either Flat Tops or Maroon Bells. Therefore, it can be concluded that the much smaller level of development from the Orchard Unit GAP is not likely to have a measurable effect on these Class I areas.

Mitigation: Mitigation of air quality impacts would be accomplished through the permitting of all regulated air pollution sources through the Colorado Department of Public Health and Environment, Air Pollution Control Division (CDPHE-APCD). The construction and operating permitting processes, where applicable (large glycol dehydration units), typically require the use of emission controls to reduce air pollutant impacts. For smaller, minor sources of air pollution (small heaters, condensate tanks), impacts are generally insignificant and mitigation is not typically warranted.

Air quality impacts would be minor during the construction, drilling, completion, testing, and operation of the proposed project. However, the following additional mitigation would be implemented to further reduce impacts:

- The operator is required to and responsible for applying dust abatement measures. The type of treatment may be changed and must be approved by the Authorized Officer to control dust; either by watering, application of various dust agents, surfactants, and/or application of road surfacing materials.

- Speed control measures on all project-related unpaved roads would also be implemented to reduce vehicle fugitive dust.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Lease Stipulations: None.

Affected Environment: There are no ACECs within the OUGA.

Environmental Consequences/Mitigation: N/A.

CULTURAL RESOURCES

Lease Stipulation: None.

Affected Environment: Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take in to account the effects their actions will have on cultural resources. As a general policy, an agency must consider effects to cultural resources for any undertaking that involves federal monies, federal permitting/authorization, or federal lands.

Within the GAP 17 cultural resource inventories (GSFO #'s 356, 591, 791, 883, 1102-1, 5600-1, 5403-1, 5404-1, 5404-2, 5404-3, 5405-3, 5405-5, 5405-7, 5405-12, 5405-14, and 5405-18) have been completed. The first four listed are over 20 years old and considered inadequate. As a result of these inventories about 85 cultural resources have been identified. This includes 21 sites and 64 isolated finds. Of the 21 sites 15 are considered to be historic properties, eligible or potentially eligible for listing on the National Register of Historic Places (NRHP). The remaining six sites are considered not eligible, as are all of the isolated finds.

One NRHP eligible site, 5ME12825, was adversely impacted during construction of the E28 pipeline. A bulldozer deviated from the approved route and the tracks adversely impacted an area approximately 168 meters long by 5 meters wide; equal to about 840 square meters.

A reroute of the A28 road and pipeline have been proposed, but not inventoried as of 9/7/05. Without knowing what kind of sites and NRHP assessment of cultural resources may be affected by this reroute, any authorization of the OUGA without a cultural resource inventory will result in a determination of possible "Adverse Effects" for cultural resources. Resources may also be found could be of concern to Native American Tribes as well which would require additional Native American notification/consultation. The area near the reroute has a number of historic properties that are eligible for the NRHP. One has already been adversely impacted during construction of the E28 pipeline. A determination of "Adverse Effect" requires that the BLM consult with the Colorado State Historic Preservation Officer. The SHPO is allowed 10 days to respond. They probably will still require that the reroute be inventoried at a Class III level prior to authorizing any APD's.

Environmental Consequences: The Proposed Action has the potential to adversely affect historic properties. "Adverse affect" to an historic property occurs when a Proposed Action

"may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." (36 CFR §800.5[a][1]). Which part or parts of the Proposed Action may cause such an effect depends on the nature of the historic property, the criterion or criteria under which it is considered significant and eligible for the NRHP (36 CFR §60.4), which aspects of integrity are considered critical to that significance, and the location and nature of the specific proposed development with respect to the historic property.

Direct Impacts

Direct physical impacts are the greatest single source of potential adverse effect to the majority of historic properties known and expected in the OUGA. For archaeological sites (sites manifested by artifacts and features found on or below the ground surface) these impacts come primarily from disturbance of surface and subsurface sediments through topsoil stripping, excavation, and pipeline trenching. Many of these historic properties are considered eligible under National Register Criterion "d". Criterion "d" recognizes the information potential inherent in the materials on these sites. A site's potential is dependent on the integrity of materials, location, and association, all which are damaged by disturbance to the matrix of the site. This loss of integrity negates the significance of the site. Such impacts are generally concentrated during the development phase of the Proposed Action, though they can result any time undisturbed ground is subject to alteration.

As mentioned previously, Site 5ME12825 has been evaluated as eligible for the NRHP with SHPO concurrence. This site was "Adversely" impacted by construction of the E28 pipeline; approximately 840 square meters were impacted. To mitigate the adverse impact to 5ME12825 a mitigation plan was developed by the GSFO in consultation with the Colorado State Historic Preservation Office (SHPO) in accordance with the BLM/SHPO National Programmatic Agreement (1997) and Colorado Protocols (1998) and National Historic Preservation Act (16 U.S.C. 470f). Concurrence with the plan was received from the SHPO on June 27, 2005. Native American consultation was undertaken with the Southern Ute, Ute Mountain Ute, and Ute Tribe of the Uinta and Ouray Agency via a letter dated June 27, 2005. No objection to the proposed mitigation plan was received within the mandatory 30-day comment period.

Indirect Impacts

Generally, activities that do not directly physically damage or destroy an historic property are not considered to have an "adverse effect". However, there are certain Native American sites that can be adversely affected by impacts that alter their surroundings. These culturally sensitive sites are usually ones that convey a significant association to the surrounding terrain or vegetation or specific topographic features. Assessing this effect is often one of consideration of the magnitude of the effect, the degree to which the significant qualities of the surrounding landscape are already affected, and how much weight these surroundings carry in the overall significance of the historic property. Evaluating this effect also relies on consultation with interested Native American tribes because sites may be significant within the context of their surroundings for reasons that are of religious or cultural importance to tribes.

Additionally, indirect long-term cumulative impacts 1) could occur from increased public access and personnel involved in the GAP development; 2) could result in a range of impacts to known and undiscovered cultural resources from illegal collection and excavation to vandalism; or 3) if environmental degradation is allowed to occur which could potentially expose cultural material which was once buried.

Mitigation: The importance of the Education/Discovery Stipulation needs to be stressed to EnCana and all of their subcontractors. The following measures must be undertaken to mitigate the potential "Adverse Effect" of the OUGA on cultural resources.

1. A Class III cultural resource inventory will be conducted by a GSFO qualified archaeological firm of the rerouted A28 road and pipeline and all identified cultural resources will be evaluated for the NRHP to mitigate the "Adverse Effect" of not having the reroute inventoried prior to this EA. All historic properties are to be avoided and or mitigated prior to authorizing the road or pipeline.

2. An archaeological monitor is required of the A28 reroute in the W½NW¼ of Section 28. No ground disturbing construction activities (topsoiling, grading, or ditching) will begin prior to the archaeologist's arrival. EnCana is responsible for notifying the archaeological firm at least 72 hours in advance of areas requiring monitoring. EnCana will be responsible for all construction delays due to insufficient notification. Archaeological monitoring will involve monitoring of the construction zone during vegetation clearing, grading and; during pipeline trenching. Pipeline trenching monitoring (inspection) will follow the trenching equipment at a cautionary distance, allowing time for the construction dust to settle and for visible detection of buried cultural features. Cultural features identified will be salvaged and analyzed for radiocarbon, subsistence information at a minimum as appropriate. At least one, stratigraphic profile of the trench wall will be made.

3. The following corrective action for site 5ME12825 will be undertaken and fieldwork completed by November 1, 2005 by EnCana using an authorized archaeological contractor for the GSFO/BLM. The final report for this mitigation will be delivered to the GSFO by March 1, 2006.

    - A barrier/fence will be constructed along the boundary of the site at the intersections of the bulldozer track with the existing ATV trail, along the Orchard Unit E28OU pipeline, and along the new access road and pipeline to the Orchard Unit A28OU well pad, to prevent future use of the track via any mechanized equipment. The barrier/fence will be maintained by EnCana until which time the BLM determines it is no longer needed to protect the site.

    - Remapping of the site using GPS point plot data for comparison to the original map and determination as to where excavation units should be placed.

    - Excavation (data recovery) not to exceed 50 m^2. These units will be hand excavated following established professional standards:

- An excavation unit (4 x 4 m^2) will be placed outside the disturbed area to act as a control for the excavation units within the disturbed area. The control will act as a standard to help determine the extent of the impacts observed within the units excavated within the disturbed area. A stratigraphic profile will be developed from this unit.
- At a minimum, a 4 x 4 m^2 excavation unit will be placed over the damaged hearth and across the bulldozer tracks to expose the feature, associated activity areas, and cultural depositional contexts.
- A series of shovel probes will be excavated at a maximum of 10m intervals along the bulldozer track. The remaining excavation units will be used to further expand positive shovel probes and/or if features are exposed.
- Samples will be collected and analyzed from all features excavated and the stratigraphic profile. At a minimum this will include: radiocarbon, pollen, and floatation as appropriate, to determine the cultural/temporal affiliation(s), subsistence, and paloenvironmental conditions.
- All work will conform to established archaeological standards for excavation and will include: a research design; field work; laboratory analysis; reevaluation form; and an acceptable report(s) to realize the information potential or Archaeological value of site 5ME12825.

- All restoration work of the track to return it to a more natural setting will require an archaeological monitor to record, salvage, analyze, and report any and all cultural manifestations identified during the process.

4. Education/Discovery Condition of Approval for Cultural Resource protection will be added to the permit:"The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the BLM Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act."

Lease Stipulation Adherence: Cultural Resource inventories have been completed for all proposed surface disturbing activities with the exception of the A28 road and pipeline reroute within the OUGA. Class III cultural resource inventories will be required on any and all new wells, access road, pipelines and other ground disturbing activities not covered in this plan that require a federal permit or authorization to conduct the action. Additional action specific mitigation may be required – including but not limited to moving the location, archaeological monitoring, testing, or data recovery. At the end of calendar year 2010, the operation will contract out an archaeological synthesis compiling the past cultural work and the effects of development on cultural resources within the GAP on a landscape basis which will include but is not limited to: cultural/temporal affiliation, settlement patterns, subsistence, technology, social

organization and origins and transitions. Information from this synthesis will provide data to protect and/or conserve archaeological resources.

ENVIRONMENTAL JUSTICE

Lease Stipulation: None.

Affected Environment: Review of 2002 data from US Census Bureau indicates the median annual income of Garfield County averaged $43,560, while the median annual income of Mesa County averaged $37,053, compared with $48,060 for the State of Colorado as a whole (**Table 7**). While both counties are below the state average, neither is considered to be impoverished. U.S. Census Bureau data from July, 2002 shows the minority population of Garfield and Eagle County comprises less than 3 % of the total population[1].

Table 7. Median Household Incomes in Garfield and Mesa Counties and State of Colorado

Median Household Income		
Garfield County	**Mesa County**	**State of Colorado**
$43,560	$37,053	$48,060

Environmental Consequences/Mitigation: The Project Area is in a remote location with no residential communities or concentrations of minority or low income residents. As a result, the Proposed Action is not expected to create a disproportionately high and adverse human health impact or environmental effect on minority or low-income populations within the area.

FARMLANDS, PRIME AND UNIQUE

Lease Stipulation: None.

Affected Environment: The Project Area does not contain any prime or unique farmlands.

Environmental Consequences/Mitigation: The Proposed Action would have no impact on prime or unique farmlands.

FLOODPLAINS, WETLANDS & RIPARIAN ZONES

Lease Stipulation: For lands within ½ mile of the high water mark of the Colorado River on both banks, an NSO stipulation applies to protect plants and animals, riparian values, waterfowl production areas, and other sensitive resource values.

Affected Environment: Within the OUGA, intermittent drainages occur along Smith Gulch, and Alkali and Little Alkali Creeks. No wetland habitats have been documented along these drainages. However, floodplains occur along Alkali and Little Alkali Creeks. A Proper

Functioning Condition assessment conducted in 2000 determined both creeks to be non-riparian systems due to their limited potential to produce riparian vegetation.

Environmental Consequences: Small parcels of floodplain would be impacted by the Proposed Action, due to proposed construction of access road crossings and gathering line crossings of Little Alkali Creek. Indirect and cumulative impacts (e.g., sedimentation) to the floodplain of Little Alkali Creek are discussed under the Water Quality (Surface and Ground Water) section of this EA. No well pads or new access roads would be located within wetlands.

Finding on the Public Land Health Standard for Riparian Systems: There would be no effect on the Public Land Health Standard for riparian systems.

GEOLOGY AND MINERALS

Lease Stipulation: For lease C-58675, in Sections 18 and 19 of T8S, R96W, CSU stipulations apply to areas with approved surface or underground coal mines. However, the great depth to coal in this area (more than 3,000 feet) makes future mining of coal by surface or underground methods unlikely.

For lease C-64191, No Surface Occupancy (NSO) applies to areas with slopes greater than 50% in Sections 20 and 21 of T8S, R96W. NSO also applies to slopes greater than 30% with high visual sensitivity along the Interstate 70 watershed.

Affected Environment:

Geology

There are three major topographic divisions in the State of Colorado, which loosely correspond to three major geologic zones. The topographic divisions include the eastern plains, Rocky Mountains, and the Colorado Plateau. The Colorado Plateau region falls within the western part of the state and consists of a succession of plateaus and mesas that decline gradually toward the west away from the mountains or step down in a series of horizontal plateaus. The Colorado Plateau is classified as a sedimentary zone. Igneous and metamorphic areas occur within the plateau, but these areas are small in comparison to the extent of sedimentary rock.

The project area is located south of the Colorado River, within the southern portion of the Piceance Basin. The Piceance Basin is a broad, asymmetric, southeast-northwest trending structural basin that contains sedimentary rocks up to 20,000 feet thick and lies between the White River uplift to the northeast, the Gunnison uplift to the south, and the Uncompahgre swell to the west (George 1927; Weiner and Haun 1960). The Piceance Basin contains stratified sediments ranging in age from Cambrian through middle Tertiary. The northern half of the basin is deepest and has the thickest stratigraphic sequence.

Figure 3 provides the geologic map for the project area. Most of the project area is underlain by the Eocene and Paleocene Wasatch Formation. The Wasatch Formation consists of variegated

siltstone, claystone, and sandstone, and locally, conglomerate. The Wasatch Formation is about 2,000 feet thick in this area.

The Wasatch Formation is underlain unconformably by the Mesaverde Group. The Mesaverde Group includes various rock formations that have sometimes been given individual formation names, such as the Iles Formation and Williams Fork Formation. The Mesaverde Group has also sometimes been referred to as the Mesaverde Formation on some maps, with the various rock units considered to be members of the formation. The Mesaverde Group is composed of mudstones and sandstones with interlayered coal beds and ranges in thickness from about 3,000 to over 7,000 feet. The Wasatch Formation is a source of many varieties of fossils, including early horses, primates, birds, rodents, fish, turtles, clams, snails, and plants (BLM 1999a). However, there are no areas of critical environmental concern for the Wasatch Formation within the project area.

A small portion of the southern part of the project area is underlain by the Eocene Green River Formation. The Green River Formation consists of marlstone, siltstone, mudstone, and oil shale, and is an important source of fossils. No project facilities would be located on exposures of the Green River Formation.

Alluvial deposits of Quaternary age are present on the tops of the mesas within the project area, along Alkali Creek and Little Alkali Creek, in the upper reaches of Smith Gulch, and along the Colorado River in the northern portion of the project area (**Figure 3**). There are four alluvial units exposed in the project area: Holocene alluvial stream deposits, Holocene alluvial lake-bed deposits, and two glacial gravel units. These deposits generally consist of unconsolidated sand, gravel, and clay and may locally produce groundwater to wells. The most extensive of these units is the older Bull Lake gravels, which cover the surface of about one-half of the project area (Yeend 1969).

Portions of the project area underlain by the Wasatch Formation on steep slopes may be susceptible to landslides. Landslide deposits are extensive on some north-facing slopes in the region (Madole and Streufert 2003). These landslides were produced by three mechanisms: transitional earth slides, complex rotational earth slides – debris flows, and complex rotational earth slides – earth flows (Cruden and Varnes 1996). The transitional landslides are shallow features with failure surfaces originating between 3 and 15 feet below ground surface (bgs). These landslides originate on steep slopes and involve sliding of regolith, colluvium, and decomposed bedrock along the interface between the regolith and underlying competent bedrock. Rotational slope failures in the area are typically large and their failure surfaces deeper than for transitional landslides. These rotational landslides involve unconsolidated surface materials, decomposed bedrock, and weakly cemented beds of the Wasatch Formation.

Minerals

Mineral resources within the southern portion of the Piceance Basin include oil and gas deposits, coal, and minor sand and gravel.

Oil and gas deposits are found throughout the Piceance Basin, and the entire area is considered to be a potential resource. Oil and gas production is from both structural and stratigraphic traps from sandstones within the Mesaverde Group. The overlying Wasatch Formation may also have the potential for some oil and gas production in this area. Most of the gas reservoirs also produce varying amounts of oil/gas condensate. The Parachute, Rulison, and Mamm Creek Fields are located east of the Project Area and currently produce gas from thousands of existing wells.

The proposed natural gas drilling project would target various sandstone horizons within the Mesaverde Group. There are several known hydrocarbon-producing marine sands at or near the base of the Mesaverde Group, including the Cameo, Cozette, Corcoran, and Rollins Sandstones. Above these units lies the "barren member", named because of the lack of coal in this interval, which consists of numerous unconnected sandstones, shales, and mudstones with low permeability (Glover et al 1998).

Limited amounts of salable mineral resources are located within the Project Area. These minerals include sand, gravel, and sandstone. Sand and gravel are found in Quaternary alluvial deposits located along the stream valleys.

The entire project area is underlain by the Cameo-Fairfield Coal Group of the Mesaverde Formation. However, there are currently no coal leases within the project area, owing to the great depth (more than 3,000 feet) to coal beneath the area. These coal beds may contain some natural gas. Therefore, there is some potential for future gas production from these coal beds.

Environmental Consequences: The construction of well pads for the Proposed Action would result in changes to the local topography, including cuts made into bedrock surfaces of the Wasatch Formation at some well pad locations, including proposed well pad C17OU. These changes to the visual topographic character of the area would be minor, but long-term. In addition to the visual aspects of the cuts, cuts into the Wasatch Formation on steep slopes could result in slope instability, possibly including landslides. The potential for increased landslide activity in the project area from the Proposed Action is considered to be minor. Some small slumps may also occur in the cuts created for the new access roads, where these roads cross exposures of the Wasatch Formation on steep slopes. However, these mass movements would be localized in extent and would not affect any existing structures or roads.

If the proposed Orchard Unit wells were to become productive, implementation of the Proposed Action would result in natural gas and associated water being produced from the hydrocarbon-producing sands within the Mesaverde Group. The amount of natural gas that may be potentially produced from the proposed wells cannot be estimated accurately. However, if the wells become productive, initial production rates would be expected to be highest during the first few years of production, then steadily decline during the remainder of the wells' economic lives. Natural gas production from the proposed wells would contribute to the draining of hydrocarbon-bearing reservoirs within the Mesaverde Group in this area, an action that would be consistent with BLM objectives for mineral production.

The proposed access roads would have a combination of native soil and gravel surfaces, where needed. Construction materials (sand and gravel) may be indirectly affected in that they are likely to be used from local sources for surfacing materials for the access roads.

Injection of drilling fluids and hydraulic fracturing of the wells would have the potential to induce earthquakes in nearby faults. Injection of waste liquids has historically caused earthquakes at some locations in the United States, notably near Denver, Colorado. Earthquake-induced ground shaking could result in damage to above-ground structures within the Project Area. However, the likelihood of fluid-induced earthquakes is considered to be very low, as indicated by the absence of recorded historic earthquake epicenters in the region. Accordingly, the Proposed Action would have a negligible impact on the risk of fault-generated earthquakes.

The great depth to the Cameo-Fairfield coal group of the Mesaverde Group beneath the Project Area (more than 3,000 feet) makes mining of coal there by surface methods uneconomical at the present time. Therefore, there would be no potential impacts to coal mining from the Proposed Action.

Mitigation: Mitigation measures for protection of geologic resources are detailed in the OUGAP. These measures include specific procedures for drilling, cementing, and completing the proposed wells to ensure that gas does not migrate into usable water-bearing zones or contaminate other geologic formations. The OUGAP also describes methods for minimizing the potential for slope instability and erosion, and for interim and final reclamation of disturbed surfaces.

INVASIVE, NON-NATIVE SPECIES

Lease Stipulation: None

Affected Environment: Based on a plant survey conducted in June 2004, the entire OUGA is, to some extent, affected by cheatgrass (downy brome) (*Bromus tectorum*), an invasive noxious weed species, and many locations within the Project Area are dominated by cheatgrass (B&A 2004). In certain areas of sagebrush flats and pinyon/juniper woodlands, cheatgrass is a major component of the understory. Noxious weeds are defined as plants that grow out of place and are competitive, persistent, and pernicious (James et al 1991). Cheatgrass is on the State of Colorado noxious weed list (and is addressed in BLM's 1999 Oil and Gas Reclamation Policy). No other noxious weeds have been documented in the Orchard Unit GAP. However, musk thistle is known to occur in the vicinity of the Project Area.

Environmental Consequences: The spread of weeds is of concern to the BLM Glenwood Springs Field Office in the areas proposed for oil and gas development activities in the OUGA. Specific negative effects of noxious and invasive weeds can include:

- reduction in the overall visual character of an area;
- competition with, or complete over-running of, native plants resulting in the loss of species diversity and ecosystem functions;
- reduction or fragmentation of wildlife habitats; and

- increased soil erosion.

Construction activities, increased soil disturbance, and higher traffic volumes could potentially introduce and spread undesirable weed species within the OUGA. However, implementation of the following mitigation measures would minimize the potential for invasion or expansion of invasive or noxious weeds within the Project Area.

Mitigation: Mitigation measures identified in EnCana's OUGAP to minimize the potential for invasion of noxious weeds are provided below.

- EnCana would implement an intensive reclamation and weed control program beginning the first growing season after well completion. All disturbed areas not needed for immediate operation of the wells will be seeded with a mixture of native grasses and shrubs. Site specific seed mixes designed to reclaim the sites and deter establishment of noxious weeds are presented in the vegetation section. The seed shall be certified free of primary or secondary noxious weeds. The operator shall adhere to the specified seed mix and will continue with reclamation activities, including additional reseeding if necessary, until BLM's interim reclamation objectives are achieved.

- The operator shall be required to monitor for the presence of noxious weeds, which are included on the State or County noxious weed lists at least once each year during the growing season. The operator shall be responsible for promptly controlling any noxious weed infestations, which have resulted from the operator's construction, operation, or maintenance activities within the Project Area. A Pesticide Use Proposal must be approved by the Authorized Officer prior to the use of any herbicides.

- Given that cheatgrass is common in portions of the Project Area, it may not be possible to totally eliminate this noxious weed from the reclaimed area. In the case of cheatgrass, interim reclamation will be considered acceptable if cheatgrass and other undesirable vegetation are less than five percent cover, if the adjacent vegetation is less than 50 percent undesirables. Cheatgrass will be less than 50 percent cover, if the adjacent vegetation is more than 50 percent undesirables (1999 GSRA Oil and Gas FSEIS).

- Vehicle washing of heavy equipment prior to entering the GAP area is a high priority.

MIGRATORY BIRDS

Lease Notice: A biological survey will be required for raptor nests prior to approval of operations. Mitigation measures such as relocation and fencing of habitat may be required.

No Surface Occupancy Stipulation: No surface use is allowed on all lands on Lease C-58675 from February 1 to August 15 within a ¼ mile buffer zone around nest sites for golden eagles and all accipiters: falcons, except the kestrel; all buteos; and owls. Exceptions may be granted during years when the nest site is unoccupied, when occupancy ends by or after May 15 or once the young have fledged and dispersed from the nest.

Affected Environment: The Migratory Bird Treaty Act of 1918 (MBTA) as amended, was implemented for the protection of migratory birds. Unless permitted by specific regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of Federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds.

The OUGA provides habitat and/or potential habitat for numerous migratory birds, including species identified as "birds of conservation concern" by the USFWS, Region 6 (USFWS 2002). **Table 8** provides a list of birds of conservation concern that may occur in the OUGA at various times of the year and the habitat in which each of these species may be found.

Table 8. Birds of Conservation Concern for the Southern Rockies/Colorado Plateau Potentially Present in the Orchard Unit (USFWS 2002)

Common Name	Scientific Name	Habitat	Potential Presence
Northern Harrier	*Circus cyaneus*	Wetlands with dense vegetation; also grasslands, agricultural lands, mountain sagebrush, and marshes.	Y
Ferruginous Hawk	*Buteo regalis*	Grasslands and semi-desert shrubs; rock outcrops, buttes.	Y
Golden Eagle	*Aquila chrysaetos*	Open habitats including grasslands, sagebrush, farmlands, and pinyon-juniper woodlands.	Y
Lewis's Woodpecker	*Melanerpes lewis*	Open pine forest, riparian, and pinyon-juniper woodlands	Y
Gray Vireo	*Vireo vicinior*	Pinyon-juniper woodlands; understory of sagebrush and other desert scrub.	Y
Pinyon Jay	*Gymnorhinus cyanocephalus*	Pinyon-juniper woodlands.	Y
Virginia's Warbler	*Vermivora virginiae*	Dense shrublands and scrub forest associated with mesa slopes, foothills, open ravines, and valleys.	Y
Black-throated Gray Warbler	*Dendroica nigrescens*	Pinyon-juniper woodlands.	Y
Sage Sparrow	*Amphispiza belli*	Large, low-elevation stands of big sagebrush or mixed big sagebrush and greasewood.	Y

A raptor survey was conducted at well site M17OU by Wildlife Specialties, LLC on June 9, 2005. A hand-held GPS Unit was used to identify the approximate center of the proposed well pad, based on the UTM coordinate for the location. Areas within 0.25 mile of roads and well pads were examined for raptor nests. No active raptor nests were identified within a 0.25-mile radius of well site M17OU. . A raptor survey was conducted by Buys & Associates, Inc. at the locations of proposed access roads and well pads within the OUGA on August 3-4, 2005 (B&A

2005). Three inactive raptor nests were observed within the Project Area. These nests are described in **Table 9**.

Table 9. Locations of Inactive Raptor Nests within the Orchard Unit.

Nest ID	Nest Location Type	Height	Elevation	Habitat
Nest 1	Cottonwood Tree	45ft	5,265ft	Pinyon/Juniper
Nest 2	Cottonwood Tree	42ft	5,349ft	Pinyon/Juniper
Nest 3	Cliff Face	12ft	5,264ft	Pinyon/Juniper

Four red-tailed hawks, one immature golden eagle and two unidentified raptors were observed during field surveys. These birds were likely utilizing the Project Area as foraging grounds. As foraging areas for raptors may span many miles, the occurrence of these birds does not imply the presence of nests.

Environmental Consequences: The vegetation in the OUGA consists predominantly of Utah Juniper with scattered pinyon pine at higher elevations. Drainages and ridge tops/mesas are dominated by big sagebrush. Small areas of greasewood fans and flats are present in the northern portion of the Project Area. The Proposed Action could result in loss of foraging, hunting, and nesting habitat of the migratory bird species. Reclamation activities resulting in the growth of herbaceous vegetation species would increase the habitat of small rodents and other prey species for raptors. While habitat loss may affect individual birds, it is not expected to adversely affect the species as a whole.

Mitigation: In order to protect nesting raptors, an annual raptor survey would be conducted prior to any new construction, drilling, or completion activities scheduled between February 1 and August 15. If an active raptor nest is documented within ¼ mile of proposed construction, drilling or completion, the activity could be delayed until the young have fledged or the nest is no longer active, as determined by a qualified wildlife biologist. If lease stipulation does not exist to protect nesting raptors, a 60 day timing limitation would be applied to a ¼ mile buffer around the nest site to minimize disturbance during a portion of the critical nesting period.

NATIVE AMERICAN RELIGIOUS CONCERNS

Lease Stipulation: None.

Affected Environment: The Orchard Unit GAP is within a larger area identified by the Ute Tribes as part of their ancestral homeland, particularly the Uintah and Ouray Bands of the Ute Tribe. Several areas of Native American concern were identified during the cultural resource inventories. The Southern Ute, Ute Mountain Ute, and the Uintah and Ouray Bands of the Ute Tribe, have been notified on five occasions (October 16, 2002, August 13, 2003, November 25, 2003, June 27, 2005, and July 25, 2005) for various actions within the Orchard Unit GAP. These actions include seismic work and natural gas development by EnCana. The last letter informed them of the GAP in more detail. No response was received by September 6, 2005.

The proposed A28 road and pipeline reroute have not been inventoried and/or resource identified, or assessed. Additional Native American notification/consultation maybe required depending upon the results of the inventory.

Environmental Consequences: Direct impacts of construction of well locations, access roads, and pipelines have the potential to irreparably damage or destroy culturally sensitive sites, Additionally, these impacts will affect the physical setting possibly resulting in a loss of what makes the area significant thereby causing an adverse effect. There may also be other unidentified culturally sensitive or significant locations in the area that have not been identified on both federal and private lands. Indirect impacts resulting from increased access and personnel could range from illegal collection to vandalism, adversely impacting sensitive site. Cumulative impacts of increasing development, access, construction, operations and maintenance may also adversely impact these sites, possibly degrading the cultural significance by either destroying the sensitive area or its landscape setting.

Direct impacts have adversely impacted 5ME12825 along the E28 pipeline, as stated in the Cultural Resources section.

Mitigation: Representatives of the Ute Tribe of the Uinta and Ouray Bands have visited other culturally sensitive sites within the GSFO and have provided written and verbal indication as to how they would like these sites/areas protected. The following mitigation is based upon this information. If new data are disclosed by the Native Americans new terms and conditions may have to be negotiated to accommodate their concerns during the implementation phase.

- A Class III cultural resource inventory will be conducted by a GSFO qualified archaeological firm of the rerouted A28 road and pipeline and all identified cultural resources will be evaluated for the NRHP to mitigate the "Adverse Effect" of not having the reroute inventoried prior to this EA. All historic properties found are to be avoided and or mitigated prior to authorizing the road or pipeline.

- Site-specific Native American mitigation measures suggested during notification/consultation will be considered during the implementation phase of the proposed action(s).

- Strict adherence to the confidentiality of information concerning the nature and location of archaeological resources will be required of EnCana and their subcontractors (Archaeological Resource Protection Act 16 U.S.C. 470hh).

- Periodic monitoring of these sensitive areas will be required.

- Inadvertent Discovery: The National Historic Preservation Act (NHPA) as amended requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or

Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the BLM Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)).

- Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act (16 U.S.C. 470hh) and Colorado State Statues:

- On private lands, for Historic, Prehistoric, and Archaeological Resources, and for Unmarked Human Graves (CRS 24-80-401 and CRS 24-80-1301) will have to be adhered to by EnCana and their subcontractors. These State statues require that the federal Authorizing Officer be notified immediately of any historic or prehistoric finds or human grave. The find must be protected until the Authorizing Officer indicates that the action may proceed.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Lease Stipulation: Endangered Species Act Section 7 Consultation – "*The lease area may contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened and endangered species or result in the destruction or adverse modification of a designed or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.*" The lease stipulations for the OUGA are provided in **Table 10.**

Table 10. Lease Stipulations for Threatened and Endangered Species, Raptors, BLM Sensitive Species

Lease Number	Well Pads	Stipulation
C-58675	C17OU, M17OU, N17OU	**NSO** from Feb 1-Aug 15 to protect raptors, golden eagles, all accipiters falcons (except kestresl), all buteos and owls nesting and fledgling habitat for ¼ mile around nest site. Exceptions granted during years when nest site is unoccupied, when occupancy ends by or after May 15 or once the young have fledged and dispersed from the nest.
C-59629	F8OU	**NSO** to protect plants and animals, riparian values, waterfowl production areas, and sensitive resource values. This stipulation is for lands within ½ mile either side of the high water mark of the Colorado River. Note: Surface is private.
C-64191	None	**NSO** to protect 14 seclusion areas that provide high wildlife value. Exceptions may be granted based on approval by the AO of a mitigation plan that suitably addresses the wildlife seclusion values at risk.

Lease Number	Well Pads	Stipulation
	None	**NSO** to protect T/E species. Exceptions may be authorized by the AO, who will consider the type and amount of surface disturbance, plant frequency and density, relative abundance of habitat, species and location, topography and other related factors.
	None	**CSU** to protect sensitive species
	F21OU	**NSO** to protect riparian and wetland zones. Oil and gas operations are restricted to an area beyond the outer edge of riparian vegetation. Exceptions may be granted if the AO determines that vegetation lost can be replaced within 3-5 years with vegetation of like species and age class or exception may be permitted for stream crossing if an area analysis indicated that no suitable alternative is available.
C-64189	None	**NSO** to protect T/E species
	None	**NSO** to protect wildlife seclusion areas
	None	**CSU** subject to special operating constraints for the purpose of protecting BLM sensitive species.

Affected Environment: Based on information from the U. S. Fish and Wildlife Service, the federally listed and candidate plant and animal species identified in **Table 11** may reside or be impacted by actions occurring in Garfield and Mesa Counties. They include the bald eagle, Canada lynx, Mexican spotted owl, boreal toad, yellow-billed cuckoo, Uinta Basin hookless cactus, Parachute beardtongue, DeBeque phacelia, razorback sucker, Colorado pikeminnow, bonytail chub, and humpback chub. Designated critical habitat has been identified for the Colorado pikeminnow and razorback sucker on the Colorado River from Rifle, Colorado to Lake Powell, Utah.

Additional plant species listed as sensitive by the BLM include the Naturita milkvetch (*Astragalus naturitensis*), Debeque milkvetch (*A. debequaeus*), and adobe thistle (*Circium perplexans*).

Table 11. Threatened, Endangered, and Candidate Species Potentially Present in the Orchard Unit

Common Name	Scientific Name	Habitat	Status	County
Bald eagle	*Haliaeetus leucocephalus*	River, reservoir, and stream habitat.	Threatened	Mesa/Garfield
Boreal toad	*Bufo boreas boreas*	Spruce/fir forests between 7-12,000ft.	Candidate	Mesa/Garfield
Canada lynx	*Lynx canadensis*	High elevation aspen and spruce-fir forests	Threatened	Mesa/Garfield
De Beque phacelia	*Phacelia submutica*	Clay and sandstone of the Wasatch Formation in Western Colorado	Candidate	Mesa/Garfield
Gunnison sage grouse	*Centrocercus minimus*	Sagebrush, grasslands	Candidate	Mesa/Garfield
Mexican spotted	*Strix occidentalis*	Forested canyon bottoms	Threatened	Garfield

Common Name	Scientific Name	Habitat	Status	County
owl	*lucida*			
Parachute beardtongue	*Penstemon debilis*	Steep, white shale talus, above 8,000 ft; Western Colorado, only five known locations	Candidate	Garfield
Uinta Basin hookless cactus	*Sclerocactus glaucus*	Gravelly, rocky surfaces, mesa slopes	Threatened	Mesa/Garfield
Yellow-billed cuckoo	*Coccyzus americanus*	Riparian; gallery cottonwoods	Candidate	Mesa/Garfield
Colorado pikeminnow	*Ptychocheilus lucius*	Colorado River System	Endangered	Mesa/Garfield
Humpback chub	*Gila cypha*	Colorado River System	Endangered	Mesa/Garfield
Razorback sucker	*Xyrauchen texanus*	Colorado River System	Endangered	Mesa/Garfield
Bonytail	*Gila elegans*	Colorado River System	Endangered	Mesa/Garfield

Fish species identified as species of special concern by the Colorado Division of Wildlife (CDOW) include the Colorado River cutthroat trout (*Oncorhynchus clarkia pleuriticus*), flathead chub (*Platygobio gracilis*), Iowa darter (*Etheostoma exile*), mountain sucker (*Catostomus platyrhynchus*), orangethroat darter (*Etheostoma spectabile*), Rio Grande cutthroat trout (*Onchorhynchus clarkii virginalis*), and stonecat (*Noturus flavus*). Colorado River cutthroat trout are found in both Mesa and Garfield Counties. Bluehead sucker, flannelmouth sucker, and roundtail chub, which are CDOW and BLM sensitive species, are found in the Colorado River near the Project Area (http://ndis.nrel.colostate.edu/aspresponse/statusbycnty_res.asp).

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is listed as threatened under the federal Endangered Species Act. Historically, the species ranged throughout North America, but its numbers declined drastically in the middle of the 20th Century, due to eggshell damage caused by the pesticide DDT, as well as loss of habitat. The bald eagle typically is found in areas with tall trees near large rivers, lakes, and seacoasts. Bald eagles feed on fish, waterfowl, muskrats, squirrels, rabbits, prairie dogs, and road-killed animals. Bald eagles construct nests up to eight feet in size in tall trees. Females lay one to three eggs, which are incubated approximately 35 days. Both the male and female incubate the eggs. (http://wildlife.state.co.us/species_profiles/baldeagle.asp, accessed 7/7/05). Although there are no recorded nesting or roosting sites in the vicinity of the OUGA, bald eagles are occasionally observed in the general area, especially near the Colorado River.

Endangered Colorado River Fish

Four species of fish in the Colorado River System are classified as endangered under the federal Endangered Species Act. They include the Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*). The Colorado pikeminnow thrive in swift flowing muddy rivers with quiet, warm

backwaters. The humpback chub prefer deep, canyon-bound portions of the Upper Colorado River system, such as Black Rocks and Westwater Canyon on the Colorado River, and Yampa Canyon within Dinosaur National Monument. The razorback sucker is most often found in quiet, muddy backwaters along the Colorado, Green, and San Juan rivers. The bonytail is extremely rare in Colorado and no self-sustaining populations exist throughout the Colorado River Basin. The construction and operation of large dams is one of the major factors that contributed to the decline of these species. Other factors that contributed to their decline include water diversions, introduction of non-native species, and stocking of predatory game fish species, such as largemouth bass, northern pike, and catfishes. A recovery program managed by the USFWS, using hatchery-reared fish has been underway for several years. (http://wildlife.state.co.us/species_cons/wildlifeindanger/). Designated critical habitat for the Colorado pikeminnow and razorback sucker is located on the Colorado River and its 100-year floodplain from Rifle, Colorado to Lake Powell. The Colorado River is north of the Project Area (See Figure 2).

Uinta Basin Hookless Cactus

Uinta Basin hookless cactus (*Sclerocactus glaucus*) is a federally listed threatened plant that occurs in Western Colorado and eastern Utah. It produces pink flowers from late April to late May. The Uinta Basin hookless cactus is typically found on river benches, valley slopes, and rolling hills in xeric, fine textured soils overlain with cobbles and pebbles. It grows in salt desert shrub and pinyon-juniper communities at elevations ranging from approximately 4,500 to 6,600 feet. The species and habitat are vulnerable to disturbance from domestic livestock grazing, oil and gas exploration and development, and off-road vehicle use (Heil and Porter 1993). Uinta Basin hookless cactus has been observed in xeric habitats near the Project Area, and habitat for this species is present within the area. However, a special status plant survey, conducted in June 2004, did not find any individuals in areas that could be impacted by the proposed access roads, pipelines and well pads.

Several changes have been made to the Proposed Action since the original survey was conducted. These changes involve a new alignment for the A-28 access road, a new road parallel to Little Alkali Creek, and a change in the C17ou pad location. The areas where these changes would occur have been assessed for potential habitat. The BLM has determined that these changes do not involve potential habitat for any special status plant species, except the adobe thistle. Results of the adobe thistle survey are discussed in that section. In addition, a route for a new pipeline from A-28 has not been determined or assessed. Therefore, an additional survey may be required in Spring, 2006 to cover any changes in the Proposed Action that were not previously surveyed.

DeBeque Phacelia

DeBeque phacelia (*Phacelia submutica*) is considered a candidate for listing under the Endangered Species Act. The species is a low-growing annual plant with light yellow or cream colored flowers, often with a purple tinge. It occurs on moderately steep exposures and on small benches, as well as on ridge tops. It is limited to soils with high clay content and relatively light vegetative cover. DeBeque phacelia is a narrow endemic with small populations known only

from Garfield and Mesa counties. Livestock grazing, OHVs, reservoir development and oil and gas development are potential threats to the species. (www.sw-center.org/swcbd/Programs/bdes/cp/co.html, accessed 7/21/05).

DeBeque phacelia has been previously documented in several locations immediately adjacent to the Project Area (DNHP 2000). Although potential habitat for the DeBeque phacelia is present within the Project Area, a special status plant survey, conducted in June 2004, did not find any individuals in areas that could be impacted by the proposed access roads, pipelines, and well pads.

Parachute Penstemon

Parachute penstemon (*Penstemon debilis*), a Candidate for listing under the ESA, is among the rarest plants in North America, known from only five locations along the cliff of the Roan Plateau in Garfield County, Colorado. The species is a low growing plant with large white to pale purple-lavender flowers and is restricted to steep, sparsely vegetated oil shale slopes of the Green River Formation. There is no habitat for the Parachute penstemon within the OUGA.

Adobe Thistle

The adobe thistle (*Circium perplexans*) is endemic to the Colorado and Gunnison river valleys in Delta, Mesa, Montrose, and Ouray counties. It has pink or purplish flowers that bloom from late May to early July. The habitat of this species is characterized by open areas and disturbed sites in mixed shrublands and pinyon-juniper woodlands at an elevation ranging from 5,000 to 8,000 feet (Spackman and Anderson 2002). During a survey conducted in June 2004, this species was observed throughout the Project Area. A total of six distinct groups of the thistle, ranging from single individuals to groups of more than 1,000, were seen on the chocolate-brown or gray clay soils of the Wasatch Formation (B&A 2004).

DeBeque Milkvetch

The DeBeque milkvetch (*Astralagus debequaeus*) is a member of the pea family. It is a small plant with white or yellowish-white flowers. The habitat consists of varicolored, fine textured, seleniferous, saline soils of the Wasatch Formation-Atwell Gulch Member, containing barren outcrops of dark clay interspersed with lenses of sandstone. This species of milkvetch is found at an elevations ranging from 5,100 to 6,400 feet (www.cnhp.colostate.edu/rareplants.html, accessed 7/21/05). Two distinct groups of this species, totaling approximately 100 individuals, were observed along Horsethief Creek during a plant survey conducted in June 2004. However, the Project Area no longer includes this location.

Naturita Milkvetch

The Naturita milkvetch (*Astralagus naturensis*) is a small perennial plant in the pea family, which flowers in late April and May. It is found on sandstone ledges and rimrock along canyons in pinyon-juniper woodland in southwestern Colorado at an elevation of 5,400 to 6,200 feet. Although this species is fairly widespread, it is considered rare because of the sporadic

distribution of small populations. (http://nmrareplants.unm.edu/reports/astnat.htm, accessed 7/21/05). Although potential habitat for the Naturita milkvetch exists within the Project Area, no individuals were observed (B&A 2004).

No other federal or state listed species or federal proposed or candidate species or BLM sensitive species or their habitats are found in the vicinity of the Project Area.

Environmental Consequences:

Bald Eagle

Although bald eagles have been observed in the area, there is no bald eagle nest or roost site in the vicinity of the Project Area. The closest bald eagle nest to the project area is located in northern Garfield County (http://ndis/nrel/colostate/edu/maps/). The Project Area is near the southern boundary of the county. Although potential roosting exist along the Colorado River north of the Project Area, the OUGA, itself, lacks the preferred bald eagle habitat. Therefore, the Proposed Action would have "*no effect*" on the bald eagle.

Endangered Colorado River Fish

In May 1994, the BLM prepared a Programmatic Biological Assessment (PBA) that addresses water depleting activities in the Colorado River Basin that would impact the endangered Colorado River fish. In response to BLM's PBA the USFWS issued a Biological Opinion (#ES/GJ-6-CO-94-F-017) on June 13, 1994, which determined that water depletions from the Colorado River Basin are likely to jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker, and result in the destruction or adverse modification of their critical habitat.

The Biological Opinion includes reasonable and prudent alternatives developed by the USFWS, which allow the BLM to authorize projects that result in water depletion (less than 100 acre-feet), while avoiding the likelihood of jeopardy to the endangered fishes and avoiding destruction or adverse modification of their critical habitat. As a reasonable and prudent alternative, the USFWS authorized the BLM to make a one-time contribution to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) in the amount equal to the average annual acre-feet depleted by each project. Payment was to be made to the National Fish and Wildlife Foundation to cover all BLM authorized actions that result in water depletions.

Oil and gas development in the upper Colorado River basin was determined to produce more water that is used in construction and development activities. The USFWS concurred with this determination in the Biological Opinion. Therefore, oil and gas development is not currently considered a water depleting activity. (T. Fresques, BLM, personal communication, July 21, 2005).

Special Status Plants

Habitat is present in the Project Area for the Uinta Basin hookless cactus (threatened), DeBeque phacelia (candidate), Naturita milkvetch (BLM sensitive), DeBeque milkvetch (BLM sensitive), and adobe thistle (BLM sensitive), and some of these species have been reported from the area.

Adobe Thistle. The BLM sensitive plant, adobe thistle, was found to occur at the proposed A28OU pad location and along its proposed access road. The original access road was staked such that it traversed through the center of two adobe thistle populations. During an onsite visit on July 12, 2005, the A28OU access road was realigned to avoid the first population of adobe thistle. The access road was also realigned where it entered the A28OU pad, since it traversed through the center of the second adobe thistle population. The road was moved so that it now enters the pad from the northwest corner. The A28OU pad was also shifted 100 feet to the northeast to avoid the adobe thistle population. As a result of the realignment of the roads, the potential for direct impacts would be minimized.

Indirect impacts to the adobe thistle and its habitat could result from noxious weed invasion following surface disturbing activities. Noxious weeds tend to be aggressive and develop dense stands which outcompete native species. Mitigation to address this potential indirect impact is presented in the Mitigation section below. Indirect impacts to adobe thistle habitat also may result from increased public access to the area following construction of new roads and improvement of existing roads. Damage to the adobe thistle and its habitat may occur if OHVs diverge from the roads and travel cross-country through open hillsides and benches. This is particularly true for the A28OU access road and pad which traverses through occupied and potential habitat for adobe thistle. Although the area is currently designated “open” for cross-country travel in the 1984 GSRA RMP (BLM 1984), this activity may result in negative impacts to special status plants in the area. In order to discourage off-road vehicular traffic in the area, the access road to the A28OU pad would be gated and locked in the most defensible place between the E28OU pad and Smith Gulch.

DeBeque Phacelia. Habitat for DeBeque phacelia occurs throughout the southern portion of the Project Area. Direct impacts could result from placement of roads, pads and pipelines in potential habitat of this species. Indirect impacts to DeBeque phacelia habitat could result from noxious weed invasion following surface disturbing activities. Noxious weeds tend to be aggressive and develop dense stands which outcompete native species. Mitigation to address this potential indirect impact is presented in the Mitigation section below. Indirect impacts to the habitat of DeBeque phacelia also may result from increased public access to the area following construction of new roads and improvement of existing roads. Damage to its habitat may occur if OHVs diverge from the roads and travel cross-country through open hillsides and benches. Since this area is currently designated “open” for cross-country travel in the 1984 GSRA RMP (BLM 1984), the Proposed Action may result in negative impacts to DeBeque phacelia habitat.

Uinta Basin Hookless Cactus. Habitat for the Uinta Basin hookless cactus occurs within the Project Area. Direct impacts could result from placement of roads, pads and pipelines in potential habitat of this species. Indirect impacts could result from noxious weed invasion following surface disturbing activities. Mitigation to address this potential indirect impact is

presented in the Mitigation section below. Indirect impacts to the habitat of the Uinta Basin hookless cactus also may result from increased public access to the area following construction of new roads and improvement of existing roads. Damage to its habitat may occur if OHVs diverge from the roads and travel cross-country through open hillsides and benches. Since this area is currently designated "open" for cross-country travel in the 1984 GSRA RMP (BLM 1984), the Proposed Action may result in negative impacts to Uinta Basin hookless cactus habitat.

DeBeque milkvetch. Habitat for the DeBeque milkvetch occurs within the Project Area. Direct impacts could result from placement of roads, pads and pipelines in potential habitat of this species. Indirect impacts could result from noxious weed invasion following surface disturbing activities. Mitigation to address this potential indirect impact is presented in the Mitigation section below. Indirect impacts to the habitat of the DeBeque milkvetch also may result from increased public access to the area following construction of new roads and improvement of existing roads. Damage to its habitat may occur if OHVs diverge from the roads and travel cross-country through open hillsides and benches. Since this area is currently designated "open" for cross-country travel in the 1984 GSRA RMP (BLM 1984), the Proposed Action may result in negative impacts to DeBeque milkvetch habitat.

Naturita milkvetch. Habitat for the Uinta Basin hookless cactus occurs within the Project Area. Direct impacts could result from placement of roads, pads and pipelines in potential habitat of this species. Indirect impacts could result from noxious weed invasion following surface disturbing activities. Mitigation to address this potential indirect impact is presented in the Mitigation section below. Indirect impacts to the habitat of the Uinta Basin hookless cactus also may result from increased public access to the area following construction of new roads and improvement of existing roads. Damage to its habitat may occur if OHVs diverge from the roads and travel cross-country through open hillsides and benches. Since this area is currently designated "open" for cross-country travel in the 1984 GSRA RMP (BLM 1984), the Proposed Action may result in negative impacts to Naturita milkvetch habitat.

Since no other federal or state listed species or federal proposed or candidate species or BLM sensitive species or their habitats are found in the project vicinity, the proposed action would have **"***no effect***"** to any other special status species.

Mitigation: Mitigation measures for threatened, endangered, or sensitive species would include the following measures.

- Any discoveries of previously unknown bald eagle nesting or roosting sites would be addressed by application of the appropriate stipulations and consultation with the USFWS prior to commencement of development activities.

- Biological inventories (surveys) for sensitive plant species will be conducted in potential new disturbance areas not covered in the Orchard Unit GAP EA.

- Mitigation of impacts to special status plants would include 1) relocating gas activities and facilities to minimize direct impacts; 2) requiring EnCana to seed the well pads with native

species, including species that provide direct competition with cheatgrass, such as bottlebrush squirreltail, and/or Sandberg bluegrass; 3) ensuring that seeding occurs at the appropriate time of year to optimize the potential for seeding success; and 4) requiring EnCana to control all noxious weeds within the disturbed areas.

- Gate and lock the access road to the A28OU pad in a defensible location between the E28OU pad and Smith Gulch. This road is currently a rough ATV access road which receives little public use. Upgrading the road to the standards required for oil and gas drilling rigs would change the existing road to a road accessible to 4WD trucks and even automobiles. This increased access is likely to encourage off-road vehicle use on the adjacent sparsely vegetated slopes. Some of these slopes provide habitat for rare plants and are also highly susceptible to erosion. Keeping the new access road gated and locked will minimize the potential for indirect impacts to rare plants from off-road vehicular traffic.

Finding on the Public Land Health Standard for Threatened and Endangered Species (Standard 4): The Land Health Assessment of the Battlement Mesa Area (BLM 2000), which included the OUGA, evaluated whether special status species in the Battlement Mesa area were meeting Standard 4. Therefore, the determinations of Standard 4 for Battlement Mesa are relevant for this project. **Table 12**, based on the Land Health Assessment (BLM 2000), indicates that Standard 4 was being achieved for those threatened, endangered, and special status species for which there is appropriate habitat within the Project Area. With the implementation of the mitigation measures identified in this section and elsewhere in this EA, Standard 4 should continue to be achieved.

Table 12. Evaluation of Health Standard 4 for Special Status Species in the Orchard Unit[1]

Special Status Species	Status	Evaluation of Standard 4	Trend
Threatened, Endangered, Candidate Species			
Bald eagle	Threatened	Standard 4 is being achieved for this species	Through implementation of the mitigation measures identified above Standard 4 will continue to be achieved
Colorado pikeminnow	Endangered	The streams within the Project Area are ephemeral. Thus, suitable habitat does not exist within Alkalai and Little Alkalai Creeks, However, the Colorado River, just north of the Project Area, supports this species	Through implementation of the mitigation measures identified above Standard 4 will continue to be achieved
Humpback chub	Endangered	The streams within the Project Area are ephemeral. Thus, suitable habitat does not exist within Alkalai and Little Alkalai Creeks, However, the Colorado River, just north of the Project Area, has the potential to support this species	Through implementation of the mitigation measures identified above Standard 4 will continue to be achieved
Razorback sucker	Endangered	The streams within the Project Area are ephemeral. Thus, suitable habitat does not exist within Alkalai and Little Alkalai Creeks, However, the Colorado River, just north of the Project Area, supports this species	Through implementation of the mitigation measures identified above Standard 4 will continue to be achieved
Bonytail	Endangered	The streams within the Project Area are ephemeral. Thus, suitable habitat does not exist within Alkalai and Little	Through implementation of the mitigation measures

Special Status Species	Status	Evaluation of Standard 4	Trend
		Alkalai Creeks, However, the Colorado River, just north of the Project Area, has the potential to support this species	identified above Standard 4 will continue to be achieved
Uinta Basin hookless cactus	Threatened	Suitable habitat is present within the Project Area. Therefore, Standard 4 is being achieved.	Through implementation of the mitigation measures identified above Standard 4 will continue to be achieved
DeBeque phacelia	Candidate	Although this species was not observed within the Project Area, suitable habitat exists in the area. Therefore, Standard 4 is being achieved for this species.	Through implementation of the mitigation measures identified above Standard 4 will continue to be achieved
BLM Sensitive Species			
DeBeque milkvetch	BLM Sensitive	Suitable habitat is present for this species. Therefore, Standard 4 is being achieved.	Through implementation of the mitigation measures identified above Standard 4 will continue to be achieved

[1] Source: Land Health Assessment Battlement Mesa Area (BLM 2000).

WASTES, HAZARDOUS OR SOLID

Lease Stipulation: None.

Affected Environment: N/A

Environmental Consequences: Hazardous materials and solid waste, which are defined in various ways under a number of regulatory programs, can represent potential risks to both human health and the environment when not managed properly. The Proposed Action would generate various solid and liquid wastes, including trash, produced water, and drill cuttings. In addition, the project would use other potentially hazardous materials during construction and production operations, including fuels and lubricants for vehicles and heavy equipment.

The USEPA has specifically exempted certain waste materials generated in oil and natural gas exploration and production (E&P) from regulation as hazardous wastes (USEPA 1988). To classify as exempt E&P waste, these materials must be intrinsic or uniquely associated with the production of oil and natural gas. Examples of these exempt wastes are produced water, drilling fluids, and drill cuttings. Although specifically exempted from regulation as hazardous wastes, these materials are considered to be solid wastes and must be disposed in ways that are protective of human health and the environment. All natural gas condensate and produced water generated during operation of the project would be stored in tanks within secondary containment and transported offsite to market or a permitted offsite disposal facility. Drill cuttings would be placed in the reserve pit on the drilling location. Any hydrocarbons in the reserve pit would be removed as soon as possible and processed or disposed of at a permitted offsite facility, and excess liquids in the reserve pit evaporated. The cuttings would then be buried in place. The

potential for impacts to soil and water resources from burial of drill cuttings is considered to be negligible.

Potential impacts from hazardous materials that would be used for the project would be mainly from spills and leaks of motor fuels and lubricants, which would be used in modest quantities. Fuel and lubricant spills, if not remediated quickly, have the potential to adversely impact soil and water resources. Under the Proposed Action, fuel and lubricants would be temporarily stored in transportable containment trailers or tanks on the proposed well pads. In order to minimize potential impacts from fuel and lubricant spills, the operator would implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan. The SPCC Plan would include accidental discharge reporting procedures, spill response, and cleanup measures. All potentially hazardous materials and substances would be handled in an appropriate manner that minimizes the risk of accidental contamination of soil and water resources. EnCana and its contractors would also comply with all applicable federal laws and regulations regarding the transportation, handling, and storage of hazardous materials. No other hazardous or potentially hazardous materials would be brought into the OUGA.

It is important to note that, because of the relatively small amounts of potentially hazardous materials that would be transported and used for the Proposed Action, the potential for impacts to soil and water resources from accidental spills is considered to be minor.

Mitigation: Any release (leaks or spills) of hazardous substances in excess of the reportable quantity, as established by 40 CFR, Part 117, would be reported as required by the CERCLA of 1980, as amended. If the release of a hazardous substance in a reportable quantity would occur, a copy of a report would be furnished to the BLM and all other appropriate federal and state agencies. In addition, all releases to soil or water of 10 gallons or more of any substance would be immediately reported verbally to the BLM and COGCC compliance officers and proof of cleanup provided for the project record. This mitigation would be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

WATER QUALITY, SURFACE AND GROUND WATER

Lease Stipulation: None

Affected Environment:

Surface Water

The OUGA is located within the Colorado Headwaters - Plateau watershed (Hydrologic Unit Code 14010005). Streams in the OUGA are tributary to the Colorado River.

Streamflow data are not available for the creeks in the OUGA (USGS 2005). Stream flows in the drainages within the OUGA are generally ephemeral and dependent on seasonal storm and snowmelt runoff. The majority of the runoff is during the spring and early summer and is generated by melting of the winter snow pack. However, flood flows generally result from summer convective storms.

Water Quality and Beneficial Uses

The Colorado Department of Public Health and Environment (CDPHE) uses specific criteria to classify surface waters for the purpose of assigning water quality standards in compliance with the national water quality improvement objectives of the Clean Water Act. The classification system addresses beneficial use categories together with narrative standards, an anti-degradation rule, and numeric standards that define conditions necessary to maintain or attain the beneficial uses. All surface waters in the OUGA are assigned the following beneficial uses:

- **Aquatic Life Warm Water Class 2:** These waters are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

- **Recreation Class 1b:** These are waters for which primary contact uses have the potential to occur, and for which no use attainability analysis has been performed demonstrating that a recreation class 2 classification is appropriate. Recreation class 2 waters are not suitable or intended to become suitable for primary contact recreation uses, but are suitable for or intended to become suitable for recreational uses on or about the water which are not included in the primary contact subcategory, including but not limited to wading, fishing, and other streamside or lakeside recreation.

- **Agriculture:** Waters are suitable or intended to become suitable for irrigation of crops and which are not hazardous as drinking water for livestock.

Water quality data are not available for the streams within the OUGA (USGS 2005). However, no stream segments associated with the OUGA are contained on the State of Colorado 303(d) list, which suggests that designated uses are currently being supported.

Groundwater

The OUGA lies within the south province of the Piceance Structural Basin. Groundwater resources in the OUGA include shallow groundwater within alluvium and the Wasatch Formation, and deeper water-bearing intervals located within the Mesaverde Group.

No water wells have been developed within the OUGA. However, several wells have been developed within the vicinity of the OUGA (CDWR 2005). The wells range from a few feet deep to 580 feet deep. Therefore, the wells within the area are representative of shallow groundwater that is present within the alluvium covering the surface and the underlying Wasatch Formation. Although water quality data are not available, the primary use of these wells is domestic. Therefore, it can be assumed that water quality is good as it is fit for human consumption. Glover et al (1998) reports that the depth to the Mesaverde aquifer beneath the OUGA is more than 2,000 feet below ground surface (bgs). Accordingly, there may be some shallow sandstones within the Mesaverde Group that contain usable groundwater zones. However, there are currently no water wells completed within the Mesaverde Group within the project area.

Environmental Consequences:

Surface Water

Potential direct or indirect impacts to surface water resources that could occur as a result of the Proposed Action include increased sedimentation and turbidity of surface water as a result of ground disturbance and erosion into surface waters via runoff; changes in stream flow regimes of surface waters in the OUGA and depletion of water flow in the Upper Colorado River System due to project-related water consumption, and potential contamination of surface water resources with drilling fluids, fuels, or other wastes generated by natural gas drilling and production activities.

Minor increased sedimentation of the streams within the OUGA is possible, especially during the construction of the project facilities. Increased sedimentation to these intermittent drainages could result particularly from disturbed areas. Increased sedimentation could include a short-term increase in turbidity and an increase in the deposition of fine sediment within the channels. Both of these effects could have negative impacts on aquatic habitat within affected streams. However, the disturbed areas would generally be well-buffered from the streams by vegetation, thus minimizing the amount of eroded sediment reaching streams.

For long-term access road disturbance within Little Alkali Creek, Best Management Practices (BMPs) would be employed in the disturbed areas during construction to reduce the amount of sediment that reaches the drainage. Detailed construction plans for the proposed access road would be prepared and submitted for review and approval prior to construction. The road design would include specific drainage components and BMPs that would be utilized to address control of sedimentation of surface waters in the OUGA.

Furthermore, as required, EnCana would submit 404 permit applications to the U.S. Corp of Engineers for any proposed construction within a designated Water of the U.S. In general, the access roads would be designed to maintain vegetative buffers between the roads and intermittent drainages, where possible, and feature relief ditches that would be installed at frequent intervals to channel water to undisturbed vegetated surfaces. These practices would help slow the velocity of runoff and filter out sediment prior to entering the intermittent drainages within the project area and downstream.

Since water would be obtained from an offsite source and hauled to the OUGA for drilling and completion, there would be no diversions or alterations of the flow regime of any creeks in the area. Therefore, adverse effects to stream health from changes in stream flow regime should not occur in the OUGA.

Contamination of surface water by spills of fuels, produced water, or petroleum products could potentially occur. The contamination could occur from two mechanisms: direct spills of materials into a creek, and indirect contamination of surface water due to migration of petroleum from areas of soil contamination adjacent to surface water courses. The potential for contamination of surface water from these events is considered to be minor.

Groundwater

Potential impacts to groundwater resources from the Proposed Action include contamination of groundwater from drilling fluids or petroleum constituents. Isolation of water-bearing formations during the installation of production casing would minimize this effect. Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these zones reported to the BLM and COGCC. Protection of these shallow groundwater zones would be accomplished by setting surface casing to a depth of at least 50 feet below the deepest water zone encountered and cementing the casing back to the ground surface. Any deeper usable water zones encountered below the surface casing would be isolated and/or protected by cementing across the zone. As specified by Onshore Oil and Gas Order No. 2 (43 CFR 3164.1), the minimum requirement would be to cement from 50 feet above to 50 feet below each usable water zone encountered. Determination of the casing setting depth would be based on all relevant factors, including the presence or absence of hydrocarbons, fracture gradients, potentially productive zones, usable water zones, lost circulation zones, or other unusual characteristics.

After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD. This would isolate all water-bearing formations in the borehole and would effectively eliminate communication between hydrocarbon-bearing zones and the shallow groundwater aquifers.

With respect to deeper groundwater resources, the thick impermeable layers of rock in the top section of the Williams Fork Formation make it highly unlikely for hydrocarbons or water produced from drilling operations to migrate into potable water zones. In addition, these deeper zones, while representing a possible groundwater resource, are located more than 2,000 feet below the ground surface. The gas-producing zones that would be targeted are also several thousand feet below these deeper groundwater zones.

Mitigation: EnCana will implement aggressive reclamation and re-vegetation of disturbed areas not needed for operational activities. These measures will help prevent erosion and sedimentation to drainages. In addition EnCana will implement multiple BMPs including the following:

- New access roads will be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.

- Relief ditches or corrugated metal pipes will be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.

- Ditches will be allowed to vegetate and/or will include large rocks or stones to slow the velocity of drainage and allow sediment to settle out.

- Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes will be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.

- EnCana's road construction plans will identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

- Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these zones reported to the BLM and COGCC. All usable water zones encountered (those with TDS less than 10,000 mg/L) must be isolated and protected, whether they are shallow or deep. Isolation of shallow zones would be accomplished by setting and cementing surface casing from a depth of at least 50 feet below the deepest water zone to the ground surface. Deeper water zones would be cemented off as required.

- After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.

- All vehicles would be refueled at least 100 feet from stream channels.

- EnCana would consult with the Army Corps of Engineers (for Section 404 permits) and with the State of Colorado Water Quality Control Division (for stormwater permits) prior to commencing construction activities within the OUGA. Written documentation to the BLM would be required to indicate that appropriate permits have been obtained or are not required by the authorizing agency.

In addition, the following site-specific mitigation measures will be implemented:

In accordance with EnCana's standard policy, all reserve pits will utilize impermeable liners to contain drilling fluids. Following completion activities, pit liners would be removed at the respective landowner's request. At the discretion of EnCana and in cooperation with the respective landowner, closed-loop drilling systems may be used on well pads within 100 feet of intermittent drainages.

In accordance with EnCana's standard policy, erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, placement of surface rock, straw bales, and/or matting will be used along proposed road reaches within 100-feet of stream channels.

Within areas less than 100 feet from intermittent drainages, an adequate vegetative buffer, artificial buffers (e.g., straw bales, matting, etc.), or filter strip will be maintained between the road and the drainage to filter runoff from the road before it reaches the creek, wherever possible.

WILD AND SCENIC RIVERS

Lease Stipulation: None.

Affected Environment: There are no un-studied rivers, or rivers found to be eligible or designated Wild and Scenic Rivers within the OUGA.

Environmental Consequences/Mitigation: N/A

Lease Stipulation: None.

WILDERNESS

Affected Environment: There are no designated Wilderness Areas, Wilderness Study Areas, or citizen's wilderness proposal areas within the OUGA.

Environmental Consequences/Mitigation: N/A

NON-CRITICAL ELEMENTS

HYDROLOGY AND WATER RIGHTS

Affected Environment: See Water Quality, Surface and Groundwater section.

Environmental Consequences: Since water would be obtained from an offsite source and hauled to the new well pad locations for drilling and completion, there would be no diversions or alterations of the flow regimes of the streams in the OUGA. No effects to stream health from changes in stream flow regime should occur in the OUGA as a result of the Proposed Action.

Development of additional gas wells would result in the use of about 0.25 acre-feet of water to drill each well, for a total of approximately 20 acre-feet. Based on the average annual flow rate of 2,820,000 acre-feet per year for the Colorado River downstream from the OUGA (based on flow data from the USGS gauging station at Cameo), this project-related water use would be insignificant from a hydrologic standpoint.

Mitigation: Not Applicable

NOISE

Lease Stipulation: None.

Affected Environment: The BLM has not established noise standards. A 55-dBA threshold for noise established by EPA (EPA 1974) is not a regulatory requirement. Rather, the 55-dBA threshold for noise should be recognized as a level below which there is no reason to suspect that the public health and welfare of the general population would be at risk from any of the identified effects of noise.

The Colorado Oil and Gas Conservation Commission (COGCC 2004) has established regulatory noise limits for oil and gas facilities on state and private lands as follows:

> "Oil and gas operations, including gas facility operations, shall comply with the following maximum permissible noise levels for the predominant land use existing in the zone in which the operation occurs. Any operation involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation is subject to the maximum permissible noise levels for industrial zones. In the hours between 7:00 a.m. and the next 7:00 p.m. the noise levels permitted below may be increased ten (10) db(A) for a period not to exceed fifteen (15) minutes in any one (1) hour period".

Industrial zone thresholds, under which oil and gas construction activities are classified, are 80 dBA between 7:00 a.m. and 7:00 p.m. and 75 dBA between 7:00 p.m. and 7:00 a.m. the next day. The 80 dBA threshold may be increased by 10 dBA under the circumstances described above. **Table 13** shows examples of noise levels generated by commonly experienced sources and the relative strength of the "loudness" of noise levels compared to normal conversation.

Current noise in and near the OUGA is typical of a rural area with occasional traffic noise from oil and gas vehicle trips and ranching activities in the area. Currently, natural gas drilling and production activities are widespread but limited in scale within and adjacent to the Project Area. Current noise sources include distant traffic on I-70 northwest of the Project Area and existing oil and gas operations at the 8 existing well pads. Noise levels are elevated near well pad and access roads in the project area, where vehicle-related noise is sporadic and likely in the 55 – 65 dBA range as shown on **Table 13**. In portions of the Project Area where no oil and gas development has occurred to date, noise levels are typical of a rural area (about 40 dBA).

Table 13. Common Noise Levels

Noise Source	Average Noise (dBA)	"Loudness" (based on normal conversation baseline)	Range of Noise (dBA)
Ambulance siren at 100 feet	100	16	95-105
Motorcycle at 25 feet	90	8	85-95
On a typical construction site	85	6	80-90
Single truck passing at 25 feet	80	4	75-85
Urban shopping center	70	2	65-75
Single car passing at 25 feet	65	1.5	60-70
Average highway noise at 100 feet	60	1	55-65
Normal conversation 5 feet apart	60	1	57-63
Residential area during day	50	50%	47-53
Recreational area	45	37%	40-50
Residential area at night	40	25%	37-43
Rural area during day	40	25%	37-43

Noise Source	Average Noise (dBA)	"Loudness" (based on normal conversation baseline)	Range of Noise (dBA)
Rural area at night	35	18%	32-37
Quiet whisper	30	12%	27-33
Threshold of hearing	20	6%	17-23

Source: EPA (1974), Harris (1991)

Environmental Consequences:

Development Phase Noise Impacts

Noise above existing levels would occur during construction, drilling, completion of natural gas locations as a result of the Proposed Action. Elevated noise from construction of well pads and roads, drilling, and completion activities would occur for about 50 to 75 days at any given location.

Noise from an individual source is the greatest in the immediate vicinity. Noise decreases with increasing distance from a source. Noise levels at a given distance from a source can be estimated using the Inverse Square Law of Noise Propagation (Harris 1991). Essentially, this law states that noise decreases by 6 dBA with every doubling of distance from a source. For example, if the noise at 50 feet from an industrial engine is 70 dBA, the noise at 100 feet will be 64 dBA, and 58 dBA at 200 feet.

Construction noise levels would be moderate but short-term at any given location (7 to 14 days). Based on an average construction site noise level of 85 dBA at 50 feet from the site, the construction noise could be above 55 dBA within 1,500 feet of the site. Additionally, elevated noise levels would occur along access roads as vehicles and heavy equipment travel to each site. Elevated noise levels would occur for a short duration at any given location and would occur only during daytime because construction would generally cease between sunset and sunrise.
Noise impacts from drilling and completion activities would be moderate and would last approximately 45 to 60 days at any individual well. Based on a measured noise level of 50 dBA at ¼ mile (1,320 feet) from a drill rig, the noise would be above 55 dBA within 800 feet of a drill rig. Drilling noise would occur continuously for 24 hours per day during the approximate 45 to 60-day drilling period for each well. Completion flaring activities would also contribute to elevated noise levels for a short duration at any one site.

Additionally, traffic noise levels would be elevated along access roads during the drilling and completion sequences. However, the majority of traffic would occur during the morning and evening hours as workers arrive at and leave from the drilling sites. Vehicle traffic would be negligible during evening hours provided suggested mitigation is implemented. There are no occupied residences, commercial businesses, schools, or other noise-sensitive receptors within the Project Area. Therefore, noise-related impacts would be negligible during the development phase of the project.

Production Phase Noise Impacts

Noise impacts related to increased traffic during operations would be periodic and minor along access roads. Additional minor noise impacts would result from periodic maintenance and workovers at well sites. Since noise impacts would result at locations only within close proximity (within ¼ mile) to the noise source, cumulative noise impacts (i.e., cumulative increases in noise throughout the GAP) are not expected. Ongoing projects in the region are expected to only affect site-specific locations. As described previously, since there are no noise-sensitive receptors within the Project Area, noise-related impacts would be negligible over the operational life of the project.

Mitigation: The Proponent would encourage commuting of construction and drilling crews to reduce the number of vehicle trips and mitigate vehicle-related noise impacts.

PALEONTOLOGY

Lease Stipulation: Lease Notice – Within Class I and II Paleontological Areas, an inventory shall be conducted by an accredited paleontologist approved by the AO prior to surface-disturbing activities in these areas (BLM 1999b).

Affected Environment: Paleontological resources include vertebrate, invertebrate, and plant fossils found in various rock formations. The geologic formations have been classified to indicate the potential for scientifically important fossils. Classification of formations or members of formations may change as data becomes available.

- Class I -Areas known or likely to produce abundant scientifically important fossils vulnerable to surface-disturbing activities.

- Class II -Areas showing evidence of fossils but unlikely to produce abundant scientifically important fossils.

- Class III -Areas that are unlikely to produce fossils.

The Class I formations in the GSRA where scientifically important vertebrate fossils are known to occur include the Wasatch, Morrison, Chinle, and State Bridge Formations. Scientifically important invertebrate fossils are known from the even younger Parachute Creek member of the Green River Formation at a stratigraphic location between the R-6 Oil Shale Zone and the Mahogany Zone between Rifle and DeBeque and the southern rim of the Piceance Creek Basin.

Within the OUGA, the Wasatch Formation and Parachute Creek member of the Green River Formation are present at the surface. However, the Parachute Creek member of the Green River Formation only occurs in the extreme southern portion of the Project Area, where no project-related surface disturbance is proposed. Accordingly, the only Class I formation within the Project Area that is of concern is the Wasatch, which includes fossils of early horses, rare primates, rhinoceroses, birds, crocodiles, rodents, fish, turtles, fresh water clams, snails, and plants.

Site-specific conditions in the Project Area are not conducive to finding fossils on the surface. Dense soil and vegetation cover obscure rock outcrops, making the likelihood of finding fossils low. As a result, paleontological surveys of the Project Area have not been required by the BLM prior to project authorization (Armstrong 2005).

Environmental Consequences: Potential impacts to paleontological resources include the loss of scientifically important fossils due to ground-disturbing activities such as well pad, reserve pits, road, and pipeline excavation in locations where bedrock is encountered in the Wasatch Formation. To minimize impacts to paleontological resources, significant discoveries made during surface excavations would be avoided until further evaluated as described below.

Mitigation: If vertebrate fossils are documented during construction, excavation at that location would be delayed until the project paleontologist, BLM paleontologist or representative, and the company inspector are notified and evaluate the discovery. Construction work would be allowed to proceed beyond the discovery to reduce construction delays. If scientifically important fossils are encountered during operations and cannot be avoided, additional mitigation measures (e.g., relocation of the pad/access road) may be necessary.

RANGE MANAGEMENT

Affected Environment: The BLM permits livestock grazing on public land on two allotments in the OUGA: the Alkali Creek Common and Alkali Gulch. The Alkali Creek Common allotment is permitted for cattle grazing and the Alkali Gulch Allotment is permitted for sheep grazing. All of the public land in the Alkali Creek Common and Alkali Gulch Allotments lie within the OUGA. **Table 14** identifies these allotments, their respective permittees, the type and number of livestock permitted, their seasons of use and capacity in terms of Animal Unit Months (AUMs). An AUM is the amount of forage needed by an "animal unit" (AU) grazing for one month. An AU is defined as one mature 1,000 pound cow and her suckling calf.

Table 14. Grazing Allotments in Orchard Unit Geographic Area

Allotment Name & Number	Permittee	Livestock Kind & No.	Period of use	Acres	AUMs
Alkali Creek Common # 08130	David and Cynthia Graham	Cattle 40	05/01 – 06/15	2,895	60
	John and Phyllis Hyrup	Cattle 93	05/01 – 06/15		141
Alkali Gulch #08131	Malcolm Jolley	Sheep 200	12/17 – 02/15	1,183	80
		Sheep 200	12/17 – 02/15		80

Environmental Consequences: The Proposed Action would have negative and positive impacts on livestock grazing. The Alkali Creek Allotment would have two new well pads, about 27,000 feet (5.1 miles) of new or upgraded road segments, and approximately 10,000 feet (1.9 miles) of gathering lines installed. Two new well pads, about 2,500 feet of access roads, and 500 feet of gathering lines would be installed within the Alkali Gulch Allotment. The other three

well pads and remaining access roads and gathering lines would be constructed on private surface and not affect these federal grazing allotments.

Surface disturbing activities such as construction and use of roads, pipelines, well pads, etc. would initially remove forage. On areas that are disturbed and rehabilitated, herbaceous vegetation and herbaceous forage production typically recovers to the level before disturbance in 3 years. Rehabilitated sites often produce more livestock forage then native rangeland. There would be some loss of vegetation on well pads and roads that remain in use for the life of the project. This long-term projected loss of vegetation and forage on each allotment is expected to be relatively minor with a projected loss of about 43 acres. This would amount to an estimated loss of about 1.8 AUMs of forage on the Alkali Creek Common Allotment and 2.5 AUMs of forage on the Alkali Gulch Allotment. Development and maintenance of oil and gas facilities would increase human activity, which would disturb grazing livestock. Construction of roads and pipelines may improve access into remote areas of allotments that livestock have difficulty reaching.

Mitigation: It is not anticipated that the level of impacts expected from implementation of the Proposed Action would require adjustment of stocking rates. The level of forage utilization will be monitored on affected allotments and if necessary, adjustments in livestock use would be made to protect land health based on this monitoring.

EnCana would fence newly reclaimed well pads to exclude livestock and big game grazing pressure on seeded sites.

Range improvements (fences, gates, reservoirs, pipelines, etc.) will be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for repairing or replacing the damaged range improvements.

RECREATION

Lease Stipulation: None.

Affected Environment: The Project Area is located on a combination of private property and public lands administered by the BLM, and offers open space where visitors can participate in primitive or unconfined recreational activities in a relatively undisturbed setting. There are no developed recreational facilities, such as campgrounds or picnic areas within the Project Area. Overall, the BLM-administered portion of the Project Area features minimal evidence of visitor management and site modifications, which adds to its primitive and wild character.

Recreation Planning and the Recreation Opportunity Spectrum (ROS)

From a recreation planning standpoint, the 1984 RMP, states that the recreation resource management objective is to, "To ensure the continued availability of outdoor recreational opportunities which the public seeks and which are not readily available from other sources, to

reduce the impacts of recreational use on fragile and unique resource values, and to provide for visitor safety" (BLM 1984, Page 34).

The ROS is a conceptual framework for planning, management and research that helps to clarify relationships between recreational settings, activities, experiences and the ensuing outcomes. Changing or maintaining the physical, social and administrative characteristics of the recreation setting makes different recreation opportunities available. The recreation setting character (recreation opportunity spectrum) required to produce recreation opportunities was also adopted in the RMP and described on Map 9 and in Appendix C. The Proposed Action is within the "Roaded Natural" (RN) opportunity class where there is: 1) equal opportunity for affiliation with other user groups and for isolation from the sights and sounds of man, 2) an opportunity to have a high degree of interaction with the natural environment, 3) ability to practice outdoor skills, and 4) opportunities for both non-motorized and motorized recreation activity opportunities. Resource modification and use practices are evident but harmonize with the natural environment.

For recreation management purposes, the Glenwood Springs Resource Area was also divided into special recreation management areas (SRMAs) and extensive recreation management areas (ERMAs). SRMAs generally have a distinct, primary recreation-tourism market as well as a corresponding recreation management strategy with: specific outcome objectives, prescribed recreation setting character and a corresponding set of implementing actions. Anything not delineated as an SRMA is an ERMA. In ERMAs recreation is not the principal management activity but an activity of significance. The custodial management direction within all ERMAs is geared to providing dispersed recreation activities. Visitor health and safety, user conflict and resource protection issues in particular should be addressed in ERMAs. The GSFO RMP priority of implementation #2 for recreation is "Manage ERMAs to provide visitor information, minimal sanitation facilities and access. Also manage ERMAs to resolve management issues and for off-road (ORV) use". The proposed action is within the GSFO ERMA.

Recreational Uses of the Project Area

The primary recreational use of the Project Area is seasonal big game hunting. Hunting is managed by the Colorado Division of Wildlife (CDOW 2005) from the end of August through January. Primary hunting is elk, mule deer and bear. Bow hunting is permitted early in the season. Other common recreational activities in the Project Area include wildlife viewing, off-highway vehicle riding/driving, mountain biking, hiking and horseback riding. Winter snowfall is inadequate to support snowshoeing, snowmobiling, or cross-country skiing. There are no commercial outfitters permitted in the Project Area.

Environmental Consequences: Over the short-term, project-related construction activities and drilling and completion of wells would generate vehicle traffic, dust, noise, and increased human activity in the Project Area over the approximately three-year development and drilling phases of the project. Since hunting relies on the presence of game species and hunters generally prefer relatively quiet settings, it is likely that construction and well drilling activities would disrupt hunting in localized areas within about one mile of those activities. Both game species and hunters would likely avoid active construction areas and well drilling activities and would be

displaced to other locations within and outside of the Project Area. Similarly, OHV riders and other types of recreational visitors could choose to recreate in other locations over the short-term due to the presence of heavy trucks and intensive human activity.

Over the long-term 20 to 30 year operational life of the project, the presence of natural gas wells, production equipment and other facilities would change the character of the Project Area from generally wild to relatively altered/developed, at least in areas where these facilities would be visible. This change in the character of the Project Area could diminish the recreational experience for visitors near well pad locations. Based on these impacts, the Project Area would remain in a "Roaded Natural" ROS setting, but the physical, social and administrative setting components would shift closer to a "Rural" ROS setting because of landscape modifications, use, and the more evident sights and sounds of development.

The addition of project-related access roads, however, could increase motorized public access to portions of the Project Area and facilitate various types of public recreational uses such as car camping and sightseeing. Essentially, areas only accessible to high clearance 4-wheel drive vehicles and OHVs would become accessible to automobiles. A total of about 5.8 miles of new access roads would be constructed, although some of these roads would be gated and access restricted.

Finally, there is the potential that conflicts between hunting and project activities could arise. If hunters were to discharge their firearms in close proximity to active project locations, serious risks of injury or death could occur.

Mitigation: Mitigation intended to reduce visual impacts, which are described below, should be implemented to minimize negative impacts on the physical recreation setting conditions (recreational appeal) of the Project Area.

To promote safety for hunters and project workers alike during hunting season, warning signs should be posted along access roads serving active construction and drilling sites to warn hunters of the presence of workers and associated vehicle traffic in the area.

SOILS

Affected Environment: Elevations within the Project Area range from approximately 5,300 feet above mean sea level (amsl) near existing well pad F8OU to 7,200 feet near the south corner of the area. Annual precipitation within the Project Area ranges from 25 to 40 inches. Soils surrounding the Project Area are distributed according to the major soil forming factors including climate (effective moisture and temperature), parent material, topographic position, and slope.

Twenty-one soil associations are found within the Project Area, as shown on **Figure 4** (SCS 1985; SCS 2003). **Table 15** provides a summary of the soil types found within the Project Area. All of these soil types, with the exception of the Ildefonso stony loams, the Potts loam (3 to 6%), the Potts-Ildefonso complex (3 to 12%), and the Potts-Ildefonso complex (12 to 25%), are considered to possess either severe or very severe potential for water erosion.

Table 15. Soil Associations in the Orchard Unit Project Area

Soil Association Name	Soil Description	Slope
Badland	Vary shallow, poorly-drained areas showing no soil characteristics; formed from residuum derived from highly calcareous and gypsiferous shale and bentonite. Surface runoff is rated as very rapid and erosion potential is very severe.	10-65%
Barx loam	Deep, well-drained loam and clay loam formed in eolian deposits derived from mixed materials and found between 5,000 and 6,400 feet. Surface runoff is rated as moderate and erosion potential is severe.	3-12%
Barx-Clapper complex	Deep, well-drained loam and very stony loam formed in eolian deposits derived from mixed materials and found on dissected plateaus. Surface runoff is rated as moderate and erosion potential is severe.	3-12%
Bunkwater very fine sandy loam	Deep, well-drained sandy loam and clay loam formed in eolian deposits derived from mixed materials and found on structural benches. Surface runoff is rated as slow and erosion potential is severe.	1-8%
Clapper very stony loam, 12 to 25%	Deep, well-drained very stony loam and very cobbly loam formed in weathered glacial till derived from basalt and mixed materials; found on the side slopes of mountains. Surface runoff is rated as rapid and erosion potential is severe.	12-25%
Clapper very stony loam, 25 to 65%	Deep, well-drained very stony loam and very cobbly loam formed in weathered glacial till derived from basalt and mixed materials; found on foothill slopes. Surface runoff is rated as rapid and erosion potential is severe.	25-65%
Dominguez clay loam	Deep, well-drained clay loam formed from sandstone and shale residuum and clay found on alluvial fans and toeslopes. Surface runoff is rated as moderate and erosion potential is severe.	3-8%
Happle very channery sandy loam	Deep, well-drained very channery sandy loam and very channery sandy clay loam formed in alluvium derived from shale residuum found on alluvial fans. Surface runoff is rated as slow and erosion potential is severe.	3-12%
Ildefonso stony loam, 6 to 25%	Moderately-sloping to hiily, deep, well-drained stony loam formed from reworked alluvium deribed from basalt. Found on mesas, benches, and the sides of valleys. Surface runoff is moderate and erosion potential is moderate.	6-25%
Ildefonso stony loam, 25 to 45%	Hilly, deep, well-drained stony loam formed from reworked alluvium derived from basalt. Found on mesa breaks, alluvial fans and the sides of valleys. Surface runoff and erosion potential are moderate.	25-45%
Nihill channery loam	Moderately-sloping to hilly, deep, well-drained channery loam and channery sandy loam formed from reworked alluvium derived from shale and sandstone and found on alluvial fans and the sides of valleys. Surface runoff is slow and erosion potential is severe.	6-25%
Potts loam, 3 to 6%	Moderately-sloping, deep, well-drained loam and clay loam formed from in alluvium derived from sandstone, shale, and basalt. Found on mesas, benches, and the sides of valleys. Surface runoff is slow and erosion potential is moderate.	3-6%
Potts loam, 6 to 12%	Gently-sloping to rolling, deep, well-drained loam and clay loam formed from in alluvium derived from sandstone, shale, and basalt. Found on mesas, benches, and the sides of valleys. Surface runoff is moderate and erosion potential is severe.	6-12%

Soil Association Name	Soil Description	Slope
Potts-Ildefonso complex, 3 to 12%	Gently-sloping to rolling, deep, well-drained loam and clay loam formed from in alluvium derived from sandstone, shale, and basalt. Found on mesas and the sides of valleys. Surface runoff is slow and erosion potential is moderate.	3-12%
Potts-Ildefonso complex, 12 to 25%	Strongly-sloping to hilly, deep, well-drained loam and clay loam formed from in alluvium derived from sandstone, shale, and basalt. Found on mesas and the sides of valleys. Surface runoff and erosion potential are moderate.	12-25%
Potts-Ildefonso complex, 25 to 45%	Hilly to very steep, deep, well-drained loam and clay loam formed from in alluvium derived from sandstone, shale, and basalt. Found on alluvial fans and the sides of valleys. Surface runoff is moderate and erosion potential is severe.	25-45%
Rock outcrop-Torriorthents- complex	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony loams exposed on south-facing slopes of mountains, hills, ridges, and canyonsides. Runoff is very rapid and erosion potential is very severe.	15-90%
Torriorthents- Rock outcrop complex, steep	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony and very channery loams exposed on south-facing slopes of mountains, hills, ridges, and canyonsides. Runoff is very rapid and erosion potential is very severe.	15-90%
Torriorthents- cool-Rock outcrop complex	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony and very channery loams exposed on south-facing slopes of mountains, hills, ridges, and canyonsides. Runoff is very rapid and erosion potential is very severe.	35-90%
Torriorthents- warm-Rock outcrop complex	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony and very channery loams exposed on south-facing slopes of mountains, hills, ridges, and canyonsides. Runoff is very rapid and erosion potential is very severe.	35-90%
Torriorthents-Camborthids-Rock outcrop complex, steep	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony loams and clay found on toe slopes and concave open areas on foothills and mountainsides. Runoff is very rapid and erosion potential is very severe.	15-70%
Torriorthents- Rock outcrop complex, steep	Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony loams and clay found on toe slopes and concave open areas on foothills and mountainsides. Runoff is very rapid and erosion potential is very severe.	15-70%

Environmental Consequences: Potential impacts to soils in the Project Area from the Proposed Action include removal of vegetation and increased susceptibility of the soils to water erosion, and contamination of soils with petroleum products.

Excavation of proposed well pads and expansion of existing well pads could potentially result in increased erosion of these soils in the short-term. Additional erosion may also be expected from construction of access roads and pipeline rights-of-way. The increased erosion of soils could potentially lead to increased sedimentation in watercourses, siltation of ponds, and loss of vegetative cover on the side slopes of the mesas that underlie the area. However, environmental impacts to soils in the Glenwood Springs Resources Area from existing oil and gas development are considered to be minimal (BLM 1999a). The BLM attributed these minimal impacts to soils to well-established mitigation and reclamation practices. In addition, field observations of

recently-completed pipeline corridors in the Piceance Basin (the TransColorado Pipeline, completed in 1998, and the American Soda pipeline, completed in 2000) show that vegetation has been reestablished on these corridors in only a few years and erosion is minimal.

Implementation of the Proposed Action would initially disturb up to 107.9 acres of surface soils, or approximately 2.0% of the total Project Area of approximately 5,320 acres. These disturbed areas would consist of areas where vegetation is removed during the construction of 7 new well pads and expansion of 8 existing well pads (56.5 acres), 3.3 miles of new access roads (18.6 acres), and gas and water gathering pipelines (7 acres). Each new well pad is anticipated to cover between 5.7 and 9.1 acres. Existing well pads would be expanded by between 0.7 and 2 acres each.

Of the total of 107.9 acres of new surface disturbance, approximately 65.6 acres would be reclaimed and re-vegetated upon the completion of drilling. The remaining 43.3 acres would remain disturbed for the long-term 20 to 30 year life of the project.

The primary effect of long-term surface disturbances on soil resources is increased erosion and the resulting increase in sediment yield to nearby drainages and streams. However, because the well pads would be constructed to be nearly level, the additional erosion from all new well pads would be minimal. In addition, because all pads would generally be well buffered (at least 100 feet) from creeks, and Best Management Practices (BMPs) for road and pipeline construction would be utilized, very little of this additional eroded material is expected to reach the ephemeral creeks within the Project Area in the short- or long-term from the disturbed surfaces. Accordingly, the expected increase of sedimentation to Alkali Creek and Little Alkali Creek from the Proposed Action would be negligible. It is also expected that following re-vegetation and two to four growing seasons, the erosion rate and potential sediment yield would drop to near baseline conditions from well pads, but would remain at slightly elevated levels for the new access roads.

Contamination of surface and subsurface soils near oil and gas facilities can occur in oil and gas fields. Sources of potential contamination include leaks from wellheads, conveyance pipelines, compressor stations, produced water sumps, condensate storage tanks, and fuel spills from vehicles. Petroleum released to surface soils infiltrates the soil and, under the right circumstances, can migrate vertically until the water table is encountered. The potential for spills of this type from the Proposed Action is considered to be minor.

Controlled Surface Use stipulations (CSUs) apply to facilities constructed on fragile soils within the Project Area. In addition, a No Surface Occupancy (NSO) stipulation applies to all soils on slopes greater than 50%. **Figure 5** provides a map of the fragile soils within the Project Area (those considered to have severe erosion potential) and shows areas where NSO applies. Inspection of **Figure 5** reveals that one proposed well pad (C17OU) is partially located on soils that exceed 30% slope. In addition, a portion of the proposed pipeline from existing well pad C10OU to proposed well pad 19OU crosses areas of both more than 30% and more than 50%. Special precautions would be necessary in these areas to prevent excessive erosion.

Mitigation: In addition to the measures and stipulations required by the leases, the following measures would be implemented to help prevent erosion and subsequent sedimentation:

- Erosion protection and silt retention techniques, including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, and placement of straw bales and/or matting would be used at the proposed crossings of Little Alkali Creek.

- New access roads would be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.

- Relief ditches or corrugated metal pipes would be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.

- Ditches would be allowed to vegetate and/or would include large rocks or stones to slow the velocity of drainage and allow sediment to settle out.

- Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.

- Straw cover would be placed on excess material piles to help limit heavy dust emissions into the air during weather-created wind events.

- Road construction plans would identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

TRAVEL/ACCESS

Affected Environment: The travel designation for BLM administered public lands is "open to year-round travel on and off routes". Except for fall big game hunting-related travel, the area sees low to moderate use for most of the year.

Environmental Consequences: Project-related travel is managed by operating stipulations and mitigation identified in this document. However, travel designations that apply to the general public remain unchanged. Even though EnCana's access roads are gated for safety reasons, users traveling cross-country or from adjacent private lands legally can use the expanded/improved road system on public lands. If proposed land use changes require restricting travel for safety reasons or to mitigate resource conflicts/concerns, then area travel designations in the GSFO Resource Management Plan will need to be amended from "open" to "limited" or "closed".

TRANSPORTATION

Lease Stipulation: None.

Affected Environment: Traffic to the OUGA would originate from the DeBeque, Colorado exit on I-70 (Exit 62). Project-related traffic would then use one of four routes to access the Project Area:

- Travel easterly along County Road (CR) V.00 and then CR T.00 to an existing EnCana access road to reach the existing E28OU pad and the proposed A28OU pad;

- Travel northeasterly along CR V.50 parallel to the Colorado River to reach existing EnCana access roads to the existing G18OU and F8OU pads. This route would also be taken to reach the proposed new access road to proposed well pad C17OU. In the same vicinity, County Road 49.5 has been upgraded by EnCana to the south to reach existing well pads L16OU, N17OU, M17OU, and F21OU atop Samson Mesa across BLM and private property. Unlike other access roads in the OUGA, which are/would be gated and closed to public access, this county road is open to public travel;

- Travel south from Una Bridge at the Colorado River on Garfield County Road 306 and roads crossing private property to the existing C10OU pad, then southeast up Little Alkali Creek to proposed pads G15OU and F14OU. Furthermore, a proposed access road west from the existing C10OU pad across BLM and private (Keinath) properties would access proposed pads I9OU, H16OU, and K9OU on Creek Mesa.

All of these existing county roads are improved for oil and gas development traffic. Other roads within the OUGA not previously improved by EnCana range from semi-improved dirt roads to two-tracks. The county road system is currently open for public use, but EnCana's access roads are closed to the public for safety reasons.

Environmental Consequences: Under the Proposed Action, approximately 5.8 miles of new and upgraded existing roads would be constructed in order to access the proposed well pads. Short-term increases in the volume of both heavy and light traffic would occur during the construction, well drilling, and completion phases of the project. To construct, drill and complete each well, an average of approximately 16 light truck trips and 8 heavy truck trips per day would be expected on local area roads. Project-related traffic during the 20 to 30 year operational phase of the project would be as follows. An EnCana employee would visit the proposed well pads approximately twice per week to inspect well site facilities, read meters, and perform other routine facility maintenance activities. Tanker trucks would remove condensate from the storage tanks on the well pads at varying rates from 1-2 trips per day to about once per week. On average, there would be one workover or recompletion per well per year. Increased traffic associated with a workover or recompletion would consist of three to five truck trips per day for a period of seven days.

All traffic in and out of the OUGA would be along Mesa CRs V.00 and V.50 and Garfield County Road 306. Potential impacts to travel and access of other land users during the

construction/drilling phase and recompletion/workover activities would include temporary conflicts with existing traffic (including a potential for delays and increased vehicle collision rates), degradation of County roads due to heavy equipment use, fugitive dust, and traffic-related noise at residences near County Roads. After all drilling and completion would be finished, traffic levels would decline substantially on these local roads.

Mitigation: The operator would encourage car pooling for commuting construction and drilling crews to reduce the number of vehicle trips on local area roads and associated wear and tear.

The operator would encourage commuting construction and drilling crews to comply with posted speed limits on public roads and limit driving speeds to 20 mph on more primitive access roads to reduce the potential for vehicle collisions. By complying with posted 25 mph speed limit along County Roads, traffic-related noise would also be reduced at nearby residences.

VEGETATION

Lease Stipulation: None

Affected Environment: The vegetation within the OUGA consists of woodland hillsides dominated by Utah Juniper (*Juniperus osteosperma*), with a few scattered pinyon pine (*Pinus edulis*) at higher elevations or north-facing slopes. Drainages and ridge tops/mesas in the Unit (Samson Mesa, Creek Mesa) were dominated by Basin and Wyoming big sagebrush (*Artemisia* spp.), greasewood (*Sarcobatus vermiculatus*) and shadscale (*Atriplex confertifolia*). Drainages in the southeast portion of the project area, as well as high-elevation hillsides, had dense groves of scrub oak (*Quercus gambelii*) with understory species such as creeping hollygrape (*Mahonia repens*), mountain pussytoes (*Antennaria parvifolia*), yarrow (*Achellea millefolium*), northern sweetvetch (*Hedysarum boreale*), and sego lily (*Calochortus nuttalli*). Some patches of serviceberry (*Amelanchier alnifolia*) and mountain-mahogany (*Cercocarpus montanus*) were also found along drainage hillsides. The most common understory species found within the sagebrush/greasewood flats included orange globemallow (*Sphaeralcea munroana*), yellow and red prickly pear cactus (*Opuntia polyacantha*), cryptantha (*Cryptantha glomerata*), and yucca (*Yucca glauca*).

The entire OUGA has, to some extent, been affected by cheatgrass (downy brome) (*Bromus tectorum*) (see Invasive, Non-Native Species). It is often associated with sagebrush communities and disturbed areas, especially two-track roads. In the pinyon/juniper woodlands, this species may be found as the understory.

Stressed by the recent drought, many pinyon pine trees in the Colorado Plateau have succumbed to an engraver beetle (*Ips confusus*) infestation. However, in the OUGA, the scattered pinyon pine trees have shown few signs of infestation.

Environmental Consequences: Vegetation removal and soil disturbance associated with the construction and installation of the well pads, pipelines, and access roads would affect vegetation resources directly and indirectly. Direct effects would include the short-term loss of vegetation and the long-term modification of structure, species composition, and extent of cover types.

Indirect effects may include the short-term and long-term increased potential for noxious weeds invasion, exposure of soils to accelerated erosion, shifts in species composition and changes in plant density.

The OUGA contains approximately 4,300 acres of pinyon-juniper woodlands, 950 acres of big sagebrush, and approximately 65 acres of greasewood fans/flats. The Proposed Action would result in short-term loss of 107.9 acres or 2.0% of vegetation in the OUGA due to construction of well pads, access roads, and pipelines. After reclamation of the pipelines and partial reclamation of the unused portions of the well pads and access roads, the long-term vegetation disturbance would be 43.3 acres or 0.8% of the OUGA (see Table 2, Chapter 2). The Proposed Action would mainly impact pinyon-juniper woodlands and sagebrush communities. Most of the proposed roads and pipelines and three of the proposed wellpads would be located in pinyon-juniper habitat, while four well pads and some access roads and pipelines would be located in sagebrush habitat. The impact of the Proposed Action to greasewood fans/flats would be very small, since only one road would be constructed in this habitat type.

It is estimated that herbaceous ground cover would re-establish within 2-3 years. Revegetation of shrub species, such as sagebrush, would take at least 7-8 years (and, perhaps, longer if not included in the seed mix), while pinyon pine and Utah juniper would take more than 100 years to recover to its former structure and age class. The 43.3 acres of long-term disturbance would remain unvegetated for the life of the project (i.e., until the wells are plugged and abandoned and roads and pads entirely reclaimed). With the implementation of mitigation measures identified below, establishment of desirable vegetation species is anticipated.

Freshly cut, drought-stressed, or injured trees are susceptible to *Ips* beetle infestation. Where pinyon pines must be removed under the Proposed Action, those trees would be at increased risk for *Ips* infestation and would also place nearby pinyon trees at greater risk of infestation.

Mitigation: All surface disturbances would be recontoured and revegetated according to an approved Reclamation Plan. Only seed mixes approved by the Authorized Officer will be used. Reclamation would be considered successful when the objectives described in the Glenwood Springs Resource Area Reclamation Policy are achieved. The mitigation measures are provided below.

- In order to minimize the potential for attracting Pinyon *Ips* beetles to the OUGA, any pinyon trees that would be removed due to construction activities during the *Ips* beetle active flight season (late March to early November) would either be chipped or buried on the site within 24 hours.

- A specified seed mix designed to meet interim reclamation standards while providing forage and browse for wintering deer and elk using a mixture of shrub and grass species shall be applied. The following seed mix and rates will be used on all disturbed surfaces:

Species of Seed	Variety	Application Rate (PLS lbs/ac)
Shadscale saltbush		2.0
4-wing saltbush	Rincon	2.0
Wyoming big sagebrush		0.5
Western wheatgrass	Arriba	3.0
Bottlebrush squirreltail		2.0
Indian ricegrass	Paloma	1.5
Galleta	Viva	1.5
Total		**12.5**

- (The seed mix may be modified with approval from the BLM based on site-specific conditions, the identification of additional useful species for site stabilization, cheatgrass competition, and winter wildlife habitat needs, species success in past revegetation efforts, and seed availability and cost. Native species will be used unless they are proven unsuitable for meeting BLM's reclamation objectives.) Reclamation would be considered successful when the objectives described in the Glenwood Springs Resource Area Reclamation Policy are achieved. Refer to Appendix I. Surface Reclamation of the 6/98 GSFO's Draft Supplemental EIS for Oil & Gas Leasing & Development (pages I-1 through I-8).

- The reclamation contractor will utilize a seed drill capable of correctly planting the various types of seeds included in the specified seed mixes.

- For seed planted using broadcast methods (e.g., sagebrush), raking or harrowing immediately before and after seeding will be necessary to ensure adequate seed/soil contact. For best success, broadcast seeding of sagebrush in strips is recommended.

- Areas being reclaimed will be fenced (using fence type approved by Authorized Officer) to exclude livestock for the first two growing seasons or until the seeded species have established. Species will be considered established when 50 percent of the seeded species are producing seed.

- Reclaimed areas will be monitored for revegetation success.

- The operator will submit an annual report on the status of reclamation to the Authorized Officer.

Finding on Public Land Health Standard for Plant Communities (Standard 3): According to the 2000 Battlement Mesa Land Health Assessment, the health of the vegetative communities was the most widespread problem noted in this landscape. Most of the pinyon/juniper sites consist of mature Utah juniper with lesser amounts of pinyon pine. Most of these woodland sites have very few understory species present. Perennial grasses and forbs are minimal or absent and where shrubs are present, often are decadent or in poor vigor. Age class diversity is poor, with most plants in the mature to overmature state with little recruitment and establishment of younger age classes. Cheatgrass is abundant and occasionally dominant under the tree canopy. In some cases, the tree species are also decadent and show signs of stress (BLM 2000).

Sites not achieving Standard 3 are in pinyon-juniper, sagebrush, and shadscale communities (BLM 2000).

The seed mix proposed for reclamation of disturbed habitat includes shadscale, saltbush, sagebrush, western wheatgrass, bottlebrush squirreltail, and Indian rice grass. If successful the proposed seeding program could result in an upward trend, with a greater possibility of achieving Standard 3.

VISUAL RESOURCES

Lease Stipulation: For lands in Section 8, a Conditional Surface Use stipulation applies to protect scenic values in VRM Class II areas (Lease C-59629). In addition, within Sections 3, 21, and 33, the No Surface Occupancy stipulation applies to lands with slopes exceeding 30 percent with high visual sensitivity in the I-70 viewshed (Leases C-64189, C-64191, and C-64192). Exceptions may be granted if the activity meets VRM Class II objectives and that the overall landscape character is retained.

Lease Notice: "Special design and construction measures may be required to minimize the visual impacts of drilling activities within five miles of all communities and population centers, major BLM or county roads, and state and federal highways. The overall goal of these measures would be to blend in the disturbance with the natural landscape as much as possible. At a minimum, operations should be designed to insure that the disturbance does not dominate the natural landscape character (VRM Class III objective). BLM acknowledges that activities on private lands may alter the landscape character and such alterations will be considered when evaluating mitigation proposals relative to the visual quality of the overall landscape."

Affected Environment: The OUGA contains a variety of scenic qualities, some of which are highly visible from vantage points on I-70 between the towns of Parachute and DeBeque. The region that includes the OUGA is characterized by the broad Colorado River Valley, which is rimmed by sagebrush and pinyon juniper-covered mesas and valleys, and higher spruce-fir and aspen forested mountains and mesas, and the Roan Cliffs above. This dramatic assortment of landscapes and vegetation cover provides travelers on I-70 and local area residents a variety of visual experiences.

Within the OUGA, landforms generally consist of dry mesas divided by deeply incised creek valleys. The vegetative cover on these mesas is primarily sagebrush, with groves of pinyon pine and junipers interspersed and on the steeper slopes on the flanks of the mesas. The creek bottoms are dominated by sagebrush vegetation. These streams are ephemeral and do not flow much of the year. Thus, apart from the Colorado River, which flows outside of the Project Area to the northwest, water features do not noticeably contribute to the visual quality of the OUGA.

Man-made modifications that are present within the OUGA include existing roads, eight existing well pads, production facilities associated with the existing wells (tanks, wellheads, metal sheds), and fence lines and gates primarily associated with livestock grazing. These man-made modifications are scattered through the OUGA and are generally isolated in their locations. In some cases, these modifications attract the attention of the observer, but in most cases, they are

subtle and generally blend in with the characteristic landscape or are screened from view by topography and pinyon-juniper vegetation. In areas where they are not screened from view, roads and pipeline corridors appear as linear man-made alterations that contrast in color and texture from the adjacent native vegetation. Similarly, well pads constructed within the last two years have altered the characteristic landscape in terms of color and texture, due to disruption of natural vegetation and exposure of native soils to the observer.

The BLM utilizes the Visual Resource Management (VRM) system to manage and protect visual/scenic resources. In the region including the OUGA, BLM's visual resource management emphasis has been generally to protect the scenery visible from I-70, other busy transportation corridors, and areas with high sensitivity. This impact analysis is based on the views from selected Key Observation Points (KOPs). The KOPs used for this analysis are the I-70 corridor and County Road V.5 along the northern edge of the OUGA.

The Proposed Action would take place within areas classified by the BLM as Visual Resource Management (VRM) Classes II, III, and IV, as identified in the 1984 Glenwood Springs Resource Management Plan and amendments. A small portion of the northwestern corner of the Project Area in Section 8 falls within VRM Class II, whereas the vast majority of the Project Area is within VRM Classes III and IV. Class IV occurs in the southern and eastern two thirds of the Project Area and Class III occurs in the northwestern third of the project area. **Figure 6** provides a map showing the distribution of VRM classes in the OUGA. Objectives for each of these VRM classes, as defined in the BLM's Manual H-8410-1 - Visual Resource Inventory (BLM 1986), are described below:

- The objective of VRM Class II is to retain the existing characteristic landscape. The level of change in any of the basic landscape elements (line, form, color, texture) due to management activities in Class II areas should be low and not evident.

- The objective of VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- The objective of VRM Class IV is to provide for management activities that require major modifications of existing character of the landscape. The level of change within VRM Class IV areas can be high. Management actions within VRM Class IV may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of activities in areas through careful location, minimal surface disturbance, and repeating the basic landscape elements.

Environmental Consequences: Short-term visual impacts due to construction, drilling and completion activities would occur on all new pads, and on existing pads where new wells are proposed. The existing landscape would be changed by introduction of new elements within the landscape in the form of new lines, colors, forms, and textures. New well pad facilities, roads and pipelines would increase natural gas-related visual elements (e.g., dozers, drilling rigs, truck

traffic, heavy equipment, dust, flaring, lights, etc.) within the OUGA landscape. These activities, presence of heavy equipment and drill rigs, and related surface disturbance would detract from the visual quality of the landscape and attract the attention of the observer. Construction would take place over a 2- to 3-year period. Drilling activity would occur 24 hours per day. Therefore, the lights from the drill rigs and well flaring would be visible in the distance from the I-70 corridor at night for a 50- to 75-day duration for each well during drilling and completion over the 2- to 3-year drilling phase of the project.

Construction would be primarily evident from I-70 between Una (southwest of Parachute) and DeBeque and from various vantage points along County Road (CR) V.5 along the northern edge of the OUGA. From the I-70 corridor, short-term construction and drilling-related visual impacts would be visible in the background perspective, whereas from CR V.5, drilling activities and/or construction-related disturbance would be visible in the middle ground perspective in the vicinity of proposed well pad C17OU. Proposed drilling activities at well pads G18OU and F8OU would also be visible from some locations along CR V.5, although these pads are located on private property. This part of Colorado is sparsely populated and it is likely that only a few residences would experience visual impacts during the short-term project development period. Construction and drilling activities would not be visible from the Towns of DeBeque or Parachute/Battlement Mesa due to distance and terrain.

Long-term impacts of the project consist of reduced visual character within portions of the landscape due to new contrasts from well pad facilities, pipelines and roads, where those facilities would not be screened from sight. The visibility of new well pads, roads, and production equipment would increase the existing visual contrasts associated with man-made modifications already present in the OUGA. Although the well pads would undergo interim reclamation, the pads would remain at about 1 acre in size over the productive life of the project. At these locations, cut banks and fill slopes could remain visible for many years, unless topography and vegetation screens them from view. Interim reclamation and revegetation of these slopes would largely mitigate the visual contrast of these long-term pads. Similarly, production equipment, such as tanks, dehydration unit enclosures/shed, and well heads would be painted shale green, which would help them blend in with the adjacent vegetation. Given the distance of the OUGA from I-70, it is likely that the combination of interim reclamation of surface disturbance and the painting of production-facilities would reduce the visual contrast of project features to minor levels.

Conformance with VRM Classes

The protection of VRM classes, landscape character and scenic quality on private and public lands and split estate is discussed on pages 3-41 through 3-45 of the 1999 Oil & Gas Leasing and Development FSEIS. The impacts of development are discussed on pages 4-49 through 4-54 of the 1999 FSEIS (BLM 1999a). **Table 16** provides a summary of the distribution of existing and proposed well pads by VRM class. The majority of well pads, and associated surface disturbance would occur in VRM Class IV areas, which are the least sensitive and least restricted with respect to permissible visual alteration.

No additional surface disturbance is proposed in VRM Class II areas in the OUGA. The existing F8OU pad would not be expanded, but about 1 acre of existing disturbance would remain over the long-term life of the project. No additional visual impacts would occur in VRM Class II areas as a result of the Proposed Action. It is important to note that the F8OU well location is well screened from view on I-70, due to topography and presently has little or no impact on the view from I-70. Given that no new disturbance is proposed in VRM Class II areas, the project would be in compliance with all lease stipulations that apply to visual resources.

Table 16. VRM Classes of Existing and Proposed Well Pads, Access Roads, and Pipelines

Pad	Surface Location Sec-Twp-Rge	Status	VRM Class	New Short-Term Disturbance (acres)	Long-Term Disturbance (acres)
F8OU	8-T8S-R96W	Existing	II	0.0	1.0
Access Roads		Existing	II	0.0	0.0
Total VRM Class II Disturbance				**0.0**	**1.0**
G18OU	18-T8S-R96W	Existing	III	0.0	1.0
K9OU	9-T8S-R96W	Proposed	III	4.9	1.0
C17OU	17-T8S-R96W	Proposed	III	6.1	1.0
Access Roads		Proposed	III	3.7	2.4
Total VRM Class III Disturbance				**14.7**	**5.4**
J10OU	10-T8S-R96W	Existing	IV	1.0	1.0
L160U	16-T8S-R96W	Existing	IV	1.0	1.0
M17OU	17-T8S-R96W	Existing	IV	1.0	1.0
N17OU	17-T8S-R96W	Existing	IV	1.0	1.0
F21OU	21-T8S-R96W	Existing	IV	0.9	1.0
E28OU	28-T8S-R96W	Existing	IV	0.0	1.0
I9OU	9-T8S-R96W	Proposed	IV	5.6	1.0
F14OU	14-T8S-R96W	Proposed	IV	6.0	1.0
G15OU	15-T8S-R96W	Proposed	IV	6.1	1.0
H16OU	16-T8S-R96W	Proposed	IV	5.0	1.0
A28OU	28-T8S-R96W	Proposed	IV	9.1	1.0
Access Roads		Proposed	IV	14.3	10.3
Pipelines*		Proposed	IV	18.6	9.3
Total VRM Class IV Disturbance				**69.6**	**30.6**
Project Total				**84.3**	**37.0**

* Pipelines not co-located with access roads

Only two new well pads are proposed in VRM Class III areas: C17OU and K9OU. The existing G18OU pad is also located in a VRM Class III area. During drilling and completion stages, the G18OU pad will be visible from I-70 but viewing is limited in duration due to adjacent topography. Once reclamation occurs the pads visibility will be low and not evident. It would

not be expanded, but about 1 acre of existing disturbance would remain over the long-term life of the project. With the proposed access roads to the C17OU and K9OU locations, total short-term disturbance in VRM Class III areas would amount to approximately 14.7 acres, which would undergo interim reclamation after well drilling were completed. Long-term surface disturbance that would remain in VRM Class III areas would be about 5.4 acres. Vegetation and topography screens much of the roads and pad sites from view from I-70. However, the C17OU pad would be quite visible from several vantage points along I-70 and from CR V.5 prior to interim reclamation. Given its setting in dense pinyon-juniper woodland, the removal of vegetation for pad construction could create a geometric shape that would contrast with the form, line, and color of the adjacent landscape. Production facilities at the pads would be painted shale green, as described above, to reduce their visual contrast. With the mitigation measures described below, the level of change to the characteristic landscape should be moderate and would likely meet the BLM's VRM objectives for Class III areas.

The remaining 5 proposed and 6 existing well pads and associated roads and pipelines would be located in BLM VRM Class IV areas. Total short-term disturbance in VRM Class IV areas would amount to approximately 69.6 acres, which would undergo interim reclamation after well drilling were completed. Long-term surface disturbance that would remain in VRM Class III areas would be about 30.6 acres. With topographic and vegetative screening of many of the proposed well pad sites, roads, and pipelines; interim reclamation of surface disturbance; and painting of production facilities, visual contrasts that would result in VRM Class IV areas would be minor to moderate, given the distance of the Class IV part of Project Area from observers on I-70 and CR V.5. Given that the level of change within VRM Class IV areas can be high, the facilities proposed in VRM Class IV areas would comply with the BLM's VRM objectives for Class IV areas.

Summary of Long-Term Visual Impacts

The introduction of new production facilities on both new and existing pads would contribute to long-term visual impacts within the landscape on a site-specific basis. Given the distance of the OUGA from I-70, project-related visual impacts would be in the background views. Cumulatively, the addition of new well pads, new production facilities, pipelines, and access roads would increase the altered appearance of the OUGA when combined with existing gas-related disturbance in the area. Mitigation measures would reduce some impacts to visual resources on a site-specific basis. Overall, with successful mitigation measures, the project-related changes to the landscape would meet applicable VRM objectives.

Mitigation: The following site specific mitigation and design features will be incorporated into the project to minimize visual impacts.

- To help mitigate the contrast of bare, re-contoured slopes, reclamation will include measures to feather cleared lines of vegetation, and to save and re-distribute cleared trees, debris, and rock over re-shaped cut and fill slopes.

- All facilities will be painted shale green to blend in with the landscape background.

- To reduce the visibility of production facilities from visibility corridors, facilities will not be placed in visually exposed locations. Rather, facilities will be placed against backdrops or cut sides of pads and will be placed to allow the maximum re-shaping of cut and fill slopes.

- Trees and vegetation would be left along the edges of the pads whenever feasible.

- C17OU pad - to mitigate the straight line resulting from cut and fill slopes:
  1) Scatter pinyon-juniper debris on cut slopes.
  2) Leave trees within and at toe of fill slopes.
  3) In order to mitigate straight line of the cut slopes, adaptive management techniques will be analyzed by BLM staff after construction of the pad. If the upper edges (cut slopes) of the pad create a high degree of visual contrast, additional trees may need to be cleared by hand adjacent to the pad's edges to create an irregular shape or natural looking mosaic pattern.
  4) To reduce visual impacts of storage tanks on the site, maximum 300 barrel tanks will be used for produced water and condensate storage.

WILDLIFE, AQUATIC

Lease Stipulation: None.

Affected Environment: The streams that occur in the Project Area are intermittent and contain water after snowmelt and rainfall. Thus, fish are not present in streams within the OUGA. However, all of the ephemeral/seasonal drainages located within the GAP area drain into the Colorado River. The Colorado River in the vicinity of the Project Area contains the Federal listed species addressed previously, as well as other fish and aquatic insects. The fish species recorded for Mesa County include cutthroat trout (*Salmo clarki*), rainbow trout *(Salmo gairdneri*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*Salvelinus namaycush*), and mountain whitefish (*Prospium williamsoni*). (http://www.mesastate.edu/schools/snsm/shideler/coloradofish.htm). The NSIS website has no county occurrence data for fish at this time. Aquatic insects reported for Mesa County include mayflies, stoneflies, craneflies, water boatmen, black flies, dragonflies, caddisflies, mosquitoes, whirligig beetles, backswimmers, creeping water bugs, and damselflies.
(http://www.mesastate.edu/schools/snsm/shideler/grandmesaaquatic insectsind.htm).

Environmental Consequences: As streams within the OUGA are intermittent or ephemeral, the Proposed Action would not have any direct impact on aquatic wildlife. However, potential effects to fish and aquatic insects in the Colorado River, which is approximately ¼ mile north of the Project Area at its closest distance, could occur from soil entering the river from erosion, decrease in water quality from spills of oil, gas or other chemicals. Soil and water quality impacts are addressed in the soil and water quality sections of this EA. Since many insect species are detrital feeders, removal of vegetation as a result of the Proposed Action could decrease available sources of food for these species. Potential effects to threatened and endangered fish in the Colorado River are discussed in the section on Threatened, Endangered, and Sensitive species.

Finding on Public Land Health Standard for Plant and Animal Communities (Standard 3): The health of aquatic species (fish and aquatic insects) is affected by soil, water quality, and vegetation. According to the 2000 Battlement Mesa Land Health Assessment, existing water quality in Alkali and Little Alkali Creeks does not exceed the standards established for the classified uses. The soils in the area appear stable and functioning with no significant problems regarding indicators of soil health (BLM 2000). Much of the terrestrial vegetation in the Battlement Mesa area is functioning at risk. Riparian vegetation, however, is achieving the standard (BLM 2000). With the implementation of the mitigation measures discussed in the water quality, soil, vegetation, and wildlife sections of this EA, the condition of the aquatic wildlife species would not be expected to show a downward trend.

Mitigation: N/A.

WILDLIFE, TERRESTRIAL

Lease Stipulation: The lease stipulation for terrestrial wildlife at some of the well locations in the OUGA is a timing limitation whereby no surface occupancy is allowed from December 1 to April 30 in big game winter habitat (mule deer and elk), which includes severe big game winter range and other high value winter habitat, as mapped by the Colorado Division of Wildlife. This stipulation does not apply to operation and maintenance of production facilities. Under mild winter conditions, the last 60 days of the seasonal limitation may be suspended after consultation with the CDOW. Severity of the winter will be determined on the basis of snow depth, snow crusting, daily mean temperature, and whether animals were concentrated during the winter months. The limitation may apply to work requiring a Sundry Notice pending environmental analysis of any operational or production aspects. The remaining pads would be subject to a 60-day Condition of Approval (COA) for protection of wintering big game. The COA would be invoked from 1/15 through 3/15. The leases and associated wells for the OUGA that have timing limitations for big game habitat are shown in **Table 17** below. The wells located within the leases C-58676, C-60434, C-64191do not have wildlife timing limitations.

Table 17. Leases with Timing Limitations for Big Game Winter Habitat

Lease Number	Well Pads Included	Stipulation
C-58674	None	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.
C-58675	C17OU, M17OU, N17OU	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.
C-59629	F8OU	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.
C-64192	None	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.
C-64189	None	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.

Affected Environment: Numerous terrestrial wildlife species are present in the OUGA. Mammals likely to occur in the OUGA are provided in **Table 18**, and include elk, mule deer,

bighorn sheep, black bear, mountain lion, bobcat, coyote, raccoon, badger, porcupine, Nuttall's cottontail, white-tailed jackrabbit, red fox, ringtail, striped skunk, and various species of shrews, rodents and bats. Bird species include numerous migratory and upland game birds, and raptors. Herptiles potentially found in the OUGA include the plateau lizard, sagebrush lizard, smooth green snake, Great Plains rat snake, western terrestrial garter snake, and western rattlesnake (Hammerson 1999).

Table 18. Common Mammals in Mesa County and Potentially Present within the OUGA

Common Name	Scientific Name	Abundance
American Badger	*Taxidea taxus*	Fairly Common
American Beaver	*Castor canadensis*	Fairly Common
American Elk	*Cervus elaphus*	Abundant
American Marten	*Martes americana*	Fairly Common
American Pika	*Ochotona princeps*	Fairly Common
Big Brown Bat	*Eptesicus fuscus*	Abundant
Black Bear	*Ursus americanus*	Common
Black-tailed Jackrabbit	*Lepus californicus*	Common
Bobcat	*Lynx rufus*	Common
Botta's Pocket Gopher	*Thomomys bottae*	Fairly Common
Brush Mouse	*Peromyscus boylii*	Fairly Common
Bushy-tailed Woodrat	*Neotoma cinerea*	Fairly Common
California Myotis	*Myotis californicus*	Fairly Common
Canyon Mouse	*Peromyscus crinitus*	Fairly Common
Common Muskrat	*Ondatra zibethicus*	Common
Coyote	*Canis latrans*	Abundant
Deer Mouse	*Peromyscus maniculatus*	Abundant
Desert Cottontail	*Sylvilagus audubonii*	Common
Golden-mantled Ground Squirrel	*Spermophilus lateralis*	Fairly Common
Gray Fox	*Urocyon cinereoargenteus*	Fairly Common
Hoary Bat	*Lasiurus cinereus*	Common
Hopi Chipmunk	*Tamias rufus*	Fairly Common
House Mouse	*Mus musculus*	Abundant
Least Chipmunk	*Tamias minimus*	Common
Little Brown Myotris	*Myotis lucifugus*	Abundant
Long-eared Myotis	*Myotis evotis*	Fairly Common
Long-legged Myotis	*Myotis volans*	Common
Long-tailed Vole	*Microtus longicaudus*	Fairly Common
Long-tailed Weasel	*Mustela frenata*	Common
Masked Shrew	*Sorex cinereus*	Fairly Common
Mexican Woodrat	*Neotoma mexicana*	Fairly Common
Mink	*Mustela vison*	Fairly Common
Montane Shrew	*Sorex monticolus*	Common

Common Name	Scientific Name	Abundance
Montane Vole	*Microtus montanus*	Common
Mountain Cottontail	*Sylvilagus nuttallii*	Common
Mountain Lion	*Felis concolor*	Common
Mule Deer	*Odocoileus hemionus*	Abundant
Northern Grasshopper Mouse	*Onychomys leucogaster*	Fairly Common
Northern Pocket Gopher	*Thomomys talpoides*	Common
Ord's Kangaroo Rat	*Dipodomys ordii*	Common
Pallid Bat	*Antrozous pallidus*	Fairly Common
Pine Squirrel	*Tamiasciurus hudsonicus*	Fairly Common
Pinyon Mouse	*Peromyscus truei*	Common
Red Fox	*Vulpes vulpes*	Fairly Common
Ringtail	*Bassariscus astutus*	Fairly Common
Rock Squirrel	*Spermophilus variegatus*	Fairly Common
Silver-haired Bat	*Lasionycteris noctivagans*	Common
Snowshoe Hare	*Lepus americanus*	Fairly Common
Southern Red-backed Vole	*Clethrionomys gapperi*	Fairly Common
Striped Skunk	*Mephitis mephitis*	Abundant
Western Harvest Mouse	*Reithrodontomys megalotis*	Fairly Common
Western Jumping Mouse	*Zapus princeps*	Fairly Common
Western Pipistrelle	*Pipistrellus hesperus*	Fairly Common
Western Small-footed Myotis	*Myotis ciliolabrum*	Common
Western Spotted Skunk	*Spilogale gracilis*	Fairly Common
White-tailed Prairie Dog	*Cynomys leucurus*	Fairly Common
White-throated Woodrat	*Neotoma albigula*	Fairly Common
Yellow-bellied Marmot	*Marmota flaviventris*	Common
Yuma Myotis	*Myotis yumanensis*	Fairly Common

Source: http://ndis.nrel.colostate.edu/aspresponse/spxbycnty_res.asp

Information on elk, mule deer, and bighorn sheep seasonal activity areas were researched and downloaded from the CDOW's Wildlife Resource Inventory System (WRIS) for several types of habitats: summer range, winter range, summer concentration areas, winter concentration areas, severe winter range, production areas, and migration corridors (CDOW 2005). Ranges of black bear and mountain lion within the OUGA were also ascertained. Definitions of these types of habitat, as defined by the CDOW, are provided in **Table 19**.

Table 19. CDOW Seasonal Big Game Range Definitions

Seasonal Range	Definition
Summer Range	That part of the range of a species where 90 percent of the individuals are located between spring green-up and the first heavy snowfall, or during a site specific period of summer as defined for each data analysis unit (DAU). Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

Seasonal Range	Definition
Winter Range	That part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.
Summer Concentration Area	Those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high-energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.
Winter Concentration Area	That part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.
Severe Winter Range	That part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten
Production Area	That part of the overall range of elk occupied by the females from May 15 to June 15 for calving. Only known production areas have been mapped by the CDOW, additional production areas in each DAU may exist.
Migration Corridors	A specific identifiable corridor through which large numbers of animals migrate and loss of which would change migration routes.

Elk seasonal use areas in the OUGA include the following:

- Summer range – Approximately 130 acres within the southeastern edge of the OUGA are within the elk summer range. However, no well pads, roads or pipelines are proposed in that area.

- Elk winter range –is found throughout the majority of the OUGA. All well pads and access roads are located within elk winter range.

- Elk winter concentration area – is found throughout the western two-thirds of the OUGA. Approximately 3,746 acres of elk winter concentration areas are within the Project Area. Well pads and associated access roads within the winter concentration area include G18OU, F8OU, C17OU, N17OU, K9OU, I9OU, H16OU, L16OU, F21OU, E28OU, and the access roads leading to A28OU.

- Elk severe winter range – There is no severe winter range for the elk within the Project Area.

Mule deer seasonal use areas in the OUGA include the following:

- Summer range – There is no mule deer summer range within the OUGA. The mule deer summer range is to the southeast of the Project Area.

- Mule deer winter range – occurs throughout the OUGA. All well pads, pipeline ROWs, access roads are within the mule deer winter range.

- Mule deer winter concentration area – occurs in the western half of the Project Area. Approximately 2,850 acres are within the OUGA. Well pads and associated access roads

within the winter concentration area include G18OU, F8OU, C17OU, N17OU, K9OU, I9OU, H16OU, L16OU, and F21OU.

- Mule deer severe winter range – Approximately 1,863 acres of mule deer severe winter range occurs in the northeast portion of the Project Area. Well pads and associated access roads that are within the mule deer severe winter range include F8OU, G18OU, C17OU, N17OU, K9OU, and L15OU.

Bighorn sheep seasonal use areas in the OUGA include the following:

- Overall range – of the bighorn sheep consists of 252 acres in the southern edge of the Project Area.

- Summer range – of the bighorn sheep consists of 219 acres within the southern edge of the Project Area.

- Winter range – of the bighorn sheep consists of 121 acres in the southern edge of the Project area.

As indicated in **Table 3**, in Chapter 2, and **Table 17** in this section, leases C-58676, C-60434, and C-60491 do not have timing limitations associated with big game winter habitat. The Colorado Division of Wildlife, in a letter on the Orchard Unit GAP (CDOW 2005b), stated a lack of timing limitations in Sections 21 and 28, which lie within the "overall range", "winter range," and "winter concentration area" of the bighorn sheep. The general area between Smith Gulch and Alkali Creek, in Section 28 where a new road is proposed, is noted as a big game movement corridor, summer to winter transition area. The CDOW also noted that well locations and associated roads lie within the "winter range", "severe winter range" and "winter concentration area" for mule deer and elk. The specific wells and associated roads that are within the winter ranges of the elk, mule deer, and bighorn sheep are identified above.

As described on **Tables 2** and **17**, the Big Game Winter Habitat Timing Limitation will be required on the existing F8OU, M17OU, N17OU and proposed C17OU pads. All remaining pads proposed on GAP have no timing limitation listed in their leases (or use County or public roads to access the pad – which allows for year-round motorized traffic). The pads in areas where the timing limitation is not specified would be subject to 60-day Condition of Approval (COA) for protection of wintering big game (1/15 through 3/15) (J. Byers, BLM, personal communication, August 2005).

Proposed and existing well pads F21OU, K9OU, I9OU, J10OU, F14OU, G15OU, H16OU, L16OU, G18OU, A28OU, and E28OU are located in mapped big game winter range that has been identified as High Value habitat. The leases and wells where the Big Game Winter Habitat Timing Limitation would apply are shown in **Table 17**. In addition to big game, a variety of small game and non-game wildlife, and birds are found in the vicinity of these proposed wells. General impacts (short term, long term, and cumulative) to terrestrial wildlife were adequately addressed in the 1999 FSEIS. At this time, a site-specific habitat assessment has not been conducted to determine the quality of the habitat. However, based on the Battlement Mesa Land

Health Assessment (BLM 2000), many of the areas evaluated by the LHA were considered to be functioning at risk.

Environmental Consequences: The Proposed Action would result in initial loss and fragmentation of 107.9 acres of potential terrestrial wildlife habitat in the OUGA. Pinyon-juniper woodlands characterize much of the area outside of the Project Area, so that loss of some pinyon-juniper trees would not likely impact the viability of most wildlife species. Big sagebrush communities are also present to the west and southwest of the Project Area, but are not as abundant. Therefore, greater impacts could result from loss of sagebrush communities within the OUGA. Following reclamation of pipelines and partial reclamation of well pads and access roads, habitat disturbance would be reduced to 43.3 acres.

The primary concern for terrestrial wildlife is the potential effect of the Proposed Action on big game, particularly impacts to big game winter ranges. The OUGA contains winter ranges for mule deer, elk, and bighorn sheep, and winter concentration areas for mule deer and elk and severe winter range for the mule deer (CDOW 2005b). As shown in Table 17, and discussed above, only some of the leases have big game winter timing limitations. The remaining leases have no winter timing limitations for big game species, which could result in impacts from construction and drilling activities, as well as visual and noise impacts. These impacts are discussed below.

Construction and drilling activities within winter ranges and winter concentration areas would have the potential to displace mule deer, elk, and bighorn sheep from these areas. Construction activities, vegetation disturbance, and traffic could potentially result in the introduction and spread of weed species within the OUGA. Weed invasion and establishment has become an increasingly important concern associated with surface disturbing activities in Colorado and other western states. Weeds often out-compete native plant species, rendering an area less productive as a source of forage for wildlife. However, implementation of the suggested mitigation measures in the Invasive, Noxious Weed section of this EA would minimize the potential for invasion and establishment of the OUGA by undesirable plants.

Construction and drilling operations would likely result in the temporary displacement of wildlife species from the OUGA into surrounding habitats. Depending on the suitability of adjacent habitats, displacement from habitats can result in increased animal mortality rates and reduced breeding success. The increased network of roads and associated traffic could increase mortality and injury to big game from collisions with vehicles, illegal hunting, and harassment from people and their dogs. Vehicle traffic and soil excavation could result in the mortality of nesting birds, small mammals, amphibians and reptiles occurring in the OUGA. If construction were to occur during the spring, the Proposed Action could also result in the mortality of eggs and/or nestlings in the OUGA.

The extent to which human activity disturbs big game varies by species and other factors, such as timing of disturbance, topography, vegetative screening, habituation to disturbance, and frequency and intensity of disturbance. The amount of habitat lost due to displacement is termed “effective habitat loss”. In some areas, research has shown big game reduce their habitat use within a 1/8-mile buffer on either side of roads. This “effective habitat loss” displacement factor

was used in the Glenwood Springs Resource Area Oil and Gas Leasing Development Record of Decision and Resource Management Plan (BLM 1999b) to analyze indirect impacts to big game species. The same methodology is used here to evaluate impacts to big game in the OUGA. Using a one-eighth mile buffer of existing and proposed roads and facilities, the Proposed Action would indirectly result in decreased habitat use and forage in approximately 1,963 acres of the OUGA.

Elk and mule deer forage on a variety of vegetation and diet composition is largely dependant upon the season and amount of available forage. In spring and summer mule deer feed on green leaves, herbs, weeds and grasses more than on browse species. The reverse is true in fall and winter. Elk on the other hand are predominantly grazers, and commonly only consume browse during winter months. The vegetation, within the one-eighth-mile buffer around proposed and existing facilities and roads, is commonly used by big game for foraging. **Table 20** shows the distribution of vegetation types within the 1,963-acre buffer within the OUGA.

Table 20. Vegetation within a One-eighth Mile Buffer Surrounding the Roads, Well Pads and Pipelines within the Orchard Unit

Vegetation Type	Area within 1/8-mile Buffer (acres)	Percent of Total Buffer
Pinyon-Juniper	1,335	68.0
Big Sagebrush	576	29.3
Greasewood Fans/Flats	45	2.3
Irrigated Agriculture	7	0.4
TOTAL	**1,963**	**100**

Because the federal leases related to 12 existing and proposed well pads (F21OU, C10OU, K9OU, I9OU, J10OU, F14OU, G15OU, H16OU, L16OU, G18OU, A28OU, E28OU) contain no big game winter timing limitation, a 60-day Condition of Approval (COA) will be invoked in order to provide some protection to wintering big game in the area (J. Byers, BLM, personal communication, August 2005). Compliance with this timing limitation will minimize impacts to wintering big game by limiting construction during a 60-day period of the critical winter months – January 15 through March 15.

Standard measures are incorporated into the APD along with other measures (i.e., automatic well reporting, and reclamation) to conform to the BLM FSEIS (BLM 1999) that will help to mitigate wildlife impacts. Public access and use of the roads for all the proposed well sites will be prevented due to controlled access on private lands. This will minimize disturbance and reduce effective habitat loss.

Mitigation: Mitigation measures identified below focus on game species but are applicable to all terrestrial wildlife.

For the following well pads (F21OU, K9OU, I9OU, J10OU, F14OU, G15OU, H16OU, L16OU,G18OU, A28OU, E28OU), no road or pad construction, drilling, or completion work

including all surface completion, pipeline construction, movement of equipment, etc., will be allowed from January 15 to March 15, in order to protect wintering big game. For the F8OU, M17OU, N17OU and C17OU pads, the winter timing stipulation placed on the leases will apply from December 1 through April 30, with the applicable exception criteria.

- EnCana will notify all employees that conviction of a major game violation within the GAP area could result in disciplinary action or dismissal (of contractors).

- EnCana will not permit hunting and dogs within the Project Area during working hours by employees or contractors.

- Main access roads will be signed to restrict vehicular use to oil and gas company personnel only.

- Remote monitoring will be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife. In addition, scheduled winter visits (those other than for emergency purposes), should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife.

Threshold Analysis for Wildlife and Wildlife Habitat Mitigation: In addition to the mitigation measures proposed above, the FSEIS Record of Decision (March 1999) on page 14 it states that: *"Within high value or crucial big game winter range, the operator is required to implement specific measures to reduce impacts of oil and gas operations on wildlife and wildlife habitat…Measures to reduce impacts would generally be considered when well density exceeds four wells per 640 acres, or when road density exceeds three miles of road per 640 acres."* Furthermore, Lease Notice GS-LN-05 states: *"Within high value or crucial big game winter range, the operator is required to implement specific measures to reduce impacts of oil and gas operations on wildlife and wildlife habitat."*

The road and well density threshold analysis (Appendix A) was completed for the seven new surface locations, associated access roads, and the existing natural gas development within the Project Area boundary. Results show that 15 pads would be present. The threshold is 33.25 pads. The road density will be 16.6 miles and the threshold is 42.0 miles. Thus, the threshold for surface locations has not been exceeded. However, if future activity within the OUGA exceeds the proposed level of activity and exceeds the threshold values identified in the Glenwood Springs RMP (BLM 1999b), additional mitigation would be required by the BLM.

Finding on Public Land Health Standard for Animal Communities (Standard 3): According to the Land Health Assessment of the Battlement Mesa Area (BLM 2000), the current condition of fish and wildlife habitats varies across the landscape. Habitats within the landscape have been altered by roads, power lines, pipelines, fences, residential development, oil and gas development, and livestock and wild ungulate grazing (BLM 2000). Sagebrush habitats vary from poor to good condition with evidence of light to heavy use. The sagebrush stands provide important habitat for a variety of wildlife species and are particularly important as food and cover for wintering big game within the Battlement Mesa landscape. Pinyon-juniper habitats also vary in condition. Many sites have a sparse herbaceous understory while others have a more

diverse grass and forb component. Pinyon-juniper woodlands are important habitat for nesting raptors and other birds, and provide shelter and cover for a variety of wildlife (BLM 2000). According to the Land Health Assessment (BLM 2000), mule deer numbers have decreased dramatically since the late 1980's, while the numbers appear to be increasing for the elk population, which is shifting to a more permanent residency on BLM lands within the Battlement Mesa Landscape. In addition, winter range habitats in the area may be at or above animal carrying capacity (BLM 2000). Although the Proposed Action would add to the disturbance of sagebrush habitats and pinyon-juniper woodlands, the BLM stipulations and mitigation measures proposed in this EA would minimize the impact from the proposed project. Thus, the Proposed Action may, in time, result in an upward trend of wildlife habitat within the OUGA.

OTHER NON-CRITICAL ELEMENTS: **Table 21** provides a list of other non-critical elements, and whether they have been brought forward for analysis in the EA, not analyzed due to no impact, or are not applicable to this project.

Table 21. Other Non-Critical Elements

Non-Critical Element	Applicable and Present and Brought Forward for Analysis	Applicable or Present, No Impact	NA or not Present
Travel/Access	X		
Cadastral Survey			X
Fire/Fuels Management			X
Forest Management			X
Geology and Minerals	X		
Hydrology/Water Rights	X		
Law Enforcement			X
Paleontology	X		
Noise	X		
Range Management	X		
Realty Authorizations		X	
Recreation	X		
Socio-Economics	X		
Transportation	X		
Visual Resources	X		

SOCIO-ECONOMICS

Lease Stipulation: None.

Affected Environment: A basic socio-economic description of Garfield County, Colorado is available at the County's website http://www.garfield-county.com/home/index.asp?page=2.

Tourism, gas & coal mining, sheep & cattle ranching, and fruit & vegetable growing are the major industry types. Unemployment is low. Public lands account for about 60% of the total land base of the County.

Property Tax Revenue

Oil & Gas Assessed Valuation in Garfield County amounted to $259,832,000, or about 25% of total assessed valuation in the county of $1,019,831,820 in 2003. Based on this assessed value, $12,515,617 in property tax revenue was collected in Garfield County from oil and gas operations. These revenues were used to fund a variety of county facilities and services, including local school districts, fire districts and other special service districts, Colorado Mountain College, local city governments, and the Garfield County government in general.

In Mesa County, oil and gas development to date has been far less extensive than has been the case in Garfield County. Assessed valuation of oil and gas development in Mesa County was approximately $21.5 million (or about 2.1%) out of a total assessed valuation of $1,040,945,810 in 2004 (Mesa County, 2004). As is the case with Garfield County, property tax revenue collected on oil and gas development helps fund a variety of local community facilities and services, though to a lesser extent in Mesa County than in Garfield County.

Mineral Lease Royalty Payments

Federal mineral royalties are levied on oil and gas production from federal mineral leases. For oil and gas production that took place in Garfield County in 2003, total royalties collected amounted to $125,683,568, paid to the U.S. Treasury. Half of those royalties or $62,841,784 was then paid to the State of Colorado. The state's share of the revenue was then distributed using a complex formula to a variety of state and local agencies, including the State School Fund (49%), Department of Local Affairs (23%), the Colorado Water Control Board (10%), counties where oil and gas were produced (8%), local towns in those counties (5%), and local school districts (5%). In 2003, the Garfield County share of Federal mineral lease royalties was $1,332,000.

In total, oil and gas-related revenues paid to Garfield County, local communities in the county, and various school and special service districts in the county totaled about $13.8 million in 2003 (Martin, 2004).

Environmental Consequences: The Proposed Action would positively impact the local economies of Garfield and Mesa Counties through the creation of additional job opportunities in the oil and gas industry and supporting trades and services. In addition, local governments in Garfield and Mesa Counties would experience an increase in tax and royalty revenues collected, assuming economic production from the proposed natural gas wells in the OUGA. Table 22 provides a brief summary of the types of social/economic impacts that would be experienced as a result of the Proposed Action and No Action Alternative.

Table 22. Social / Economic Summary Table

	Impacts	
	Proposed Action	**No Action Alternative**
1. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	No	No
2. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities?	Yes, add economic opportunities	No
3. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so, estimated number.	Yes, add job opportunities	No
4. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue?	Yes, create tax revenue	No
5. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc) be needed?	No	No
6. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans negatively affected?	No	No
7. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing?	No	No
8. SOCIAL STRUCTURES: Is some disruption of native or traditional lifestyles or communities possible?	No	No
9. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	No	No

CUMULATIVE IMPACTS SUMMARY

The 2004 Draft Roan Plateau Resource Management Plan & Environmental Impact Statement released in November, 2004 (BLM 2004) analyzed five alternatives for oil and gas development in the Roan Plateau planning area. These alternatives assessed impacts, including cumulative impacts, for oil and gas scenarios ranging from 855 to 1,582 new gas wells on public lands. The drilling of the wells addressed in this Environmental Assessment is well below the low range of development analyzed in the DEIS.

Since the completion of the 1999 Oil and Gas Leasing and Development FEIS, the number of wells analyzed in subsequent NEPA documents has exceeded the 230 federal wells forecast in the RFD for lands outside the NOSR Production Area. However, drilling technology advancements have drastically reduced the expected surface disturbance of 3.4 acres per well or 1,020 acres from federal wells analyzed in the 1999 FSEIS. The FSEIS analysis was based on a reasonably foreseeable development scenario, including the number of wells, well spacing, required equipment, and assumed pollutant emission rates. Since completion of the FSEIS, the majority of new wells has been drilled directionally and, in many instances, is being drilled from

existing well pads thereby reducing the overall anticipated surface impact addressed in the 1999 FSEIS.

The air quality analysis conducted in the 2004 DEIS does assess the cumulative impacts to the airshed from oil and gas development within and around the Roan Plateau Planning Area. The Proposed Action addressed in this document, which include well pad and road construction, well drilling and well completion work typical for oil and gas development, would not represent an increase in emissions beyond that anticipated in the 2004 DEIS.

PERSONS / AGENCIES CONSULTED

PUBLIC INVOLVEMENT

The Council on Environmental Quality (CEQ) regulations require an "early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a Proposed Action" (40 CFR 1501.7). In order to satisfy this CEQ requirement, the BLM requested input from the public to determine their concerns and issues with EnCana's proposal, to develop alternatives to the proposal that respond to those issues, to analyze the environmental effects of the Proposed Action and to prepare the environmental document for the OUGAP.

The legal notice addressing the OUGAP Proposed Action was published in three local newspapers with circulation in Garfield and Mesa counties, including the Glenwood Springs Post Independent (June 19, June 26, and July 3), the Rifle Citizen Telegram (June 23, June 30, and July 7), and the Grand Junction Daily Sentinel (June 18, June 28, and July 2). Additionally, a copy was mailed directly to multiple state and federal agencies, adjacent landowners, the Garfield County oil and gas auditor, and the Colorado Department of Wildlife. The 30-day comment period ended on July 18, 2005.

Two comment letters were received. The respondents included the Bureau of Reclamation and the Colorado Division of Wildlife. The comments are summarized as follows:

<u>Bureau of Reclamation</u>

- The Bureau of Reclamation manages the DeBeque Wildlife Area adjacent to the OUGA.
- Traffic associated with existing natural gas development activities has damaged wildlife area gates and fences. The Proposed Action would likely increase traffic through the wildlife area and damage to fences and gates will also increase.

<u>Colorado Division of Wildlife</u>

- The Project Area lies within "winter range", "severe winter range", and "winter concentration areas" for mule deer and elk. Construction and drilling activities from December 1 to April 30 each year could negatively impact wintering deer and elk. Negative impacts to big game could be minimized if construction and drilling were avoided during the sensitive winter time period.

- During the operations phase of the project, winter impacts to big game could be minimized if remote telemetry equipment were used to monitor production and human activity and vehicle traffic in the Project Area were correspondingly reduced.
- Sections 21 and 28 in the OUGA are within "winter range", "winter concentration", and "overall range" of bighorn sheep. Winter timing limitations should apply to this part of the OUGA.
- The proposed road in Section 28 passes through a big game migration corridor. The proposed new road in Section 28 could increase recreational use and human activity, which could negatively impact bighorn sheep. This road should be gated and locked to restrict access and vehicle traffic.
- Relocation of the A28OU pad may benefit wildlife.
- Location of pads and roads along the edges of sagebrush parks and mesas and/or into pinyon-juniper woodlands would reduce impacts to wildlife.
- The removal and disturbance of native vegetation will negatively impact wildlife species. These impacts can be offset during reclamation by planting a suitable mixture of native grass/forbs/shrub seed.
- Reclamation will be more successful with proper soil preparation (ripping) and seeding techniques.
- A performance-based reclamation plan is preferable to a simple seeding rate specification for reclamation.
- Non-native weeds have become established in parts of the Project Area. Continual control of weeds over the life of the project will help restore native vegetation beneficial to wildlife.
- New roads in the Project Area in general should be gated to restrict public access and reduce negative impacts to wildlife.
- New roads and pipelines will increase habitat fragmentation, which is detrimental to wildlife.
- Pits create potential drowning and exposure hazards for wildlife. Escape ramps should be installed, or pit slopes should be no steeper than 3:1 and covered with soil or other "non-slippery" surface.
- Ponds attract waterfowl and shorebirds and exposure to their contents can be detrimental to these birds. Ponds should be fenced and netted to prevent birds from using them.
- To reduce human/bear conflicts, bear proof trash containers should be used and project employees should be prohibited from feeding bears.

Key Issues

Key issues were defined as issues that 1) drive the analysis of environmental effects; 2) prescribe or necessitate the development of mitigation measures; 3) drive the development of additional project alternatives. These key issues are summarized as follows:

- Effects on big game and winter range
- Effects on wildlife and wildlife habitat
- Construction and operational methods to prevent erosion.
- Interim reclamation methods

- Public Access

Agencies Consulted

In addition to the public "scoping" period, BLM has initiated formal consultation with the Southern Ute Tribe, Ute Mountain Ute Tribe, and Uintah and Ouray Ute Tribe. BLM has also contacted and received comments from the Colorado Division of Wildlife.

List of Preparers and Interdisciplinary Review

The EA was prepared by an interdisciplinary team of resource specialists from Buys & Associates Environmental Consultants (a third-party contractor) with direction from and independent review by BLM employees in the Glenwood Springs Field Office. **Tables 23 and 24** list the BLM staff members who provided review for the EA and the people from Buys & Associates who prepared the EA.

Table 23. List of Buys & Associates Preparers

Resource Parameter/Area of Responsibility	Responsible B&A Member
Project Management, Visual Resources, Land Use, Socioeconomics Transportation, Recreation	Chris Freeman
Hydrology	Sue Barker
Air Quality, Noise	Jon Torizzo
Biological Resources	Marion Fischel
Geology and Minerals, Soils	Dave Nicholson
GIS	Gary Thompson
NEPA Review, Technical Editors	Marty Buys, Stephanie Stewart and Melissa Lasley

Table 24. List of BLM Interdisciplinary Reviewers

Resource Parameter/Area of Responsibility	Responsible IDT Member
Air Quality	Mark Wimmer
Areas of Critical Environmental Concern	Kay Hopkins
Cultural Resources	Cheryl Harrison
Environmental Justice	Jim Byers
Farmlands, Prime and Unique	Jim Byers
Floodplains	Mark Wimmer
Invasive, Non-Native Species	Carla Scheck
Migratory Birds	Tom Fresques
Native American Religious Concerns	Cheryl Harrison
Threatened, Endangered and Sensitive Species	Tom Fresques (wildlife), Carla Scheck (plants)
Wastes, Hazardous or Solid	Jim Byers
Water Quality, Surface and Ground (404 permit issues)	Mark Wimmer
Wetlands and Riparian Zones	Mike Kinser

Resource Parameter/Area of Responsibility	Responsible IDT Member
Soils	Mark Wimmer
Vegetation	Carla Scheck
Wildlife, Aquatic	Tom Fresques
Wildlife, Terrestrial	Tom Fresques
Travel/Access	Brian Hopkins
Geology and Minerals	Bruce Fowler
Hydrology/Water Rights	Mark Wimmer
Paleontology	Harley Armstrong
Range Management	Mike McGuire
Realty Authorizations	Carlos Sauvage
Recreation	Brian Hopkins
Socio-economics	Brian Hopkins
Visual Resources	Kay Hopkins

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Figures 1 through 6

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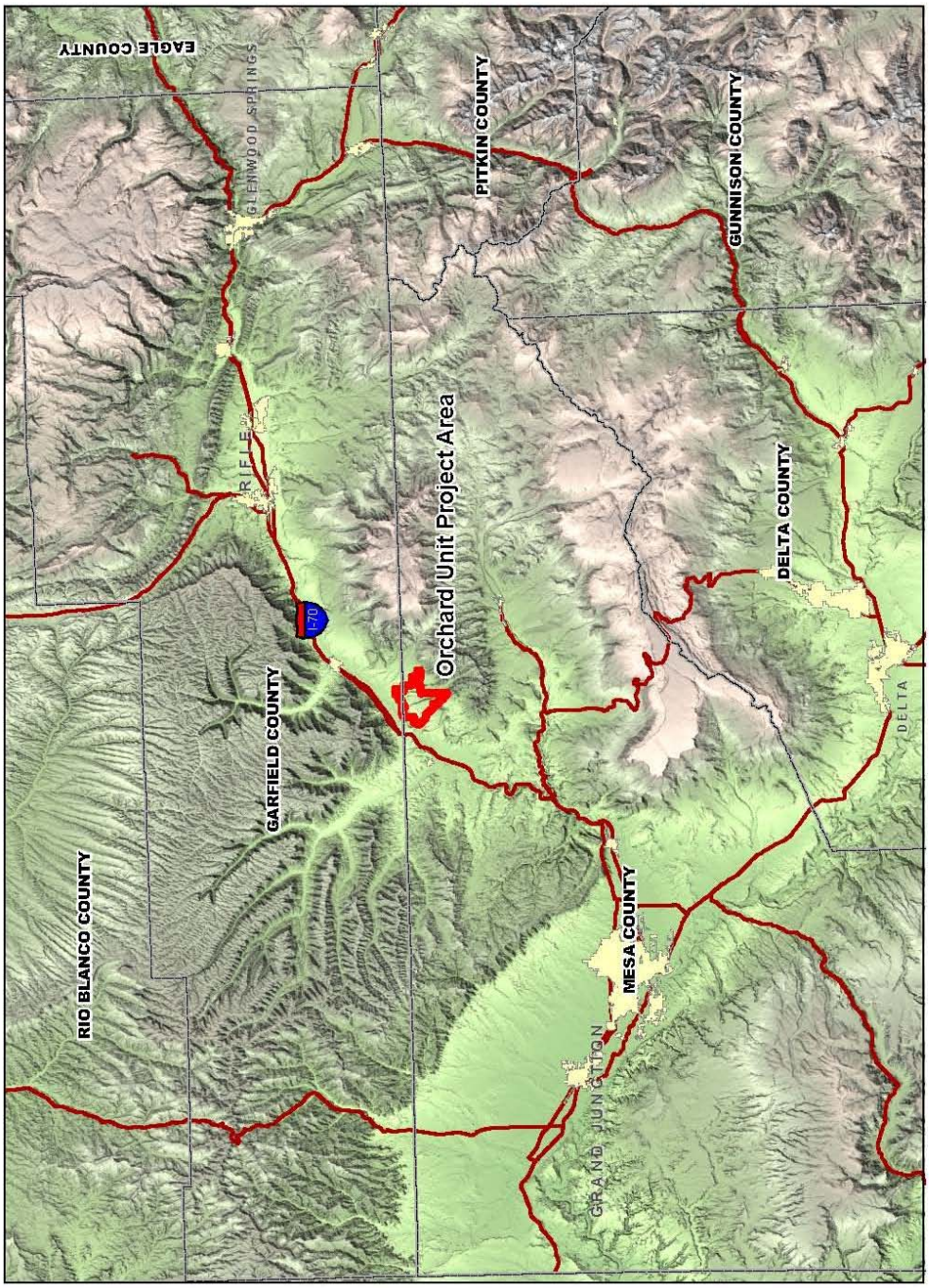

Figure 1. Location of the Orchard Unit Project Area

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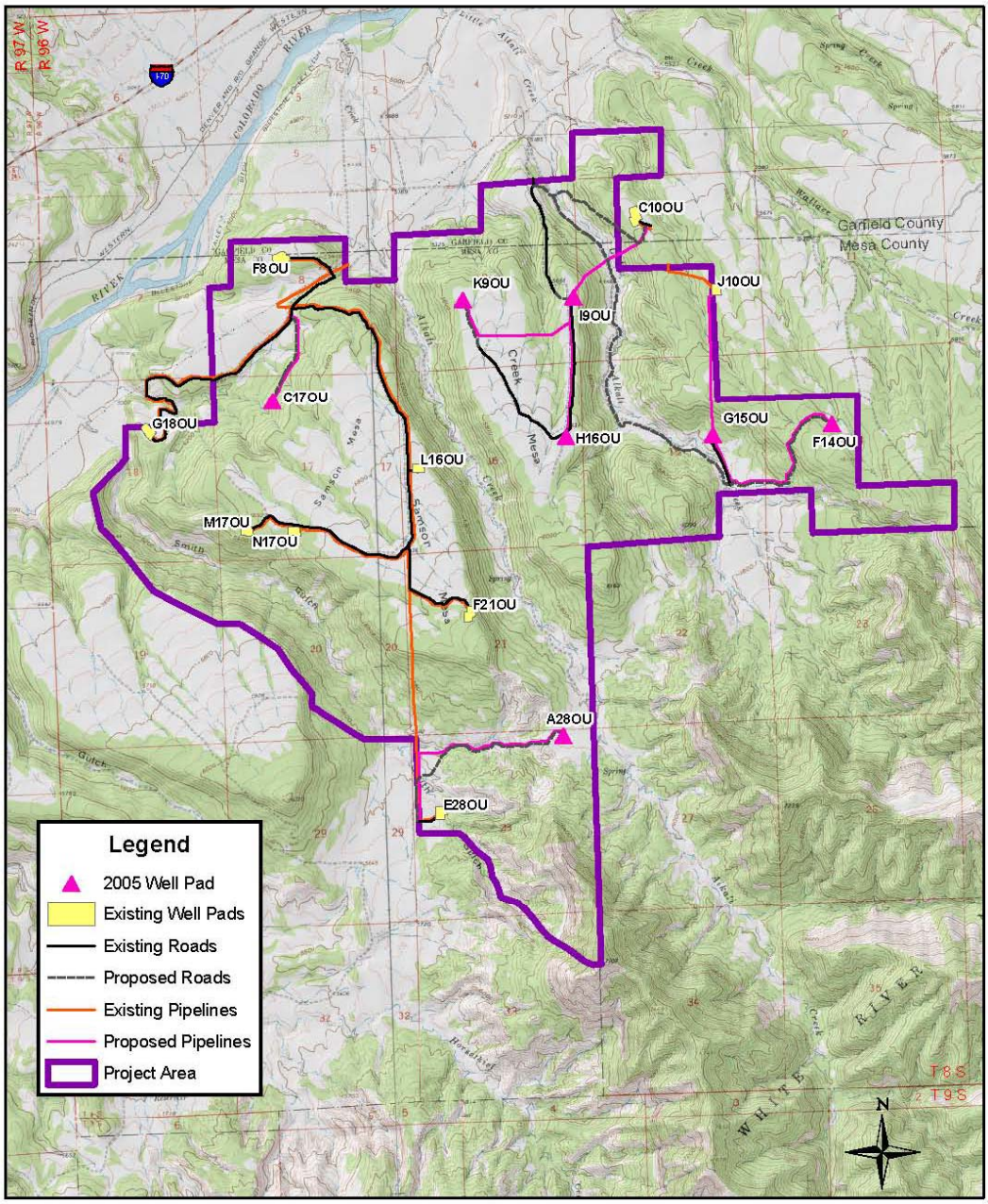

Figure 2. Orchard Unit Project Area Map

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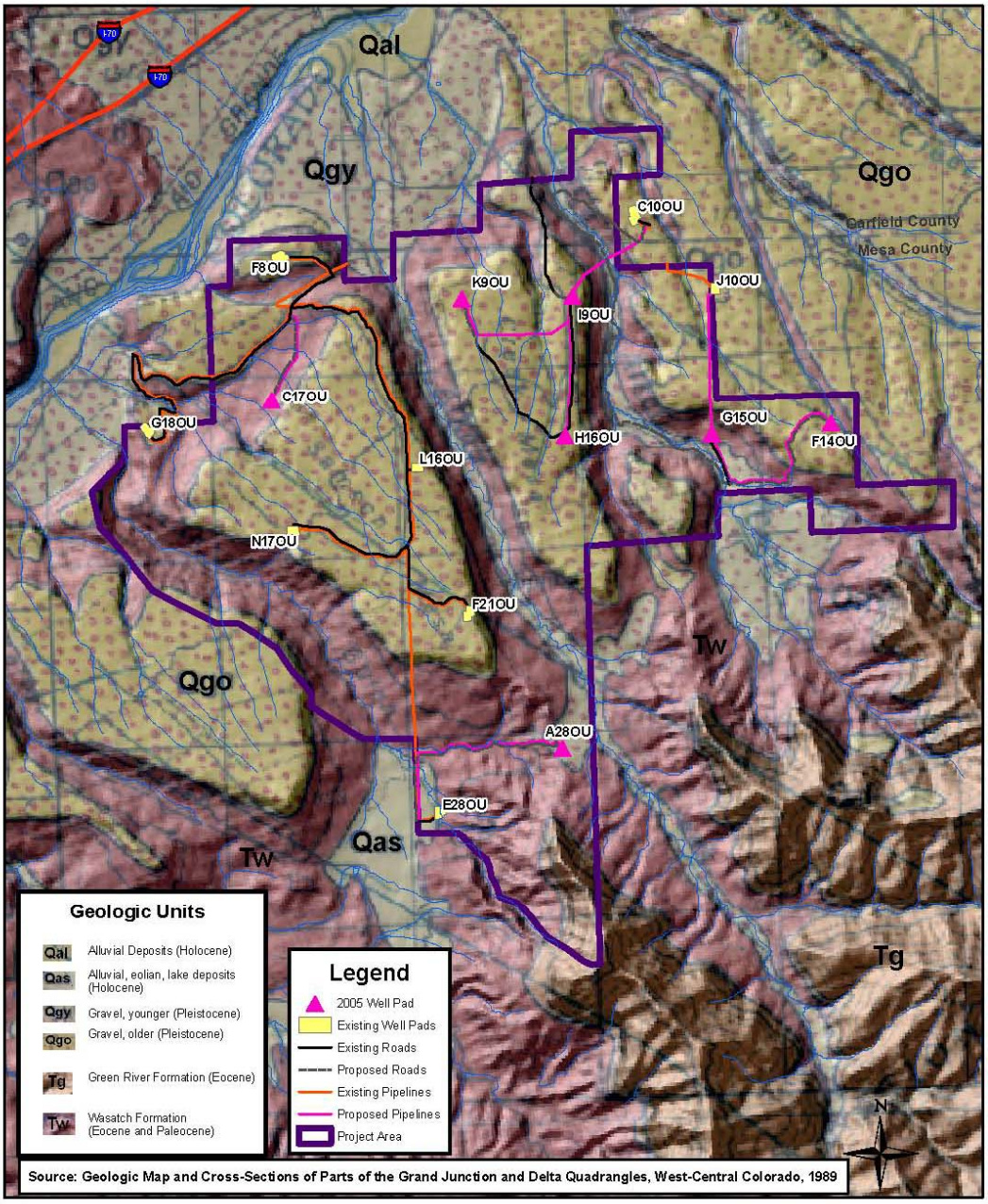

Figure 3. Geologic Map of the Orchard Unit Project Area and Vicinity

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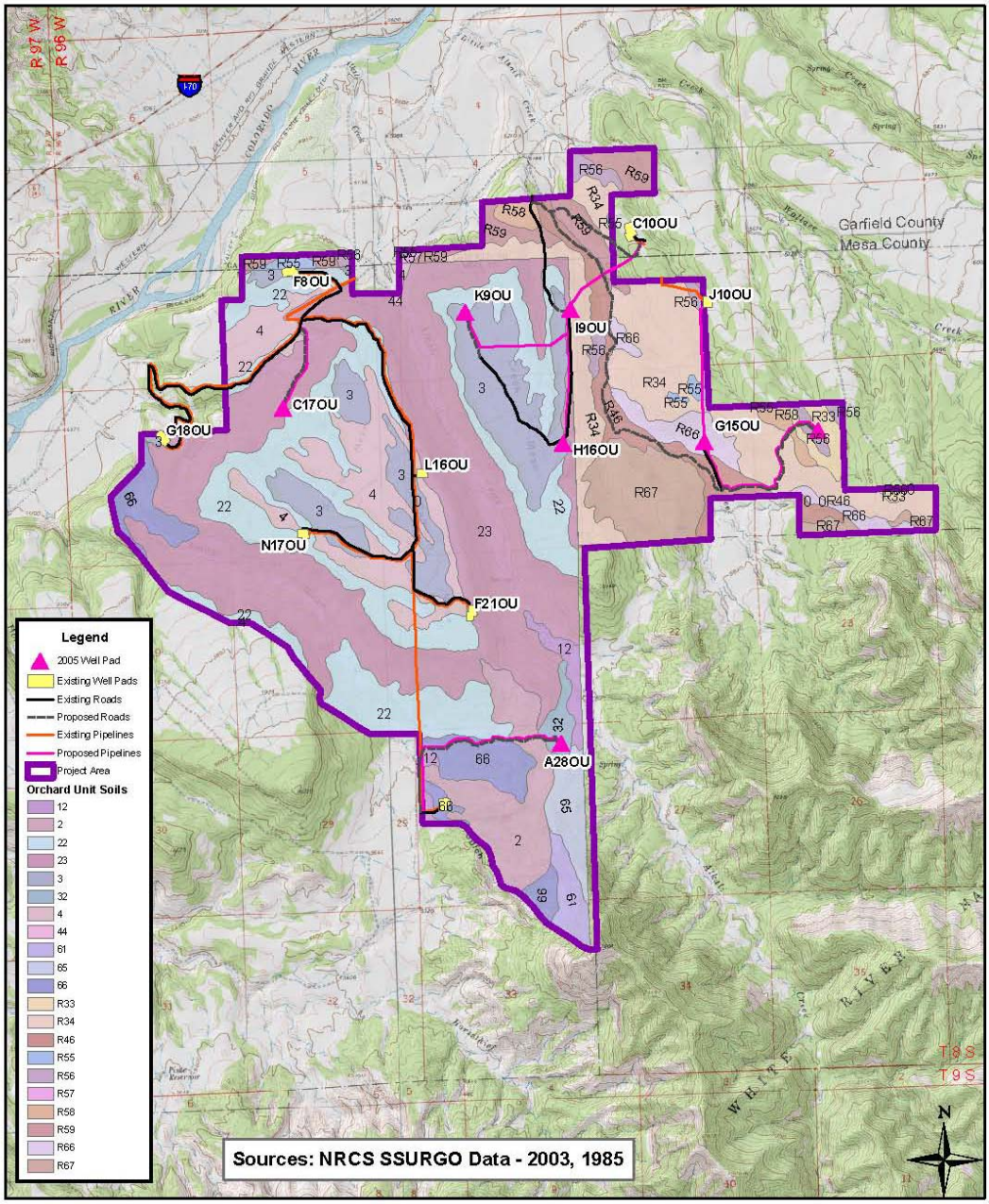

Figure 4. Orchard Unit Soils Map

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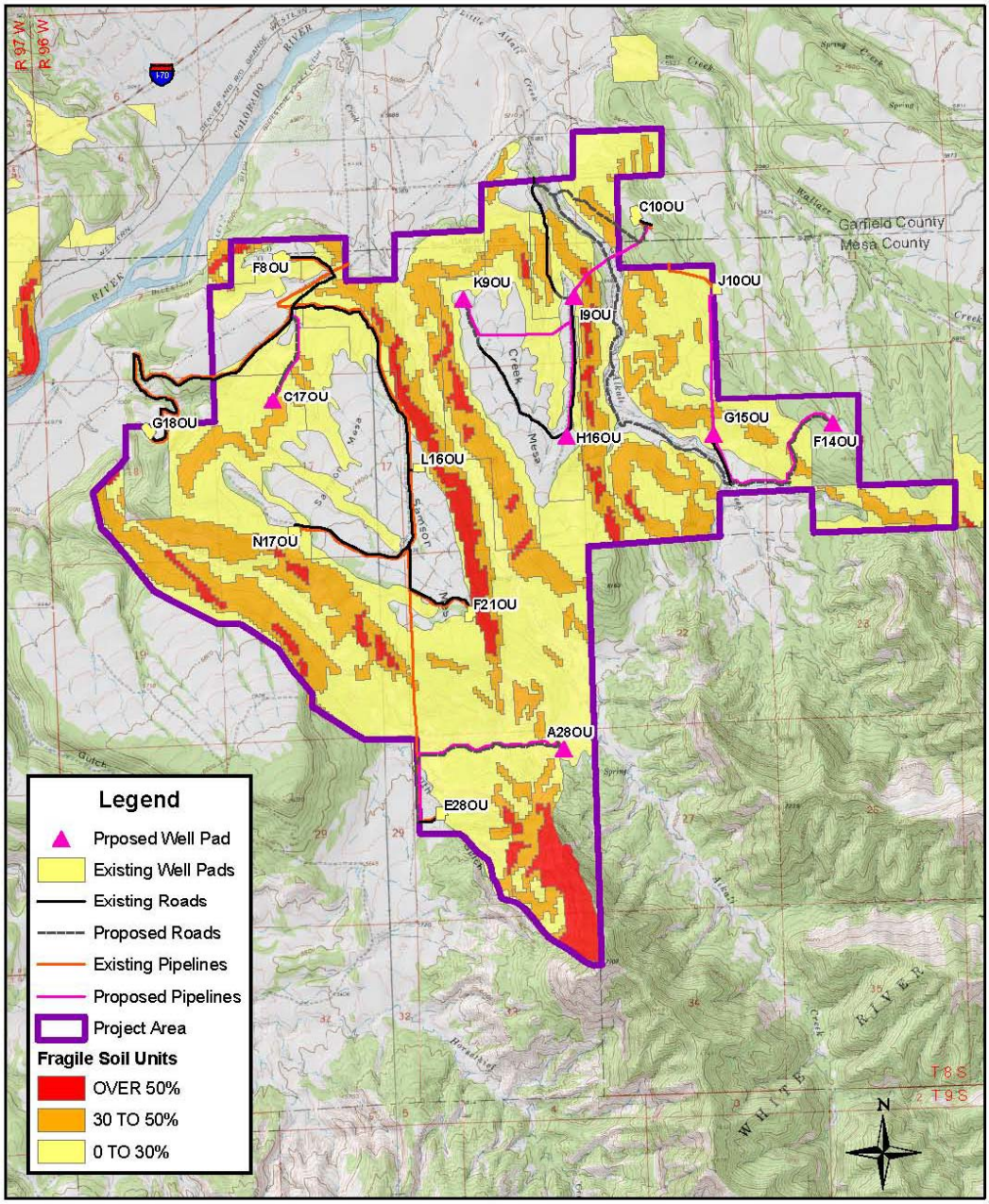

Figure 5. Orchard Unit - Fragile Soils Map

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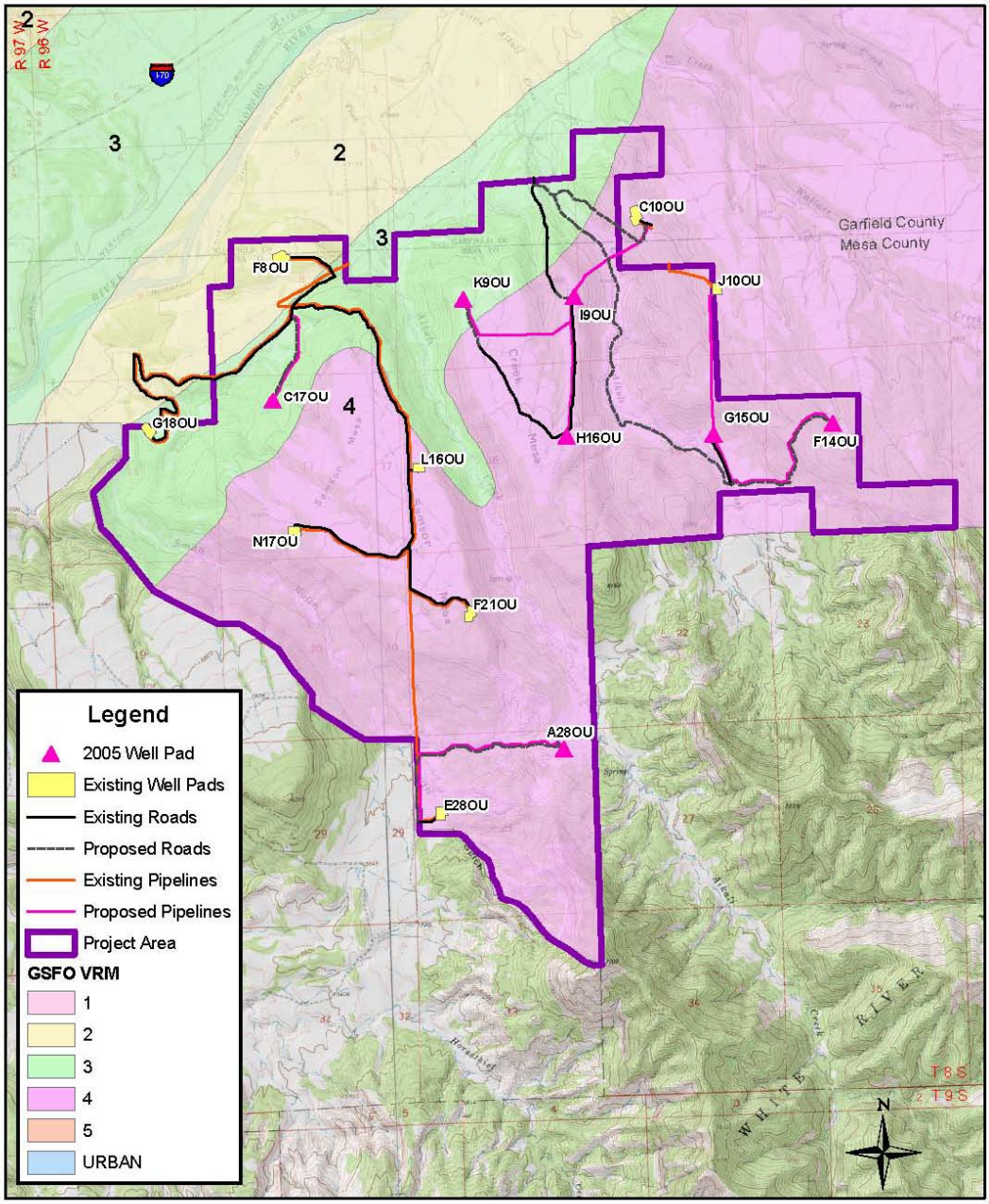

Figure 6. Visual Resource Management Classes in the OUGA

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APPENDIX A

13 POINT SURFACE USE PLAN & 10 POINT DRILLING PLAN for the ORCHARD UNIT GAP

1. EXISTING ROADS

A. The proposed wellsite is staked and reference stakes are present as shown on attached Topo maps.
B. Access Roads – refer to Topo maps "A" and "B".
C. Access Roads within a one-mile radius – refer to Topo map "B".
D. The existing roads will be maintained in the same or better condition as existed prior to the commencement of operations and said maintenance will continue until final abandonment and reclamation of the well location. Excessive rutting or other surface disturbance will be avoided. Operations will be suspended temporarily during adverse weather conditions if excessive rutting is occurring when access routes are wet, soft, or partially frozen.

2. PLANNED ACCESS ROAD

All proposed access roads are shown on Topo map "B".

A. Width maximum – 30 feet overall right-of-way with an 18-foot road running surface, crowned and ditched and/or sloped and dipped.
B. Construction standard: The road will be constructed to meet the standards of the anticipated traffic flow and all weather requirements. Construction will include ditching, draining, crowning and capping or sloping and dipping the roadbed as necessary to provide a well-constructed and safe road.

   Prior to construction/upgrading the roadway shall be cleared of any snow cover and allowed to dry completely.

   Traveling off of the thirty (30) foot right-of-way will not be allowed.

   Road drainage crossings shall be of the typical dry creek drainage crossing type. Crossings shall be neither designed so they will not cause siltation or the accumulation of debris in the drainage crossing nor shall the drainages be blocked by the roadbed. Diverting water off at frequent intervals by means of cutouts shall prevent erosion of the drainage ditches by runoff water.

   Upgrading shall not be allowed during muddy conditions. Should mud holes develop, they will be filled in and detours around them avoided.

C. Maximum grade – the average grade will be 10% or less, wherever possible. The 10% grade will only be exceeded in areas where physical terrain or unusual circumstances require it.

D. Drainage design – the access road will be crowned and ditched or sloped and dipped, and water turnouts installed as necessary to provide proper drainage along the access road route.
E. Turnouts will be constructed along the access route as necessary or required to allow for the safe passage of traffic.
F. Culverts – none will be required unless otherwise specified during the onsite inspection.
G. Surface materials – surfacing materials will consist of native soil. If any additional surfacing materials are required they will be purchased from a local contractor having a permitted source of materials in the area. None are anticipated at this time.
H. Gates, cattle guards or fence cuts – none required unless specified during the onsite inspection.
I. Road maintenance – during both the drilling and production phase of operations, the road surface and shoulders will be kept in a safe and legal condition and will be maintained in accordance with the original construction standards. The access road right-of-way will be kept free of trash during operations.
J. The proposed access road has been centerline flagged.
K. Dust will be controlled on the roads and locations during construction and drilling by periodic watering of the roads and locations.

3. **LOCATION OF EXISTING WELLS WITHIN A ONE MILE RADIUS**
Please refer to Topo Map "C".

4. **LOCATION OF EXISTING AND/OR PROPOSED FACILITIES**
A. At each drill location, surface disturbance will be kept to a minimum. Each drill pad will be leveled using cut and fill construction techniques as noted in the attached survey.
B. Should drilling result in established commercial production the following will be shown:
    1. Proposed location and attendant lines, by flagging, if off well pad.
    2. Dimensions of facilities.
    3. Construction methods and materials.
    4. Protective measures and devices to protect livestock and wildlife.
    5. All buried pipelines will be buried to a depth of 3 feet, except at road crossing where they will buried to a depth of 4 feet.
    6. Construction width of the right-of-way/pipeline route shall be restricted to 60 feet of disturbance.
    7. Pipeline location warning signs shall be installed within 90 days after construction is completed.
    8. EnCana shall condition pipeline right-of-ways in a manner to preclude vehicular travel upon said rights-of-way, except for access to pipeline drips and valves.
    9. Pipeline right-of-way will be requested on the APD. ROW request is for 60' for construction of working surface during construction. After construction is complete 30' is to be rehabilitated leaving a 30' working

surface. In the event production is established this well will be tied-in to an existing pipeline as shown in Topo map "D".

10. The area used to contain the proposed production facilities will be built using native materials. If these materials are not acceptable, arrangements will be made to acquire appropriate materials from private sources.
11. A dike will be constructed completely around any production facilities which contain fluids (i.e. production tanks, produced water tanks, etc.) These dikes will be constructed of compacted subsoil, be impervious, hole 110% of the capacity of the largest tank, and be independent of the back cut.
12. All permanent (onsite for six months or longer) above-the-ground constructed or installed, including pumping units, will be painted a flat non-reflective, earthtone color to match one of the standard environmental colors as determined by the five State Rocky Mountain Interagency committee. All production facilities will be painted within six months of installation. Facilities that are required to comply with Occupation Health and Safety Act Rules and Regulations will be excluded from this painting requirement.
13. The production (emergency) pit will be 8 feet in diameter and 8 feet deep. It will be lined with corrugated steel with a steel mesh cover.
14. If different production facilities are required, a sundry notice will be submitted.

C. EnCana Oil & Gas (USA) Inc. shall protect all survey monuments, witness corners, reference monuments and bearing trees in the affected areas against disturbance during construction, operation, maintenance and termination of the facilities authorized herein.

   EnCana Oil & Gas (USA) Inc. shall immediately notify the authorized officer in the event that any corners, monuments or markers are disturbed or are anticipated to be disturbed. If any monuments, corner or accessories are destroyed, obliterated or damaged during construction, operation or maintenance, EnCana shall secure the services of a Registered Land Surveyor to restore the disturbed monuments, corner or accessories, at the same location, using surveying procedures found in the Manual of surveying Instructions for the Survey of the public Lands of the United States, latest edition. EnCana shall ensure that the Registered Land Surveyor properly records the survey in compliance with the Colorado Revised Statues 38-53-101 through 38-53-112 (1973) and shall send a copy to the authorized officer.

D. During drilling and subsequent operations, all equipment and vehicles will be confined to the access road right-of-way and any additional areas as specified in the approved Application for Permit to Drill.
E. Reclamation of disturbed areas no longer needed for operation will be accomplished by grading, leveling and seeding as recommended by the Bureau of Land Management.

EnCana Oil & Gas (USA) Inc. will be responsible for road maintenance from the beginning to completion of operations.

5. LOCATION AND TYPE OF WATER SUPPLY

A. Water to be used for the drilling of these wells will be hauled by truck over the roads described in item #1 and item #2, from the nearest water supply. Water volume used in drilling operation is dependent upon the depth of the well and any losses that might occur during drilling.

6. SOURCE OF CONSTRUCTION MATERIALS

A. All access roads crossing Federal land are described under Item #2, and shown on the Orchard Unit GAP Map dated 5/31/05.
All construction material for these location sites and access roads shall be borrowed material accumulated during the construction of the location sites and access roads. No additional construction material from other sources is anticipated at this time. If in the future it is required, the appropriate actions will be taken to acquire it from private sources.

B. All trees on the locations, access road, and proposed pipeline routes shall be disposed of by one of the following methods:
   1. Trees shall be cut with a maximum stump height of six inches (6") and cut to 4-foot lengths and stacked off location. Trees will not be dozed off the location or access road, except on private surface where trees may be dozed. Trees may also be dozed on pipeline routes and then pulled back onto right-of-way as part of final reclamation.
   2. Limbs may be scattered off location, access road or along the pipeline, but not dozed off.

Rootballs shall be buried or placed off location, access road, or pipeline route to be scattered back over the disturbed area as part of the final reclamation.

7. METHODS OF HANDLING WASTE MATERIALS

A. Cutting will be deposited in the reserve/blooie pit.

B. Drilling fluids including salts and chemicals will be contained in the reserve/blooie pit. Upon termination of drilling and completion operations, the liquid contents of the reserve pit will be removed and disposed of at an approved waste disposal facility within ninety (90) days after termination of drilling and completion activities.

In the event that adverse weather conditions prevent removal of the fluids from the reserve pit within this time period, an extension may be granted by the Authorized Officer upon receipt of a written request from EnCana Oil & Gas (USA) Inc. The reserve pit will be constructed so as not to leak, break or allow discharge.

C. Produced fluids – liquid hydrocarbons produced during completion operations will be placed in test tanks on the location. Produced wastewater will be confined

to a lined pit (reserve pit) or storage tank for a period not to exceed ninety (90) days after initial production. During the permanent disposal method and location, along with the required water analysis shall be submitted for the Authorized Officer's approval. Failure to file an application within the time frame allowed will be considered an incidence of noncompliance.

D. Sewage- self-contained, chemical toilets will be provided for human waste disposal. Upon completion of operations, or as needed, the toilet holding tanks will be pumped and the contents thereof disposed of in the nearest, approved, sewage disposal facility.
E. Garbage and other waste material – garbage, trash and other waste materials will be collected in a portable, self-contained and fully – enclosed trash cage during drilling and completion operations. Upon completion of operations (or as needed) the accumulated trash will be disposed of at an authorized sanitary landfill. No trash will be burned on location or placed in the reserve pit.
F. Immediately after removal of the drilling rig, all debris and other waste materials not contained in the trash cage will be cleaned up and removed from the well location. No adverse materials will be left on the location. Any open pits will be maintained until such time as the pits are backfilled.
G. The reserve and/or production pit will be constructed on the existing location and will not be located in natural drainages where a flood hazard exists or surface runoff will destroy or damage the pit walls. All pits will be constructed so as not to leak, break, or allow the discharge of liquids there from.
H. Any spills of oil, gas, salt water or other potentially hazardous substances will be reported immediately to the BLM, and other responsible parties, and will be mitigated immediately, as appropriate, through clean up or removal to an approved disposal site.

8. ANCILLARY FACILITIES

Self-contained travel-type trailers may be used on site during drilling operations. Standard drilling operation equipment to be on location will include: drilling rig with associated equipment; living facilities for company representative, tool pusher, mud logger, directional driller; toilet facilities and trash containers.

Facilities other than those described in this surface use plan to support drilling operations will be submitted to the Authorized Officer via a sundry notice (form 3160-5) for approval prior to commencing operations.

WELLSITE LAYOUT

A. The attached location plat specifies the drill site layout as staked. Cross sections have been drafted to visualize the planned cuts and fills across the location. An average minimum of six (6) inches of topsoil will be stripped from the location (including the areas of cut, fill and/or subsoil storage) and stockpiled for future reclamation of the well site. The stockpiled soil will be seeded within 48 of completion of the pad.
B. A production schematic showing the proposed production facility layout is attached.

C. The reserve pit and blooie pit will be constructed as a combination pit capable of holding approximately four times the TD hole volume. The pits were combined, as these are gas wells and there will be no danger of the accumulation of hydrocarbons that could result in a potential safety hazard. The blooie pit might be used for testing, but only after the drilling is completed and the drilling equipment and personnel are off the well site location. In the event that drilling fluid (mud) will have to be used then this pit will also serve as the reserve pit. The reserve pit will be lined to prevent seepage.

   This requirement may be waived by the Bureau of Land Management upon receipt of additional information from EnCana Oil & Gas (USA) Inc. concerning the location of fresh water aquifers and potential flow rates, chemical analyses of waters from the aquifers, and information concerning both the mechanics and nature of the air mist drilling system including any additives used therein.

D. Prior to the commencement of drilling operations, the reserve pit will be fenced on three (3) sides using three strands of barbed wire according to the following minimum standards:
   1. Corner posts shall be cemented and/or braced in such a manner to keep the fence tight at all times.
   2. Standard steel, wood, or pipe posts shall be used between the corner braces. The maximum distance between any two (2) posts shall be no greater than sixteen (16) feet.
   3. All wire shall be stretched using a stretching device before it is attached to the corner posts.

   The fourth side of the reserve pit will be fenced immediately upon removal of the drilling rig and the fencing will be maintained until the pit is backfilled.

E. Any hydrocarbons on the pit will be removed from the pit as soon as possible after drilling operations are completed.

F. Operator will notify the Authorized Officer at least three (3) working days prior to construction of the well pad and/or related facilities and within two (2) working days after completion of the well pad.

9. PLANS FOR RECLAMATION OF THE SURFACE:

The BLM will be contacted prior to commencement of any reclamation operations.

A. Production
   1. Immediately upon well completion, the well location and surrounding areas(s) will be cleared of all debris, materials, trash and junk not required for production.
   2. Immediately upon well completion, any hydrocarbons in the pit shall be removed in accordance with 43CFR 3162.7-1.
   3. Before any dirt work to restore the location takes place, the reserve pit will be completely dry and all cans, barrels, pipe, etc. will be removed.

Other waste and spoil materials will be disposed of immediately upon completion of drilling and workover activities.

4. The reserve pit and that portion of the location and access road not needed for production facility/operations will be reclaimed within ninety (90) days from the date of well completion, weather permitting.
5. If the well is a producer, EnCana will upgrade and maintain access roads as necessary to prevent soil erosion, and accommodate year round traffic. Areas unnecessary to operations will have areas reshaped. Topsoil will be redistributed and disked. All areas outside the work area will be re-seeded according to the Bureau of Land Management recommendations for seed mixture.
6. If the well is abandoned or a dry hole, EnCana will restore the access road and location to approximately the original contours. During reclamation of the site, fill material will be pushed into cuts and up over the backslope. No depressions will be left that will trap water or form ponds. Topsoil will be distributed evenly over the location and seeded according to the recommended seed mixture. The access road and location shall be ripped or disked prior to seeding. Perennial vegetation must be established. Additional work shall be required in case of seeding failures, etc.

   Seedbed will be prepared by disking then roller packing following the natural contours. Seed will be drilled on contours at a depth no greater than one-half inch (1/2). In areas that cannot be drilled, seed will be broadcast at double the seeding rate and harrowed into soil. Certified seed will be used whenever available.

   Fall seeding will completed after September 1, and prior to prolonged ground frost. To be effective, spring seeding will be completed after the frost has left the ground and prior to May 15th.

7. Upon completion of backfilling, leveling and recontouring, the stockpiled topsoil will be evenly spread over the reclaimed areas(s). Prior to reseeding, all disturbed surfaces will be scarified and left with a rough surface. No depressions will be left that would trap water and form ponds. All disturbed surfaces will be re-seeded with a seed mixture to be recommended by the BLM.

   Seed will be drilled on the contour to approximately a depth of one-half (1/2) inch. All seeding will be conducted after September 1 and prior to ground frost. Spring seeding will be done after the frost leaves the ground and no later than May 15th. If the seeding is unsuccessful, EnCana may be required to make subsequent seedings.

B. DRY HOLE/ABANDONED LOCATIONS

   A. On lands administered by the BLM, abandoned well sites, roads or other disturbed areas will be restored to near their original condition.

This procedure will include:

1. Re-establishing irrigation systems where applicable,
2. Re-establishing soil conditions in irrigated field in such a way as to ensure cultivation and harvesting of crops and,
3. Ensuring revegetation of the disturbed areas to the specification of the BLM at the time of abandonment.

B. All disturbed surfaces will be recontoured to the approximate natural contours and re-seeded according to BLM specifications. Reclamation of the well pad and access road will be performed as soon as practical after final abandonment and reseeding operations will be performed in the fall or spring following completion of reclamation operations.

10. SURFACE OWNERSHIP

Surface ownership may be either Fee or Federal and is noted on the APD.

11. OTHER INFORMATION

a. A Class III Cultural Resource Inventory of the proposed drill sites, access roads and other facilities on Federal lands will be conducted and a report filed with the appropriate BLM office.
b. If archaeological, historical or vertebrate fossil materials are discovered during the course of any construction activities, EnCana will suspend all operations that further disturb such materials and immediately contact the appropriate BLM office. Operations in the area of discovery will not resume until written authorization to proceed has been issued by the BLM Authorized Officer (AO).
c. EnCana will be fully responsible for the actions of their subcontractors. A copy of the approved APD and Conditions of Approval will be on location during drilling and completion operations.
d. Any construction activity in the areas shall be done with awareness that many natural gas pipelines are buried. Some are apparent as to location; some have grown over with weeds and brush. It is suggested that the contractor contact the operators in the area to locate all lines before digging.

12. REPRESENTATIVES AND CERTIFICATION

A. Representative:
RuthAnn Morss
EnCana Oil & Gas (USA) Inc.
370 17th Street, Suite 1700
Denver, CO 80202
(720)-876-5060

All lease and/or unit operations will be conducted in such a manner that full compliance is made with all applicable laws, regulations, Onshore Oil and Gas Orders, the approved Plan of Operations, and any applicable Notice to Lessees.

The Operator will be fully responsible for the actions of its subcontractors. A complete copy of the approved Application for Permit to Drill will be furnished to the field representatives to ensure compliance and shall be on location during all construction and drilling operations.

B. Representative Certification:

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

RuthAnn Morss
EnCana Oil & Gas (USA) Inc.
(720) 876-5060
May 31, 2005

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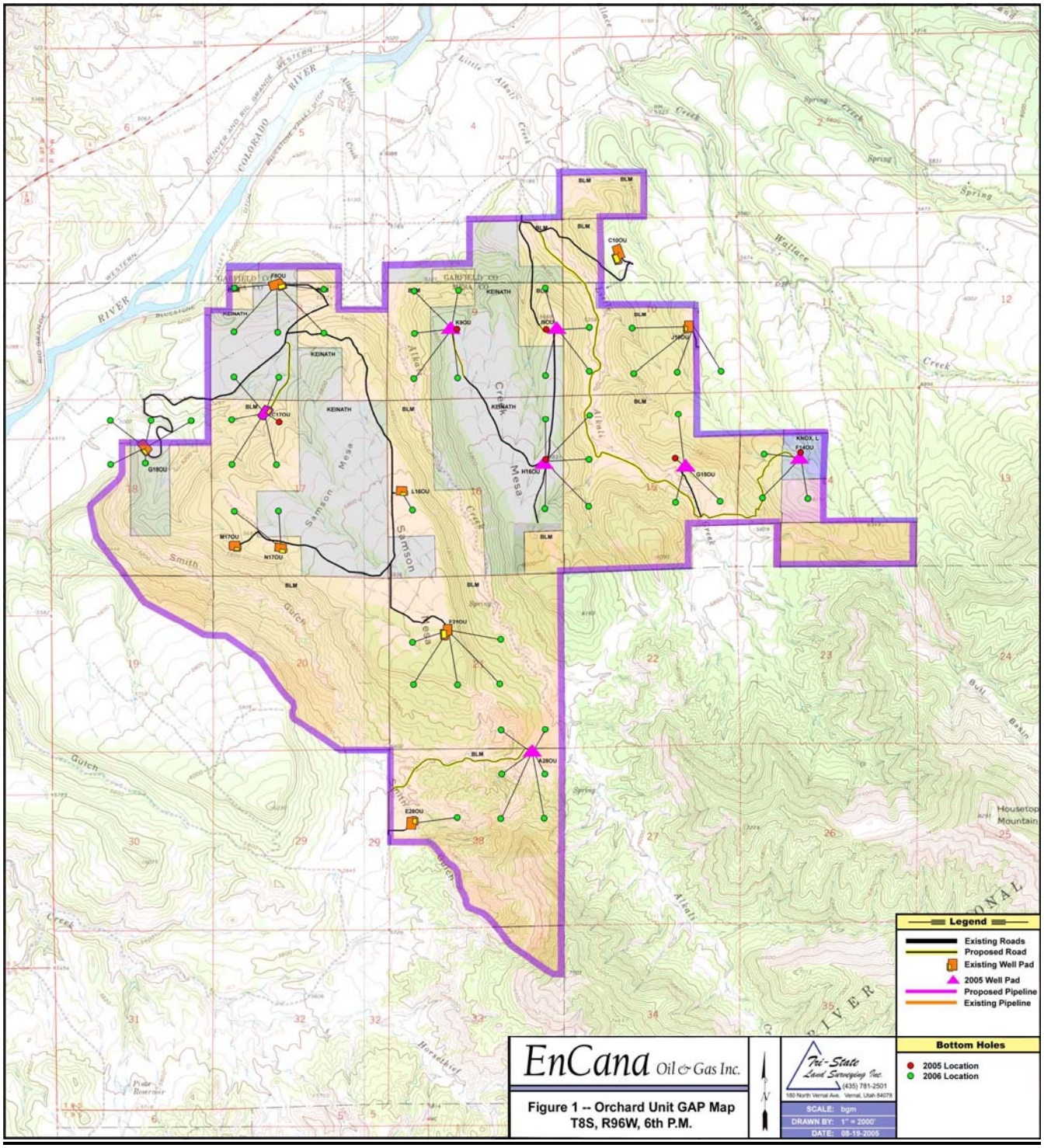
Legend
Existing Roads
Proposed Road
Existing Well Pad
2005 Well Pad
Proposed Pipeline
Existing Pipeline
Bottom Holes
2005 Location
2006 Location
EnCana Oil & Gas Inc.
Figure 1 -- Orchard Unit GAP Map
T8S, R96W, 6th P.M.
Tri-State Land Surveying Inc.
(435) 781-2501
180 North Vernal Ave. Vernal, Utah 84078
SCALE: bgm
DRAWN BY: 1" = 2000'
DATE: 08-19-2005
Samson Mesa
Allen Creek
Smith Gulch
Wallace Creek
Little Allen Creek
Spring Creek
Bull Basin
Housetop Mountain
KEINATH
BLM

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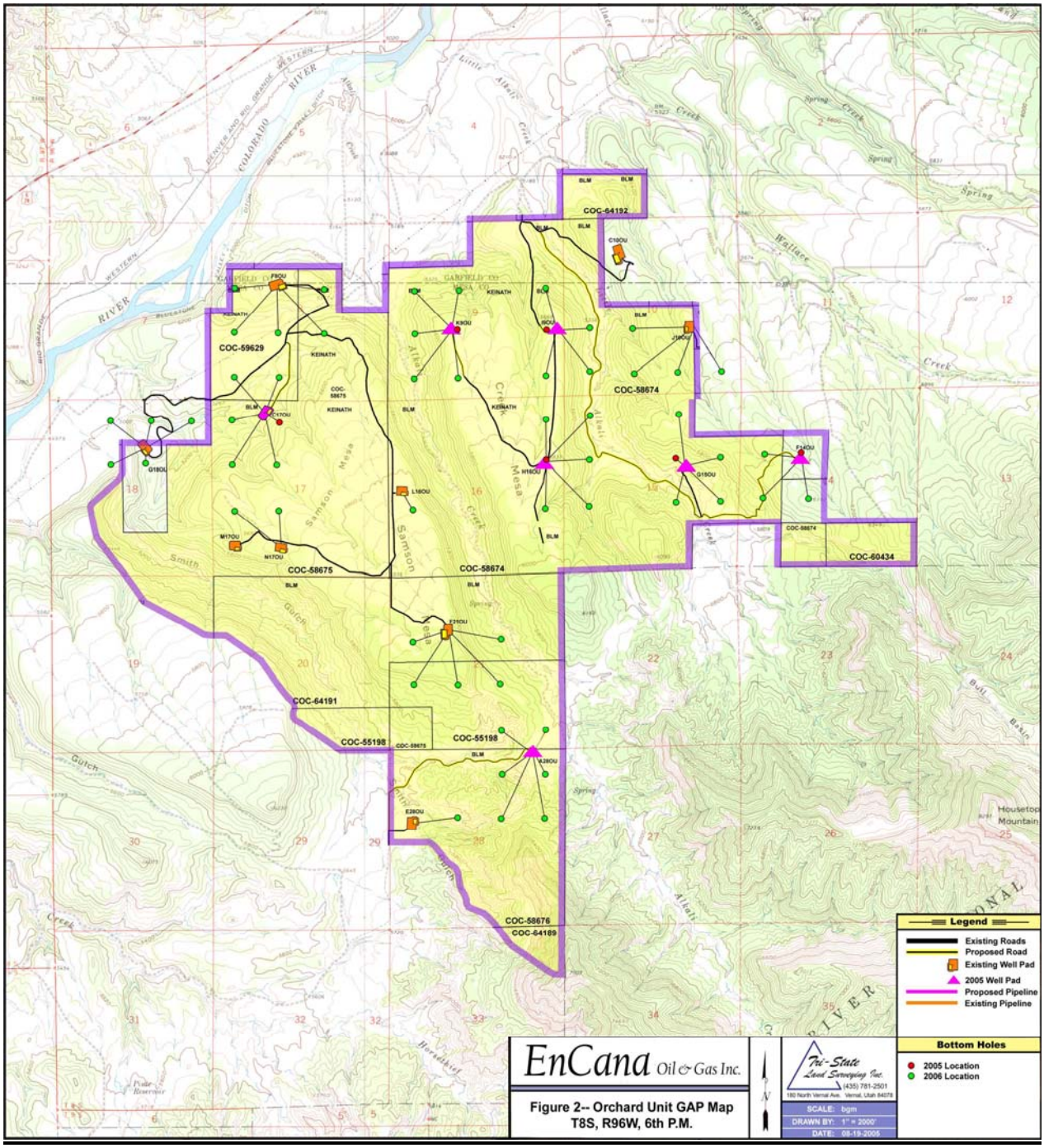
COC-64192
COC-59629
COC-58674
COC-58675
COC-58674
COC-60434
COC-64191
COC-55198
COC-55198
COC-58676
COC-64189
Legend
Existing Roads
Proposed Road
Existing Well Pad
2005 Well Pad
Proposed Pipeline
Existing Pipeline
Bottom Holes
2005 Location
2006 Location
EnCana Oil & Gas Inc.
Figure 2-- Orchard Unit GAP Map
T8S, R96W, 6th P.M.
Tri-State Land Surveying Inc.
SCALE: bgm
DRAWN BY: 1" = 2000'
DATE: 08-19-2005

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10-POINT DRILLING PLAN

All lease and/or unit operations will be conducted in such a manner that full compliance is made with applicable laws, regulations (43CFR3100), Onshore Oil and Gas Orders No. 1 and No. 2 and the approved Plan of Operations. The Operator is fully responsible for the actions of its subcontractors. A copy of the Conditions of Approval will be furnished to the field representatives to ensure compliance.

EnCana Oil & Gas (USA) Inc. will be operating under its Nationwide Bond # RLB0004733.

1. **Estimated Tops of Important Geologic Markers**
   a. Formations and depths will be submitted with the site specific APD.

2. **Estimated Depths of Anticipated Water, Oil Gas or Mineral Formations**
   a. The proposed casing and cementing program has been designed to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall receive approval prior to use.

      The surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing.

3. **Pressure Control Equipment**
   a. Minimum working pressure on rams and BOPE will be 3,000 psi.
   b. Function test and visual inspection of the BOP will be conducted daily and noted in the IADC Daily Drilling Report.
   c. Both high and low pressure tests of the BOPE will be conducted.
   d. The Annular BOP will be pressure tested to a minimum of 50% of its rated working pressure.
   e. Blind and Pipe Rams/BOP will be tested to a minimum of 100% of rated working pressure (against a test plug)
   f. BOP testing procedures and testing frequency will conform to Onshore Order No. 2.
   g. BOP remote controls shall be located on the rig floor at a location readily accessible to the driller. Master controls shall be on the ground at the accumulator and shall have the capability to function all preventors.
   h. The kill line shall be 2” minimum and contain two kill line valves, one of which shall be a check valve.
   i. The choke line shall be 3” minimum and contain two choke line valves (3” minimum).
   j. The choke and manifold shall contain two adjustable chokes.
   k. Hand wheels shall be installed on all ram preventors.
   l. Safety valves and wrenches (with subs for all drill string connections) shall be available on the rig floor at all times.
   m. Inside BOP or float sub shall also be available on the rig floor at all times.
   n. Upper Kelly cock valve (with handle) shall be available at all times.

Casing	Depth	Hole Size	Size	Weight	Grade	Cement Volume
Conductor	0-40'	+/- 24"	16"	0.25" Wall	X42	+/- 5 yds ready mix (to surface)
Surface	Surface to 630' - 1500'	12 1/4"	8 5/8"	24#	J-55, STC All New	± 450 sks - ± 1060sks Class (G) 15.8ppg 1.17 ft^3/sx
Production Option #1	0' - 6300'	7-7/8"	5 ½"	17#	I-80, LTC All New	450 - 650 sx TXI 13.5 ppg 1.26 ft^3/sx
Production Option #2	0' – 6300'	7 7/8"	4 ½"	11.6#	I-80 LTC New	550 - 750 sx TXI 13.5 ppg 1.26 ft^3/sx

Proposed BOP and Choke Manifold arrangements are attached.

4. Proposed Casing and Cementing Program

a. The specific casing setting depths will vary depending on well location and drilling conditions. The depths listed in the table give the approximate anticipated setting depth.
b. The contingency string will be in situations in which sever drilling conditions are encountered. Hazards such as severe lost circulation or hoe stability problems would warrant the use of a contingency string.
c. The proposed casing and cementing program shall be conducted as approved to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall receive approval prior to use. The casing setting depth shall be calculated to position the casing seat opposite a competent formation which will contain the maximum pressure to which it will be exposed during normal drilling operations. Determination of casing setting depth shall be based on all relevant factors, including: presence/absence of hydrocarbons, fracture gradients, usable water zones, formation pressures, lost circulation zones, other minerals or other unusual characteristics.
d. All casing, except conductor casing, shall be new or reconditioned and tested. Approval will be obtained from the Authorized Officer prior to using reconditioned casing. Used casing shall meet or exceed API standards for new casing.
e. The surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing. Cement volumes based on 100% excess above annular volume; or as required based on field experience to ensure cement is circulated to surface. If drive pipe is used, it may be left in place its total length is less than twenty feet below the surface. If the total length of the drive pipe is equal to or greater than twenty feet, it will be pulled prior to cementing surface casing, or it will be cemented in place.
f. Surface casing shall have centralizers on the bottom three joints, with a minimum of one centralizer per joint.
g. Top plugs shall be used to reduce contamination of cement by displacement fluid. A bottom plug or other acceptable technique, such as a suitable pre-flush fluid, inner string cement method, etc. shall be utilized to help isolate the cement from contamination by the mud being displaced ahead of the cement slurry.
h. All casing strings below the conductor shall be pressure tested to 0.22 psi per foot of casing string length or to 1500 psi, whichever is greater, but not to exceed 70% of the minimum internal yield. If pressure declines more than 10% in 30 minutes, corrective action shall be taken.
i. Casing design is subject to revision based on geologic conditions encountered.

5. Proposed Casing and Cementing Programs:

a. Surface casing @ 1500' MD; 8-5/8" 24# J-55 STC

Purpose: Protect shallow fresh water and contain MASP to TD
Maximum anticipated mud weight at surface casing depth: = 9.0 ppg
Maximum anticipated mud weight at TD: = 9.0 ppg
Maximum anticipated equivalent formation pressure at TD = 7.7 ppg

Casing String				Casing Strength Properties			Minimum Design Factors		
Size	Weight (lb/ft)	Grade	Connection	Collapse (psi)	Burst (psi)	Tensile (1000 lb)	Collapse	Burst	Tension
8-5/8"	24	J/K-55	STC	1370	2950	244	1.00	1.10	1.50

Collapse Design:
Evacuated 8-5/8" 24# J-55casing with 9.0 ppg drilling fluid density:
Load = 9.0*0.052*1500' = 702 psig
Rating: = 1370
S.F. = 1.9

Burst Design: Assume kick with partially evacuated hole and an influx gradient of 0.22 psi/ft.
8-5/8" 24# J-55
MASP (Load) = 6300'*(0.4-0.22) psi/ft = 1134 psig
Rating: = 2950 psig
S.F. = 2.6

Tensile Design: Designed on Air Weight * Buoyancy + overpull margin
8-5/8" 24# J-55
Rating: = 372,000 lbs
Load: 1500'*24#*0.862+100,000 lbs (OPM) = 131,032 lbs
S.F. = 2.8

b. Production Casing @ 6300' MD; 4-1/2" 11.6# OR 5-1/2" 17# I-80, LTC

Maximum Anticipated Mud Weight at Total Depth = 9.0 ppg
Maximum Anticipated Equivalent Formation Pressure at Total Depth = 7.7 ppg
Maximum Surface Treating Pressure for Fracturing Operations = 7000 psig
Assumed Gas Gradient for Production Operations = 0.115 psi/ft

Casing String				Casing Strength Properties			Minimum Design Factors		
Size	Weight (lb/ft)	Grade	Connection	Collapse (psi)	Burst (psi)	Tensile (1000 lb)	Collapse	Burst	Tension
5-1/2"	17	I-80	LTC	6260	7740	348	1.00	1.10	1.3
4-1/2	11.6	I-80	LTC	6350	7780	212	1.00	1.10	1.3

Collapse Design: Designed on evacuated casing properties with 9.0 ppg drilling fluid density with no internal back-up.
5-1/2" 17# I-80 Weakest Collapse Resistance
5-1/2" 17# I-80 from 0' to 6300'
Load = 9.0*0.052*6300' = 2948 psig
Rating = 6260 psig
S.F. = 2.1

Burst Design: Assume maximum surface shut-in pressure during production, and maximum surface treating pressure during fracture stimulation operations.

5-1/2" 17# I-80 Weakest Burst (Internal Yield) Resistance
Design Consideration #1: Maximum Surface Shut-In Pressure
Design Point #1: 5-1/2" 17# I-80 from 0' to 6300'
MASSIP (Load) = 6300'*(0.40-0.115) psi/ft = 1795 psig
Rating = 7740 psig
S.F. = 4.3

Design Consideration #2: Maximum Surface Treating Pressure During Frac Operations
Design Point #1: 5-1/2" 17# I-80 from 0' to 6300'
MATP: = 7000 psig
Rating: = 7740 psig
S.F. = 1.1

Design Point #2: 5-1/2" 17# I-80 @ TD
Load: Frac grad – FW frac fluid:
(0.75-0.433) psi/ft*6300' = 1997 psig
Rating: = 7780 psig
S.F. = 3.8

Tensile Design: Designed on Air Weight * Buoyancy + overpull margin

Tensile design loads are a function of the casing weight; therefore, both varieties of casing are tested below.

Design Option #1 – 5-1/2" 17# I-80 LTC at surface
Load = (6300'*17 lb/ft*0.862) +100,000 lbs (OPM) = 192,320lbs
Rating = 348,000 lbs
S.F. = 1.8

Design Option #2 – 4-1/2" 11.6# I-80 LTC at surface
Load = (6300'*11.6 lb/ft*0.862) +100,000 lbs (OPM) = 162,994 lbs
Rating = 212,000 lbs
S.F. = 1.3

*Cementing Volume Design Clarification:

Surface Casing @ 630' to 1500':

*Cement designed to cover the entire string with 100% excess.

Production Casing

*Designed to 200' above top of Mesaverde/Ohio Creek formation. Volume assumes 7-7/8" gauge hole diameter plus 30%.

*If open-hole logs are run, cement volumes will be determined from the caliper plus 10% excess.

6. Directional Drilling Program

An S-shaped directional design will be used to reach the targeted bottom hole locations. In general, a target radius of 200' will be used. Specific directional plans for each well will be included with the APD.

7. Proposed Drilling Fluids Program

DEPTH	MUD TYPE	*DENSITY Lb/gal*	*VISCOSITY (sec/qt)*	*FLUID LOSS (cc)*
0' – 1500'	Fresh Water Gel	8.4 - 9.0	28 – 35	NC
1500' – TD	LSND	8.8 – 9.0	35 – 45	5 - 15 cc

a. The drilling fluids have been designed for optimal wellbore hydraulics and hole stability.
b. Mud flow and volume will be monitored both visually and with electronic pit volume totalizers.

Proposed Alternative Drilling Fluids Program

In the event that geological conditions permit, an unconventional drilling system may be utilized. Fluids in the system include, but are not limited to, air/nitrogen, mist, foam, and aerated muds. Below listed are three unconventional fluid options and physical characteristics.

DEPTH	*MUD TYPE*	*DENSITY lbs/gal*	*VISCOSTIY (Equivalent YP)*	*FLUID LOSS (cc)*
1500' - TD	Air/N2, Mist	<0.5	5	N/A
1500' - TD	Foam	0.5 – 4	20	<5
1500' - TD	Aerated Mud	4-8	8-25	5-10

8. Testing, Coring and Logging

a. Drill Stem Testing – none anticipated
b. Coring – As deemed necessary by geology
c. Mud Logging – Optional
d. Logging:

<u>Open Hole Logging Interval</u>
PEX (Optional) AIT-GR-Neutron/Litho-Density
From TD to surface casing

<u>Cased Hole Logging interval</u>
CBL/CCL/GR/VDL As needed for perforating control
RST In lieu of PEX

9. Air/Mist Drilling

The following equipment will be in place and operational during air/gas drilling:

- Properly lubricated and maintained rotating head
- Spark arrestor on engines or water cooled exhaust
- Blooie line discharge 100 feet from well bore and securely anchored
- Straight run on blooie line
- Deduster equipment
- All cuttings and circulating medium shall be directed into a reserve or blooie pit
- Float valve above bit

- Automatic igniter or continuous pilot light on the blooie line
- Compressors will be located in the opposite direction from the blooie line a minimum of 100 feet from the wellbore
- Mud circulating equipment, water, and mud materials sufficient to maintain the capacity of the hole and circulating tanks or pits

10. Abnormal Pressures or Temperature

a. This area is known to be underpressured. Lost circulation has been experienced in offset wells. Barite and a selection of "sized" lost circulation materials will be kept on location during drilling operations.

The anticipated bottom hole pressure is 6300*0.40 psi/ft = 2520 psi
The maximum anticipated surface pressure is 6300*(0.4-0.22) psi/ft = 1134 psi
b. No hydrogen sulfide has been encountered or is known to exist from previous drilling in the area at this depth.

11. Anticipated Start Date and Duration of Operations

Drilling operations are expected to require ± 12 days on each well. Completion operations are anticipated to begin within 15 days of finishing the drilling portion of the last well on each pad. Completion operations will require approximately 30 days.

3M BOP stk

2" KILL LINE

3M DOUBLE RAM BOP

3M ANNULAR

3" CHOKE LINE FR
OUTLET ON BOTT
SIDE OF RAMS

3M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY
[54 FR 39528, Sept. 27, 1989]

ATTACHMENT A

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APPENDIX B

STANDARD CONDITIONS OF APPROVAL for the ORCHARD UNIT GAP

Air Quality:
The operator is responsible for applying dust abatement measures as needed or directed by the Authorized Officer to reduce the emissions of fugitive dust from access roads. The level and type of treatment (watering or application of various dust agents, surfactants and road surfacing material) may be changed in intensity and must be approved by the Authorized Officer. Dust control is needed to prevent heavy plumes of dust from road use that create safety problems and disperses heavy amounts of particulate matter on adjacent vegetation.

Speed control measures on all project-related unpaved roads would also be implemented to reduce vehicle fugitive dust.

Cultural Resource Inventory:
Class III cultural resource inventories will be required on any and all new wells, access roads, pipelines and other ground disturbing activities not covered in this plan that require a federal permit or authorization to conduct the action. Additional action specific mitigation may be required – including but not limited to moving the location, archeological monitoring, testing, or data recovery

Cultural Resource Synthesis Requirement:
At the end of calendar year 2010 (12/31/10) the operator will contract out an archaeological synthesis compiling the past cultural work in the GAP on a landscape basis which will include but not be limited to: cultural/temporal affiliation, settlement patterns, subsistence, technology, social organization and origins and transitions. Information from this synthesis will provide needed data for determining whether current management practices should continue or if new practices are needed to protect and/or conserve archaeological resources.

Cultural Resource Education/Discovery:
All persons in the area who are associated with this project must be informed that if anyone is found disturbing historic, archaeological, or scientific resources, including collecting artifacts, the person or persons will be subject to prosecution.

Pursuant to 43CFR10.4(g), the BLM authorized officer must be notified, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43CFR10.4 (c) and (d), activities must stop in the vicinity of the discovery and the discovery must be protected for 30 days or until notified to proceed by the authorized officer.

If in connection with operations under this contract the project proponent, his contractors, subcontractors, or the employees of any of them, discovers, encounters or becomes aware of any objects or sites of cultural or paleontological value or scientific interest such as historic or prehistoric ruins, graves or grave markers, fossils, or artifacts, the proponent shall immediately suspend all operations in the vicinity of the cultural or paleontological resource and shall notify

the BLM authorized officer of the findings (16 U.S.C. 470h-3, 36CFR800.112). Operations may resume at the discovery site upon receipt of written instructions and authorization by the authorized officer. Approval to proceed will be based upon evaluation of the resource. Evaluation shall be by a qualified professional selected by the authorized officer from a federal agency insofar as practicable. When not practicable, the holder shall bear the cost of the services of a non-federal professional.

Within five working days the authorized officer will inform the holder as to:

- whether the materials appear eligible for the National Register of Historic Places;
- the mitigation measures the holder will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and,
- a time frame for the authorized officer to complete an expedited review under 36 CFR 800.11, or any agreements in lieu thereof, to confirm through the State Historic Preservation Officer that the findings of the authorized officer are correct and the mitigation is appropriate.

The proponent may relocate activities to avoid the expense of mitigation and/or the delays associated with this process, as long as the new area has been appropriately cleared of resources and the exposed materials are recorded and stabilized. Otherwise, the proponent will be responsible for mitigation costs. The authorized officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the authorized officer that the required mitigation has been completed, the proponent will then be allowed to resume construction.

Antiquities, historic, prehistoric ruins, or objects of scientific interest that are outside of the authorization boundaries but directly associated with the impacted resource will also be included in this evaluation and/or mitigation.

Antiquities, historic, prehistoric ruins, or objects of scientific interest, identified or unidentified, that are outside of the authorization and not associated with the resource within the authorization will also be protected. Impacts that occur to such resources, which are related to the authorizations activities, will be mitigated at the proponent's cost including Native American consultation cost.

In situations where federal action is required for wells directionally drilled into federal minerals from fee surface overlying fee minerals, BLM’s responsibilities under Section 106 of the National Historic Preservation Act [(NHPA) 16 U.S.C. 470] as amended and Section 36 CFR 800.4 will be followed.

Geology:
Mitigation measures for protection of geologic resources are detailed in the OUGAP. These measures include specific procedures for drilling, cementing, and completing the proposed wells to ensure that gas does not migrate into usable water-bearing zones or contaminate other geologic formations. The OUGAP also describes methods for minimizing the potential for slope instability and erosion, and for interim and final reclamation of disturbed surfaces.

Ground Water / Soils:
EnCana will implement aggressive reclamation and re-vegetation of disturbed areas not needed for operational activities. These measures will help prevent erosion and sedimentation to drainages. In addition EnCana will implement multiple BMPs including the following:

Erosion protection and silt retention techniques, including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, and placement of straw bales and/or matting would be used at the proposed crossings of Little Alkali Creek.

New access roads would be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.

Relief ditches or corrugated metal pipes would be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.

Ditches would be allowed to vegetate and/or would include large rocks or stones to slow the velocity of drainage and allow sediment to settle out.

Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.

Straw cover would be placed on excess material piles to help limit heavy dust emissions into the air during weather-created wind events.

EnCana's road construction plans will identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these zones reported to the BLM and COGCC.

After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.

In order to isolate the Mesa Verde -Wasatch contact, production casing on Federal wells will have a cement top a minimum of 200 feet above the Williams Fork formation (typically resulting in cement coverage of 800- 1000 feet above the targeted gas zones).

In accordance with EnCana's standard policy, all pits will utilize impermeable liners to contain drilling fluids. Following completion activities, pit liners would be removed at the respective landowners request.

For pads where a reserve pit is planned, EnCana would construct a lined reserve pit to receive the drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals) and to contain drilling fluids carried over with the cuttings. No hazardous substances would be placed

in this pit.

Frac pits to contain water used in completion process will be planned for each new pad location in GAP. Frac pits will also be lined. Compliance with Onshore Order #1 would determine the timing and closure of frac pits. In instances where well drilling would occur in more than 1 drilling season on a pad, the frac pit will be drained dry prior to winter shutdown period or expiration of 90 day period, whichever occurs first. The liner in drained frac pits will be retained until frac pit use is completed.

Invasive Non-Native Species:
EnCana would implement an intensive reclamation and weed control program beginning the first growing season after well completion. All disturbed areas not needed for immediate operation of the wells will be seeded with a mixture of native grasses and shrubs. Site specific seed mixes designed to reclaim the sites and deter establishment of noxious weeds are presented in the vegetation section. The seed shall be certified free of primary or secondary noxious weeds. The operator shall adhere to the specified seed mix and will continue with reclamation activities, including additional reseeding if necessary, until BLM's interim reclamation objectives are achieved.

The operator shall be required to monitor for the presence of noxious weeds, which are included on the State or County noxious weed lists at least once each year during the growing season. The operator shall be responsible for promptly controlling any noxious weed infestations, which have resulted from the operator's construction, operation, or maintenance activities within the Project Area. A Pesticide Use Proposal must be approved by the Authorized Officer prior to the use of any herbicides.

Given that cheatgrass is common in portions of the Project Area, it may not be possible to totally eliminate this noxious weed from the reclaimed area. In the case of cheatgrass, interim reclamation will be considered acceptable if cheatgrass and other undesirable vegetation are less than five percent cover, if the adjacent vegetation is less than 50 percent undesirables. Cheatgrass will be less than 50 percent cover, if the adjacent vegetation is more than 50 percent undesirables (1999 GSRA Oil and Gas FSEIS).

Vehicle washing of heavy equipment prior to entering the GAP area is a high priority.

Migratory Birds: In order to protect nesting raptors, an annual raptor survey would be conducted prior to any new construction, drilling, or completion activities scheduled between February 1 and August 15. If an active raptor nest is documented within ¼ mile of proposed construction, drilling or completion, the activity could be delayed until the young have fledged or the nest is no longer active, as determined by a qualified wildlife biologist. If lease stipulation does not exist to protect nesting raptors, a 60 day timing limitation would be applied to a ¼ mile buffer around the nest site to minimize disturbance during a portion of the critical nesting period.

Native American Consultation:
The Ute Tribe of the Uinta and Ouray Bands have visited other culturally sensitive sites in the Glenwood Springs Field Office area and have provided written and verbal indication to protect these sites. The following mitigation is based upon this information. If new data are disclosed after the Native Americans visit the Grass Mesa GAP, new terms and conditions may have to be negotiated to accommodate their concerns.

- Site-specific Native American mitigation measures suggested during consultation will be considered during the implementation phase of the proposed action(s).
- Strict adherence to the confidentiality of information concerning the nature and location of archaeological resources will be required of EnCana and their subcontractors (Archaeological Resource Protection Act 16 U.S.C. 470hh).
- Periodic monitoring of these sensitive areas will be required.
- Inadvertent Discovery: The National Historic Preservation Act (NHPA) as amended requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the BLM Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)).

Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act (16 U.S.C. 470hh).

- On private lands, Colorado State Statues (CRS 24-80-401 and CRS 24-80-1301) for Historic, Prehistoric, and Archaeological Resources, and for Unmarked Human Graves will have to be adhered to by EnCana and their subcontractors. These State statues require that the federal Authorizing Officer be notified immediately of any historic or prehistoric finds or human grave. The find must be protected until the Authorizing Officer indicates that the action may proceed.

Noise:
EnCana will use telemetry equipment at all gas well meters to reduce the pumper traffic within the GAP area. Reduction of vehicle traffic will reduce overall noise impacts.

Paleontological Resource Education/Discovery:
All persons associated with operations under this authorization must be informed that any objects or sites of paleontological or scientific value, such as vertebrate or scientifically important invertebrate fossils, shall not be damaged, destroyed, removed, moved or disturbed. If in connection with operations under this authorization any of the above resources are encountered the proponent shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM authorized officer of the findings. The discovery must be protected until notified to proceed by the authorized officer.

As feasible, the proponent shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM authorized officer of any finds. The BLM authorized officer will, as soon as feasible, have a BLM-permitted paleontologist check out the find and record and collect it if warranted. If ground-disturbing activities cannot be immediately suspended, the proponent shall work around or set the discovery aside in a safe place to be accessed by the BLM-permitted paleontologist.

Range Management:
EnCana would fence newly reclaimed well pads to exclude livestock and big game grazing pressure on seeded sites.

Range improvements (fences, gates, reservoirs, pipelines, etc.) will be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for repairing or replacing the damaged range improvements.

Recreation:
To promote safety for hunters and project workers alike during hunting season, warning signs should be posted along access roads serving active construction and drilling sites to warn hunters of the presence of workers and associated vehicle traffic in the area.

Transportation/ Road Maintenance:
Commuting construction and drilling crews would be encouraged to car pool to reduce the number of vehicle trips on local area roads and associated wear and tear.

The operator would encourage commuting construction and drilling crews to comply with posted speed limits on public roads and limit driving speeds to 20 mph on more primitive access roads to reduce the potential for vehicle collisions. By complying with posted 25 mph speed limit along County Roads, traffic-related noise would also be reduced at nearby residences

Road maintenance standards listed in GAP EA , Proposed Action will be used and implemented on BLM land and related road easements.

Terrestrial Wildlife:
As required by lease stipulation, EnCana will avoid construction or drilling activities within their federal leases from December 1 to April 30 in order to minimize impacts to wintering big game animals. Compliance with this timing limitation is required for all drilling and construction activities on all federal lease parcels accessed with the BLM Grass Mesa Road. Exceptions to this lease stipulation could be granted for federal surface locations during the last 60-days (i.e., March 1 – April 30) of the timing limitation under mild winter conditions. Severity of winter conditions will be determined on the basis of snow depth, snow crusting, daily mean temperatures, and whether big game were concentrated on winter range within the area during the winter months.

For the pad and access road locations that do not have an identified Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.
EnCana will notify all employees that conviction of a major game violation within the GAP area could result in disciplinary action or dismissal (of contractors).

EnCana will not permit hunting and dogs within the Project Area during working hours by employees or contractors.

Main access roads will be signed to restrict vehicular use to oil and gas company personnel only.

Remote monitoring will be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife. In addition, scheduled winter visits (those other than for emergency purposes), should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife.

Threatened, Endangered and Sensitive Species:
Any discoveries of previously unknown bald eagle nesting or roosting sites would be addressed by application of the appropriate stipulations and consultation with the USFWS prior to commencement of development activities.

Biological inventories (surveys) for sensitive plant species will be conducted in potential new disturbance areas not covered in the Orchard Unit GAP EA.

Mitigation of impacts to special status plants would include 1) relocating gas activities and facilities to minimize direct impacts; 2) requiring EnCana to seed the well pads with native species, including species that provide direct competition with cheatgrass, such as bottlebrush squirreltail, and/or Sandberg bluegrass; 3) ensuring that seeding occurs at the appropriate time of year to optimize the potential for seeding success; and 4) requiring EnCana to control all noxious weeds within the disturbed areas.

Vegetation:
Where road, pipeline or pad construction requires the removal of pinyon pine trees between late March to early November, the trees will disposed of within 24 hours of disturbance in the following manner to avoid attracting pinyon *Ips* beetles into live standing trees and mitigate effects of ongoing *Ips* beetle infestation in the local area: (1) broken down with earthmoving equipment and buried in excess material pile or at toe of fillslopes; (2) cut down, sectioned and chipped with Hydroaxe-type equipment capable of chipping large pinyon trees; or (3) cut and removed trees from BLM land and hauled to Colorado State Forest Service-approved disposal site.

Visual Resources:
To help mitigate the contrast of bare, re-contoured slopes, reclamation will include measures to feather cleared lines of vegetation, and to save and re-distribute cleared trees, debris, and rock over re-shaped cut and fill slopes.

To reduce the view of production facilities from visibility corridors and private residences, facilities will not be placed in visually exposed locations (i.e., they will be located against backdrops or cut side of pad) and will be placed to allow the maximum re-shaping of cut and fill slopes. Furthermore, all above ground facilities will be painted Shale Green (Munsell 5Y 4/2) to blend with the existing landscape.

Trees and vegetation would be left along the edges of the pads whenever feasible.

Wastes, Hazardous or Solid:
Any release (leaks or spills) of hazardous substances in excess of the reportable quantity, as established by 40 CFR, Part 117, would be reported as required by the CERCLA of 1980, as amended. If the release of a hazardous substance in a reportable quantity would occur, a copy of a report would be furnished to the BLM and all other appropriate federal and state agencies. In addition, all releases to soil or water of 10 gallons or more of any substance would be immediately reported verbally to the BLM and COGCC compliance officers and proof of cleanup provided for the project record. This mitigation would be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

Water Quality, Surface and Ground:
EnCana will implement aggressive reclamation and re-vegetation of disturbed areas not needed for operational activities. In addition EnCana will implement multiple BMPs including the following: New access roads will be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity. Relief ditches will be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.

Ditches will be allowed to vegetate and/or will include large rocks or stones to slow the velocity of drainage and allow sediment to settle out. Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes will be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out. EnCana's road construction plans will identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these zones reported to the BLM and COGCC. All usable water zones encountered (those with TDS less than 10,000 mg/L) must be isolated and protected, whether they are shallow or deep. Isolation of shallow zones would be accomplished by setting and cementing surface casing from a depth of at least 50 feet below the deepest water zone to the ground surface. Deeper water zones would be cemented off as required.

After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.

All vehicles would be refueled at least 100 feet from stream channels.

EnCana would consult with the Army Corps of Engineers (for Section 404 permits) and with the State of Colorado Water Quality Control Division (for stormwater permits) prior to commencing construction activities within the OUGA. Written documentation to the BLM would be required to indicate that appropriate permits have been obtained or are not required by the authorizing agency.

In accordance with EnCana's standard policy, all reserve pits will utilize impermeable liners to contain drilling fluids. Following completion activities, pit liners would be removed at the respective landowner's request. At the discretion of EnCana and in cooperation with the respective landowner, closed-loop drilling systems may be used on well pads within 100 feet of intermittent drainages.

In accordance with EnCana's standard policy, erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, placement of surface rock, straw bales, and/or matting will be used along proposed road reaches within 100-feet of stream channels.

Within areas less than 100 feet from intermittent drainages, an adequate vegetative buffer, artificial buffers (e.g., straw bales, matting, etc.), or filter strip will be maintained between the road and the drainage to filter runoff from the road before it reaches the creek, wherever possible.

Reclamation Plan.
Refer to Appendix I. Surface Reclamation of the 6/98 GSFO's Draft Supplemental EIS for Oil & Gas Leasing Development (pages I-1 through I-8) for specific reclamation goals, objectives, timelines, measures and monitoring methods. These guidelines will be followed in completing the reclamation of disturbed surfaces on well pads, access roads and pipelines.

Some effective practices that will be implemented during reclamation include, but are not limited to: proper siting of the well pad to minimize impacts, the immediate seeding of disturbed areas after construction, proper storage and redistribution of topsoil, reshaping cut and fill slopes, seeding with specified seed mix within the first available growing season after disturbance, deep ripping (>18 inches on 2 foot centers), fencing reclaimed areas to protect from livestock use, and the use of riprap, slash or other erosion control structures to help control sediment loss.

The 4 Reclamation Categories defined on Page I-8 of Appendix I (6/98 GSFO's Draft Supplemental EIS for Oil & Gas Leasing Development) will be used in gauging the progress of reclamation monitoring.

Seed Mix Application Practices
The specified seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mixture of shrub, grass and forb species shall be applied. The following seed mix and rates will be used on all disturbed surfaces, including pipelines unless otherwise noted in the specific APD:

Species of Seed	**Variety**	**Application Rate (PLS lbs/ac)**
Shadscale saltbush		2.0
4-wing saltbush	Rincon	2.0
Wyoming big sagebrush		0.5
Western wheatgrass	Arriba	3.0
Bottlebrush squirreltail		2.0
Indian ricegrass	Paloma	1.5
Galleta	Viva	1.5
Total		**12.5**

The seed mix may be modified with approval from the BLM based on site-specific conditions, the identification of additional useful species for site stabilization, cheatgrass competition, and winter wildlife habitat needs, species success in past revegetation efforts, and seed availability and cost. Native species will be used unless they are proven unsuitable for meeting BLM's reclamation objectives.) Reclamation would be considered successful when the objectives described in the Glenwood Springs Resource Area Reclamation Policy are achieved.

The above rate of application is listed in pounds of pure live seed (PLS)/acre. The seed will be certified and there will be no primary or secondary noxious weeds in the seed mixture. The operator

shall notify the Authorized Officer 24 hours prior to seeding and shall provide evidence of certification of the seed mix to the Authorized Officer within 30 days of completion of the seed application.

Upon completion of backfilling, leveling, ripping to minimum 18-inch depth on 2-foot centers, and recontouring, the stockpiled topsoil will be evenly spread over the reclaimed areas(s). Prior to reseeding, all disturbed surfaces will be scarified and left with a rough surface. No depressions will be left that would trap water and form ponds.

The prepared seedbed will be seeded within 24 hours after completing dirt work unless a change is requested by the operator and approved by the Authorized Officer. Prepare the seedbed by contour cultivating 4-6 inches deep. Drill seed ¼ to ½ inch deep following the contour. In areas that cannot be drilled, broadcast seed at 1½ times the application rate and cover ½ to 1 inch deep with a harrow or drag bar. All seeding will be conducted after September 1 and prior to ground frost. Spring seeding will be done after the frost leaves the ground and no later than May 15th. If the seeding is unsuccessful, operator will be required to make subsequent seedings until the reclamation objectives identified in Appendix I. Surface Reclamation of the 6/98 GSFO's Draft Supplemental EIS for Oil & Gas Leasing Development are met.

The reclamation contractor will utilize a seed drill capable of correctly planting the various types of seeds included in the specified seed mixes.

For seed planted using broadcast methods (e.g., sagebrush), raking or harrowing immediately before and after seeding will be necessary to ensure adequate seed/soil contact. For best success, broadcast seeding of sagebrush in strips is recommended.

Areas being reclaimed will be fenced (using fence type approved by Authorized Officer) to exclude livestock for the first two growing seasons or until the seeded species have established. Species will be considered established when 50 percent of the seeded species are producing seed.

Erosion Control Practices

The cut and fill slopes will be protected against rilling and erosion with measures such as water bars, lateral furrows, or other measures approved by the Authorized Officer. Weed free straw bales, straw "wattles", straw matting or a well-anchored fabric silt fence will be used on cuts and fill slopes to protect against soil erosion.

Topsoil Practices

During well pad, road and/or pipeline construction, topsoil will be stripped to a minimum depth of 6 inches and segregated from other subsurface material piles, i.e. excess material from reserve pit construction. If topsoil is less than 6 inches, the top 6 inches of surface material will be stripped and piled. The topsoil piles will be seeded within 48 hours of stockpiling.

Site Protection Practices

Reclaimed areas will be fenced to exclude livestock until seeded species have established. The Authorized Officer will approve the type of fencing. Fencing shall be to BLM standards

The operator will submit an annual reclamation report by December 31 to the Authorized Officer. The report will document compliance with all aspects of the reclamation objectives. The report will specify if the reclamation objectives are likely to be achieved and actions needed to meet these objectives.

APPENDIX C

SITE-SPECIFIC CONDITIONS OF APPROVAL for the ORCHARD UNIT GAP

Existing Locations:

E28OU Pad **New wells:** 28-6

CSU: Fragile soils with performance requirements. (SEC 13: SW, SEC 28: ALL, SEC 29: ALL)

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

F21OU Pad

New wells: 21-5 21-7
21-10 21-11
21-12

The applicable stip for the lease lies outside the GAP boundary.

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

F8OU Pad

New wells: 8-5 8-7 8-10 8-11 8-12

NSO: to protect plants and animals, riparian values, waterfowl production areas, and the sensitive resource values. (Land within ½ mile either side of the river's high water mark)

CSU: to protect scenic values of Class II visual resource management.

Timing Limitation: Big Game Winter Habitat (12/1 -4/30). Exception may be allowed last 60 days.

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

G18OU Pad

New wells: 18-7 18-6
18-1 18-2
18-3

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

J10OU Pad

New wells: 10-14 10-15
10-16 10-11

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

L16OU Pad **New wells:** 16-12B

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

N17OU Pad **New wells:** 17-11 17-12

NSO: Feb. 1- Aug. 15 to protect raptors, golden eagles, all accipiters, falcons (except kestrels), all butteos and owls nesting and fledgling habitat during usage for ¼ mile around the nest site.
Exceptions: granted during years when then nest site is unoccupied, when occupancy ends by or after may 15 or once the young have fledged and dispersed from the nest.

Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days

NSO: To protect raptor nests within a 1/8 mile radius from the wellsite. Exception criteria available.

CSU: Fragile soils with performance requirements.

CSU: Operations proposed within the area of an approved surface or underground coal mine will be relocated outside the area to be mined or to accommodate room and pillar mining operations. Exception criteria available. (SEC. 18: LOTS 3,4 SEC 19: LOTS 1,2)

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

New Surface Locations:

A28OU Pad	**New wells:**	28-1	28-2
		28-7	28-8
		21-15	21-16

The BLM plans to defer any decision on A28OU pad and road pending completion of arch survey.

C17OU Pad

New wells: 17-3 17-4
17-5 17-6
8-13 8-14

NSO: Feb. 1- Aug. 15 to protect raptors, golden eagles, all accipiters, falcons (except kestrels), all butteos and owls nesting and fledgling habitat during usage for ¼ mile around the nest site. Exceptions: granted during years when then nest site is unoccupied, when occupancy ends by or after may 15 or once the young have fledged and dispersed from the nest.

Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days

NSO: To protect raptor nests within a 1/8 mile radius from the wellsite. Exception criteria available.

CSU: Fragile soils with performance requirements.

1. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

2. In order to mitigate straight line effect of the cut slopes, adaptive management techniques will be analyzed by BLM staff after construction of the pad. If the upper edges (cut slopes) of the pad create a high degree of visual contrast, additional trees may need to be cleared by hand adjacent to the pad's edges to create an irregular shape or natural looking mosaic pattern.

3. Trees cleared for pad construction will be windrowed for later use during interim reclamation (windrowed woody material will be scattered on reclaimed cutslopes and fillslopes.

4. To help provide visual screening, all trees directly outside the staked perimeter of the pad location will remain undamaged from pad construction and left standing at the toe of fillslope.

5. To reduce visual impacts of storage tanks on the site, maximum 300 barrel tanks will be used for produced water and condensate storage.

6. Install silt fencing at toe of access road, excess material pile and/or pad fillslopes.

F14OU Pad

New wells: 14-6 14-5
14-7 14-10
14-11 14-12

1. Install silt fencing at toe of access road and pad fillslopes.

2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

3. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

G15OU Pad

New wells: 15-7 15-8
15-9 15-10
15-1 15-2

1. Install silt fencing at toe of access road and pad fillslopes.

2. The existing draw to the north of pad will not be disturbed.

3. Topsoil pile will be located at southeast corner of pad.

4. A berm (approximately 15 feet high) will be built on the high side of the pad to divert water runoff around the pad.

5. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

6. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

H16OU Pad

New wells: 16-8, 16-1, 16-9, 15-4, 15-5, 15-12

1. Construct bypass route for the southern road fork east around pad corner as existing 2-track road will be inundated during pad construction. Change facility layout shown on Sheet 7 so tanks are staged at north end of pad. Install silt fencing at toe of fillslopes

2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

3. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

19OU Pad

New wells: 9-9, 9-6, 9-16, 10-5, 10-12, 10-13

1. Change facility layout shown on Sheet 7 so tanks are staged at south end of pad.

2. Install silt fencing at toe of fillslopes

3. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

4. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

K9OU Pad

New wells: 9-5 9-6
9-11 9-12
9-13 9-14

1. Change facility layout shown on Sheet 7 so tanks are staged at south end of pad.

2. Install silt fencing at toe of fillslopes.

3. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: "To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15."

The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

4. Standard Conditions of Approval outlined in Appendix B of the Orchard Unit GAP will apply and remain in full force and effect.

APPENDIX D

WELL PAD AND ASSOCIATED BOTTOMHOLE WELLS AND LEASE-SPECIFIC STIPULATIONS

Well Pad and Bottomhole Locations

Surface Lease Number	Sec-Twp-Rge Surface Location	Pad & Surface Location	Well Number: Bottom Hole Location	Bottom Hole Lease Number	Surf Owner/ Min Owner
C-59629	8-T8S-R96W	F8OU – existing pad 1779’ FNL & 2029’ FWL	8-5: 1980’ FNL & 660’ FWL	C-59629	SPLIT
			8-7: 1980’ FNL & 1980’ FEL	C-59629	SPLIT
			8-10: 1980’ FSL & 1980’ FEL	C-59629	SPLIT
			8-11: 1980’ FSL & 1980’ FWL	C-58675	SPLIT
			8-12: 1980’ FSL & 660’ FWL	C-58675	SPLIT
C-58675	17-T8S-T96W	C17OU 350’ FNL & 1639’ FWL	17-3: 660’ FNL & 1980’ FWL	C-58675	FED/FED
			17-4: 660’ FNL & 660’ FWL	C-58675	FED/FED
			17-5: 1980’ FNL & 660’ FWL	C-58675	FED/FED
			17-6: 1980’ FNL & 1980’ FWL	C-58675	FED/FED
			8-13: 660’ FSL & 660’ FWL, SEC. 8	C-59629	FED/FED
			8-14: 660’ FSL & 1980’ FWL, SEC. 8	C-59629	FED/FED
	17-T8S-R96W	N17OU - existing 801’ FSL & 2004’ FWL	17-11:1980’ FSL & 1980’ FWL	C-58675	FED/FED
			17-12: 1980’ FSL & 660’ FWL	C-58675	FED/FED
C-58674	9-T8S-R96W	K9OU 1976’ FSL & 1976’ FWL	9-12: 1976’ FSL & 1976’ FWL	C-58674	SPLIT
			9-5: 1980’ FNL & 660’ FWL	C-58674	SPLIT
			9-6: 1980’ FNL & 1980’ FWL	C-58674	SPLIT
			9-11: 1980’ FSL & 1980’ FWL	C-58674	SPLIT
			9-13: 660’ FSL & 660’ FWL	C-58674	SPLIT
			9-14: 660’ FSL & 1980’ FWL	C-58674	SPLIT
	9-T8S-R96W	I9OU 1901’ FSL & 240’ FEL	9-9: 1901’ FSL & 240’ FEL	C-58674	FED/FED
			9-6: 1980’ FNL & 660’ FEL	C-58674	FED/FED
			9-16: 660’ FSL & 660’ FEL	C-58674	FED/FED
			10-5: 1980’ FNL & 660’ FWL, SEC. 10	C-58674	FED/FED
			10-12: 1980’ FSL & 660’ FWL, SEC. 10	C-58674	FED/FED
			10-13: 660’ FSL & 660’ FWL, SEC. 10	C-58674	FED/FED
	16-T8S-R96W	H16OU 2137’ FNL & 606’ FEL	16-8: 2137’ FNL & 606’ FEL	C-58674	SPLIT
			16-1: 660’ FNL & 660’ FEL	C-58674	SPLIT
			16-9: 1980’ FSL & 660’ FEL	C-58674	SPLIT
			15-4: 660’ FNL & 660’ FWL, SEC. 15	C-58674	SPLIT
			15-5: 1980’ FNL & 660’ FWL, SEC. 15	C-58674	SPLIT
			15-12: 1980’ FSL & 660’ FWL, SEC. 15	C-58674	SPLIT
	15-T8S-R96W	G15OU 2166’ FNL & 1664’ FEL	15-7: 2166’ FNL & 1644’ FEL	C-58674	FED/FED
			15-8: 1980’ FNL & 660’ FEL	C-58674	FED/FED
			15-9: 1980’ FSL & 660’ FEL	C-58674	FED/FED
			15-10: 1980’ FSL & 1980’ FEL	C-58674	FED/FED
			15-1: 660’ FNL & 660’ FEL	C-58674	FED/FED
			15-2: 660’ FNL & 1980’ FEL	C-58674	FED/FED
	16-T8S-R96W	L160U – existing 2549’ FSL & 320’ FWL	16-12B: 1980’ FSL & 660’ FWL	C-58674	FED/FED
	10-T8S-R96W	J10OU – existing 1924’ FSL & 1495’ FEL	10-14: 660’ FSL & 1320’ FWL	C-58674	FED/FED
			10-15: 660’ FSL & 1320’ FEL	C-58674	FED/FED
			10-16: 660’ FSL & 660’ FEL	FEE	FED/FEE
			10-11:1980’ FSL & 1320’ FWL	C-58674	FED/FED

Surface Lease Number	Sec-Twp-Rge Surface Location	Pad & Surface Location	Well Number: Bottom Hole Location	Bottom Hole Lease Number	Surf Owner/ Min Owner
Fee lease	14-T8S-T96W	F14OU 1977' FNL & 1767' FWL	14-6: 1977' FNL & 1767' FWL	C-58674	FEE/FED
			14-5: 1980' FNL & 660' FWL	C-58674	FEE/FED
			14-7: 1980' FNL & 1980' FEL	FEE	FEE/FEE
			14-10: 1980' FSL & 1980' FEL	FEE	FEE/FEE
			14-11: 1980' FSL & 1980' FWL	FEE	FEE/FEE
			14-12: 1980' FSL & 660' FWL	FEE	FEE/FEE
C-58676	28-T8S-T96W	A28OU 456' FNL & 986' FEL	28-1: 456' FNL & 986' FEL	C-58676	FED/FED
			28-2: 660' FNL & 1980' FEL	C-58676	FED/FED
			28-7: 1980' FNL & 1980' FEL	C-58676	FED/FED
			28-8: 1980' FNL & 660' FEL	C-58676	FED/FED
			21-15: 660' FSL & 1980' FEL, SEC. 21	C-55198	FED/FED
			21-16: 660' FSL & 660' FEL, SEC. 21	C-55198	FED/FED
	28-T8S-R96W	E28OU- existing 2578' FNL & 195' FWL	28-6: 1980' FNL & 1980' FWL	C-58676	FED/FED
C-55198	21-T8S-R96W	F21OU – existing pad 1385' FNL & 1566' FWL	21-5: 1980' FNL & 660' FWL	C-55198	FED/FED
			21-7: 1980' FNL & 1980' FEL	C-55198	FED/FED
			21-10: 1980' FSL & 1980' FEL	C-55198	FED/FED
			21-11:1980' FSL & 1980' FWL	C-55198	FED/FED
			21-12: 1980' FSL & 660' FWL	C-55198	FED/FED
Fee lease	18-R8S-R96W	G18OU – existing pad 1410' FNL & 1937' FEL	18-7:1410' FNL & 1937' FEL	FEE	FEE/FEE
			18-6: 1980' FNL & 1980' FWL	C-58675	FEE/FED
			18-1: 660' FNL & 660' FWL	FEE	FEE/FEE
			18-2: 660' FNL & 1980' FEL	FEE	FEE/FEE
			18-3: 660' FNL & 1980' FWL	FEE	FEE/FEE

Lease Stipulations Applicable to the Orchard Unit Natural Gas Project

Lease Number	Description of Lands	Stipulations
C-58674	T8S-R96W 6TH SEC. 9: SWSW	Timing Limitation: Big Game Winter Habitat (12/1/-4/30). Exception may be allowed last 60 days
	T8S-R96W 6TH SEC. 13: E2NE, SWNE SEC. 14: NWSW	CSU: Fragile soils with performance requirements.
C-58675	ALL LANDS	NSO: Feb. 1 – Aug. 15 to protect raptors, golden eagles, all accipiters, falcons (except kestrels), all butteos and owls nesting and fledgling habitat during usage for ¼ mile around the nest site. Exceptions: granted during years when the nest site is unoccupied, when occupancy ends by or after may 15 or once the young have fledged and dispersed from the nest.
	ALL LANDS	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.
	ALL LANDS	NSO: To protect raptor nests within a 1/8 mile radius from the wellsite. Exceptions criteria available.
	ALL LANDS	CSU: Fragile soils with performance requirements.
	T8S-R96W 6TH SEC. 18: LOTS 3,4 SEC. 19: LOTS 1,2	CSU: Operations proposed within the area of an approved surface or underground coal mine will be relocated outside the area to be mined or to accommodate room and pillar mining operations. Exception criteria available.
C-58676	T8S-R96W SEC. 13: SW SEC. 28: ALL SEC. 29: ALL	CSU: Fragile soils with performance requirements.
C-59629	Land within ½ mile either side of the river's high water mark	NSO: to protect plants and animals, riparian values, waterfowl production areas, and the sensitive resource values.
	ALL LANDS	CSU: to protect scenic values of Class II visual resource management.
	ALL LANDS	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.
C-55198		The applicable stip for this lease lies outside the GAP boundary.
C-60434	T8S-R96W SEC. 14: SESE	CSU: Fragile soils with performance requirements.
C-64191	T8S-R96W 6TH SEC. 21: NE, NESE	NSO: to protect 14 seclusion areas that provides high wildlife value. Exceptions may be granted based on approval by Authorized Office of a mitigation plan that suitably addresses the wildlife seclusion values at risk.
	T8S-R96W 6TH SEC. 20: NW, N2S2 SEC. 21: SWNW	NSO: to protect threatened or endangered species. Exceptions: surface occupancy may be authorized. The Authorized Officer will consider the type and amount of surface disturbance, plant frequency and density, relative abundance of habitat, species and location, topography, and other related factors.

Lease Number	Description of Lands	Stipulations
C-64191	T8S-T96W 6TH SEC. 20: S2NE, NESE, NENW, SENW, NWSE SEC. 21: E2NW	NSO: Steep slopes greater than 50%. Exception may be granted if lessee demonstrates that operations can be conducted without causing unacceptable impacts and that less restrictive measures will protect the public interest.
	T8S-R96W 6TH SEC. 21: E2NW	NSO: to protect slopes over 30% with high visual sensitivity in the Interstate 70 viewshed. Exception would be granted if protective measures can be designed to accomplish VRM Class II objectives, namely that the overall landscape character would be retained.
	T8S-R96W 6TH SEC. 20: N2, N2SW SEC. 21: N2	CSU: to protect erosive soils and slopes greater than 30%. Specific measures to control are sited in the Surface Use Plan and Appendix D.
	T8S-R96W 6TH SEC. 20: N2, N2S2 SEC. 21: SWNW	CSU: protect sensitive species
	T8S-R96W 6TH SEC. 20: N2NW, SENW, SWNE, NWSE SEC. 21: N2	NSO: protect riparian and wetland zones. Oil and gas operations are restricted to an area beyond the outer edge of riparian vegetation. Exception may be granted if Authorized Officer determines that the activity will cause no loss of riparian vegetation or that vegetation lost can be replace within three to five years with vegetation of like species and age class or exception may be permitted for stream crossing, if an area analysis indicates that no suitable alternative is available.
C-64192	T8S-R96W SEC. 3: S/2SW	NSO: to protect slopes over 30% with high visual sensitivity in the Interstate 70 viewshed. Exception would be granted if protective measures can be designed to accomplish VRM Class II objectives, namely that the overall landscape character would be retained.
	T8S-R96W ALL LANDS	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.
	T8S-R96W SEC. 3: S/2SW	CSU: Fragile soils with performance requirements.
C-64189	T8S-R96W Sec. 33: NE/4	NSO: to protect steep slopes; to maintain site stability and site productivity on slopes greater than 50%.
	T8S-R96W Sec. 33: NE/4	NSO: to protect slopes over 30% with high visual sensitivity in the I-70 viewshed (lands within 5 miles of the interstate).
	T8S-R96W SEC. 33: N/2NE	NSO: to protect threatened or endangered species NSO: to protect wildlife seclusion areas CSU: subject to special operating constraints for the purpose of protecting BLM sensitive species. CSU: subject to special operating constraints for the purpose of protecting erosive soils and slopes greater than 30%
	T8S-R96W Sec. 33: NE/4	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days.

APPENDIX E

WILDLIFE THRESHOLD CALCULATIONS for the ORCHARD UNIT GAP

ACREAGE:
Total BLM surface ac = 4000ac
Total split estate involving federal minerals = 1,160 ac
Total FEDERAL acres in GAP area: **5,160 ac**
Total federal and fee (160) ac within GAP boundary: **5,320 ac**

PROPOSED PADS:
4 BLM surface locations
3 Split Estate Locations = **7 proposed pads with BLM involvement** (all wells will drill to federal minerals)

PAD THRESHOLD -
FEDERAL LANDS:
4,000 ac/640 ac per section = 6.25 'sections' x 4 pads/section = **25.0 pads allowed under threshold.**
4 proposed federal pads + **6 existing** federal pads = **10 BLM pads in GAP.**

ALL LANDS: (Cumulative effects)
5,320ac/640 ac = 8.31 sections x 4 pads/section = **33.25 pads allowed under threshold figure.**
4 proposed federal pads + 6 existing federal pads + 2 existing and 3 proposed fee pads = **15 pads in GAP**

ROAD THRESHOLD -
FEDERAL LANDS:
6.25 'sections' x 3.0 miles of new roads/section = **18.7 road miles allowed under the threshold.**
12.5 miles of proposed (2.6 mi new and 3.2 miles upgrades = 5.8) and existing roads (6.7 mi) attributed to oil & gas development on federal surface or split estate lands.

ALL LANDS: (Cumulative Effects)
14.0 sections x 3.0 miles/section = **42.0 miles allowed under the threshold.**
14 miles of existing and proposed (2.6 mi) roads attributed to oil & gas development regardless of land ownership = **16.6 mi of roads**.

From BLM "Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement, January 1999, Record of Decision Appendix B, Management of Lease Development - #5. Impacts on Wildlife Habitat. "It is not BLM's intent that O&G operators be held accountable for mitigation of habitat impacts due to residential, agriculture or other commercial users, including impacts associated with highways and county roads

APPENDIX F

SURVEY PLAT INFORMATION & CUT/FILL DIAGRAMS for the ORCHARD UNIT GAP

Detailed survey plat information for the 7 proposed well pads and associated wells requiring federal authorization is available for review from the BLM, Glenwood Springs Field Office upon request.