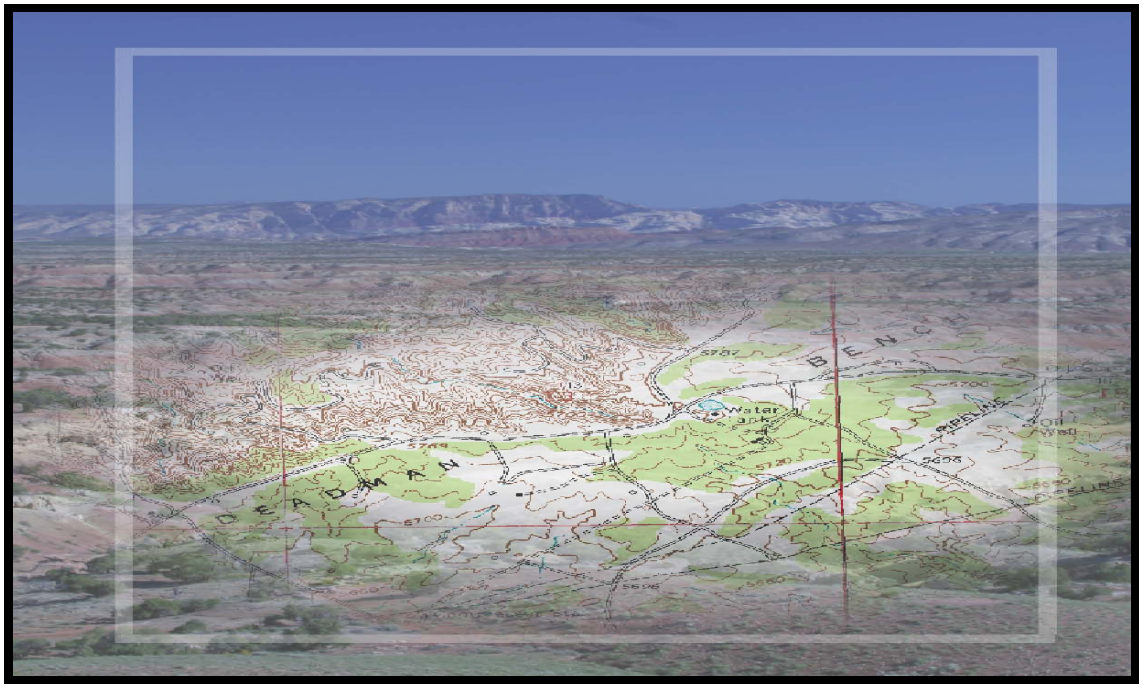
U.S. Department of the Interior
Bureau of Land Management
Vernal Field Office, Utah

FINAL ENVIRONMENTAL IMPACT STATEMENT

GREATER DEADMAN BENCH OIL AND GAS PRODUCING REGION

QUESTAR EXPLORATION AND PRODUCTION COMPANY

UT-080-2003-0369V
FES 07-49



January 2008

BLM MISSION STATEMENT

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times.

Management is based upon the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wildlife, wilderness, air and scenic, scientific, and cultural values.

UT-080-2003-0369V
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United States Department of the Interior

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TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1790
UT-081
UT-080-2003-0369V

November 9, 2007

Dear Public Land User:

The Final Environmental Impact Statement (FEIS) for the Greater Deadman Bench Region is hereby submitted for your review. It was prepared to analyze the potential impacts of Questar Exploration and Production Company's field development proposal. The proposal includes up to 1,020 natural gas and 219 oil wells, about 170 miles of new roads and 235 miles of pipelines, 31 miles of power lines, 22 new central tank facilities and 15 new gas compressor stations. In all, approximately 4,561 acres, or 5% of the total project area, would be disturbed by the proposal.

The GDBR involves approximately 98,785 acres located in Townships 6 to 8 South, Ranges 21 to 25 East, Salt Lake Base Meridian, about 20 miles south of Vernal, Uintah County, Utah. The GDBR encompasses an already developed oil and gas field. At the time of the initiation of the EIS process (in 2003), the GDBR contained approximately 278 existing oil or water-injection wells, and 300 gas wells. Also, about 57 miles of primary roads and 314 miles of secondary roads have been constructed within the region.

This FEIS analyzes two alternatives in detail. They are the Proposed Action and the No Action Alternatives. The FEIS also contains a discussion of eight other alternatives that were considered but dismissed from detailed analysis. The Proposed Action alternative is the agency preferred alternative.

The FEIS was prepared pursuant to the National Environmental Policy Act (NEPA), as well as other regulations and statutes, to address possible environmental and socio-economic impacts which could result from implementation of the project. This FEIS is not a decision document. Its purpose is to inform the public, and the Decision Maker, of the impacts associated with implementing the proponent's exploratory drilling proposal, to evaluate alternatives to the proposal, and to solicit other agencies and the public for comments. A Record of Decision is expected to be signed following the 30-day FEIS availability period.

If you wish to submit comments on this FEIS, we request that you make them as specific as possible, with references to page numbers and chapters of the document. The most useful comments will contain new technical or scientific information, identify data gaps in the impact analysis, or will provide technical or scientific rationale for opinions or preferences. Please refer to "Greater Deadman Bench EIS" in your correspondence. Written comments will be accepted

by fax, email, or letter for 30-days following the publication of the Notice of Availability in the Federal Register by the Environmental Protection Agency. Please provide your comments to:

Bureau of Land Management
Attn: Stephanie Howard
170 South 500 East
Vernal, Utah 84078
Fax: 435-781-4410
UT_Vernal_Comments@blm.gov

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. BLM will not consider anonymous comments. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection in their entirety. For further information concerning the document, please contact Stephanie Howard at (435) 781-4469.

Sincerely,

William Stringer
Vernal Field Office Manager

Enclosures – As Stated

Final Environmental Impact Statement
Questar Exploration & Production (QEP)
Greater Deadman Bench Oil and Gas Producing Region

Lead Agency:	U.S. Department of the Interior Bureau of Land Management
Project Location:	Uintah County, Utah
Comments & Further Information On this Final EIS:	Stephanie Howard Project EIS Team Lead Bureau of Land Management Vernal Field Office 170 South 500 East Vernal, Utah 84078 Phone: (435) 781-4400
BLM Authorized Officer Responsible For Preparing this Final EIS:	William Stringer, Field Manager

Abstract

QEP proposes to develop oil and gas resources within the 98,785-acre Greater Deadman Bench Oil and Gas Producing Region (GDBR) area located about 20 miles south of Vernal, Utah. The GDBR is partially developed with 278 existing oil and water-injection wells, 300 gas wells, and approximately 57 miles of primary roads and 314 miles of secondary roads. The Proposed Action would include the following: 1,020 natural gas wells, 219 oil/water injection wells, 169 miles of access roads, 193 miles of pipelines, 42 miles of oil flowlines, 15 2,000-horsepower compressor stations, and 22 central tank facilities. Construction would begin after the issuance of the Environmental Impact Statement Record of Decision, approval of individual Applications for Permit to Drill, and approved Right-of-Way grants. Construction would continue for 10 years and production is expected to continue for 40 years.

Two alternatives were considered in detail for this project. They are Alternative 1- the Proposed Action and Alternative 2 - the No Action Alternative. Alternative 1 consists of QEP's proposal for developing the GDBR. In additional to QEP's commitment to voluntarily apply selected Best Management Practices of those identified in the BLM Washington Office Instruction Memorandum 2002-194 listed in Chapter 2 of this document, mitigation has been disclosed, that once directed by the Decision of Record could lessen the environmental effects. Alternative 2 would consist of denying development of federal leases, but allowing development on federal leases that have been approved under the Application for Permit to Drill process. Under both alternatives, development would continue of State and private leases as well as roads and pipelines that would cross federal lands to access the State and private leases.

The Draft EIS was published on February 10, 2006 with a 45-day public comment period. Written comments were accepted form February 10 to March 27, 2006 on the DEIS. Seven comment letters were received on the Draft EIS. These comment letters are posted in Appendix 6-1 of this FEIS. A summary of the comments and the responses to the comments are shown in Chapter 6 of the FEIS.

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SUMMARY

The Bureau of Land Management (BLM), Vernal Field Office, prepared an Environmental Impact Statement (EIS) in response to a proposal filed by QUESTAR E&P (QEP) to extract and transport natural gas and oil in the Greater Deadman Bench oil and gas-producing region (GDBR). The Unitah County Government and the Bureau of Indian Affairs, Uintah and Ouray Agency, Fort Duchesne, Utah are Cooperating Agencies for this EIS. The location and boundary of the proposed project is shown on Map S-1. The lands QEP proposes to develop are either wholly or partially contained within townships T6S to T8S, R21E to R25E, Uintah County, Utah.

QEP holds valid federal, state, and private oil and gas leases in the GDBR. QEP holds approximately 79 percent of the leases within the GDBR. These leases grant contractual and property rights from the United States, the State of Utah, and the private mineral landowners to QEP for the purpose of developing oil and gas natural resources at a profit from those portions of the GDBR leased by them.

This EIS addresses the effects of implementing natural gas and oil development within the GDBR that is conceptual in nature. The location of wells and associated ancillary facilities depicted and described in the EIS represent a maximum level of development with tentative locations regardless of ownership. The final location of well pads, roads, and pipelines would be determined through future site-specific analyses that would be required for each facility. These analyses would occur when applications, such as Applications for Permit to Drill (APD) or BLM Right-of-Way Grants, are filed by QEP. Therefore, this EIS serves multiple purposes. It provides the basis for analyzing and disclosing the impacts of a full-field development, and it identifies mitigation to address issues and conditions of approval for the subsequent site-specific applications at individual locations.

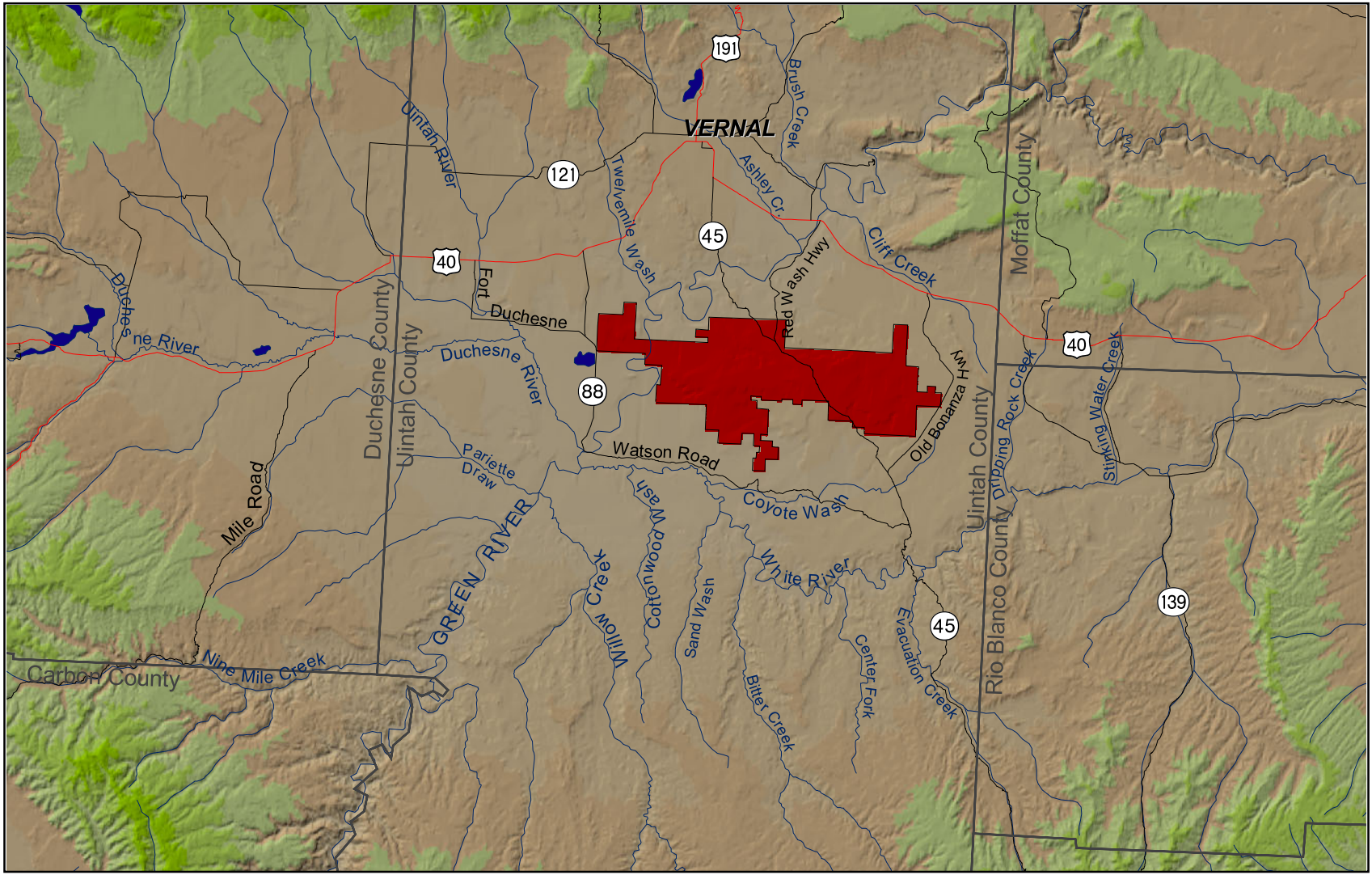
The EIS is not a decision document. Rather, it documents and discloses BLM's analysis of the potential environmental consequences of implementing the Proposed Action or the No Action alternative. The decisions regarding the GDBR project will be documented in the Record of Decision (ROD) that will be signed by the Vernal Field Office Manager, the authorized BLM official. The ROD will apply only to federal lands and leases, but decisions by other jurisdictions to issue or not issue approvals related to this project may be aided by the disclosure of impacts described in this EIS.

During the public scoping process for the Draft EIS, Uintah County and the Bureau of Indian Affairs, Uintah and Ouray Agency (BIA) were contacted and invited to be a cooperating agency on this EIS. Uintah County has participated as a Cooperating Agencies throughout the EIS process. In addition, copies of the Draft EIS and this Final EIS were submitted to the BIA and Ute Indian Tribe for their review and comment. However, no Tribal lands are included within the Proposed Action boundary. Any facilities on Tribal lands would be outside the boundary and would have a separate purpose and need so these facilities would not be reasonably connected to the Proposed Action.

LAND STATUS, LEGAL, AND POLICY CONSIDERATIONS

Land Status

The GDBR encompasses approximately 98,785 acres of land. Land ownership within this area is divided among the BLM, the Utah State Institutional Trust Lands Administration (SITLA), and various private entities. No Tribal lands are within the GDBR. BLM-administered lands account for approximately 83,864 acres (85%) of surface and mineral estate lands within the GDBR. Utah SITLA lands account for approximately 11,448 acres (12%) of surface and mineral estate lands within the GDBR. The remaining 3,473 acres (3%) consist of various privately owned surface and mineral estate lands within the GDBR. QEP currently holds leases on 79% of the federal, state, and private lands within the GDBR.



Greater Deadman Bench Project Area Boundary

0 5 10 15 20 25

Scale (Miles)

N W E S

Map S-1. Location Map of the Greater Deadman Bench Project Area, Uintah County, Utah.

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Conformance with Federal Management Plans

The Proposed and No Action Alternatives described in this EIS would take place within the historic Book Cliffs Resource Area and a small portion west of the Green River in the historic Diamond Mountain Resource Area. The Book Cliffs Resource Area is currently managed under a Resource Management Plan (RMP) approved in 1985. The Diamond Mountain Resource Area is managed under an RMP approved in 1994. The Proposed Action and Alternatives presented in this EIS are consistent with the current management decisions set out in these documents.

A draft of the revision of both RMPs was issued on January 4, 2005 that will consolidate all management activities of the entire Vernal Resource Area. Until decisions are finalized, the plan has no official status; however, impacts on the values and resources identified during the planning effort are addressed in this EIS. The decision on this field development would not preclude any alternatives being considered in the Vernal RMP effort.

The Coyote Basin ACEC would not be precluded from selection under any alternative, as all Draft RMP alternatives consider the same mineral management prescriptions that are in place under the Book Cliffs RMP. The value for which the ACEC was nominated is the white tailed prairie dogs and their habitat. The impacts to white tailed prairie dogs and their habitat are disclosed in section 4.6 of the Final EIS.

The portion of the Green River that is within the boundaries of the GDBR has been determined to be eligible as a Wild and Scenic River with a tentative classification of recreational. The BLM Manual 8351 Wild and Scenic Rivers specifies in section .32 (A) (3) that Recreational river areas are those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past. Parallel roads or railroads, existence of small dams or diversions can be allowed in this classification. A recreational river area classification does not imply that the river will be managed or prioritized for recreational use or development. However, proposed mineral management is less restrictive under all alternatives in the Draft RMP than currently exist under the Book Cliffs RMP. In addition, no new development is proposed within the eligible WSR segment of the river. Development is proposed on private land adjacent to the river, but the WSR designation would not include those lands.

Consistency with Local Plans

The Proposed Action is also consistent with the Uintah County General Plan (Plan 1996) and the Public Lands County Policy adopted August 23, 2003. The Plan generally indicates support for development proposals in its emphasis of multiple-use public land management practices and its emphasis of responsible use and optimum utilization of public land resources. As used in the Plan, multiple-use is defined as including, but not limited to, the following historically and traditionally practiced resource uses: grazing, recreation, timber, mining, oil and gas development, agriculture, wildlife habitat, and water resources as they become available or as new technology allows.

The State of Utah does not have planning documents for the vicinity of the Proposed Action.

PUBLIC INVOLVEMENT/SCOPING OF ISSUES

From November 14, 2003 through February 4, 2004, BLM conducted public and internal scoping to solicit input and identification of environmental issues and concerns associated with the proposed QEP Project. On December 9, 2003, a briefing of the Proposed Action was made to the State of Utah Resource Development Coordinating Committee (RDCC). A Notice of Intent (NOI) was published in the Federal

Register on December 19, 2003. BLM then prepared a scoping information packet and provided copies of it to federal, state, and local agencies, the Ute Tribe, as well as members of the general public. BLM sought public involvement from the following North American Tribes: Southern Ute Tribe, the Navajo Nation, the Paiute Indian Tribe of Utah, the Zuni Pueblo, the Ute Indian Tribe, the Shoshone-Bannock Tribes, the Northern Ute Tribe, the Hopi Tribe and the Ute Mountain Tribe. These North American Tribes have stated an interest in and/or declared cultural ties to the project area. Announcements of the scoping opportunities were sent to various newspapers (Vernal Express, Uintah Basin Standard, Deseret News, Denver Post and Salt Lake Tribune), the local Vernal radio stations, and Channel 6, the local Vernal television station. BLM conducted a public scoping and information open house at the Uintah County Building in Vernal, Utah on January 14, 2004. The environmental issues identified through the scoping process are listed below:

- GDBR level of development should be consistent with the existing and relevant land management plans;
- Effects of the proposed development on soils and soil erosion potential in the project area;
- Effects of the proposed development on air quality and visibility within the project area and cumulatively in the region;
- Effects of the proposed development on surface water and groundwater in the project area;
- Effects of the proposed development on the introduction and spread of noxious weeds;
- Effects of the proposed development on vegetation communities and fragmentation of communities;
- Effects of the proposed development on grazing allotments and rangeland resources in the Project Area;
- Effects of the proposed development of gas resources on wildlife and wildlife habitat;
- Effects of the proposed development on fisheries and aquatic habitats;
- Effects of the proposed development on special-concern species, including threatened, endangered, candidate, or sensitive species of plants and animals;
- Economic effects of the proposed development;
- Analysis of the proposed development on traffic and the transportation plan in the project area;
- EIS should adequately address the cumulative impacts of the proposed project plus other oil and gas development projects in the region;
- Effect of the proposed project on cultural resources;
- Reasonable range of alternatives should be considered;
- Effect of noise from projected-related activities;
- Implementation and monitoring of mitigation should be considered; and
- Effect of the project on recreation opportunities.

The draft EIS was issued on February 10, 2006 with a Notice of Availability published in the Federal Register, Volume 71, Number 18. The public was invited to provide comments on the DEIS during the formal 45-day public comment period from February 10, 2006 to April 25, 2006. A complete description of the comment letters received, the response to comments, and changes made between the DEIS and the

Final EIS are presented in Chapter 6 of this Final EIS. A public meeting was conducted on March 1, 2006 to receive comments on the DEIS and answer questions. No one from the public attended this meeting.

ALTERNATIVES

The Proposed Action and the No Action alternatives were considered in detail. The programmatic location of facilities for the alternatives is shown on Maps S-2 and S-3. Table S-1 compares the alternatives in terms of physical characteristics.

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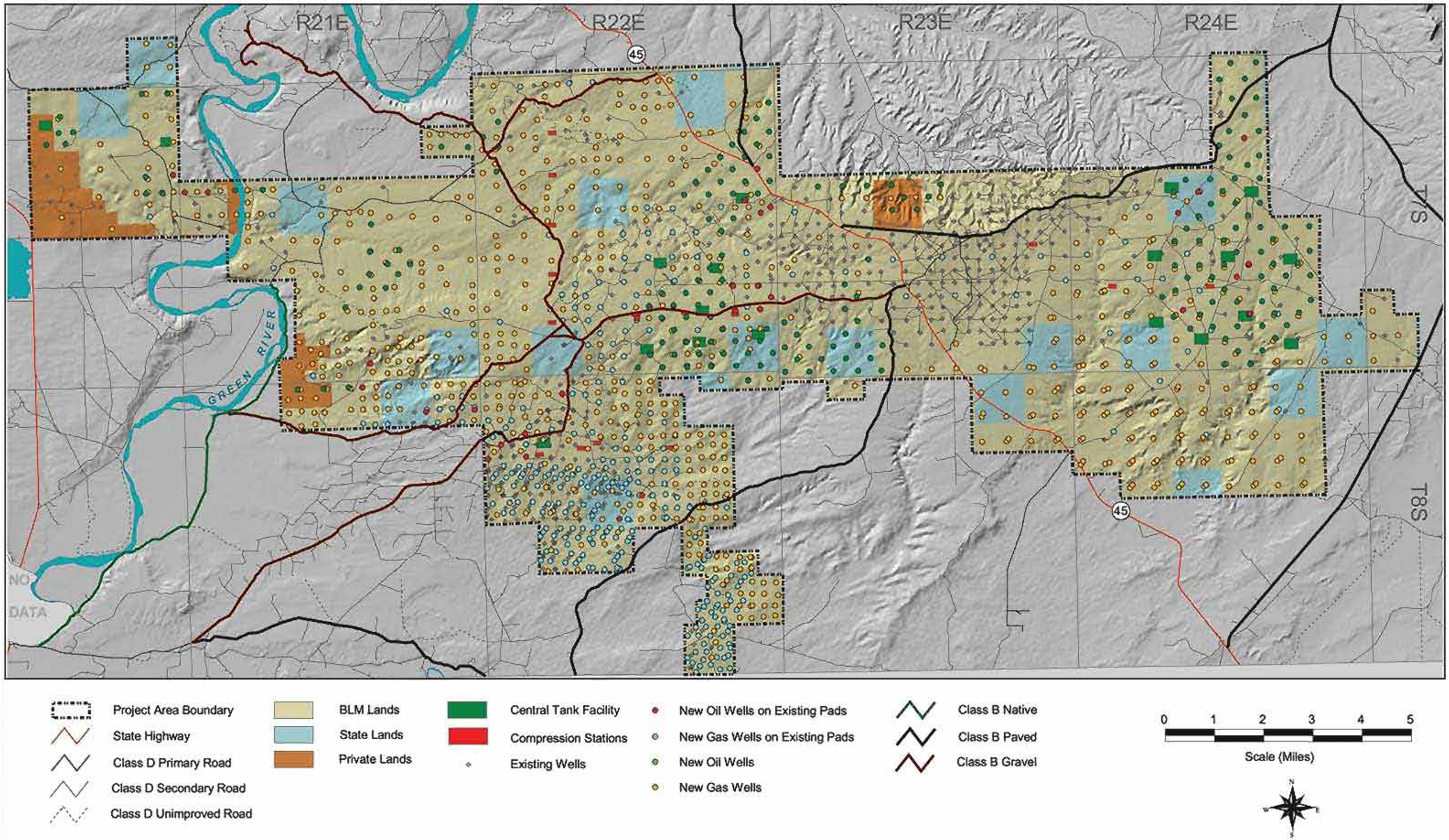

Figure S-2. Greater Deadman Bench Proposed Action.

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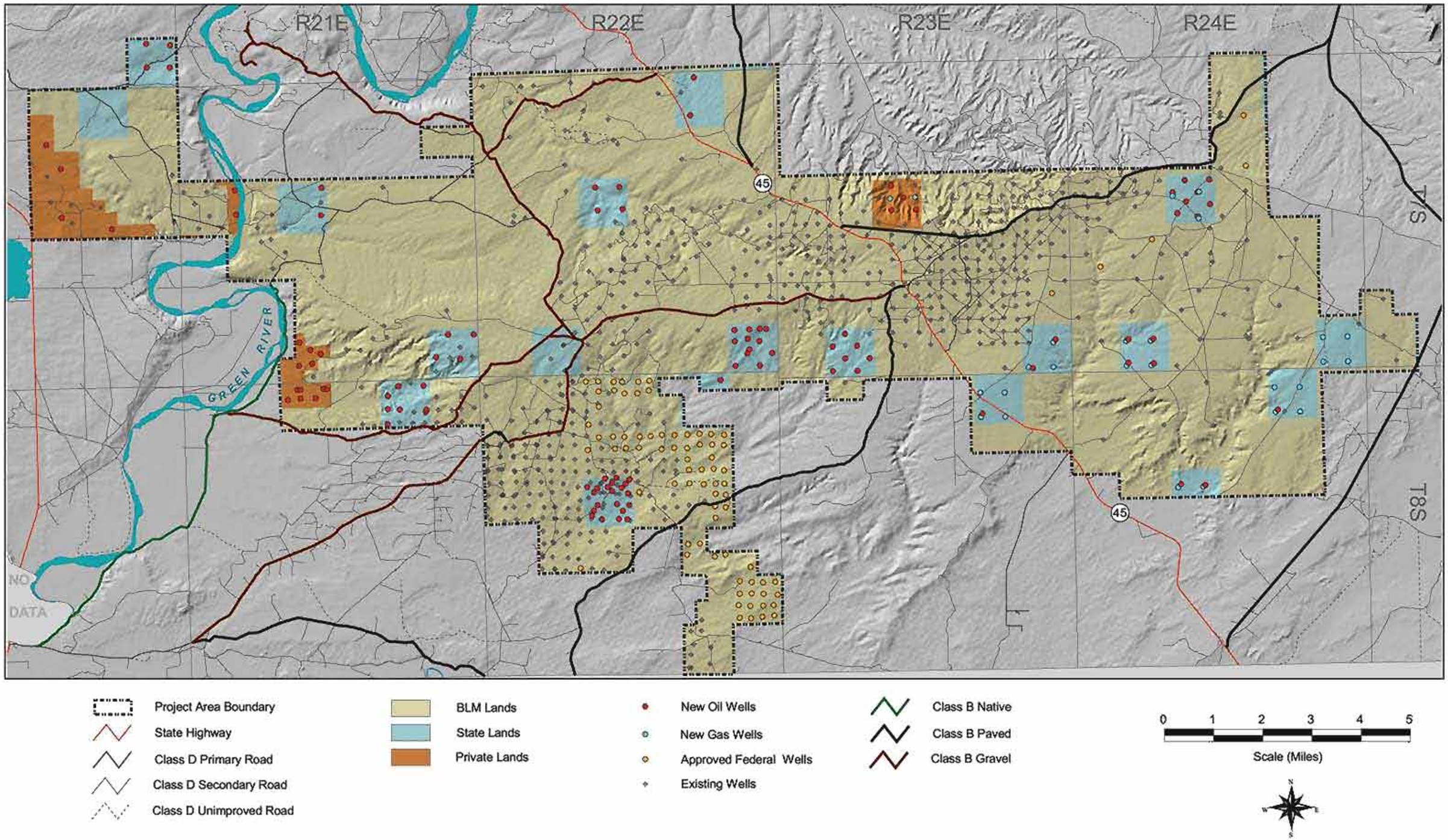

Figure S-3. Greater Deadman Bench No Action.

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Table S-1. Comparison of Alternatives

	Proposed Action	No Action
Number of New Wells	1,020 gas wells, 219 oil wells Total 1239 wells	177 gas wells, 32 oil wells Total 209 wells
Number of New Well Pads	891	187
New Access Roads	170 miles	40 miles
New Pipelines/flowlines	235 miles	40 miles
New Central Tank Facilities	22	3
New Compressor Stations	15	3
Long-term Surface Disturbance	4,561 acres (5% of GDBR)	888 (1% of GDBR)
Long-term Surface Disturbance if Interim Reclamation would be Successful	3,481 acres (3% of GDBR)	607 (1% of GDBR)
Estimated Natural Gas Extraction (life of project)	615.2 billion cubic feet	106.8 billion cubic feet
Estimated Oil Extraction (life of project)	9.52 million barrels	1.44 million barrels

Proposed Action

Currently, the GDBR consists of approximately 278 oil producing or water-injection wells in a 50/50 split, 300 gas wells, and approximately 57 miles of primary roads and 314 miles of secondary roads. Under the Proposed Action, an additional 1,020 natural gas and 219 oil wells would be developed and operated. Most of these wells would be developed on federal leases. The development would also consist of access roads, with an average length of 1,000 feet that would connect to the existing road system. The Proposed Action would also involve the construction of gas, oil, and water pipelines. Oil wells would be drilled to the Green River formation and gas wells would be drilled to multiple formations.

Well pads for natural gas, oil production and water injection all would be level 300 feet X 350 feet rectangular pads occupying approximately 2.41 acres. Drilling and completion operations would take from 4 to 90 days depending on the depth of drilling that is expected to be 2,000 to 16,000 feet. Following the drilling and initial completion operations, a portion of the pad plus the reserve pit would be reclaimed. Following interim reclamation, the average reclaimed well pad would be 1.65 acres and the average 1,000-foot road would be 0.69 acres for the total of 2.34 acres per well pad and associated access road.
In some cases, a “twin” well would be drilled on a pad to a different formation or directional drilling methodology would be used to access 20-acre spacing formations. As a result, only 891 new pads and associated 1,000-foot access roads would be constructed.

Each gas well would be equipped with a heated separator powered by 0.75 mBtu boilers and water and condensate tanks. Approximately half of the oil wells would be equipped with pumping units powered either by gas or electricity.

Ancillary facilities would be needed. A total of 15 new compressor stations, each with 2,000 horsepower engines powered by natural gas, would be constructed to move the natural gas to processing areas. Each of the 22 Central Tank Facilities would consist of two 500-barrel oil tanks, two heated separators, a station pump powered by a 30-horsepower (hp) electric motor, and one 1.5 mBtu boiler to provide the heat for the separators. Oil and water from the CTFs would be trucked to a central location for transportation to markets.

It is predicted that natural gas production over the 40-year life of the project would be 615.2 billion cubic feet. The predicted oil production may be as high as 9.52 million barrels.

No Action

The No Action alternative is required by NEPA for a comparison to other alternatives. The No Action alternative analyzes a level of development that would occur if no new authorizations were allowed on federal leases in the project area. However, APDs for 79 federal wells have been approved under NEPA analyses and subsequent Decision Records, and these wells could be developed. In addition, 130 wells would be on State of Utah and private leases. Therefore, the No Action alternative would result in a maximum level of development of about 209 wells that would include 177 natural gas wells and 32 oil wells. The federal well pads and roads would be constructed as described in the Proposed Action. The State and private pads would be constructed according to the rules and regulations of the State of Utah. For sake of analysis in this EIS, it is assumed that the well pads and roads would be similar to the federal pads and roads.

Alternatives Considered but Not Evaluated in Detail

Several additional alternatives were considered as a result of issues raised during scoping. Each potential alternative was evaluated and eliminated from detailed analysis for a variety of reasons. These alternatives included no development, delaying access to leases for a certain period of time, exchange of leases, full-field directional drilling, phased development, and conventional development techniques (one pad for each well). These alternatives and the rational for eliminating them from further analysis are described in more detail in Section 2.5 of the Final EIS.

AFFECTED ENVIRONMENT

The GDBR is in eastern Uintah County approximately 20 miles south of Vernal. The GDBR is located in a semi-arid region, and elevations range from 4,700 to 5,800 feet. The GDBR lies completely in the Uinta structural basin of northeastern Utah. The Uinta Basin is drained by the Green River and its tributaries. Major tributaries include the Duchesne River and the White River. Numerous dry washes within the GDBR only flow during snow melt and precipitation events. These ephemeral drainages flow into the Green River to the west and the White River to the south.

Groundwater aquifers beneath the GDBR are present in formations dating in age from Cambrian to recent. Water-bearing zones are found in nearly all formations in the area, but the principal aquifers include alluvial deposits along the White and Green Rivers, the Uinta Formation, the Green River Formation (including the Birds Nest Aquifer), sandstone beds within the Mesa Verde Formation, and the Frontier Sandstone. The alluvial aquifers are usually unconfined whereas the consolidated aquifers are generally unconfined near outcrops and confined down dip. The primary permeability of these aquifers is generally low. However, fractures, bedding planes, and faults produce relatively high secondary permeability.

Overall, air quality in the Project Area is good. Based on measured data, the region's remoteness, and a lack of major urban communities, the region around Vernal is designated as an attainment area for all criteria pollutants. That means all criteria pollutants are below the designated levels of the National Ambient Air Quality Standards (NAAQS) established by the U.S. Environmental Protection Agency and the Utah Department of Environmental Quality. Concentrations of criteria pollutants greater than the NAAQS are considered potentially harmful.

Soil parent materials present within the GDBR include loam, silty clay loam, clay loams, sandy loams, and silty clay. Some of 43 soil units are composed of the same soil series components but occur on different slopes. Combining all of these soil characteristics, 48 percent of the GDBR has soils with a severe erosion potential, 38 percent has a moderate erosion potential, and only 14 percent has slight erosion potential.

Seven vegetative communities occur within the GDBR: pinyon-juniper woodlands, sagebrush shrub, desert shrub, grassland, riparian, badlands, and desert sands. Desert shrub and sagebrush shrub cover over 90 percent of the GDBR. Two special status plant species, the Uinta Basin hookless cactus and horseshoe milkvetch, occur or have the potential to occur within the GDBR.

The GDBR supports a variety of wildlife. Two species of big game occur regularly in the Project Area: pronghorn antelope and mule deer. Various species of raptors, upland game, furbearers, songbirds, waterfowl, and reptiles also frequent the area. Aquatic species are present in the Green River which flows through a portion of the western part of the GDBR and would be a source of water for the project. About 9 species that have a special-status designation (e.g., threatened, endangered, or sensitive) may occur in the GDBR.

Public lands in the GDBR provide limited opportunities for fishing, hiking, picnicking, hunting small game, and off-highway vehicles. Other recreational opportunities near the GDBR are considered more attractive. The primary users of recreational resources in the Project Area are local residents.
The principal land uses in the GDBR include livestock grazing, oil and gas development and utility corridors. Current land ownership in the GDBR includes BLM (85%), State (12%), and private lands (3%).

The GDBR contains portions of 13 rangeland allotments. The 13 rangeland allotments range from approximately 9-17 acres/animal unit month (AUM). Of the 13 allotments in the GDBR, 5 are grazed by sheep, 5 by cattle, and 3 by sheep and cattle. The total allotment acreage in the Project Area supports approximately 7,621 AUMs. While grazing has had a historic presence in the area, its economic success has been marginal due to the low carrying capacity of the land. This restrictive carrying capacity is due to the arid vegetation types within the area ranging from pinyon-juniper and sagebrush grassland to salt desert. Grazing patterns are typically managed to maximize what production does exist.

Historically, the economy of Uintah County was founded on agriculture and then energy resource extraction and has been subject to changes in the energy markets. Throughout the 1990s and to the present, the local population and employment has grown gradually as a result of the diversification of the regional economy and increased activity in the energy sector. Due to the prevalence of the oil and gas and trade industry in Uintah County, wages are generally higher than in other rural counties in Utah, although they are lower than in counties along the more prosperous Wasatch Front. Presently, the counties' economies differ somewhat in composition. Given their generally high assessed value, the oil and gas industry (ad valorem property, and royalties) contribute a significant portion of a county's property tax base.

Numerous cultural surveys have been conducted in the GDBR in the late 1970s for oil and gas development, which has mainly involved seismic line, well pad, access road, and pipeline corridor construction. Prehistoric open campsites, lithic scatters, and historic sites are dominant among the identified cultural resources. Of the 63 sites documented, 35 percent are prehistoric campsites, 22 percent are prehistoric lithic scatters, 6 percent are prehistoric lithic/ceramic scatters, and 25 percent are historic sites. Additionally, four sites having both prehistoric and historic components are recorded in the GDBR.

ENVIRONMENTAL CONSEQUENCES

The likely environmental consequences are summarized in Table S-2 for the Proposed Action and the No Action alternative. Although interim reclamation efforts would take place, the percent of success would be limited due to the low annual precipitation and the physical and chemical properties of the soils. Recent BLM monitoring has documented that interim reclamation efforts in oil and gas development areas have largely been unsuccessful at reestablishing soil stability and vegetation. Accordingly, BLM field inspections are indicating that initial disturbance should be more accurately portrayed as long-term impacts for the life of the project. Therefore, the acreage initially disturbed for construction, drilling and completion would remain void of desired vegetation for the long-term length of the GDBR project.

Table S-2. Comparison of Alternatives Impacts and Descriptions

Potential Impact	Proposed Action	No Action
Number of Wells	1,020 gas wells 219 oil wells	177 gas wells 32 oil wells
Number of Well Pads	891	187
Access Roads	170 miles	40 miles
Pipelines/flowlines	235 miles	40 miles
Powerlines	31 miles	0
Long-term Surface Disturbance during Development	4,561 acres (5% of GDBR)	888 acres (1% of GDBR)
Estimated Natural Gas Extraction (life of project)	615.2 billion cubic feet	106.8 billion cubic feet
Estimated Oil Extraction (life of project)	9.52 million barrels	1.44 million barrels
Effects on surface water	Sediment loading to White and Green Rivers were predicted to be a maximum of 2,375 tons/yr, less than a 0.03% increase of the existing sediment loading in both rivers.	Sediment loading to White and Green Rivers were predicted to be a maximum of 705 tons/yr, less than a 0.01% increase of the existing sediment loading in both rivers.
Effects on ground water	Slight chance of groundwater contamination from spills, but BMPs (well pad and road construction techniques and drill pit containment) and SPCC plans would reduce potential.	Same as Proposed Action but smaller likelihood because of only 210 wells.
Effects on air quality during construction	Dust generated during construction of pads and roads and drilling wells would result in localized PM_{10} effects near construction that would be 30 to 45% of the NAAQS.	Same as Proposed Action near each individual facility and road. However, effects would occur at 210 locations rather than the 1,239 locations of the Proposed Action.

Potential Impact	Proposed Action	No Action
Effects on air quality during operations	For the life of the project, PM_{10}, NO_2, and CO ambient air concentrations predicted to be 23, 52, and 50%, respectively, of NAAQS. NO_2 and PM_{10} predicted to be 82 and 70% of PSD Class II increment. HAP ambient concentrations predicted to be less than 1% of Chronic Inhalation Exposure and Reference Exposure Levels except formaldehyde, which is predicted to be 5-10% of standard.	PM_{10}, NO_2, and CO ambient air concentrations predicted to be 5, 10, and 8%, respectively, of NAAQS because project emissions would be about 20% of Proposed Action. NO_2 and PM_{10} predicted to be 16 and 14% of PSD Class II increment.
Effects to air quality and air quality related values (AQRV) at Class I areas	Ambient pollutant concentrations predicted to be less than 0.1% of Class I increments for the life of the project at the following Class I areas: Arches NP, Canyonlands NP, Capitol Reef NP, Black Canyon of the Gunnison NP, Maroon Bells-Snowmass NP, Flat Tops WA, Eagles Nest WA, Mt. Zirkle WA, and Rawah WA. Maximum visibility effects predicted to be less than 20% of the "just noticeable change" threshold of 1.0 deciview. Nitrogen deposition value predicted to be less than 1% of threshold of 3.0 kg/ha/yr.	Insignificant effects that would be less than insignificant effects described for Proposed Action because project emissions would be 80% less than Proposed Action.
Effects to erodible soils	406 new well pads on soils rated with a severe erosion potential, 345 on moderate, 142 on slight.	76 new well pads on soils rated with a severe erosion potential, 95 on moderate, 39 on slight.
Soil Loss	Soil loss estimated to range from 602 to 2,375 tons/year during construction period. Estimated to stabilize at 1,966 tons/year after construction. Soil loss activities in distinct watersheds within GDBR would range from 0.2 to 2.5% increase over the naturally occurring rates. Subsequent sedimentation loading to both the Green and White Rivers is predicted to increase by only 0.03 percent.	Soil loss estimated to range from 308 to 705 tons/year during construction period. Estimated to stabilize at 308 tons/year after construction. Soil loss activities in distinct watersheds within GDBR would range from 0.0 to 1.9% increase over the naturally occurring rates. Subsequent sedimentation loading to both the Green and White Rivers is predicted to increase by only 0.01 percent.
Loss of Vegetation	4,561acres removed during construction. Losses would range from 1.8 to 5.8% of the available vegetation type within GDBR. Although interim reclamation would be attempted after a well would be completed, reclamation may take from years to decades depending on the species. Overall, the action is not likely to lead to the need to list a species.	888 acres removed during construction. Losses would range from 0.6 to 0.8% of the available vegetation type within GDBR. Although interim reclamation would be attempted after a well would be completed, reclamation may take from years to decades depending on the species. Overall, the action is not likely to lead to the need to list a species.

Potential Impact	Proposed Action	No Action
Effects on Special Status Vegetation Species	Development of 17 wells and roads could occur within areas of known occurrence of horseshoe milkvetch, a former candidate species but removed from the Candidate List in September 2006. Site specific preconstruction surveys would be conducted to avoid the destruction of plants. Weed control would occur to prevent invasion into potential or occupied habitats. Overall, the action is not likely to lead to the need to list the species. Potential habitat of the Uinta Basin hookless cactus is present in the southern and west portions of the GDBR in the Uinta Geological formation. Based on the anticipated effectiveness of the mitigating measures BLM finds that the Proposed Action "***may affect, is not likely to adversely affect***" the Uinta Basin hookless cactus.	1 well could occur within areas of known occurrence of horseshoe milkvetch. Site specific preconstruction surveys would be conducted to avoid the destruction of plants. Weed control would occur to prevent invasion into potential or occupied habitats. Overall, the action is not likely to lead to the need to list the species.
Loss of Wildlife Habitat	No BLM-identified antelope or mule deer critical winter habitat within the GDBR would be disturbed by new facilities. 125 acres (2% of total within the GDBR) of BLM-identified high-priority year-long antelope habitat would be disturbed. These effects would result in habitat fragmentation and potential for increased collisions with vehicles. 43 new wells and associated access roads would be constructed within raptor guideline buffers. Construction too close to nests could cause raptors to avoid the area. Overall, the action is not likely to lead to the need to list a species.	No BLM-identified antelope or mule deer critical winter habitat within the GDBR would be disturbed by new facilities. 4 new wells and associated access roads would be constructed within raptor guideline buffers. Construction too close to nests could cause raptors to avoid the area. Overall, the action is not likely to lead to the need to list a species.
Effects on Special Status Wildlife Species	New facilities would result in disturbance of up to 16 acres of about 16,000 acres of prairie dog colonies within GDBR. Proposed Action would be consistent with habitat management objectives of maintaining minimum 10,000 acres of prairie dog colonies for the Coyote Basin Primary Management Zone (PMZ). Overall, the action is not likely to lead to the need to list a species. 134 ferruginous hawk and golden eagle nests have been documented in GDBR. High likelihood of impacting some nests,	New facilities would result in disturbance up to 10 acres of about 16,000 acres of prairie dog colonies within GDBR. This disturbance would be consistent with habitat management objectives of maintaining minimum 10,000 acres of prairie dog colonies for the Coyote Basin PMZ. Overall, the action is not likely to lead to the need to list a species. 134 ferruginous hawk and golden eagle nests have been documented in GDBR. Lower likelihood than of the Proposed Action of impacting some nests, but overall abundance of nests

Potential Impact	Proposed Action	No Action
	but overall abundance of nests should result in small overall effect. Overall, the action is not likely to lead to the need to list a species. Development of facilities would result in 19 acres of disturbance in known sage grouse leks. Grouse could abandon these leks if construction would occur from March 1 to June 15 during the breeding season. However, construction activities would not be allowed during the breeding season so no effects would occur. Overall, the action is not likely to lead to the need to list a species. Based on the potential loss of prey species and loss of habitat, the Proposed Action "***may affect but not likely to adversely affect***" the bald eagle. Based on the removal of water from the Green River (i.e., water depletion) for construction and drilling operations, the Proposed Action "***may affect, is likely to adversely affect***" the endangered Colorado pikeminnow, humpback chub, bonytail, and razorback sucker.	should result in small overall effect. Overall, the action is not likely to lead to the need to list a species. Development of facilities would result in 10 acre disturbance of known sage grouse leks. Grouse could abandon these leks if construction would occur from March 1 to June 15 during the breeding season. Overall, the action is not likely to lead to the need to list a species. Based on the potential loss of prey species and loss of habitat, the Proposed Action "***may affect but not likely to adversely affect***" the bald eagle. Based on the removal of water from the Green River (i.e., water depletion) for construction and drilling operations, the Proposed Action "***may affect, is likely to adversely affect***" the endangered Colorado pikeminnow, humpback chub, bonytail, and razorback sucker.
Effects to cultural resources	Based on past data, 154 to 462 sites could occur in GDBR. Perhaps 40 percent may be eligible to the NRHP. Seven to 22 new sites could be uncovered during the earth-moving activities. Pre-construction cultural surveys would reduce potential impacts but likelihood exists that some sites could be inadvertently destroyed. Since road network already exists, potential for vandalism should not increase.	Surface disturbance would be approximately 12 percent of the Proposed Action total. Therefore, 1 to 3 new sites could be discovered during surveys or uncovered during earth-moving activities. With less wells, likelihood of inadvertently destroying sites would be less. Potential for vandalism would be similar to Proposed Action because of existing road network.
Effects to paleontological	Fossil-bearing geological formations extend into GDBR. Adverse effects (including destruction) would be minimized by paleontological surveys during APD process. Earth-moving activities would immediately stop if fossils would be discovered and the site is evaluated by BLM and State paleontologists and a decision is made whether to avoid the site.	Same as Proposed Action but likelihood of discovering sites during surveys or uncovering during construction would be much less because surface disturbance would only be 12 percent of Proposed Action.

Potential Impact	Proposed Action	No Action
Effects to land use	Continued use of lands within GDBR for oil and gas development. Minor loss of AUMs described in Rangeland Management. No changes in permitted use is anticipated as being necessary.	Change of land use on State and private leases would be identical to Proposed Action. Overall disturbance and change of land use would be 12 percent of the Proposed Action. No changes in permitted use is anticipated as being necessary.
Effects to transportation	Average Annual Daily Traffic would increase by 3.5% during 10-year construction phase and 1.4% during operations. Accident potential would increase by approximately the same percentage especially at intersections within GDBR along HW 45.	Average Annual Daily Traffic would increase by 3.5% during 2- to 3-year construction phase and 1.0% during operations. Accident potential would increase by same percentage especially at intersections with HW 45.
Effects to rangeland management	Long-term loss of 347 AUMs, a 3% decrease in the total preference of the affected allotments. Changes in the grazing permits are not anticipated. AUM losses within each allotment would be as follows:	Long loss of 69 AUMs, a less than 1% decrease. Changes in the grazing permits are not anticipated. AUM Losses within each allotment would be as follows:
	Allotment — AUM Long-term loss	Allotment — AUM Long-term loss
	Antelope Draw — 79 (2%)	Antelope Draw — 32 (2%)
	Badlands — 3 (2%)	Badlands — 2 (1%)
	Baeser Wash — 20 (4%)	Baeser Wash — 1 (<1%)
	Bohemian Bottoms — 19 (5%)	Bohemian Bottoms — 3 (1%)
	Bonanza — 0	Bonanza — 0
	Cocklebur — <1 (1%)	Cocklebur — 0
	Horned Toad — 84 (5%)	Horned Toad — 9 (1%)
	Ouray Valley — <1 (1%)	Ouray Valley — <1 (<1%)
	Pelican Lake — 6 (4%)	Pelican Lake — 0
	Powder Wash — 5 (4%)	Powder Wash — 1 (1%)
	Stateline — 21 (4%)	Stateline — 6 (1%)
	Walker Hollow — 17 (4%)	Walker Hollow — 0
	West Deadman — 91 (5)	West Deadman — 14 (1%)

Potential Impact	Proposed Action	No Action
Effects to recreational opportunities	Recreational users along Green River would casually notice construction activity.	Recreational users along Green River would casually notice construction activity.
Effects to visual resources	BLM VRM Class IV management objectives would be met. About 20 wells would be constructed in VRM Class III lands and would not meet management objectives without the prescribed mitigation described in Section 4.13.2.	3 wells would be constructed on State lands which are surrounded by BLM VRM Class III . Visual impacts would be noticeable but facilities would be beyond jurisdiction of BLM.
Socioeconomics effects	Project would employ 331 workers for 10 years to develop resources and about 60 people over the course of the project after construction activities would be completed.. Local services from commercial to government services could accommodate any new workers from out of local area. Annual payroll estimated to be $10.7 million during construction phase and an estimated $3 million after the construction phase. Royalties from federal wells to State of Utah estimated to be $140.1 million over 40-year life of project and $26.2 million to Uintah County. Severance tax to the Utah general fund would be $127 million over the life of the project.	Project would employ 331 workers for 2 to 3 years to develop resources. Local services from commercial to government services could accommodate any new workers from out of local area. Annual payroll estimated to be $10.7 million during construction phase. Royalties to State of Utah estimated to be $25.8 million over 40-year life of project and $4.1 million to Uintah County. Severance tax to the Utah general fund would be approximately $21 million over the life of the project.
Noise effects	Noise would be elevated near drill rigs and compressor stations, and along access roads. No residences are near GDBR facilities or planned since most of the land is federal- or state-owned. GDBR facilities would be audible for recreational users on the Green River and Ouray NWR, but below 55 dBA, 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.	Noise would be elevated near drill rigs and compressor stations, and along access roads. The noise effect would be similar to the Proposed Action for 3 rather than 10 years for the Proposed Action. No residences are near GDBR facilities or planned since most of the land is federal- or state-owned. GDBR facilities on private lands would be audible but below 55 dBA for recreational users on the Green River and Ouray NWR.

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1.0 PURPOSE AND NEED

1.1 PROJECT OVERVIEW

Questar Exploration and Production Company (QEP) has notified the Bureau of Land Management (BLM) Vernal Field Office that they propose to fully develop hydrocarbon resources underlying oil and gas mineral leases within the Greater Deadman Bench oil and gas-producing region (GDBR). The location of the proposed project is shown on Figure 1.1. The lands QEP proposes to develop are either wholly or partially contained within townships T6S to T8S, R21E to R25E, Uintah County, Utah. BLM, as lead federal agency, has determined that the approval of the proposed project constitutes a major federal action requiring the development of an Environmental Impact Statement (EIS).

The mineral leases within the GDBR have been obtained by QEP from the United States Government and the State of Utah and grant certain rights to explore, develop, and produce the oil and gas resources underlying such leases, granting ingress and egress to such leases, and retaining a Royalty Interest on any production accruing to the benefit of the federal government or the state of Utah. QEP holds valid federal, state, and private oil and gas leases in the GDBR; these leases grant contractual and property rights from the United States, the State of Utah, and the private mineral landowners to QEP for the purpose of developing oil and natural gas resources.

1.2 PURPOSE AND NEED

The proposed action is approval of QEP's proposed project. The purpose of BLM's action is to respond to QEP's proposal and to facilitate action on future plans related to this proposal. Any additional environmental analysis and documentation will tier to this document. The purpose of QEP's proposed project is to extract and transport oil and natural gas, at a profit, from the portions of the GDBR leased by its companies.

Increased development of natural gas and oil in an environmentally responsible manner is necessary to satisfy federal energy policy (U.S. Department of Energy [DOE], 2004). The proposed project also would provide a source of clean-burning energy. BLM's oil and gas leasing programs encourage development of domestic oil and gas reserves and the reduction of U.S. dependence on foreign energy sources. Private exploration and development of federal oil and gas reserves are integral parts of BLM's oil and gas leasing programs under the authority of the Mineral Leasing Act of 1920, as amended by the Federal Land Policy and Management Act (FLPMA) of 1976 the Federal Onshore Oil and Gas Leasing Reform Act of 1987, and the Energy Policy Act of 2005.

Natural gas and oil are widely considered essential to supplying the nation's current and future energy needs. Total demand for natural gas is projected to increase at an annual average of 1.8 percent from 22.7 trillion cubic feet per day (tcfd) to 34.9 tcfd by 2025. The increase is primarily because of the rapid growth for electrical generation facilities fueled with natural gas. Total demand for crude oil is projected to increase from 19.0 million barrels per day (mbd) to 28.3 mbd by 2025. Crude oil projections are based upon international economics. As a result, DOE projects that the demand could range from 25.6 to 31.1 mbd by 2025 based upon demand and price (DOE 2004).

BLM objectives for the project are to minimize environmental consequences, as well as to ensure conformance with the objectives of the pertinent land use plans. This EIS addresses the potential effects of implementing a level of oil and gas development. The EIS does not address the particular actions of development with particular and definitive results or definitive locations for natural gas facilities within the GDBR. For the purposes of this EIS, the wells, roads, pipelines, and ancillary facilities detailed in this

EIS are conceptual in plan and location. The final location for each component of this proposed project would be determined through consideration of topographical and geological features and site-specific analyses that would be required for each facility. These analyses would occur when applications, such as an Application for Permit to Drill (APD) or a BLM Right-of-Way (ROW) grant, are filed by QEP for each project component.

Therefore, this EIS serves two purposes. It provides the basis for analyzing and disclosing impacts resulting from the level of development proposed within the GDBR. It also identifies approval conditions and mitigation to be implemented at as-yet undetermined specific development locations within the GDBR.

1.3 EIS PROCESS

QEP submitted a proposal for the GDBR full-field development on April 21, 2003. The BLM Vernal Field Office in Vernal, Utah, as the responsible federal agency, is responding to the proposal by preparing this EIS. The Proposed Action described in Chapter 2 was developed in a cooperative effort between QEP and BLM.

BLM is required by National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) directives to analyze Proposed Actions involving federal lands and leases in terms of their potential impacts on the human environment (40 Code of Federal Regulations [CFR] Parts 1500-1508). BLM is also required (by regulations implementing the Mineral Leasing Act of 1920) to review and act on APDs and attached Surface Use Plans of Operations (SUPO) and to decide on the requirements for surface occupancy provided by the SUPO. BLM also issues ROW grants to construct and operate linear transportation facilities, such as roads and pipelines, across federal lands under Title V of FLPMA and the Mineral Leasing Act.

In anticipation of any potential environmental consequences resulting from the Proposed Action or Alternatives, as detailed in the analysis of impacts on the human environment, another responsibility of the BLM is to establish reclamation provisions (i.e. a Bond), in the event that an oil and gas operator fails to complete adequate reclamation efforts on facilities and disturbed lands. Bonds are required for oil and gas operations on federal leases to indemnify the government for safe rehabilitation, royalty payments, and civil penalties, and are also required for ROWs on federal lands.

This EIS provides BLM with information upon which to base a final decision regarding the Proposed Action. Scoping issues and concerns raised by the public and concerned agencies drove the development of Alternatives and focused the impact analysis process. This EIS documents the analysis of impacts that could result from implementation of the Proposed Action or Alternatives and the development of mitigation necessary to reduce or eliminate environmental consequences. It does not contain final decisions made regarding the Proposed Action and Alternatives.

1.4 DECISIONS TO BE MADE AFTER THE EIS PROCESS

The decisions regarding the Proposed Action and Alternatives will be documented in the Record of Decision (ROD) signed by the Vernal Field Office Manager. The BLM decision will apply only to public lands and leases. Decisions by state, private, and Tribal jurisdictions to issue or not issue approvals related to this Proposed Action may be influenced by the disclosure of impacts available in this analysis.

The ROD associated with this EIS is neither the final review nor the final approval for all actions associated with this project. Although the ROD would approve the project's oil and natural gas development and general location, each project component involving surface disturbance to federal lands

must be analyzed and approved on a site-specific basis by BLM. The method used to evaluate each surface-disturbing activity is detailed in the APD and/or ROW grant. Submission and approval of such applications are required prior to any project construction.

1.4.1 APD Process

The operator can initiate the APD process either by filing an APD or a Notice of Staking (NOS). The NOS would consist of an outline of the operator's proposal, including a location map, and a sketched site plan. The APD includes a surface use program and a drilling program. The detailed information to be submitted for each APD program is identified in Onshore Oil and Gas Order No. 1 and 43 CFR 3162.3.

On BLM-administered land, the BLM is responsible for approving a project component's final APD, the surface use and subsurface drilling programs, and appropriate mitigation for resources as necessary. Prior to approving an APD, the BLM must conduct an environmental review, prepare the documentation, and provide mitigation for surface resources on potentially affected BLM lands. The review consists of an on-site inspection of the locations proposed for the well, access road, and pipelines, and other areas of proposed surface use. The purpose of the on-site inspection is to determine the presence/absence of sensitive resource values and to apply the appropriate mitigating measures. Terms and conditions and standard operating procedures (SOP) previously analyzed as mitigating measures in the NEPA documents associated field development and land use plans. The inspection team would include the BLM's Authorized Officer (AO) or designated representative, the drilling and construction contractor, and a surveyor. After the on-site inspection, if protection of surface or subsurface resource values near the proposed activity is warranted, the project component's APD may be revised or mitigation (e.g., adjusting the proposed locations of well sites, roads, and pipelines to avoid a sensitive resource; identifying specific construction methods to be employed; or identifying reclamation standards) may be added as Conditions of Approval.

1.4.2 ROW Grant

Operators are required to submit a ROW grant for access to a road or pipeline located on BLM lands yet outside the proposed project's lease or unit. APDs and Sundry Notices are often acceptable as applications for ROW grants for these off-lease facilities if they provide sufficient detail of the entire proposal.

In the case of third party oil/gas transportation pipelines, organizations or individuals who are not oil/gas lessees, yet want to construct, operate, and/or maintain roads, power lines, telephone lines, and/or other facilities within the GDBR, are required to apply for a ROW grant pursuant to Title V of the FLPMA or Section 28 of the Mineral Leasing Act, as amended.

After drilling, routine well operations would not require approval. However, BLM would have approval authority for a variety of related activities. Any changes to an approved APD, certain subsequent well operations (complete details of subsequent well operations are contained in 43 CFR 3162.3-2), disposal of water produced from federal leases (outlined in Onshore Oil and Gas Order No. 7), and all new surface disturbances (e.g., workover pits), would require prior approval. BLM would also need to approve plugging and abandonment of wells, gas venting, gas flaring, and certain measures for handling production. Other permits, approvals, authorizing actions, and consultations required by federal, state, and local agencies are discussed in Section 1.8.

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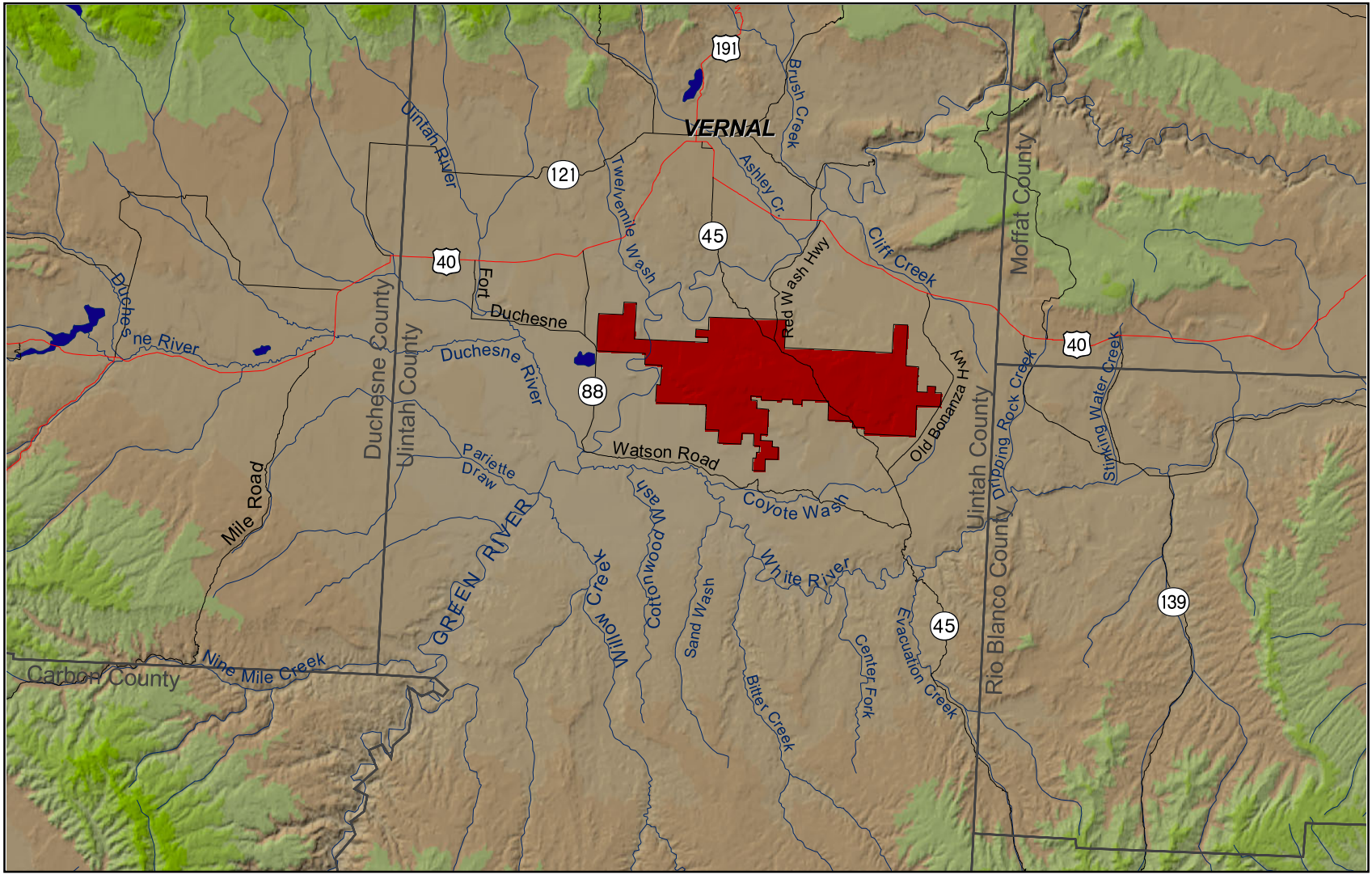

Greater Deadman Bench Project Area Boundary

0 5 10 15 20 25

Scale (Miles)

N W E S

Figure 1-1. Location Map of the Greater Deadman Bench Project Area, Uintah County, Utah.

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1.5 LAND STATUS AND CONFORMANCE WITH PLANS AND STIPULATIONS

1.5.1 Land Status

The GDBR encompasses approximately 98,785 acres of land. Land ownership within this area is divided among the BLM, the Utah State Institutional Trust Lands Administration (SITLA), and various private entities. No Tribal lands are within the GDBR. BLM-administered lands account for approximately 83,864 acres (84.7%) of surface and mineral estate lands within the GDBR. Utah SITLA lands account for approximately 11,448 acres (11.6%) of surface and mineral estate lands within the GDBR. The remaining 3,473 acres (3.7%) consist of various privately owned surface and mineral estate lands within the GDBR. QEP currently holds leases on 79% of the federal, state, and private lands within the GDBR.

1.5.2 Conformance with Federal Management Plans

The Proposed Action and Alternative described in this EIS would take place within the Book Cliffs Resource Area and a small portion west of the Green River in the Diamond Mountain Resource Area. The Book Cliffs Resource Area is currently managed under a Resource Management Plan (RMP) approved in 1985 (BLM 1985). The Diamond Mountain Resource Area is managed under an RMP approved in 1994 (BLM 1994). The management objectives of both current RMPs include leasing oil and gas, tar sands, oil shale, and Gilsonite, while protecting or mitigating other resource values. The Proposed Action and Alternatives presented in this EIS are consistent with the current management decisions set out in these documents.

A revision of both RMPs is currently being prepared that will consolidate all management activities of the entire Vernal Resource Area. A draft of the revision was issued on January 4, 2005. Until decisions are finalized, the plan has no official status; however impacts on the values and resources identified during the planning effort are addressed in this EIS. The decision on this field development would not preclude any alternatives being considered in the Vernal RMP effort.

The Coyote Basin ACEC would not be precluded from selection under any alternative, as all Draft RMP alternatives consider the same mineral management prescriptions that are in place under the Book Cliffs RMP. The value for which the ACEC was nominated is the white tailed prairie dogs and their habitat. The impacts to white tailed prairie dogs and their habitat are disclosed in section 4.6 of the Final EIS.

The portion of the Green River that is within the boundaries of the GDBR has been determined to be eligible as a Wild and Scenic River with a tentative classification of recreational. The BLM Manual 8351 Wild and Scenic Rivers specifies in section .32 (A) (3) that Recreational river areas are those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past. Parallel roads or railroads, existence of small dams or diversions can be allowed in this classification. A recreational river area classification does not imply that the river will be managed or prioritized for recreational use or development. However, proposed mineral management is less restrictive under all alternatives in the Draft RMP than currently exist under the Book Cliffs RMP. In addition, no new development is proposed within the eligible WSR segment of the river. Development is proposed on private land adjacent to the river, but the WSR designation would not include those lands.

1.5.3 Consistency with Local Plans

The Proposed Action is also consistent with the Uintah County General Plan (Plan) (Uintah County 1996) and the Public Lands County Policy adopted August 23, 2003. The Plan generally indicates support for development proposals in its emphasis of multiple-use public land management practices and its emphasis of responsible use and optimum utilization of public land resources. As used in the Plan, multiple-use is defined as including, but not limited to, the following historically and traditionally practiced resource uses: grazing, recreation, timber, mining, oil and gas development, agriculture, wildlife habitat, and water resources as they become available or as new technology allows.

The State of Utah does not have planning documents for the vicinity of the Proposed Action.

1.5.4 Lease Stipulations

BLM has issued leases with stipulations to QEP for approximately 25 percent of the GDBR. Many leases were issued before the Book Cliffs RMP and therefore do not contain stipulations other than the standard lease terms at the time of issuance. The stipulations in effect are summarized below for those leases with stipulations. Complete information about the proponent's leases and their associated stipulations is available for review at BLM, Vernal Field Office and Utah State Office.

- No surface disturbance during crucial pronghorn kidding activities May 15 to June 20;
- Ferruginous hawk and golden eagle protection (according to Appendix 2 of Diamond Mountain RMP);
- No surface occupancy within 600 ft (200 meters) of live water;
- Seasonal restrictions for raptors and habitat;
- Protect burrowing owl and habitat from surface disturbance;
- Protection of riparian vegetation and the floodplain of Antelope Draw;
- No Surface Occupancy to protect designated public water reserve (Book Cliffs RMP and EIS pg. 123);
- In critical to severe soil erosion areas, may prohibit surface disturbing activities during wet and muddy periods;
- No Surface Occupancy within 100 meters of riparian vegetation;
- Lease Notice - Habitat containing federally listing plant A*stragalus equisolensis; and*
- Lease Notice - Federally listed plant S*clerocactus glaucus.*

1.6 PUBLIC INVOLVEMENT/SCOPING OF ISSUES

From November 14, 2003 through February 4, 2004, BLM conducted public and internal scoping to solicit input and identification of environmental issues and concerns associated with the proposed QEP Project. On December 9, 2003, a briefing of the Proposed Action was made to the State of Utah Resource Development Coordinating Committee (RDCC). A Notice of Intent (NOI) to prepare the EIS was published in the Federal Register on December 19, 2003. BLM then prepared a scoping information packet and provided copies of it to federal, state, and local agencies, as well as members of the general public. BLM sought public involvement from the following North American Tribes: Southern Ute Tribe,

the Navajo Nation, the Paiute Indian Tribe of Utah, the Zuni Pueblo, the Ute Indian Tribe, the Shoshone-Bannock Tribes, the Northern Ute Tribe, the Hopi Tribe and the Ute Mountain Tribe. These North American Tribes have stated an interest in and/or declared cultural ties to the project area. Announcements of the scoping opportunities were sent to various newspapers (Vernal Express, Uintah Basin Standard, Deseret News, Denver Post and Salt Lake Tribune), the local Vernal radio stations, and Channel 6, the local Vernal television station. BLM conducted a public scoping and information open house at the Uintah County Building in Vernal, Utah on January 14, 2003.

1.6.1 Identified Issues

Written comments were received during the scoping comment period that ended February 4, 2002. Public response to the notices and meetings included 11 letters from the following agencies, organizations, and people:

- National Park Service, Intermountain Region, Denver, Colorado;
- Western Resource Advocates, Salt Lake City, Utah (representing Center for Native Ecosystems, Southern Utah Wilderness Alliance, Living Rivers, Utah Rivers Council);
- U.S. Geological Survey, Salt Lake City, Utah;
- Resource Development Coordinating Council, Salt Lake City, Utah (representing the State of Utah);
- The Hopi Tribe, Kykotsmovi, Arizona;
- The Paiute Indian Tribe of Utah, Cedar City, Utah;
- Uintah Basin Council of Governments, Roosevelt, Utah;
- Uintah County Commission, Vernal, Utah;
- U.S. Fish and Wildlife Service, West Valley City, Utah; and
- Southern Ute Indian Tribe, Ignacio, Colorado.

The environmental issues identified via the scoping process for the proposed project are identified below:

Issue 1: The GDBR level of development should be consistent with the existing and relevant land management plans.

Issue 2: The effects of the proposed development on soils and soil erosion potential in the project area.

Issue 3: The effects of the proposed development on air quality and visibility within the project area and cumulatively in the region.

Issue 4: The effects of the proposed development on surface water and groundwater in the project area.

Issue 5: The effects of the proposed development on the introduction and spread of noxious weeds.

Issue 6: The effects of the proposed development on vegetation communities and fragmentation of communities.

Issue 7: The effects of the proposed development on grazing allotments and rangeland resources in the Project Area.

Issue 8: The effects of the proposed development of gas resources on wildlife and wildlife habitat.

Issue 9: The effects of the proposed development on fisheries and aquatic habitats.

Issue 10: The effects of the proposed development on special-concern species, including threatened, endangered, candidate, or sensitive species of plants and animals.

Issue 11: The economic effects of the proposed development.

Issue 12: The analysis of the proposed development on traffic and the transportation plan in the project area.

Issue 13: The EIS should adequately address the cumulative impacts of the proposed project plus other oil and gas development projects in the region.

Issue 14: The effect of the proposed project on cultural resources.

Issue 15: A reasonable range of alternatives should be considered.

Issue 16: The effect of noise from projected-related activities.

Issue 17: The implementation and monitoring of mitigation should be considered.

Issue 18: The effect of the project on recreation opportunities.

No additional issues were identified during the course of the meetings.

1.7 CRITICAL ELEMENTS ANALYSIS

The BLM requires that potential impacts be addressed for the following critical elements of the human environment during the NEPA process (BLM 1988a):

Water Quality	Flood Plains
Wetlands/Riparian Zones	Air Quality
Farmlands, Prime/ Unique	Migratory Birds
Threatened and Endangered Species	Cultural Resources
Paleontological Resources	Areas of Critical Environmental Concern (ACECs)
Wild and Scenic Rivers	Wilderness Areas/Wilderness Study Areas
Native American Religious	Native American Trust Resources
Hazardous Materials/Waste	Environmental Justice

Of the 17 critical elements required to be addressed, ACECs, prime or unique farmlands, designated wilderness, WSAs, and wild and scenic rivers do not occur within the GDBR. Also, there are no interests or properties in the GDBR held in trust for Tribes by the U.S. government. Environmental Justice and Native American Religious Concerns were not identified as elements for analysis in this EIS.

1.8 AUTHORIZING ACTIONS

Federal, state, county, and local permitting actions required to implement any of the Alternatives would generally be the same for any Alternative selected. These permit requirements, which are listed in Table 1-1, represent most of the permitting actions required for the QEP project, but the list is not necessarily comprehensive. Also note, many of the below listed permits address site-specific actions, so that the need for those permits will not be fully known until the site specific proposal (APD, Sundry Notice, or Right of Way) is received.

Table 1.1. Major Permits, Approvals and Authorizing Actions Required for the Proposed QEP Deadman Bench Oil and Gas Development Project

Issuing Agency/Permit Approval Name	Nature of Permit Action	Applicable Project Component
DOI – Bureau of Land Management		
Permit to Drill, Deepen, or Plug Back (APD) and Sundry Notice, plugging and abandonment, venting, and flaring	Controls drilling and production for oil and gas on federal onshore leases	Wells and production facilities
ROW Grant and Temporary Use Permit	ROW grant on BLM-managed lands	Oil and gas pipelines, roads, facilities, etc. on BLM-managed lands.
Cultural Resource Use Permit	Archaeological surveys and limited testing on public lands. Archaeological data recovery (excavation) of sites on public lands	All surface-disturbing activities
Paleontological Resource Use Permit	Survey and limited surface collection during site field work on public lands	Surface-disturbing activities
Pesticide Use Permit	Control of pests	Wells, roads, and ancillary facilities
National Noxious Weed Act Compliance	Controls noxious weeds	Any occurrence of noxious weeds on and near project facilities
Material Sales	Sales of sand, gravel, and riprap	Construction activities
U.S. Environmental Protection Agency		

Issuing Agency/Permit Approval Name	Nature of Permit Action	Applicable Project Component
Underground Injection Control Permit	Controls drilling of underground water injection wells for oil waterflood operations	Drilling and operating water injection wells
New Source Review (NSR) Permit; Prevention of Significant Deterioration (PSD)	Controls emissions from new or modified sources	All pollutant emission sources and construction activities associated with Proposed Action or Alternative
Underground Injection Control Permit	Regulates underground disposal wells	Underground disposal wells
Utah Pollutant Discharge Elimination System (UPDES) Permit	Authorizes discharge of pollutants to surface waters of the state	Any point-source surface discharge
UPDES General Permit for Storm Water Discharges	Controls discharge of stormwater pollutants associated with industrial and construction activities	Construction activities disturbing more than five acres of land; and gas production facilities that have had a discharge of a reportable quantity
U.S. Department of Army Corps of Engineers		
Permit to Discharge Dredged or Fill Material	Authorized placement of fill or dredged material in waters of the United States or adjacent wetlands	All surface disturbing activities affecting waters of the United States or wetlands, such as roads and pipeline crossings; Waters of the U.S. include streams, lakes, playas, wetlands, and other identified aquatic resources
DOI – U.S. Fish and Wildlife Service		
Endangered Species Act Compliance (Section 7)	Protects threatened and endangered species	Any activity potentially affecting listed or proposed threatened or endangered species
Migratory Bird Treaty Act	Protects migratory birds	All ground-disturbing activities
Bald Eagle Protection Act	Protects bald and golden eagles	All ground-disturbing activities

Issuing Agency/Permit Approval Name	Nature of Permit Action	Applicable Project Component
Advisory Council on Historic Preservation		
Cultural Resource Compliance (Section 106)	Protects cultural and historic resources; coordinated with the Utah State Historic Preservation Officer (SHPO)	All ground-disturbing activities
U.S. Department of Transportation		
Construction and operation of natural gas, crude oil, and water pipelines	Prescribes minimum safety requirements for pipeline facilities and the transportation of gas, including pipeline facilities	Natural gas pipelines
Utah Department of Transportation		
Transport Permit	Authorizes oversize, overlength, and overweight loads	Transportation of equipment and materials on state highways
Encroachment Permit	Authorized pipeline crossings or access roads tying into state or federal highways	Construction of pipeline across state or federal highways; construction of projects roads that tie into state or federal highways
Utah Department of Environmental Quality		
None		
Utah Division of Water Rights		
Change in Nature of Use Application	Authorizes change of use on water rights	Non-consumptive and consumptive water uses
Stream Alteration Permit	Approves construction plans	Perennial stream crossings
Utah School and Institutional Trust Lands Administration (SITLA)		
Compliance with Rules	Compliance with applicable general and program rules	Facilities on SITLA lands
Utah Division of State History, Antiquities Section		
Antiquities Annual Permit: Blanket Permit to Conduct Archaeological Investigations	Regulates all archaeological investigations on state and private lands	All surface-disturbing activities on state and private lands

Issuing Agency/Permit Approval Name	Nature of Permit Action	Applicable Project Component
Antiquities Projects Permit (Excavation)	Regulates all archaeological excavations on state and private lands	All surface-disturbing activities on state and private lands
Utah Division of State History Preservation Section (SHPO)		
Section 106 Cultural Resources Consultation	Determines significance of cultural resources potentially affected by surface-disturbing activities	All surface-disturbing activities
Utah Division of Oil, Gas, and Mining		
Permit to Drill, Deepen, or Re-enter and Operate an Oil and Gas or Disposal Well	Approves drilling on all lands within the state	Wells (production and disposal)
Disposal facility permit	Waste disposal	Waste and disposal facilities
Safety Regulations for Oil and Gas Activities	Regulates oil and gas activities to protect public safety	All Proposed Action and Alternative components
Permit to Flare Gas	Regulates flaring up to 30 days of testing or 50 MMcf, whichever is less	Flaring of gas wells
Uintah County		
Conditional Use Permit	Authorizes extraction and processing on private lands	Any project activities in residential or critical environment zones
Road Use Permit	Authorizes overweight and overlength loads on county roads	Transportation of equipment and materials on county roads
Road Opening Permit	Authorizes pipeline crossings, routing of pipelines parallel to county roads, and tying a project access road into a county road	Pipelines or project roads that cross or intersect with a county road
Solid Waste Ordinance	Regulates disposal of wastes in the County	Construction and operational waste

Issuing Agency/Permit Approval Name	Nature of Permit Action	Applicable Project Component
Building Permit	Controls construction of all structures in the County	Construction of all buildings in Uintah County
Noxious Weed Act Compliance	Controls listed noxious weeds	Any occurrence of noxious weeds on and near project facilities

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2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Proposed Action is an approval of QEP's proposal. QEP proposes to fully develop hydrocarbon resources underlying oil and gas mineral leases owned at least in part by QEP within the (GDBR) located in Townships 7 and 8 South, Ranges 21 to 24 East, Salt Lake City Base Meridian (Figure 2-1). These mineral leases were issued by the United States Government and the State of Utah. The leases grant certain rights to explore, develop, and produce the oil and gas resources underlying such leases, grant certain rights for reasonable ingress and egress to develop such leases, and retain in the lessor a royalty interest on production.

Development of the oil and gas resources has been occurring within the GDBR and adjacent areas since 1950. As of March 1, 2003 the GDBR included approximately 278 existing oil and water-injection wells producing from or injecting water into the Green River Formation and 300 gas wells producing from the Wasatch Formation. QEP has established Standard Operating Procedures (SOP) for construction, drilling, completion, and operational activities. An example of these SOPs, or how QEP does business with BLM oversight in the GDBR, is shown in Appendix 2-1.

Approximately 57 miles of primary roads and 314 miles of secondary roads have been constructed within the GDBR. Ownership of some of these roads has been asserted by Uintah County under the provisions of RS 2477 that states "the right-of-way for the construction of highways across public lands not reserved for public purposes is hereby granted". Additionally, about 13 miles of Utah State Highway 45 extends through the GDBR and provides the main access to the GDBR from Vernal.

The GDBR consists of about 146 sections (98,785 acres) in an existing oil and gas producing region. The GDBR is located primarily on lands administered by the Bureau of Land Management (BLM) (83,864 acres), lands administered by the State of Utah (11,448 acres), and a small number of private landowners (3,473 acres). QEP operates the majority of the mineral lease rights (79.2 percent) underlying both the public and private lands in the Project Area.

As a plan of long-term development, subject to potential change as conditions warrant, QEP proposes to drill additional wells at the rate of 100 to 120 wells per year over a period of 10 years, or until the resource base is fully developed. The total number of wells drilled would depend largely on factors out of the Company's control such as geologic success, engineering technology, economic factors, availability of commodity markets and lease and unit stipulations and restrictions. At full field development, a maximum 1,239 wells could be drilled. Based on current success rates in the GDBR, it is assumed that 5 percent of the wells drilled would be dry holes. Because the well locations are conceptual and it would be impossible to know where dry holes would be, the Proposed Action considers the full-field development of 1,239 wells. A total of 891 wells would be drilled at new locations and 348 would be drilled from existing well pads. Table 2-1 summarizes the number of wells that would be drilled in each formation and the estimated monthly drilling rate.

Oil development would occur in the Green River formation and typically would be done as a waterflood based on 40 to 80-acre well spacing, dependent upon geologic, engineering and economic factors. QEP would drill approximately 50 percent of the proposed Green River wells as producing wells and 50 percent of the proposed Green River wells as water injection wells. The water injection wells would allow reservoir pressure to be managed and oil recovery to be maximized. Water for the project would be supplied from existing Green River water rights and from water produced in association with oil from existing Green River Formation wells.

Table 2-1. GDBR Well Development (Proposed Action)

Formation	Type	Drilling Rate (Wells/Month)	Proposed New Wells		
			Total	On New Pads	On Existing Pads [b]
Uinta	Gas	0-1	16	16	0
Green River	Oil	0-3	219	189	30
Green River	Gas	0-3	148	132	16
Wasatch	Gas	0-6	451	249	202 [a]
Mesaverde	Gas	0-1	68	53	15
Blackhawk/Mancos	Gas	0-3	311	246	65
Frontier/Dakota	Gas	0-1	26	6	20
			1239	891	348

[a] 132 Wasatch wells would be directionally drilled at 20-acre spacing from existing 40-acre spacing pads
[b] 216 wells would be "twins" drilled to a different formation from an existing or newly constructed pad.

Gas development would continue and potentially begin in a number of different horizons, the shallowest being the Uinta Formation with the Wasatch Formation located stratigraphically below the Uinta. Wasatch wells are currently drilled on 40-acre spacing. However, infill drilling on 20-acre spacing could prove to be necessary to effectively encounter and drain these multiple-stacked fluvial channel sequences. QEP typically drills approximately 2000 feet into the Wasatch Formation at a total depth of approximately 7750 feet across the EIS area. As many as 132, 20-acre wells are to be considered as a part of this Proposed Action. These 20-acre infill wells would typically be drilled directionally off of the same 40-acre spaced well pads, requiring no additional surface disturbance.

Twenty locations for potential development of the deeper Blackhawk and Mancos on 160-acre spacing have been identified in the already developed areas in and around Wonsits Valley. These wells would be located in the center of quarter-section pads that would allow deep test wells to be drilled vertically and still provide useful information in evaluating the 20-acre infill potential of the Wasatch.

The deeper horizons (i.e. Lower Mesa Verde, Blackhawk, Mancos, Frontier, Dakota, Nugget, Phosphoria, and Weber) are presently not extensively evaluated in the area. However, recent exploratory drilling and successful completions in the Blackhawk and Mancos have resulted in development locations for those formations being included in the Proposed Action. Similarly, locations have been identified in this study for additional development of the Lower Mesaverde and the Frontier/Dakota, but they are highly speculative at this time. Required infrastructure includes well pads, with pumping units for oil wells, separator heaters for gas wells, central facilities, electric power lines, roads, oil and gas flowlines and pipelines, water injection facilities, gas treatment and compression facilities. Produced oil from new wells would be transported from the wellhead via pipeline, to central gathering facilities then via pipeline or truck to refineries near Salt Lake City, Utah. Gas would be transported via pipeline to centralized compression and treatment facilities and then transported out of the GDBR via existing sales pipelines. Produced water would be trucked or piped to existing and proposed QEP water injection plants where it would be re-injected into the oil reservoir or disposal zone.

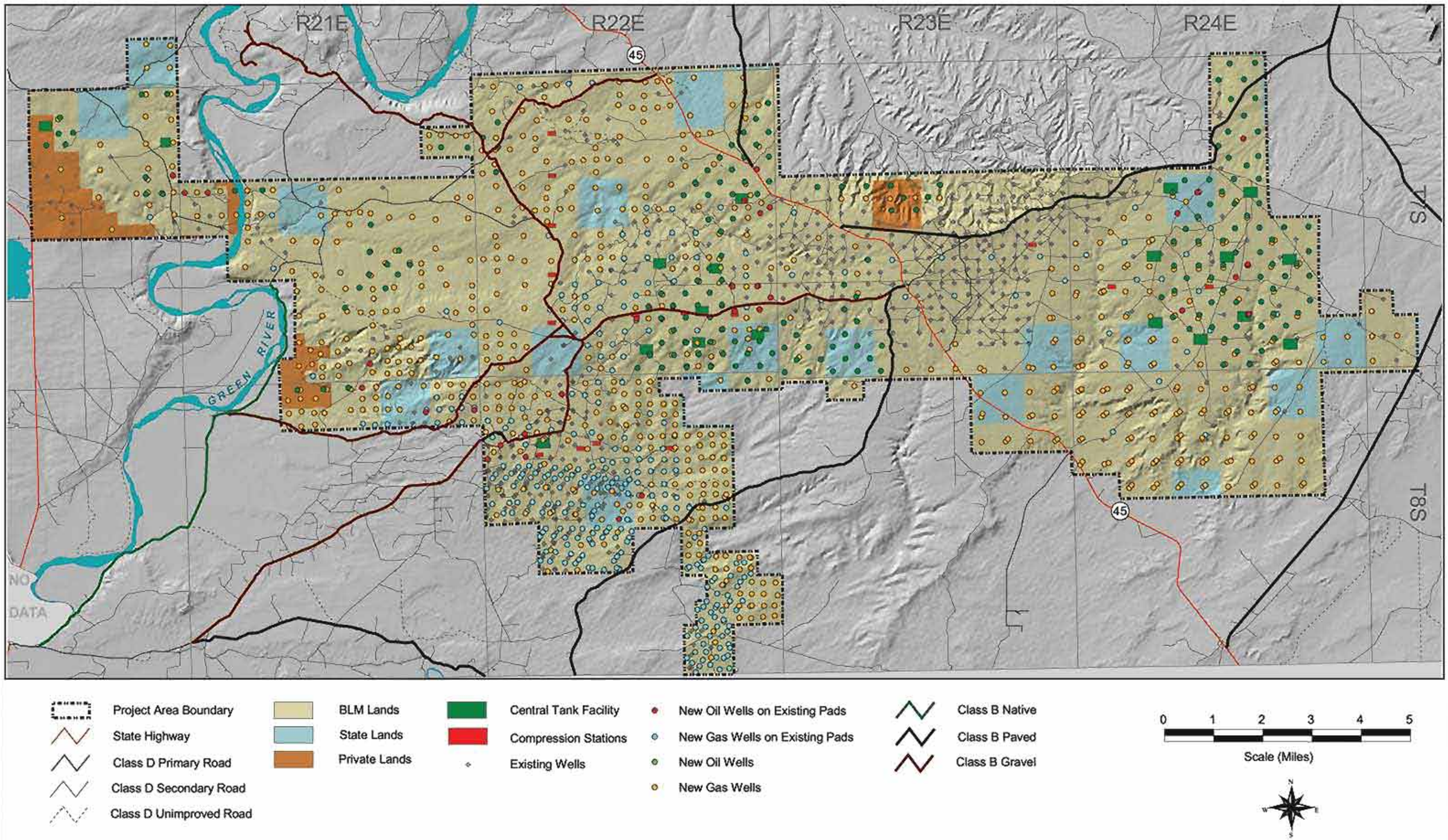

Figure 2-1. Greater Deadman Bench Proposed Action.

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2.1.1 Construction

2.1.1.1 Well Pad and Access Roads

Once an APD is approved, and subject to the Conditions of Approval, access road and well site construction would begin. Construction would generally occur only during daylight hours and fire suppression equipment would be available. First, an access road would be constructed to each proposed well pad location connecting the pad to the nearest established road. The existing road network within the EIS analysis area would provide the primary access routes to the new well sites. Over 370 miles of existing County claimed (class B & D) roads would be used, thereby minimizing additional surface impact. These roads within the GDBR are claimed by Uintah County per the RS 2477 process. The Class B roads are maintained by Uintah County, but the Class D roads are not maintained by the County. Although the length of access roads within the GDBR would vary, an average length would be approximately 1000 feet with a 30-foot right-of-way (ROW) resulting in approximately 0.69 acres of surface disturbance.

All roads would be constructed with appropriate drainage and erosion control features and structures to include cut-and-fill slope and drainage stabilization, relief and drainage culverts, water bars and wind ditches similar to those described in the BLM/USFS Surface Operating Standards for Oil and Gas Development (BLM and USFS 2006). Access roads would be constructed using standard equipment and techniques. Bulldozers and/or road graders would first clear vegetation and topsoil from the right-of-way. These materials may be windrowed for future redistribution during the reclamation process.

The well pad would be constructed from the native sand/soil/rock materials present and leveled by standard cut-and-fill techniques using a bulldozer, grader, front-end loader, or backhoe. The well pad would be a level 300 feet X 350 feet rectangular pad occupying approximately 2.41 acres (See Figure 2-2). A small reserve pit (150 feet x 70 feet x 12 feet deep, approximately 0.24 surface acres) would be excavated adjacent to the pad. Unless specified in the site specific APD, the reserve pit would be constructed on the location and would not be located within natural drainages, where a flood hazard exists or surface runoff would destroy or damage the pit walls. As described below, the reserve pit would be constructed to minimize the risk of leakage breakage, or discharge of liquids. Construction would involve preparing a level area for the equipment that would be used to drill and complete a well. First, vegetation would be cleared. Then, topsoil would be stripped to a depth determined by the BLM and stockpiled in an area adjacent to the pad and maintained for future reclamation of the pad. Depending on the amount of cut and fill required to level each site, these stockpiles would occupy approximately 0.5 acres.

The requirement for lining the reserve pit would be site-specific and would be based upon the Authorized Officer's (AO) evaluation during the APD process. Historically, pit liners have not been required at all locations. Generally, a pit liner is not required in clay or bentonite soils while a liner is usually required in sandy soil and fractured shale. If it would be determined during the on-site inspection that a pit liner is necessary, the reserve pit would be lined with a synthetic reinforced liner, a minimum of 12 millimeters thick and sufficient bedding would be used to cover rocks. The liner would overlap the pit walls and be covered with dirt and/or rocks to hold it in place.

QEP would also take measures to protect the public, livestock, and wildlife from hazards at oil and gas facilities. As directed by the AO, warning signs and fencing would be posted around reserve pits, as required by regulations to prevent unauthorized access and alert the public to potential hazards in the area.

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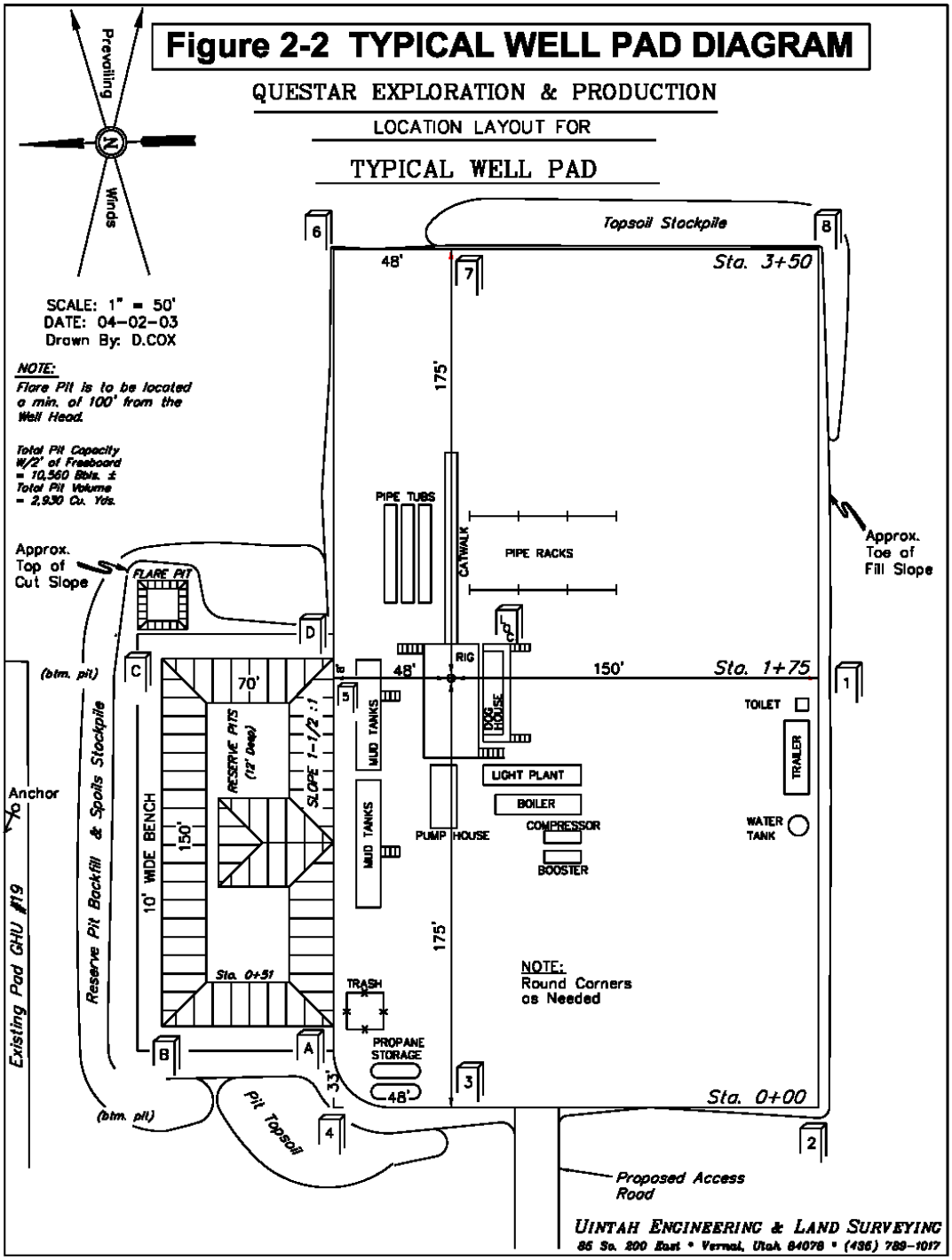
Figure 2-2 TYPICAL WELL PAD DIAGRAM
QUESTAR EXPLORATION & PRODUCTION
LOCATION LAYOUT FOR
TYPICAL WELL PAD
Prevailing Winds
SCALE: 1" = 50'
DATE: 04-02-03
Drawn By: D.COX
NOTE:
Flare Pit is to be located a min. of 100' from the Well Head.
Total Pit Capacity W/2' of Freeboard = 10,560 Bbls. ±
Total Pit Volume = 2,930 Cu. Yds.
Topsoil Stockpile
Sta. 3+50
Sta. 1+75
Sta. 0+00
Sta. 0+51
175'
150'
48'
70'
33'
PIPE TUBS
PIPE RACKS
CATWALK
RIG
DOG HOUSE
MUD TANKS
LIGHT PLANT
BOILER
COMPRESSOR
BOOSTER
PUMP HOUSE
TOILET
TRAILER
WATER TANK
TRASH
PROPANE STORAGE
FLARE PIT
RESERVE PITS (12' Deep)
SLOPE 1-1/2 :1
10' WIDE BENCH
Approx. Top of Cut Slope
Approx. Toe of Fill Slope
Anchor
(btm. pit)
Reserve Pit Backfill & Spoils Stockpile
Existing Pad GHU #19
Pit Topsoil
NOTE:
Round Corners as Needed
Proposed Access Road
UINTAH ENGINEERING & LAND SURVEYING
85 So. 200 East • Vernal, Utah 84078 • (435) 789-1017
8

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Following the drilling and initial completion operations, interim reclamation would begin on a portion of the pad plus the reserve pit. Interim reclamation would be attempted and long-term disturbance would be reduced to approximately 2.34 acres per well and access road from the initial disturbance of 3.34 acres. If a well would be determined as a dry hole when drilling ceases, it would be plugged & abandoned (P&A) per applicable regulations, the interim reclamation process would begin on the entire well location and its access road. For planning purposes, QEP assumes 5 percent of the proposed new wells would be dry holes. However, it is assumed that all wells would be productive for the analysis of impacts.

2.1.1.2 Pipelines

The gas gathering system for the Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota development program would be a surface system with 8-inch laterals and 3-inch lines connecting the wells to the laterals. These laterals would deliver the gas stream to the compressor station in Wonsits Valley (T8S R20E Section 12) where it would be compressed and sent through a 16-inch buried high-pressure line to the 24B gas plant at Red Wash (T7S R23E Section 24) where the liquids would be removed and the gas would be transferred to sales pipelines. Gas extracted from wells in the eastern part of the GDBR would be delivered directly to the 24B gas plant at Red Wash for processing and transfer to sales pipelines.

Heat-traced surface oil flow line, approximately 1000-feet in length in a 30-foot ROW from the well to a central tank battery facility, would be needed for Green River Formation oil wells. For each Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation gas wells, a gas gathering line approximately 1000-feet in length in a 30-foot ROW would be required. These pipelines would be placed on the surface. Although a 30-foot ROW would be granted for each pipeline segment, minimal disturbance would occur during the construction of these surface pipeline segments because no excavation would be required. However, a full disturbance of the ROW is assumed for the project disturbance analysis.

Construction of surface pipelines would consist of laying the pipe, welding segments, and testing. While vegetation clearing would be minimized, a 30-foot ROW would be reserved for the surface pipelines. Generally, a mile of surface pipeline would take less than a day to construct.

Water pipelines would be required for the Green River waterflood operations. These pipelines would be buried to a depth of 4 to 5 feet to prevent freezing of the water flowing through the pipe. Construction of water pipelines would proceed in a planned sequence of operations. The path would first be cleared of heavy brush by blading the surface. Brush would be left in place where possible. The pipeline trench would be excavated mechanically to a depth that would allow approximately 4 to 5 feet to be placed on the top of the pipeline. Pipe segments would then be welded together and tested, lowered into the trench, and covered with excavated material. Then, each pipeline would be tested with pressurized fresh water (hydrostatic testing) to locate any leaks. Water used for testing would be collected and disposed of at water injection facilities. Generally, a mile of buried pipeline would be constructed in 4 to 5 days.

Generally, water source lines would be either 6-inch or 8-inch steel line pipe and injection lines would be 3-inch steel line pipe. Source water lines would be designed for 500 pounds per square inch (psi) service and injection lines would be designed for 3,000-psi service. Water lines would be buried 4 to 5 feet deep to avoid freezing along a ROW that is generally 30 feet wide for construction and 20 feet wide for operations. Reclamation efforts on the surface over the buried water lines would begin following installation. Between 10 and 20 miles of new injection lines would be installed to service new injection wells in the Project Area.

2.1.1.3 Ancillary Facilities

Two types of ancillary facilities would be installed as needed for the full development of the Proposed Action. Construction techniques for clearing and grading of the ancillary sites would be similar to the construction practices for well pads.

A central tank facility (CTF) would be operated to separate saleable oil from produced water. Twenty-two new CTFs would be required to service 229 new Green River Formation oil wells because of the geographical separation of well sites. Each CTF would consist of two 500-barrel (bbl) oil tanks, two heated separators, a station pump powered by a 30-hp electric motor, and one 1.5 MBtu boiler. Each CTF would require approximately 2.5 acres of surface disturbance with an electric utility line approximately 1500 feet in length in a 30-foot ROW. Construction of a CTF would take approximately 30 days.

Extra compression would be required throughout the GDBR to move gas from the wellhead as wellhead pressures gradually decrease over time. QEP plans to construct 15 new compressor stations each consisting of natural gas-fired 2,000 horsepower engines. The engines would not be enclosed in buildings. Each compressor site would occupy approximately one acre. Construction of each compressor site would take about 10 days.

2.1.2 Drilling Operations

Drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, all State of Utah Division of Oil, Gas, and Mining rules and regulations, and all applicable local rules and regulations.

Drilling practices that would be used by QEP for Green River Formation oil and gas wells are provided in the Green River Formation Standard Operating Practices. Drilling and completion practices that would be used by QEP for Wasatch Formation gas wells are provided in the Wasatch Formation Standard Operating Practices. The drilling practices for these formations are described below.

The drilling operation would be conducted in two phases. The first phase would utilize a small drilling rig (similar in type to a water well drilling rig) to drill to a depth of approximately 600 –1000 feet or 50 feet below any freshwater aquifers encountered. All indications of usable water shall be reported to the BLM AO prior to running the next string of casing or before plugging orders are requested, whichever occurs first. QEP's standard operating procedures state that the BLM would be notified within 24 hours if any aquifers are encountered. The surface hole would be cased with steel casing and cemented in place entirely from about 600-1000 feet up to the surface. This surface casing would serve the dual purpose of providing protection for any freshwater aquifers present and as a safety feature to contain any abnormal 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.

Following the use of the surface-hole rig, a larger drilling rig would be mobilized to drill the remainder of the hole to a depth of about 12,500 –14,000 feet. Prior to drilling below the surface casing, a Blow Out 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 will 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.

The drillers may run a downhole mud motor to increase penetration rate. The rig would pump fresh water as a circulating fluid to drive the mud motor, cool the drill bit, and remove cuttings from the wellbore. In

order to achieve borehole stability and minimize possible damage to the hydrocarbon producing formations, a potassium chloride substitute and commercial clay stabilizer may be added to the drilling fluid. Also, 10 to 20 gallons of polyacrylamide polymer (PHPA) may be added to the drilling fluid to provide adequate viscosity to carry the drill cuttings out of the wellbore. From time to time other materials may be added to the fluid system, such as sawdust, natural fibers, or paper flakes, to reduce downhole fluid losses. In addition, with these deeper types of wells, barite weighting material may need to be added to the mud system to control formation pressures and provide borehole stability.

The primary purpose of the reserve pit is to receive the drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals). A secondary purpose of the reserve pit is to contain drilling fluids carried over with the cuttings, and fluids that are periodically discharged from the rig's steel tanks (usually to flush out cuttings that have settled in the tanks). No hazardous substances would be placed in this pit. QEP normally installs synthetic pit liners in this drilling program, except if BLM approval to proceed with an unlined pit is granted. The BLM would determine on a case-by-case basis if unlined pits are acceptable, or if site-specific conditions indicate that a synthetic liner in the fluid reserve pit is appropriate.

Upon drilling the intermediate hole to 5000-7000 feet, a series of logging tools would be run in the well to evaluate the potential hydrocarbon resource. Then steel production casing would be run and cemented in place from surface to 5000-7000 feet, in accordance with the well design, as approved by the BLM in the APD and any applicable Conditions of Approval. The casing and cementing program would be designed to isolate and protect the shallower formations encountered in the wellbore and to prohibit pressure communication or fluid migration between zones. The BOP equipment would be re-tested prior to drilling the final section of the well below this intermediate casing point.

Upon drilling the hole to the total depth, a series of logging tools would be run in the well to evaluate the potential hydrocarbon resource. If the evaluation concludes that adequate hydrocarbon resources are present and recoverable, then steel production casing would be run to total depth and cemented in place in accordance with the well design, as approved by the BLM in the APD and any applicable COAs. The casing and cementing program would be designed to isolate and protect the various formations encountered in the wellbore and to prohibit pressure communication or fluid migration between zones.

The time required to drill would depend on the target formation. Table 2-2 lists the approximate time required to drill and complete the wells proposed in the GDBR. The average water requirement for drilling would be approximately 5,000 barrels per well.

Table 2.2. GDBR Drilling and Completion Times

Formation	Depth of Drilling (feet)	Drilling Time (days)	Completion Time (days)
Green River	3,500 – 5,000	7	4-6
Wasatch	5,500 – 8,000	10	4-6
Mesaverde	6,500 – 10,000	14	4-6
Blackhawk/Mancos	10,500 – 14,000	50	21
Frontier/Dakota	Deeper than 16,000	90	28-42

2.1.3 Completion Operations

Once production casing has been cemented in place, the drilling rig would be removed and a completion rig would be moved in. The well completion consists of running a Cement Bond log to evaluate the cementing integrity and to correlate (on depth) the cased hole logs to the open hole logs, perforating the

casing across the hydrocarbon producing zones, and then a stimulation treatment of the formation to enhance its transmissibility of oil and gas. The typical stimulation in the area is a hydraulic fracture treatment of the reservoir, where a slurry of sand suspended in a viscous fluid (gelled water) is pumped into the producing formation with sufficient hydraulic horsepower to fracture the rock formation. The sand serves as a proppant to keep the created fracture open, thereby allowing reservoir fluids to move more readily into the well.

The typical completion operation for Green River, Wasatch and Mesaverde wells uses about 3000 - 4000 barrels of water, and normally takes 4 to 6 days to perform with most all the stimulation procedures completed as a continuous operation of one or at most two consecutive days. Deeper completions such as in the Blackhawk/Mancos and/or Dakota wells are performed in a similar manner but longer periods of time for wellbore cleanup and production testing generally occur between each stage of the completion with the initial wells in the program taking 4 to 6 weeks. Eventually that time period should be compressed to 2 weeks or less.

2.1.4 Production

2.1.4.1 Oil Wells

Wells that are successfully completed as producing Green River Formation oil wells would be equipped with a pumping unit and heated flow line to a CTF. Pumping units would be powered by electric or gas fired motors. About one half would be electric-powered and the others would be gas-powered. The pumping unit would lift fluid from the well and deliver it to a central facility via steel flowlines constructed on the surface. Approximately 1500 feet of new power lines with 30-foot right-of-ways would be needed for each of the 58 new oil well pads.

The CTF would be used to separate saleable oil from produced water. The flows from individual wells would be sent through heated separators where water, oil and gas would be separated and volumes measured. The water would be transferred via buried pipelines to water injection facilities. The oil would be transported to a lease automatic custody transfer point where it would be transmitted via pipeline to Salt Lake City or trucked to a refinery. The gas would be gathered and processed at existing compressor plants in either Wonsits Valley or Red Wash.

One CTF would be required for every 20 new producing Green River Formation oil wells. In total, approximately 22 new central tank battery facilities would be required to service 116 new and 103 twin Green River Formation oil wells.

Each CTF would consist of two 500-barrel (bbl) oil tanks, two heated separators, a station pump powered by a 30-horsepower (hp) electric motor, and one 1.5 thousand British Thermal Units (MBtu) boiler to provide the heat for the separators. Each CTF would require approximately 2.5 acres of surface disturbance with an electric utility line approximately 1500 feet in length with a 30-foot ROW. Each CTF would also have a trace system that runs to each well serviced by the CTF. The average trace system would hold about 60 barrels of glycol/water mix. Trace fluid would be heated at the CTF and circulated to and from each well through 1-inch pipe to keep the oil heated and allows it to flow through pipeline. These 22 facilities and would cause 55 acres of surface disturbance plus another 22.7 acres of power line right-of-way.

In accordance with BLM requirements, the surface equipment would be painted Carlsbad Canyon color or another color determined by the AO during the on-site inspection to blend in with the surroundings. Also per BLM requirements, QEP would prepare and submit a schematic site security diagram of the tank battery. All site security regulations specified in Onshore Oil and Gas Order No. 3 would be adhered to.

The Green River gas, produced with Green River oil, would be gathered from the individual facilities through an existing buried or heated surface gathering system to the central facilities where it would be separated and processed to remove liquids and hydrogen sulfide (H2S) if present. The preceding processes would be done at Battery #6 in Wonsits Valley or the 24B compressor plant in Red Wash. The gas would be used to fuel equipment at these sites and the excess would be sold.

All produced water inside of the Project Area would be separated at the central facilities and injected using existing waterflood injection wells or disposal systems. At individual locations, produced water would be hauled by truck to injection or disposal facilities.

2.1.4.2 Oil Well Waterflood Operations

QEP would drill approximately 50 percent of the Green River Formation wells as producing wells and 50 percent as water injection wells. The water injection wells would allow reservoir pressure to be managed and oil recovery to be maximized. Water for the project would be supplied from existing water rights and from various oil and water bearing reservoirs within the Green River formation underlying the oil field. Water is not drawn directly from the Green River flow. Rather, QEP draws water from existing five water wells, 300 to 600 feet deep, within 100 yards of the Green River high-water mark. The water rights associated with these five wells are State of Utah 49-251, 49-279, 49-280, 49-296, and 49-297. The allocation for these five wells is 1.3 cubic feet per second (cfs), 941.15 acre-feet per year (ac-ft/yr) for each well, and a total allocation of 4,705 ac-ft/yr. . At its peak water usage, the waterflood operations would require about 2,300-acre feet per year, or just less than half of their annual allocation..

QEP's expanded waterflood operations would include 4 new water filtration/injection plants with injection capacities ranging from 2,000 to 6,000 barrels of water per day (BWPD). These water filtration/injection plants would be co-located on CTFs. Existing water supply sources would provide water to injection pumps through storage tanks or direct means, depending on the water quality of the source. A network of high-pressure injection lines would supply water from injection facilities to injection wells Injection wells would be equipped with flow meters and choke valves to regulate injected water volumes.

Underground Injection Control (UIC) is regulated through the Utah Division of Oil, Gas, and Mines (UDOGM), the U.S. EPA, or both agencies depending on the injection well location. These agencies review and monitor well integrity to ensure well injection water is isolated from fresh water aquifers (underground sources of drinking water, injection pressures are below fracture gradient, and water injection sources have been permitted according to State and Federal regulations. Wellbore schematics are included with each permit for a new injection well and for all other wells within 0.5-mile radius of the new injection well. These schematics contain detailed information concerning wellbore tubulars, cementing data, completed intervals, and wellhead configuration.

Monthly injection volumes and pressures would be provided to the State of Utah. Well injection rates and pressures would be measured continually through the use of surface monitoring devices at each injection well. In addition, annual well casing integrity tests would be performed as mandated by the State and EPA to ensure isolation of the injection interval.

The estimated new water requirements for the proposed expanded waterflood area range from 15,000 to 19,000 BWPD. This water requirement would be met from surface water via existing water rights with the State of Utah which allow for approximately 40,000 BWPD to be withdrawn from the Green River, and underground water produced from the Green River Formation associated with Green River oil

production. At its peak water usage, the project would require about 2,300 acre-feet per year. All of the water would be supplied by water from the Green River.

Water associated with oil and water bearing formations in the Green River Formation is confined to encapsulated sandstone reservoirs at depths ranging from about 5,000 to 6,300 feet below the surface. Water from these formations contains Total Dissolved Solids ranging from 20,000 to 45,000 PPM, making it unsuitable for domestic or agricultural use. This water is currently being brought to the surface and reinjected by existing waterflood operations in the EIS analysis area. As additional wells are drilled for the proposed waterflood, additional water from these formations would be brought to the surface and reinjected by the new waterflood wells. All produced water would be permitted, monitored, and reported to the appropriate State and Federal agencies. If necessary, alternative water sources would be permitted through the appropriate government agency.

2.1.4.3 Gas Wells

Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation gas wells would be completed as flowing wells through a separator where the water and condensate are captured in separate tanks. Both fluids would be trucked from location as necessary and disposed of or sold. The gas stream would be connected to the existing gathering system, which would be expanded to handle production from proposed new gas wells. Most gas wells would be ultimately placed on a plunger lift system to lift these liquids as the pressure associated with the gas stream diminishes with depletion.

The gas gathering system for the Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/ Dakota development program would be a surface system with 8-inch laterals and 3-inch lines connecting the wells to the laterals. These laterals would deliver the gas stream to the compressor station in Wonsits Valley (T8S R20E Section 12) where it would be compressed and sent through an existing 16-inch buried high-pressure line to the 24B gas plant at Red Wash (T7S R23E Section 24) where the liquids would be removed and the gas would be transferred to sales pipelines. Gas extracted from wells in the eastern part of the GDBR would be delivered directly to the 24B gas plant at Red Wash for processing and transfer to sales pipelines.

2.1.5 Surface Disturbance Summary

Based upon the level of development of the Proposed Action, the total long-term new disturbance to construct and operate all facilities would be 4,561 acres. The disturbance for each type of facility for the Proposed Action is summarized in Table 2.3.

Workovers would be required from time to time for both Green River Formation and for the Wasatch and for the Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation wells to repair worn downhole equipment, to sustain existing production rates, or to recomplete the well to enhance its productivity. Completion rigs would perform workovers and typically take 1 to 5 days for routine repairs and 5 to 10 days for any recompletion operations. Workover operations would not require additional surface disturbance.

2.1.6 Water Requirements

Major water requirements would consist of water needed for drilling and completion for development, and for the Green River formation waterflood during operations. Typically, water use be would 5,000 barrels per well for drilling and 3,000 to 4,000 barrels for completion of each well. Approximately 124 wells would be drilled every year for 10 years. Annual water use for drilling and completion would be 108 acre-feet per year. Water requirements for waterflood operations would be 2,300 acre-feet/year. The

resultant annual water use during the 10-year development phase would be a maximum of 2,408 acre-feet per year and would decrease to 2,300 acre-feet per year after all wells were developed.

QEP has existing water rights from five Green River wells. At a full year of withdrawal, QEP has the water rights for 4,705 ac-ft/yr. Therefore, QEP's current water rights would be more than sufficient for the GDBR project. QEP's water requirements could also be met from produced water from the Green River formation.

2.1.7 Hazardous Materials

QEP has reviewed the EPA's Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 (as amended) to identify any Hazardous Substances proposed for use in this project, as well as the EPA's List of Extremely Hazardous Substances as defined in 40 CFR 355, as amended. QEP's Vernal, Utah Field Office maintains a file containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or other potentially hazardous substances that would be used during construction, drilling, completion, production and gas gathering operations in the GDBR. Hazardous Substances that would be used in this project for drilling and completion are also identified in the Standard Operating Practices that are included as Appendix 2-1.

QEP would develop drilling and operational plans that cover potential emergencies including fire, employee injuries, chemical releases, and spill prevention. QEP and its contractors would comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated governing the location, handling and storage of hazardous substances. QEP and its contractors would locate, handle, and store hazardous substances in an appropriate manner that prevents them from contaminating soil and water resources or otherwise sensitive environments. Any release of hazardous substances (leaks, spills, etc.) in excess of the reportable quantity as established by 40 CFR, Part 117, would be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act (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's Authorized Officer (AO) and all other appropriate Federal and State agencies.

QEP has evaluated its overall field operations within the GDBR and has prepared and implemented Spill Prevention, Control and Countermeasure (SPCC) Plans. The plans include accidental discharge reporting procedures, spill response and cleanup measures, and maintenance of dikes, and copies are kept at QEP's Vernal, Utah field office as well as the Denver, Colorado office. A Hazardous Communication Program also is kept at QEP's Vernal field office, and SARA Title III (community right to know) information is submitted yearly as required and copies are kept in QEP's Denver office, as well as in QEP's Vernal field office.

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Table 2.3. GDBR Proposed Action Surface Disturbance Summary

Formation	Description	Wells	Pad Construction	Road	Flow Lines	Gas pipelines	Power Lines to 22 CTFs	Power Lines to 108 Oil Wells	22 CTFs	Water pipeline	15 Compressor Stations
Green River Oil	New pads	188	595	130	130						
	On existing pad	31			21						
Uinta Gas	New pads	16	50	11		11					
	On existing pad	0									
Green River Gas	New pads	132	416	91		91					
	On existing pad	16				11					
Wasatch 40-ac Gas	New pads	252	784	172		172					
	On existing pad	67				48					
Wasatch 20-ac Directional Gas	New pads	0	0	0							
	On existing pad	132				91					
Mesaverde Gas	New pads	53	167	37		37					
	On existing pad	15				10.4					
Blackhawk/Mancos Gas	New pads	246	775	170		170					
	On existing pad	65				45					
Frontier/Dakota Gas	New pads	6	19	4		4					
	On existing pad	20				14					
	Total new gas wells	1020									
	Total new oil wells	219									
	Wells on new pads	893									
	Wells on existing Pads	346									
	Total new wells	1239									
Total Disturbance	Acres	**4561**	2813	616	151	704	23	106	55	73	15
Total long-term disturbance if interim reclamation would be successful		**3148**									
Total Linear Disturbance	Miles		NA	169.1	41.5	193.2	6.3	30.7	NA	20.0	NA

3.15 acres/pad for short term includes 300X350 pad (2.41), 150X70 reserve pit (0.24), and 0.5 acre topsoil stockpile
1.65 acres/pad if interim reclamation would be successful
Roads and pipelines are assumed to be 1,000 ft. x 30-ft. ROW. Compressor stations – 1 acre; CTFs - 2.5 acres.
Power lines are assumed to be 1,500 ft. x 30-ft. ROW. Water pipelines are total of 20 miles in a 30-ft construction ROW all to be reclaimed after construction.

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2.1.8 Reclamation

Prior to abandonment of any well, location, access road or other facility, QEP would file with the BLM a Form 4: Notice of Intent to Abandon, detailing the proposed Plugged and Abandoned (P&A) procedures. Upon BLM approval, wellbores would be plugged with cement as necessary to prevent fluid or pressure migration, and to protect mineral and/or water resources. Wellheads would be removed, both the surface casing and production casing would be cut off below ground level, and an appropriate dry hole marker would be set in compliance with Federal and State regulations.

All surface equipment and above ground flow lines and gas system pipelines that had been installed would be removed from the site. Underground pipelines would be purged and retired in place.

The well pad, reserve pit (if not previously done), and access road would be reclaimed as per BLM requirements. At a minimum, reclamation efforts would include backfilling the pit, contouring the surface to its original appearance, and distributing the topsoil to blend the site in with its natural surroundings. A seed mixture of desired grass and plant species, as per the BLM's specifications, would then be planted on project-related disturbed areas.

2.1.9 Workforce

The majority of the workforce requirement would be for construction, drilling and completion. Afterwards, a minimal workforce would be required to operate and maintain the facilities. Most workers would likely reside within 50 miles of the GDBR and commute daily.

2.1.9.1 Construction

Construction of a well pad and the associated access road would take about 4 days. Five people would operate construction equipment (bull dozers, back hoes, front end loaders, and graders) for about 12 hours per day. Approximately 5 round trips would be required to transport equipment to the site and another 8 round trips would be necessary for workers traveling daily to the construction sites.

2.1.9.2 Drilling

Drilling would be a 24-hour per day operation involving three shifts of 7 people. Drilling times would vary from 7 days for the shallower oil and gas wells to a maximum of 90 days for the deeper formations. Large trucks would be needed to transport the drill rigs and other equipment to the site. Other large trucks would transport fuel, water, and other materials on a daily basis. Three round trips a day would be required for workers. Depending on the depth of the well to be drilled, vehicle round trips would range from 71 to 735 for the duration of drilling activities.

2.1.9.3 Completion

Completion would be a 24-hour hour per day operation involving 3 shifts of 7 people. Completion operations on a well would take from 6 to 42 days depending on the depth of the formation. Required equipment would include truck mounted rigs, sand trucks, pump trucks, frac trucks, tanker trucks, and others. Depending on the depth of the well to be completed, vehicle round trips would range from 41 to 215 for the duration of completion activities.

2.1.9.4 Pipelines

Approximately 6 workers would be needed for two to three days to install buried water pipelines. The same number of workers would require an average of only one day to install short surface gas pipelines and oil flow lines. Equipment requirements would include a backhoe, welding truck, hydrostatic testing equipment, and pickups for worker transportation.

2.1.9.4 Operations

Upon completion of all drilling, completion, and testing activities, the workforce would be minimal. A maintenance person (”pumper”) would visit each well daily during production to monitor well operations. One pumper would generally be responsible for 30 wells. At full production, 41 pumpers would be employed to monitor 1,239 wells under the Proposed Action.

Periodically, a workover procedure on the well would be required to ensure that the well facilities are maintained in good condition and are capable of continuing efficient operation. A crew of 5 workers could do routine maintenance in one day. However, more detailed workovers could take five days to complete. It is expected that each well would require a workover every 2 to 3 years.

Table 2.4 lists the estimated workforce requirements for the Proposed Action based on the assumptions listed above.

Table 2.4. Proposed Action Estimated Workforce Requirements

Category	Project Total	Workers per Activity	Duration (days)	Worker Days Total 10-Year Construction Period	Worker Days per Year	Workers per Year [1]
Pad/Access Road Construction	893	5	4	17,860	1,786	6.9
Water pipeline (miles)	20	5	3	300	30	0.1
Gas or oil surface pipeline/flowline (1000-ft segments)	1,239	5	1	6,195	620	2.4
Drilling (wells)						
Green River	367	21	7	53,949	5,395	20.8
Uintah	16	21	7	2,352	235	0.9
Wasatch	451	21	10	94,710	9,471	36.4
Mesaverde	68	21	14	19,992	1,999	7.7
Blackhawk/Mancos	311	21	50	326,550	32,655	125.6
Frontier/Dakota	26	21	90	49,140	4,914	18.9
Completion (wells)						
Green River	367	21	6	46,242	4,624	17.8
Uintah	16	21	6	2,016	202	0.8
Wasatch	451	21	6	56,826	5,683	21.9
Mesaverde	68	21	6	8,568	857	3.3
Blackhawk/Mancos	311	21	21	137,151	13,715	52.8
Frontier/Dakota	26	21	42	22,932	2,293	8.8

Category	Project Total	Workers per Activity	Duration (days)	Worker Days Total 10-Year Construction Period	Worker Days per Year	Workers per Year [1]
Workovers per year	620	5	5	15,500	1,550	6.0
Workers/Year (Development)					86,029	331
Operations (pumpers)	30	41	365			41
Operations (staff)	30	20	260			20
(Employees/Year Operations)						61

[1] 260 worker-days = 1 worker-year

2.2 NO ACTION

The No Action alternative is denial of QEP's proposal. Under the No Action Alternative, the oil and gas development on federal lands under the Proposed Action would not be implemented. The No Action alternative analyzes a level of development that would occur if no new authorizations were allowed on federal leases in the project area. However, APDs for 79 federal wells have been approved based on other NEPA documents, and these wells could be developed. In addition, 130 wells would be on State of Utah and private leases. Therefore, the No Action Alternative would result in a maximum level of development of about 209 wells that would include 177 natural gas wells and 32 oil wells. The location of wells under the No Action Alternative is shown on Figure 2-3.

For the EIS analysis, the following is assumed:

- a new well pad would be constructed for 90 percent of the wells;
- a 1,000-foot access road would be required for each well;
- 1000-foot pipelines or flowlines would be required for each well;
- 3 new 2,000 horsepower compressor stations would be constructed; and
- 3 new central tank facilities would be constructed.

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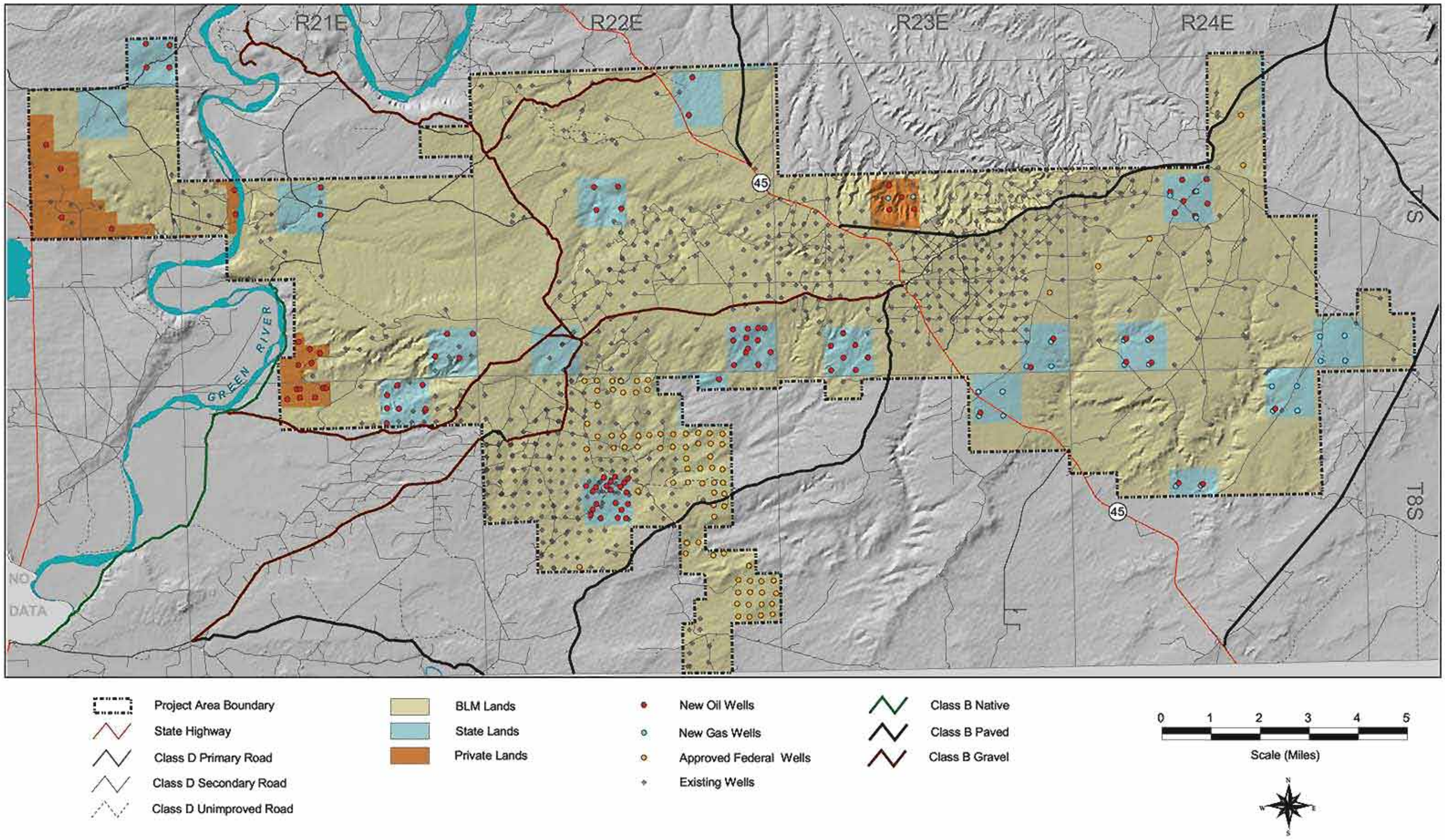

Figure 2-3. Greater Deadman Bench No Action.

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As described in Table 2.5, long-term surface disturbance would be 548 acres. Construction would occur over a 3-year period and each well would produce for 30 years resulting in a 33-year life of the project.

Table 2.5. GDBR No Action Surface Disturbance Summary

Type Well	# Wells	Well Pad (acres)	Access Road (acres)	Pipeline/ Flowline (acres)	3 CTFs (acres)	3 Compressor Stations (acres)
Federal Oil New Pad	2	6	1	1		
Federal Gas New Pad	77	242	53	53		
State Oil New Pad	18	56	12	12		
State Gas New Pad	66	207	45	46		
State Oil Existing Pad	4	0	3	3		
State Gas Existing Pad	18	0	12	12		
Private Oil New Pad	8	25	6	6		
Private Gas New Pad	16	50	11	11		
Total	210	589	144	144	8	3
Total Disturbance (acres)		**888**				
Linear Disturbance (miles)			**40**	**40**		
Total Long-term Disturbance if Interim Reclamation Would be Successful (acres)		**607**				

3.15 acres/pad for short term includes 300X350 pad (2.41), 150X70 reserve pit (0.24), and 0.5 acre topsoil stockpile
1.65 acres/pad if interim reclamation would be successful
Roads and pipelines are assumed to be 1,000 ft. x 30-ft. ROW.
Power lines are assumed to be 1,500 ft. x 30-ft. ROW.
Water pipelines are total of 20 miles in a 30-ft construction ROW all to be reclaimed after construction.
Compressor stations – 1 acre; CTFs - 2.5 acres.

2.3 APPLICANT-COMMITTED MITIGATION AND BEST MANAGEMENT PRACTICES

The following are applicant-committed mitigation including some environmental best management practices taken from WO IM 2007-021.

In addition to these applicant-committed BMPs, the BLM on-site inspection for each new well site may identify specific resources that may be affected on a particular location. The on-site inspection would be used in conjunction with the measures described below to develop site-specific mitigating measures for sensitive resources.

2.3.1 Cultural Resources

A Class III cultural resources survey, conducted by a qualified archaeologist, would be conducted over all areas proposed for surface disturbance. Class III cultural resource block surveys have been conducted in portions of the proposed development area and would be utilized where applicable. If these surveys identify areas with a high probability of encountering potentially significant subsurface archaeological sites, a qualified archaeologist would monitor surface disturbance. QEP and their contractors would inform their employees about relevant federal regulations intended to protect cultural resources. Equipment operators would be informed that if a site is uncovered during construction, activities in the vicinity would immediately cease and the BLM's Authorized Officer (AO) would be notified. Historic properties considered eligible for the National Register of Historic Places (NRHP) would be avoided or mitigated through a data recovery plan approved by the BLM and State Historic Preservation Officer (SHPO).

2.3.2 Paleontological Resources

Based on site-specific recommendations from the BLM’s AO, surveys for paleontological resources would be conducted on areas with sandstone outcrops and where bedrock excavation into sensitive formations is necessary. The survey would be conducted by a qualified paleontologist funded by QEP and would determine fossil localities and the sensitivity of the area for fossil resources. These actions would determine the necessity of having a qualified paleontologist on-site during construction. If paleontological resources were uncovered during ground disturbing activities, QEP would suspend all operation that would further disturb such materials and would immediately contact BLM’s AO, who would arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan in coordination with the SHPO.

2.3.3 Wildlife and Vegetation (including Federally listed, Candidate and Proposed Species)

QEP would comply with Endangered Species Act (ESA) regulations in order to prevent adverse impacts to federally listed, Candidate and Proposed wildlife and plant species. QEP would also implement appropriate protective measures (e.g., timing and spatial stipulations), shown in Table 4.6-2: Raptor Protection Dates, in order to prevent adverse impacts on wildlife species and habitats.

2.3.4 Power Lines

Unless otherwise agreed to by the AO in writing, power lines shall be constructed in accordance with the standards outlined in Suggested Practices for Raptor Protection on Power Lines, (Edison Electrical Institute 1996). QEP would construct power lines in accordance with these standards or will assume the

burden and expense of proving pole designs not shown in the referenced publication are "raptor safe". A raptor expert acceptable to the AO shall provide such proof. The AO would require modification or additions to all power line structures on route authorizations, should they be necessary to ensure the safety of large perching birds. QEP would make such modifications and/or additions without liability or expense to the Federal Government.

As directed by the AO, QEP would place raptor perch guards on power line poles in areas near sensitive wildlife habitat areas such as sage grouse leks and prairie dog towns.

2.3.5 Noxious and Invasive Weeds

QEP would monitor and control noxious and invasive weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. On BLM-administered land, a Pesticide Use Proposal would be submitted and approved prior to the application of herbicides, pesticides or other hazardous chemicals.

2.3.6 Reduced Surface Disturbance Footprint

The primary objective of the BLM BMPs is to reduce the disturbance footprint of oil and gas development. QEP's Proposed Action would minimize roads and well pads required to drill and complete 1,239 wells. QEP would construct 891 new well pads and associated 1,000-foot access roads. QEP would directionally drill 132 wells and 216 twin wells from either existing or newly constructed pads for other wells. Accordingly, QEP's Proposed Action would require 65.9 less miles of access roads and 348 less well pads (1,096 fewer acres short-term disturbance and 574 fewer acres long-term disturbance). All existing and newly constructed roads would be maintained and kept in good repair during all drilling, completion, and production operations associated with wells. Planned access roads and surface disturbing activities would conform to standards outlined in the BLM and Forest Service publication: Surface Operating Standards for Oil and Gas Exploration and Development, 2006 (The Gold Book).

2.3.7 Interim Reclamation

After drilling and completion activities, QEP would initiate reclamation efforts to reduce the size of long-term well pads from the original disturbance of slightly over 3 acres to less than 2 acres. This reduction would be accomplished by reclamation of the drilling pit and revegetation of the portions of the pad that would no longer be needed for long-term operations.

If a new road would need to be constructed to replace an existing one, QEP would reclaim and revegetate the existing road.

2.3.8 Visual Resources

Based on site-specific recommendations from the BLM's AO, surface equipment would be painted to blend in with the surroundings. Additionally, all surface equipment on a site (well pad, central tank facility, compressor station) would be painted the same color.

QEP would avoid, where feasible, the placement of facilities on hill tops or along ridge lines in visually sensitive areas classified as VRM Class III or higher. If facilities could not be relocated off ridge lines or hill tops in visually sensitive areas, QEP would use tanks with a smaller height as directed by BLM's AO.

2.3.9 Existing Facilities and Rights-of-Way

Cattle guards would be used for fence crossings whenever practicable. If a fence must be cut, H-braces would be installed to support the existing fence and a cattle guard installed to prevent livestock movement.

2.3.10 Hazardous and Solid Waste/Trash Disposal

All solid waste or trash would be transported for disposal to an approved solid waste disposal facility.

2.3.11 Construction and Operations

QEP would install remote monitoring to measure production on gas and oil wells. At full development of the field, this monitoring would reduce trips to individual sites by pumpers to once every 3 days instead of daily trips.

Where directed by the AO, QEP would construct erosion control devises (riprap, bales, heavy vegetation) at culvert outlets.

QEP would use secondary containment (berms, metal containment rings) around chemical storage devises.

2.3.12 Reclamation Monitoring

QEP will work with the BLM to monitor the success of interim and final reclamation. QEP and BLM will perform annual inspections on chosen sites reclaimed 2 years prior. The 2 year gap will allow the seed to become established and give the vegetation 2 full growing seasons for a better measure of success. If QEP and the AO for the BLM determine the reclamation has not been successful, QEP will reseed the location.

2.3.13 Road Usage Monitoring

QEP will meet with the BLM, Uintah County Commission, and Uintah County Road Department once every 5 years to review usage of existing access roads inside the GDBR boundary. If it is determined by all that a certain access road is no longer used or needed, QEP will reseed the road and return it to its native condition.

2.3.14 Road Maintenance

QEP will maintain new access roads leading to their facilities inside the GDBR. Access roads are typically the 30 ft. by 1,000 ft class D roads that branch off the main Class B and D County roads.

2.3.15 Reclaiming Temporarily Abandoned Well Pads

If a well is to be temporarily abandoned for more than 3 years, QEP will revegetate the well pad with a seed mixture approved by the BLM. If the well is brought back onto production, the minimum amount of clearing needed to conduct safe operations will be done.

2.4 ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN DETAIL

Several alternatives were considered as a result of issues identified during the scoping process. Potential alternatives were evaluated and some were eliminated from detailed analysis. A description of the alternatives considered follows along with a description of the rationale for not addressing these alternatives in depth.

2.4.1 No Development

A no development alternative that would deny APDs and ROWs on federal lands was considered and rejected for several reasons. There are private and state lands in the GDBR, and development could occur on these lands regardless of any decision to deny development of federal lands.

BLM cannot deny access to private holdings on non-federal land. BLM's policy concerning access to oil and gas resources on non-federal is documented in BLM Manual 2800.06D, release 2-224 (May 15, 1985). The policy directs BLM to allow access to secure to the owner reasonable use and enjoyment. Ingress and egress do not necessarily require the highest degree of access, but rather a degree of access commensurate with reasonable use and enjoyment of the land. The access necessary cannot be denied as long as the landowner complies with BLM rules and regulations on federal surface.

In addition, denial of development on federal lands could lead to the drainage of federal reserves from wells on adjacent State and private lands. A drainage stipulation designed to protect the federal mineral estate is included in the lease term contractual agreements for all leased lands in the GDBR.

A denial to develop a valid lease would violate the lessees' contractual rights and result in a loss of federal royalties. An oil and gas lease grants the lessee the right and privilege to drill from, extract, mine, remove, and dispose of all oil and gas deposits in the leased lands, subject to the terms and conditions incorporated in the lease. A denial of all activity would constitute a breach of contract of the lessees' rights to conduct developmental activities on the leased lands. Only the U.S. Congress has the authority to grant a complete denial.

In addition, none of the issues identified were of such a nature that denial of all operations would be required to resolve the issues. With the proposed action and standard lease terms, the impacts could be avoided or minimized while allowing oil and gas development. NEPA Section 102(E) requires that agencies study, develop, and describe appropriate alternative to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative use of available resources. In this case, the Proposed Action with mitigation resolves the conflicts.

2.4.2 Suspension of Operations

An alternative to delay access to certain leases for an extended period of time was considered. However, this type of delay would not change the environmental effects, but merely put off potential environmental effects for the period of the suspension of lease access. Therefore, this alternative was not analyzed further.

2.4.3 Exchange of Leases

The potential of exchanging the GDBR federal leases with leases at some other locations was considered. However, it would not be possible to determine potential effects at other locations because the locations are unknown. Furthermore, the Federal Land Policy Management Act requires that the exchanged assets

would have to be of equal value. Without knowing the location or value of other leases that may be involved, evaluation of effects would be impossible.

2.4.4 Full-Field Directional Drilling

Consideration was given whether the number of new drill pads could be reduced by requiring that a single pad be used for drilling one vertical well and one or more directional wells. In concept, for example, directional wells might be used to avoid surface disturbance near prairie dog towns or near floodplains in the GDBR or simply to reduce the total acreage disturbed by new pads.

Whether directional drilling can be conducted successfully depends on site-specific geological conditions. An analysis, specific to the GDBR, was completed of the technical and economic feasibility of the use of directional drilling (QEP 2004). Based on this analysis, BLM has determined that an alternative requiring some level of directional drilling within the GDBR is not a feasible means of achieving the purpose of the proposed action. A summary of the assessment, and the primary technical and economic rationale for BLM's decision to dismiss a directional drilling alternative from detailed analysis in the EIS, is provided in the following discussion. While further consideration of an alternative based on directional drilling was determined to be infeasible, it should be understood that consideration of directional drilling as an option for a site-specific situation, as described above for example, may be appropriate.

QEP prepared a directional drilling paper for BLM review. The technical drilling and economics in the report is summarized here. Because some company-confidential information is included in the report, a copy of the report may be viewed only at the BLM Vernal Field Office in Vernal, Utah.

2.4.4.1 Technical Aspects of Directional Drilling

QEP's vertical wells are typically drilled with a combination of rotating drill pipe and downhole mud motors to turn the drill bit. On a vertical well the weight of the drill string creates a plumb bob effect and the inclination (or deviation from vertical) will normally be less than 2 degrees. This usually places the bottom hole location (BHL) within 50 to 100 feet of the surface location at a depth of 9,000 feet.

Conversely, a directionally drilled well is intentionally deviated from vertical and steered to a planned BHL which is not directly under the surface location. In order to obtain this displacement and directionally drill the well to a different BHL, the angle or inclination needs to be established in the well while drilling it. Typically, the well will be drilled vertically to a depth of approximately 1,500 feet from surface. Then a drill bit, mud motor, and special tools are run in the well to increase the angle and "steer" it towards the planned BHL. Once the angle is increased to approximately 12-15 degrees, the angle is held at this position and direction for 3,000 feet or more, until the well nears the objective (or target area). Then the angle in the well is allowed to reduce back to vertical and the productive pay zones are drilled.

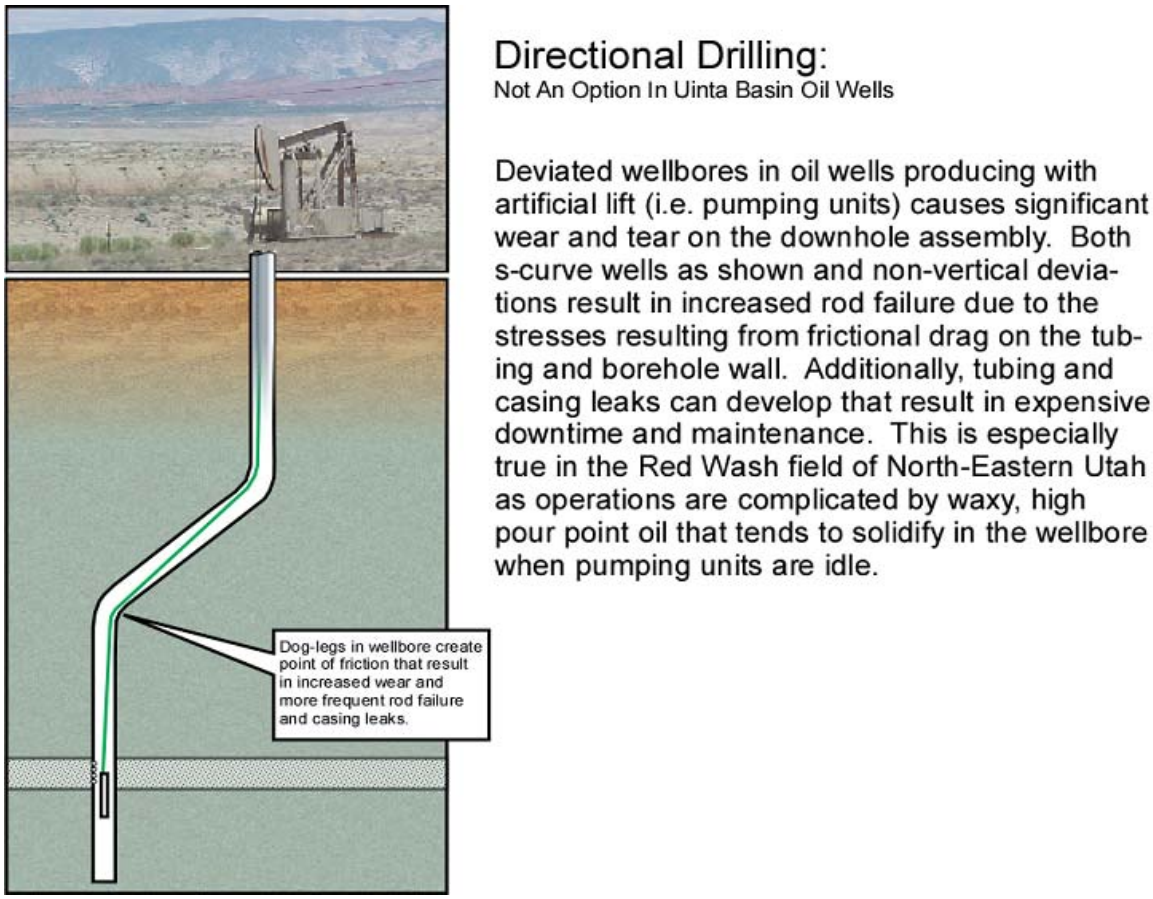
With the well at total depth, the well is then electric logged, cased and cemented, and completed in the same manner as a vertical well. Drilling times on an 11,000 foot measured depth directional well are usually 3 to 4 days longer than the equivalent vertical well. This increase in drilling time (and resultant cost) plus the cost of the directional contractor to control and steer the well would amount to an increase of nearly $140,000 per well or approximately 19% more. There can also be an increase in risk associated with drilling a directional well due to the possibility for more downhole problems and sticking of the drill string or electric logs. Completion times and cost are not appreciably impacted by directionally drilling gas wells of this type.

It is technically impractical to directionally drill shallow gas wells. QEP proposes to drill 164 gas wells into the Uinta and Green River formation gas wells at depths to 1,500 to 5,000 feet. These wells are too

shallow to deviate and get to a BHL. These relatively shallow directionally drilled wells would require extremely large angles, possibly 50 to 70 degrees, to reach BHLs on 160 acre offsets. These high angle directional wells would be very difficult to drill. Some of the problems very likely to occur include a higher likelihood of hole problems, loss of circulation while drilling directionally through the Bird's Nest aquifer, and a higher tendency to stick the drill string. Economically, the higher costs combined with the higher risk factors would make these wells unfeasible to drill, complete, and operate.

In addition to the shallow gas wells into the Uinta and Green River formations, QEP is proposing to drill 219 Green River formation oil and water injection wells. Of these, 188 would be on new pads, 31 would be on existing pads. The 31 wells proposed on existing pads will not be directionally drilled; instead, they will be drilled as twins. The following diagram and narrative explains why it is not technically prudent to directionally drill an oil well.

Figure 2-4 Directional Drilling



QEP is planning to directionally drill about 132 infill wells on 20-acre spacing into the Mesaverde formation to depths of near 10,000 feet. QEP acknowledges that these wells would be reasonable for directional drilling because the deviation angle would not be excessive. The distance to the BHL would be small because of the 20-acre spacing. For the 20-acre infill drilling that QEP is proposing, the planned BHL will be 800 to 900 feet vertically displaced from the wellhead at the surface location.

If directional drilling would be employed for 40-acre spacing, the planned BHL would be more than 1,800 feet. Deviations would be larger as spacing would increase to 80-acre or 160-acre. Therefore, the risk of failure to directionally drill these wells would be unacceptable unless the expected rate of economic return would be high. The following discussion demonstrates that the estimated rate of return would not be high enough to accept the technical risk of drilling deep wells on greater than 20-acre spacing.

2.4.4.2 Economic Aspects of Directional Drilling

QEP prepares an economic evaluation of all wells when they are proposed to be drilled. This evaluation is an integral part of the management authorization process. QEP recently began drilling several directional wells from a single pad at 40-acre spacing in the GDBR. Directional drilling was necessary because the topography would make it impossible to construct an individual pad and access for every well. As a result, QEP has recent well cost and economic evaluations for these wells. This data was developed by QEP's drilling department and reservoir engineering group and is used to discuss the limitations of directional drilling to develop 40-acre Wasatch/Mesaverde reserves in the GDBR.

Two factors affect the economic viability of directional drilling: the Rate of Return (ROR) after federal income tax (as a percentage) and the Estimated Ultimate Recovery (EUR) (as bcf). The factors effecting ROR are the probability of success (POS) to drill and complete a well and the cost to drill and operate the well. Wells drilled into areas and/or depths with less known information have a lower POS. QEP has predicted a POS between 75 and near 100% for proposed GDBR wells.

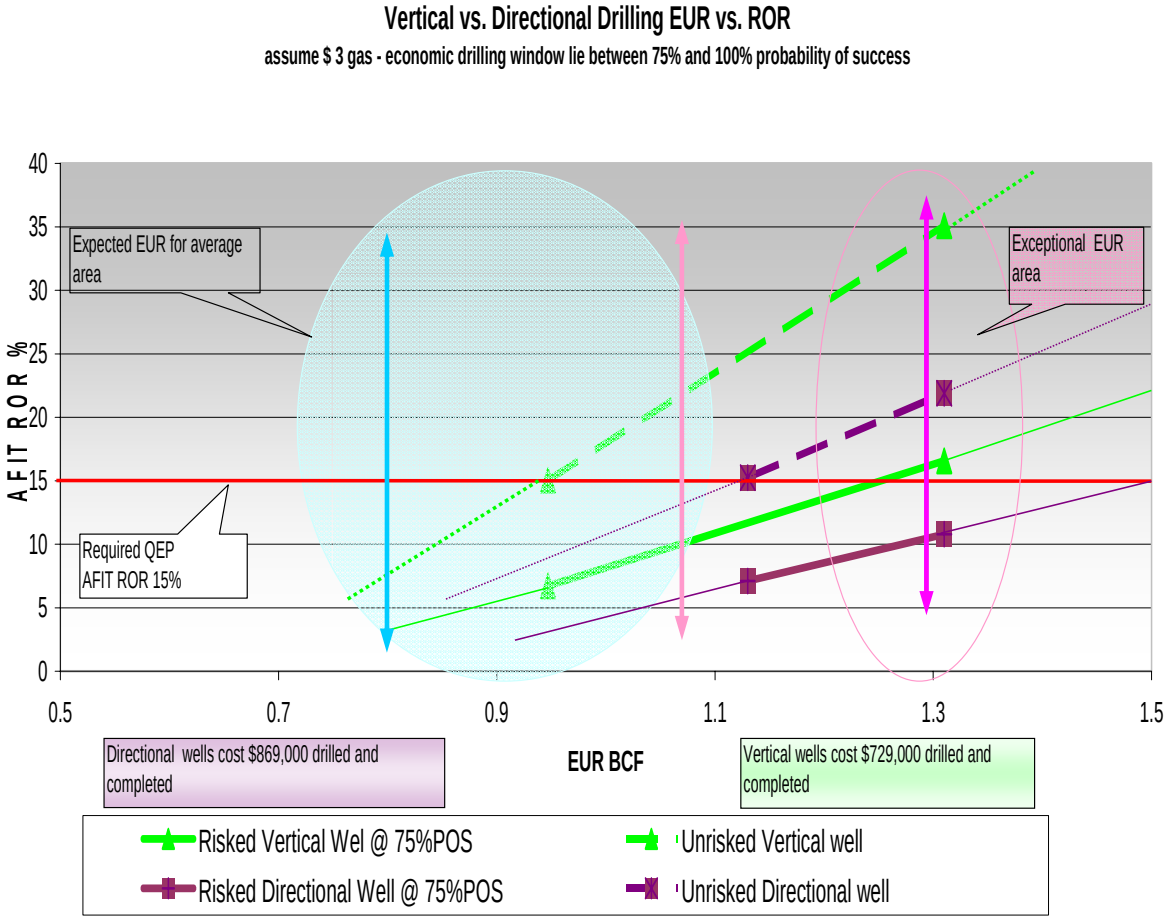
The EUR is based upon known past performance of well recoveries and future estimates for a well at a given depth and location. Of the 430 wells drilled to date in the GDBR, the EURs are currently averaging 0.8 bcf. More than 90% of these wells have been drilled just through the first 1800 feet of the Wasatch formation. In the past year, QEP has been drilling wells through the Wasatch and into the first 600 feet of the Mesaverde formation. These wells (30+) are averaging 1.08 BCF. The area in which QEP is planning to drill the directional wells in has been averaging reserves closer to 1.3 bcf or a sweet spot due to better reservoir permeability and fracture enhancement from a local structural trend.

The two data sets on Figure 2-5 represent the costs to drill a conventional vertical well and a directional well with a bottom hole 1100+ feet from the surface location. The estimated difference in cost is $140,000 based upon a 2004 analysis. The current estimated difference is $300,000. For each of these data sets a 100% (dashed) POS is analyzed as well as a case at 75% POS. QEP would typically expect the probability to be in the 85 to 90% range for development programs such as the GDBR. A POS greater than 85% takes into account wells that have unusually thin pay intervals, unexpected costs in drilling, failure to obtain a good stimulation, etc. The red horizontal line is set at a 15% ROR which is the internal QEP financial threshold for approving drilling projects. As shown on Figure 2-5, the EUR of directional wells would have to exceed 1.1 bcf for wells with POSs greater than 85%. This is generally not the case for the GDBR wells.

The economic viability of directional drilling derived by staying above the 15% ROR requirement and within the economic and risk for a vertical well as defined by the green solid and dashed curves. This window indicates vertical wells can be drilled well down into the average reserve range for Wasatch/Mesaverde. At higher prices this window will shift left and allow some wells at the lower end of the reserve range to be drilled.

Directional drilling does have its benefits. However, it must also be recognized that it is considered only in areas where topography is an issue, the average EURs are much higher than those typically found in the GDBR.

Figure 2-5



Of the 1,239 proposed wells, 346 would be drilled from an existing pad. Therefore, only 893 new pads are being proposed. Oil wells and shallow gas wells cannot be considered for directional drilling because of the technical difficulties and related high risk factors. The deeper gas wells may be technically feasible in some situations, but the economics will not allow management to approve the project unless it is an exceptionally high volume well.

2.4.5 Conventional Oil and Gas Plan Development

This alternative would evaluate the effects of a conventional oil and gas plan of development. QEP voluntarily proposed Best Management Practices (BMP) to reduce surface disturbance. The purpose of considering this alternative was to compare the effects to the Proposed Action. Specifically, this alternative evaluated the effects of developing each of the proposed 1,239 oil and gas wells on a separate pad. In other words, QEP would not employ directional drilling at 20-acre spacing or “twin” drilling techniques. Also, 1,239 short (1,000 feet GDBR-wide average length) access roads would be constructed and maintained for the 40-year life of the project. All other facility construction and operation would be the same as the Proposed Action.

Total short-term disturbance under this alternative would be 5,889 acres. The disturbance would include 235 miles of new access roads. Under the Proposed Action, the short-term disturbance would be 4,561

acres and 169 miles of new access roads. As described earlier in Chapter 2, the main reason for less total surface disturbance under the Proposed Action would be the 132 directional wells and 216 "twins" to be drilled on existing or other newly developed pads. As a result of the 29 percent greater surface disturbance, this alternative was not analyzed in detail.

2.4.6 Best Management Practices

Best Management Practices ("BMPs") are practices currently identified by BLM in Washington Office Instruction Memorandum 2004-194 defined as "innovative, dynamic, and economically feasible mitigation applied on a site-specific basis to reduce, prevent, or avoid adverse environmental or social impacts.

As discussed in Section 2.3, the project proponent has voluntarily committed to implement some of the BMPs as well as many standard operating practices commonly used in the Uinta Basin to reduce the potential environmental impacts of the proposed natural gas development. For the GDBR, selected BMPs and improved standard operating practices specific to the project area were developed and evaluated that would mitigate potential impacts resulting from QEP's operations. These measures have been incorporated into the Proposed Action and the No Action alternatives.

The BLM considered an alternative that would require QEP, as a condition of approving the Proposed Action, to implement all of the additional BMPs listed in the national policy guidance and those referenced on the BLM national website (http://www.blm.gov/bmp) to mitigate potential impacts to surface and subsurface resources. BLM considered whether to apply all listed BMPs to all APDs and rights-of-way sought under the Proposed Action.

Per instructions in WO IM 2007-021, the VFO will incorporate appropriate environmental BMPS into proposed APDs, sundry notices, and associated on- and off-lease rights-of-way approvals after appropriate environmental review. Environmental BMPs to be considered in nearly all circumstances include the following::

- Interim reclamation of well locations and access roads soon after the well is put into production;
- Painting of all new facilities a color which best allows the facility to blend with the background, typically a vegetated background;
- Design and construction of all new roads as to safe and appropriate standard, "no higher than necessary" to accommodate their intended use; and
- Final reclamation recontouring of all disturbed areas, including access roads, to the original contour or a contour which blends with the surrounding topography.

Other BMPs are more suitable for Field Office consideration on a case-by-case basis depending on their effectiveness, the balancing of increased operating costs vs. the benefit to the public and resource values, the availability of less restrictive mitigation alternatives, and other site specific factors. Examples of typical case-by-case BMPs include, but are not limited to the following

- Installation of raptor perch avoidance;
- Burying of distribution power lines and/or flow lines in or adjacent to access roads;
- Centralizing production facilities;
- Submersible pumps;

- Belowground well heads;
- Drilling multiple wells from a single pad;
- Wildlife monitoring;
- Seasonal restriction of public vehicle access;
- Avoiding placement of production facilities on hilltops and ridgelines;
- Screening facilities from view;
- Bioremediation of oil field wastes and spills; and
- Use of common utility or right-of-way corridors.

In addition to these national BMPs, the Vernal Field Office of the BLM, operators in the Uinta Basin and Uintah County officials are cooperatively developing a comprehensive list of improved standard operating practices and additional BMPs specific to oil and gas operations in the Uinta Basin. The objective of this cooperative effort is to apply those on individual wells in a case-by-case basis to demonstrate the effectiveness in the field and to facilitate their application to future operations in the Uinta Basin.

Based on preliminary data from over 50 years of oil and gas operations in the Uinta Basin, the final list is expected to include more than one hundred measures that could be considered and evaluated on a case-by-case basis.

Evaluation of these site-specific BMPs and improved standard operating practices requires evaluation during the BLM-mandated onsite reviews prior to approval on individual APDs. That review is currently part of normal BLM permitting procedures; thus, this document does not include evaluation of site-specific BMPs. BMPs would be applied as appropriate under the Proposed Action or No Action alternative. Therefore, a BMP alternative is actually part of the Proposed Action and No Action alternatives. The VFO does not believe the remaining impacts from the Proposed Action necessitate application of all nationally identified BMPs as a separate alternative.

2.4.7 Phased Development

A phased development alternative was suggested by EPA in their comments on the Draft EIS. It is unclear how this alternative would reduce impacts. The 10-year developmental phase of the GDBR project is a type of phased development. As improved drilling techniques would become available over the 10-year period, QEP would apply these techniques if enhanced recovery of the reserves would occur and the new methods would be economically feasible. However, it appears that the EPA-recommended phased development would restrict exploration and development in distant areas until all development within a given area would be complete. As a result, the phased development scenario would deny the operator the opportunity to expand far enough out from existing development to drill exploratory type of wells. These exploratory wells are needed to determine the extent, quantity, and quality of oil and gas potential reserves at locations distant from existing development. The exploratory drilling may indeed lessen overall impacts if it is found that the exploratory wells would not have the desired economic potential. In a phased development scenario, the traffic would tend to be more concentrated in distinct areas thereby increasing traffic impacts on the roads in the vicinity of the construction and development. For these reasons, this alternative was not analyzed in detail.

2.4.8 Minimum Setback Distances

This alternative was also suggested by EPA in their comment letter on the draft EIS. It is unclear how this alternative would reduce impacts. Minimum setback distances are part of the Proposed Action. Setbacks are already incorporated into the Proposed Action. Regulations at 43 CFR 3101.1-2 dictate that facilities can be moved 200 meters to reduce or avoid any impacts. The mitigation and applicant committed measures take into account many of the suggested setback distances, both in time and space. The well pad and access road locations in this document are conceptual, so that the need for setbacks will be identified and analyzed through additional NEPA documentation on a site-specific basis during the review phase of the specific project Application. As stated on page 4-3 of the DEIS, "Executive Order 11988 requires federal agencies to make decisions in a manner that promotes avoidance of adverse impacts and reduces the risk of property loss and human safety due to floodplain development/modification, and preserves the natural and beneficial values of floodplains. Floodplain development/modification is allowed only after there are no other feasible alternatives." Since the minimum setback distances alternative is incorporated into the Proposed Action so there is no need to address minimum setbacks as a separate alternative and it was not analyzed further.

Table 2.6. Comparison of Alternatives Impacts and descriptions

Potential Impact	Proposed Action	No Action
Number of Wells	1,020 gas wells 219 oil wells	177 gas wells 32 oil wells
Number of Well Pads	891	187
Access Roads	170 miles	40 miles
Pipelines/flowlines	235 miles	40 miles
Powerlines	31 miles	0
Long-term Surface Disturbance during Development	4,561 acres (5% of GDBR)	888 (1% of GDBR)
Estimated Natural Gas Extraction (life of project)	615.2 billion cubic feet	106.8 billion cubic feet
Estimated Oil Extraction (life of project)	9.52 million barrels	1.44 million barrels
Effects on surface water	Sediment loading to White and Green Rivers were predicted to be a maximum of 2,375 tons/yr, less than a 0.03% increase of the existing sediment loading in both	Sediment loading to White and Green Rivers were predicted to be a maximum of 705 tons/yr, less than a 0.01% increase of the existing sediment loading in both rivers.
Effects on ground water	Slight chance of groundwater contamination from spills, but BMPs (well pad and road construction techniques and drill pit containment) and SPCC plans would reduce potential.	Same as Proposed Action but smaller likelihood because of only 210 wells.
Effects on air quality during construction	Dust generated during construction of pads and roads and drilling wells would result in localized PM_{10} effects near construction that would be 30 to 45% of the NAAQS.	Same as Proposed Action near each individual facility and road. However, effects would occur at 210 locations rather than the 1,239 locations of the Proposed Action.

Potential Impact	Proposed Action	No Action
Effects on air quality during operations	For the life of the project, PM_{10}, NO_2, and CO ambient air concentrations predicted to be 23, 52, and 50%, respectively, of NAAQS. NO_2 and PM_{10} predicted to be 82 and 70% of PSD Class II increment. HAP ambient concentrations predicted to be less than 1% of Chronic Inhalation Exposure and Reference Exposure Levels except formaldehyde, which is predicted to be 5-10% of standard.	PM_{10}, NO_2, and CO ambient air concentrations predicted to be 5, 10, and 8%, respectively, of NAAQS because project emissions would be about 20% of Proposed Action. NO_2 and PM_{10} predicted to be 16 and 14% of PSD Class II increment.
Effects to air quality and air quality related values (AQRV) at Class I areas	Ambient pollutant concentrations predicted to be less than 0.1% of Class I increments for the life of the project at the following Class I areas: Arches NP, Canyonlands NP, Capitol Reef NP, Black Canyon of the Gunnison NP, Maroon Bells-Snowmass NP, Flat Tops WA, Eagles Nest WA, Mt. Zirkle WA, and Rawah WA. Maximum visibility effects predicted to be less than 20% of the "just noticeable change" threshold of 1.0 deciview. Nitrogen deposition value predicted to be less than 1% of threshold of 3.0 kg/ha/yr.	Insignificant effects that would be less than insignificant effects described for Proposed Action because project emissions would be 80% less than Proposed Action.
Effects to erodible soils	406 new well pads on soils rated with a severe erosion potential, 345 on moderate, 142 on slight.	76 new well pads on soils rated with a severe erosion potential, 95 on moderate, 39 on slight.
Soil Loss	Soil loss estimated to range from 602 to 2,375 tons/year during construction period. Estimated to stabilize at 1,966 tons/year after construction. Soil loss activities in distinct watersheds within GDBR would range from 0.2 to 2.5% increase over the naturally occurring rates. Subsequent sedimentation loading to both the Green and White Rivers is predicted to increase by only 0.03 percent.	Soil loss estimated to range from 308 to 705 tons/year during construction period. Estimated to stabilize at 308 tons/year after construction. Soil loss activities in distinct watersheds within GDBR would range from 0.0 to 1.9% increase over the naturally occurring rates. Subsequent sedimentation loading to both the Green and White Rivers is predicted to increase by only 0.01 percent.
Loss of Vegetation	4,561acres removed during construction. Losses would range from 1.8 to 5.8% of the available vegetation type within GDBR. Although interim reclamation would be attempted after a well would be completed, reclamation may take from years to decades depending on the species. Overall, the action is not likely to lead to the need to list a species.	888 acres removed during construction. Losses would range from 0.6 to 0.8% of the available vegetation type within GDBR. Although interim reclamation would be attempted after a well would be completed, reclamation may take from years to decades depending on the species. Overall, the action is not likely to lead to the need to list a species.

Potential Impact	Proposed Action	No Action
Effects on Special Status Vegetation Species	Development of 17 wells and roads could occur within areas of known occurrence of horseshoe milkvetch, a former candidate species but removed from the Candidate List in September 2006. Site specific preconstruction surveys would be conducted to avoid the destruction of plants. Weed control would occur to prevent invasion into potential or occupied habitats. Overall, the action is not likely to lead to the need to list the species. Potential habitat of the Uinta Basin hookless cactus is present in the southern and west portions of the GDBR in the Uinta Geological formation. Based on the anticipated effectiveness of the mitigating measures BLM finds that the Proposed Action "***may affect, is not likely to adversely affect***" the Uinta Basin hookless cactus.	1 well could occur within areas of known occurrence of horseshoe milkvetch. Site specific preconstruction surveys would be conducted to avoid the destruction of plants. Weed control would occur to prevent invasion into potential or occupied habitats. Overall, the action is not likely to lead to the need to list the species.
Loss of Wildlife Habitat	No BLM-identified antelope or mule deer critical winter habitat within the GDBR would be disturbed by new facilities. 43 new wells and associated access roads would be constructed within raptor guideline buffers. Construction too close to nests could cause raptors to avoid the area. Overall, the action is not likely to lead to the need to list a species.	No BLM-identified antelope or mule deer critical winter habitat within the GDBR would be disturbed by new facilities. 4 new wells and associated access roads would be constructed within raptor guideline buffers. Construction too close to nests could cause raptors to avoid the area. Overall, the action is not likely to lead to the need to list a species.
Effects on Special Status Wildlife Species	New facilities would result in disturbance of up to 16 acres of about 16,000 acres of prairie dog colonies within GDBR. Proposed Action would be consistent with habitat management objectives of maintaining minimum 10,000 acres of prairie dog colonies for the Coyote Basin Primary Management Zone (PMZ). Overall, the action is not likely to lead to the need to list a species. 134 ferruginous hawk and golden eagle nests have been documented in GDBR. High likelihood of impacting some nests, but overall abundance of nests should result in small overall effect. Overall, the action is not likely to lead to the need to list a species.	New facilities would result in disturbance up to 10 acres of about 16,000 acres of prairie dog colonies within GDBR. This disturbance would be consistent with habitat management objectives of maintaining minimum 10,000 acres of prairie dog colonies for the Coyote Basin PMZ. Overall, the action is not likely to lead to the need to list a species. 134 ferruginous hawk and golden eagle nests have been documented in GDBR. Lower likelihood than of the Proposed Action of impacting some nests, but overall abundance of nests should result in small overall effect. Overall, the action is not likely to lead to the need to list a species. Development of facilities would result in 10 acre disturbance of

Potential Impact	Proposed Action	No Action
	Development of facilities would result in 19 acres of disturbance in known sage grouse leks. Grouse could abandon these leks if construction would occur from March 1 to June 15 during the breeding season. However, construction activities would not be allowed during the breeding season so no effects would occur. Overall, the action is not likely to lead to the need to list a species. Based on the potential loss of prey species and loss of habitat, the Proposed Action "***may affect but not likely to adversely affect***" the bald eagle. Based on the removal of water from the Green River (i.e., water depletion) for construction and drilling operations, the Proposed Action "***may affect, is likely to adversely affect***" the endangered Colorado pikeminnow, humpback chub, bonytail, and razorback sucker.	known sage grouse leks. Grouse could abandon these leks if construction would occur from March 1 to June 15 during the breeding season. Overall, the action is not likely to lead to the need to list a species.
Effects to cultural resources	Based on past data, 154 to 462 sites could occur in GDBR. Perhaps 40 percent may be eligible to the NRHP. Seven to 22 new sites could be uncovered during the earth-moving activities. Pre-construction cultural surveys would reduce potential impacts but likelihood exists that some sites could be inadvertently destroyed. Since road network already exists, potential for vandalism should not increase.	Surface disturbance would be approximately 12 percent of the Proposed Action total. Therefore, 1 to 3 new sites could be discovered during surveys or uncovered during earth-moving activities. With less wells, likelihood of inadvertently destroying sites would be less. Potential for vandalism would be similar to Proposed Action because of existing road network.
Effects to paleontological resources	Fossil-bearing geological formations extend into GDBR. Adverse effects (including destruction) would be minimized by paleontological surveys during APD process. Earth-moving activities would immediately stop if fossils would be discovered and the site is evaluated by BLM and State paleontologists and a decision is made whether to avoid the site.	Same as Proposed Action but likelihood of discovering sites during surveys or uncovering during construction would be much less because surface disturbance would only be 12 percent of Proposed Action.
Effects to land use	Continued use of lands within GDBR for oil and gas development. Minor loss of AUMs described in Rangeland Management. No changes in permitted use is anticipated as	Change of land use on State and private leases would be identical to Proposed Action. Overall disturbance and change of land use would be 12 percent of the Proposed Action. No

Potential Impact	Proposed Action	No Action
	being necessary.	changes in permitted use is anticipated as being necessary.
Effects to transportation	Average Annual Daily Traffic would increase by 3.5% during 10-year construction phase and 1.4% during operations. Accident potential would increase by approximately the same percentage especially at intersections within GDBR along HW 45.	Average Annual Daily Traffic would increase by 3.5% during 2- to 3-year construction phase and 1.0% during operations. Accident potential would increase by same percentage especially at intersections with HW 45.
Effects to rangeland management	Long-term loss of 347 AUMs, a 3% decrease in the total preference of the affected allotments. Changes in the grazing permits are not anticipated. AUM losses within each allotment would be as follows:	Long loss of 69 AUMs, a less than 1% decrease. Changes in the grazing permits are not anticipated. AUM Losses within each allotment would be as follows:
	Allotment — AUM Long-term loss	Allotment — AUM Long-term loss
	Antelope Draw — 79 (2%)	Antelope Draw — 32 (2%)
	Badlands — 3 (2%)	Badlands — 2 (1%)
	Baeser Wash — 20 (4%)	Baeser Wash — 1 (<1%)
	Bohemian Bottoms — 19 (5%)	Bohemian Bottoms — 3 (1%)
	Bonanza — 0	Bonanza — 0
	Cocklebur — <1 (1%)	Cocklebur — 0
	Horned Toad — 84 (5%)	Horned Toad — 9 (1%)
	Ouray Valley — <1 (1%)	Ouray Valley — <1 (<1%)
	Pelican Lake — 6 (4%)	Pelican Lake — 0
	Powder Wash — 5 (4%)	Powder Wash — 1 (1%)
	Stateline — 21 (4%)	Stateline — 6 (1%)
	Walker Hollow — 17 (4%)	Walker Hollow — 0
	West Deadman — 91 (5)	West Deadman — 14 (1%)

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3.0 AFFECTED ENVIRONMENT

3.1 GEOLOGY AND MINERALS

3.1.1 Physiography and Topography

The Uinta Basin is a bowl-shaped structural and sedimentary basin located in northeast Utah. The basin trends roughly east-west, is approximately 115 miles wide at the widest part, and narrows toward the west. The Uinta Basin is bounded on the east by the Douglas Creek Arch, on the south by the Book Cliffs, on the west by the Wasatch Plateau and to the north by the Uinta Mountains.

The Project Area lies primarily within the Central Badlands Topographic District of the Uinta Basin (Figure 3.1-1). It is one of five described topographic districts within the basin (Clark, 1957). The Central Badlands district comprises badland topography consisting of steep erosional slopes, narrow ridges, gullies, and dry washes. There are also broad areas of pediment and plateau adjacent to the badlands within this topographic district.

A portion of the Project Area lies within the Green River Valley Topographic District, which bisects the eastern portion of the Project Area. Within the Green River Valley district, the topography is dominated by nearly flat-lying flood plains of the Green River approximately ½ to 1½ miles wide. The flood plains are bounded by low cliffs, ledges, steep erosional slopes, pediment slopes and small tributary alluvial fans.

3.1.2 Stratigraphy

The majority of the Uinta Basin is underlain by sandy shale of the Eocene-Oligocene aged Duchesne River Formation, which erodes into low bluffs and ridges (Figure 3.1-2). The Duchesne River formation is fossiliferous in places and contains small mammal fossils. The underlying rocks which would be intercepted by the proposed drilling include the Eocene Green River Formation, the Eocene Wasatch/Colton Formation, the Cretaceous Mesaverde Formation and Mancos Shale, and the Jurassic Dakota/Cedar Mt. Formation (Figure 3.1-2). Figure 3.1-3 presents a geologic cross-section of the basin.

Gravelly and sandy pediment slopes, sandy washes, low bluffs and cliffs, and ledges and ridges of sandstone and sandy shale characterize the surface exposures within much of the Project Area. Quaternary alluvium and colluvium occurs in drainage bottoms and dry washes, and as small alluvial fans within the confines of the Green River Valley canyon. In places, older alluvial deposits comprised of sand, gravel and rounded cobbles cover these surface exposures, particularly on benches and mesa tops.

Eolian (wind-blown) deposits of sand are present in the southern portion of the Project Area, where they form dunes. Some of these dunes are active, but many have been anchored by vegetation.

3.1.3 Structure

The Uinta Basin is a structural basin that has been partially filled with sediments. Structural characteristics of the Uinta Basin developed during the Laramide Orogeny, mainly during the early Eocene (Clark, 1957). The structural axis of the basin generally trends west-northwest and plunges gently to the northwest, as shown on Figure 3.1-2. The Duchesne River follows a course parallel to and 10 miles south of the structural axis. The Project Area falls directly over the structural axis in the eastern portion of the basin. Three large-scale folds are the dominant structural features within the basin (Figure 3.1-2). The northern flank of the basin is bounded by faults in many places.

The bedrock strata generally dip about one to three degrees to the north in the central portion of the basin to greater than 30 degrees near the northern flank of the basin. Within the project area, strata are nearly flat to sub-horizontal showing a general shallow dip to the northeast south of the structural axis and a general shallow to moderate dip to the southwest north of the structural axis.

3.1.4 Mineral and Energy Resources

Mineral and energy resources within the Project Area with known, proven economic reserves are largely limited to oil and gas hydrocarbons. The Uinta Basin contains extensive deposits of oil and natural gas. Existing gas and oil fields within and near the Project Area include the Red Wash, Wonsits Valley, White River, Brennan Bottom, and Coyote Basin oil fields, and the Horseshoe Bend and Chapita Wells gas fields (Figure 3.1-4).

In addition to oil and gas reserves, the Uinta Basin also contains deposits of “Gilsonite” (also known as asphaltum, uintaite or uintahite) several miles southeast of the Project Area (Figure 3.1-2). Gilsonite is composed of black, brittle hydrocarbon resins that resemble tar or asphalt. The deposits occur in vertical to near-vertical, long, thin northwest-trending veins that occur primarily in the Green River, Uinta, and lower Duchesne River Formations. The “Rainbow” Gilsonite vein is 14 miles long and some veins are up to fourteen feet thick (Osmond, 1992). These veins are mined primarily by shaft and stoping, and open pit methods. Gilsonite has not been observed in commercial quantities at the surface within the Project Area and it appears unlikely that there are commercially recoverable amounts of these minerals within the Project Area boundaries.

Uranium and other metals are not known to exist in recoverable quantities within the Project Area. The Uinta Basin appears to have a low potential for the occurrence of these minerals (Pera et al. 1977).

The Uinta Basin produces some stone derived from the Green River Formation that is used as decorative building materials. Small quantities of sand and gravel are also mined from several dry washes.

3.2 WATER RESOURCES

3.2.1 Physiography and Climate

The GDBR lies completely in the Uinta structural basin of northeastern Utah. The Uinta Basin has an area of approximately 10,890 miles and is bounded to the north by the Uinta Mountains and the Wyoming border, to the east by the Colorado border, and to the south and west by portions of the Wasatch Range and the Roan Cliffs. The highest point in the basin is King Peak in the Uinta Mountains at an elevation of 13,528 feet above mean sea level (amsl), and the lowest point is about 4,040 ft amsl on the Green River.

The climate within the basin varies widely. Average precipitation ranges from 6 inches per year to over 40 inches in the surrounding Uinta Mountains. The basin generally has short, warm summers and long, cold winters, especially at higher elevations.

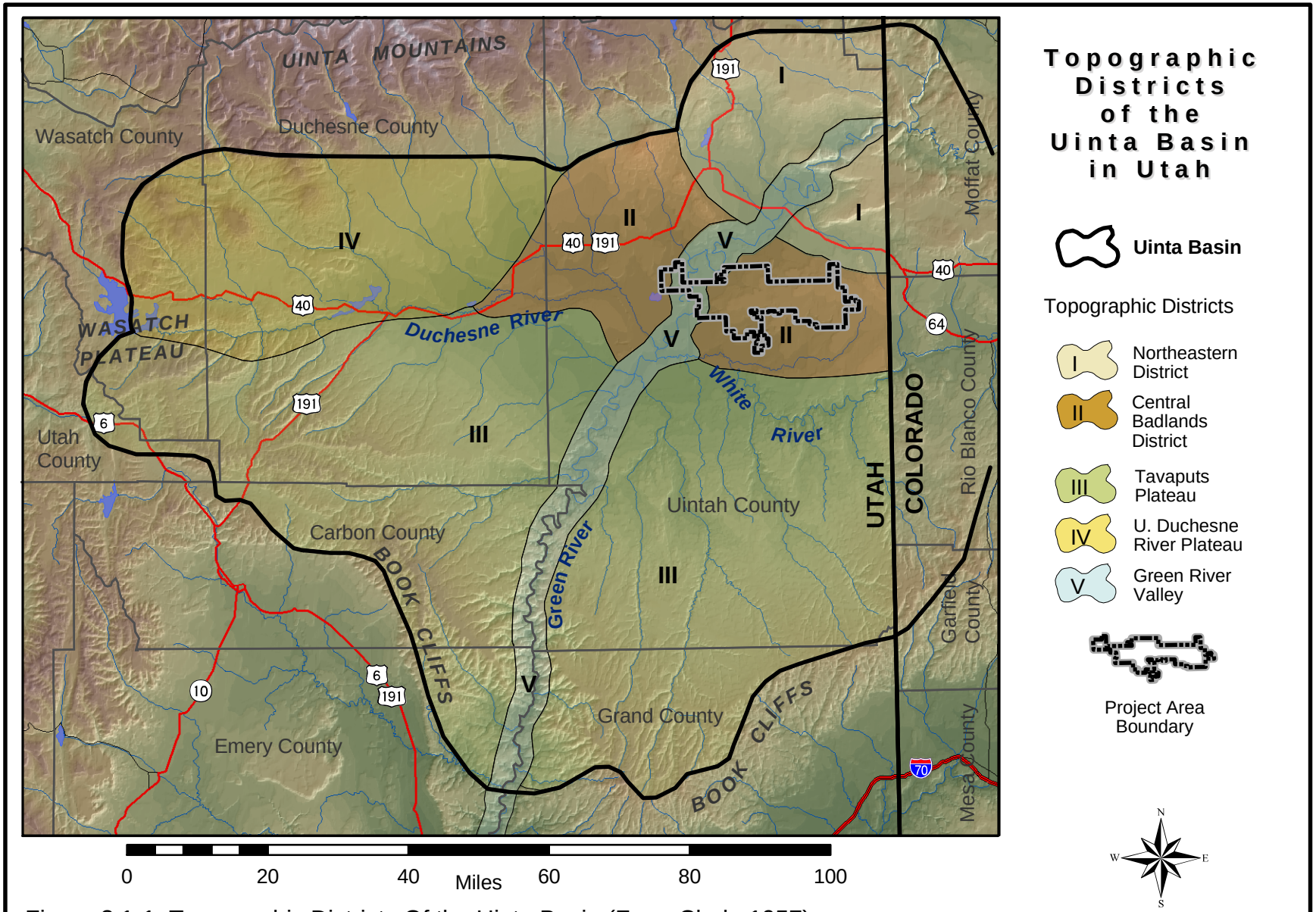

Figure 3.1-1. Topographic Districts Of the Uinta Basin (From Clark, 1957).

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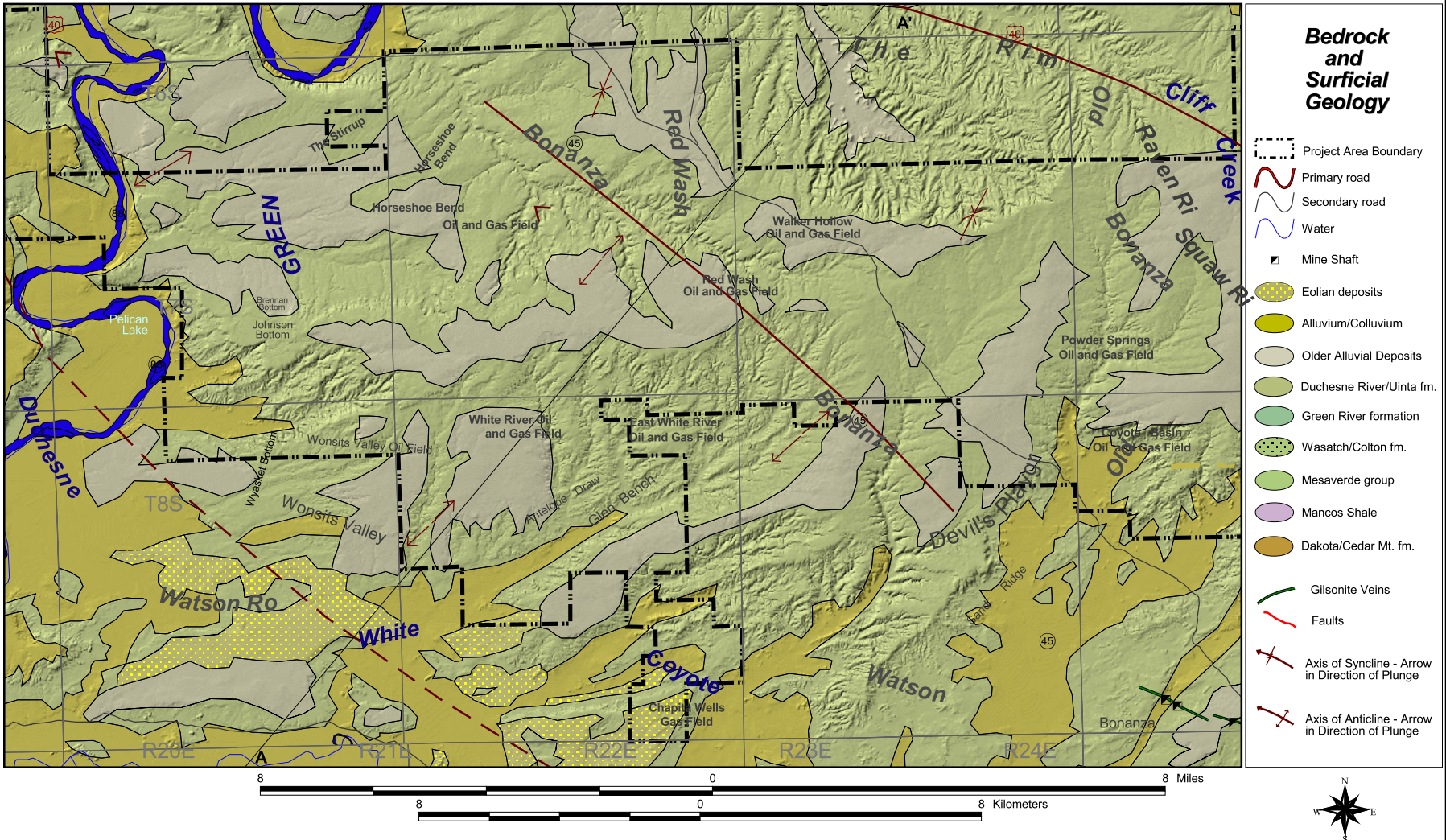

Figure 3.1-2. Geology within and near the Greater Deadman Bench Project Area (from Hintze, 1980).

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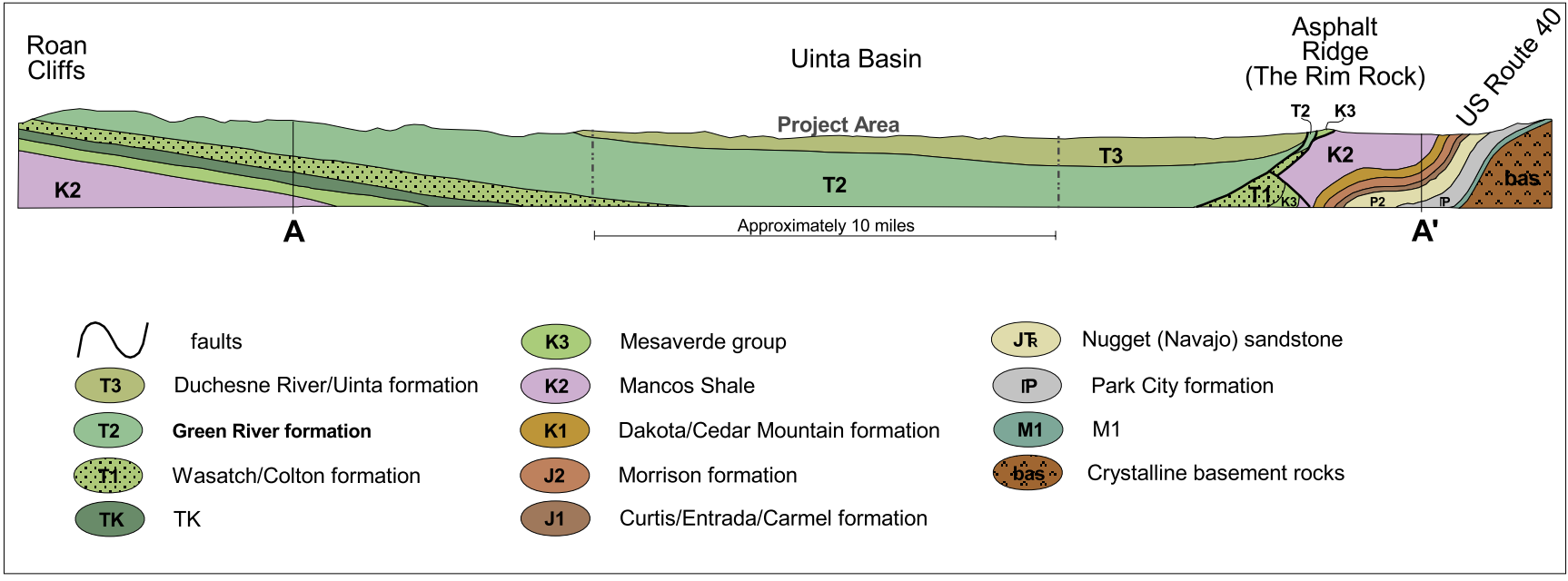

Figure 3.1-3. Geologic Cross-section.

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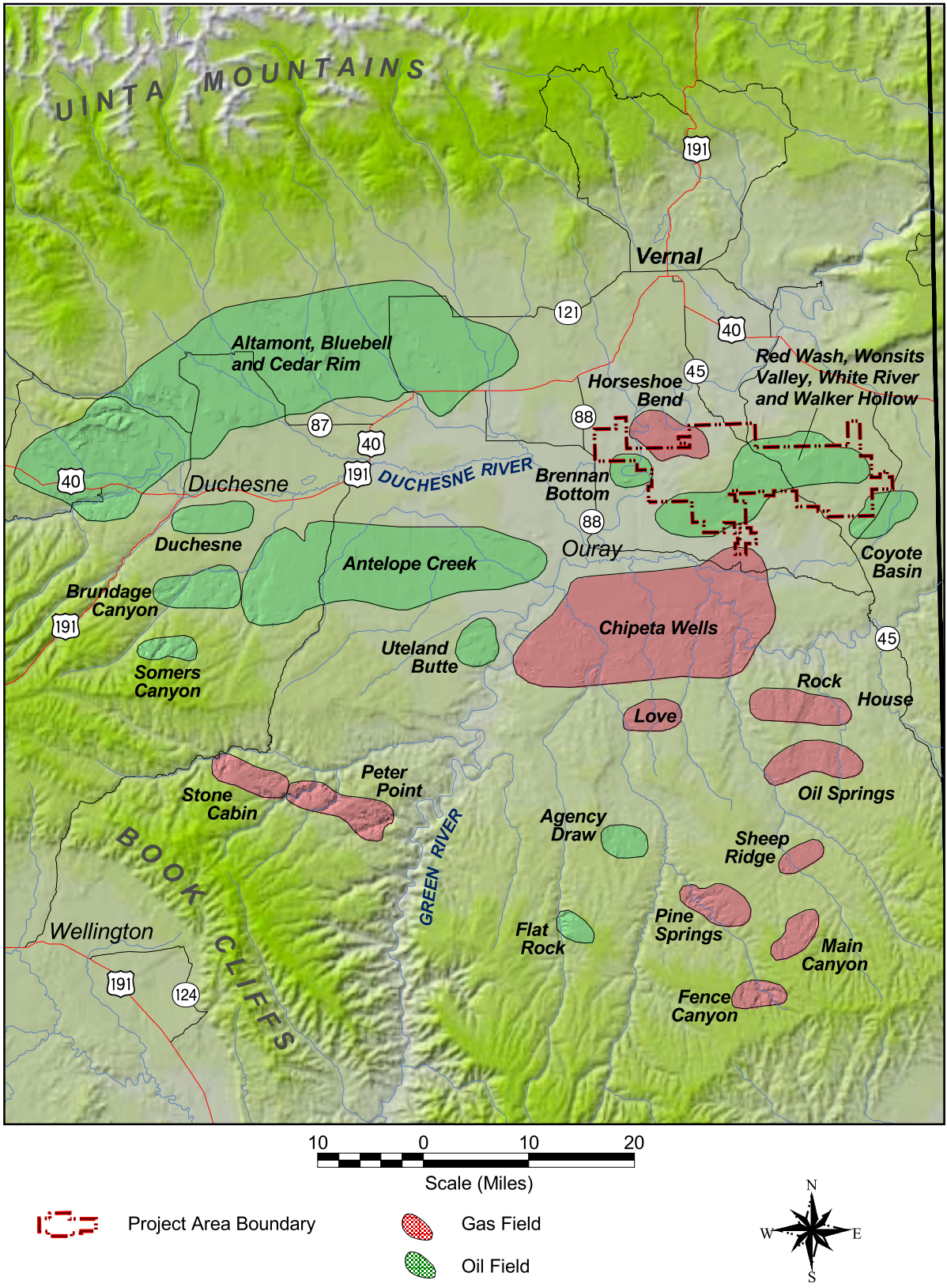

Figure 3.1-4. Oil and Gas Fields in and near the Project Area (from Spencer, 1988).

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3.2.2 Hydrologic Setting

The Uinta Basin is drained by the Green River and its tributaries. Major tributaries include the Duchesne River and the White River. The White River drains the eastern portion of the basin, including those portions of the basin within Colorado. Within the Uinta Basin, the State of Utah has classified five drainages as hydrological sub-units: the Upper Green, the Green, the Ashley-Brush, the Duchesne/Strawberry, and the White River (Utah Division of Water Resources, 1999). The GDBR lies within the White River sub-unit.

Geologic formations in the basin include Tertiary and Cretaceous age sediments which consist mainly of lacustrine deposits containing clay, silt, and lime with lenses of fluvial sands, conglomerates and evaporites. Several of these consolidated rock formations are considered to be important aquifers in the region.

3.2.3 Surface Water

Figure 3.2-1 shows the two perennial rivers, the ephemeral washes within and near the GDBR, and the watersheds of the washes. The GDBR mostly lies east of the Green River in the north-central portion of the Uinta Basin. The Green River is a major river in the western United States. It originates in Wyoming along the Continental Divide and joins the Colorado River south of the GDBR. The flow in the Green River is partially controlled by the Flaming Gorge Dam. From 1947 to 2005, the flow in the Green River at Jensen averaged 3,058,696 acre-feet/year (acft/yr) and ranged from a maximum annual flow of 5,634,674 acft/yr in 1984 to a minimum flow of 1,054,827 in 1963 (USGS 2006).

In the northern and western portions of the GDBR, the ephemeral washes flow directly to the Green River. Streams which drain the GDBR and flow into the Green River include:

- The north-flowing Powder Springs Wash in the east portion of the GDBR;
- The northwest-flowing Walker Hollow Right Fork in the north-central portion of the GDBR;
- The northwest-flowing Baeser Wash in the northwestern-central portion of the GDBR; and
- Several small washes that flow west directly into the Green River.

These streams are mainly ephemeral and only flow in direct response to rainfall events. During certain portions of the year, streams on the west side of the Green River may flow with irrigation return water. They have developed a dendritic drainage pattern and are incised with rills and gullies typical of badland topography. Two irrigation canals (the Ouray Valley Canal and the Ouray Park Canal), which carry water from the Ouray Valley to the Green River, are located in the western portion of the GDBR.

The White River originates in Colorado and is a tributary of the Green River. It is a free flowing river except for a small reservoir in western Colorado. The southern portion of the GDBR is drained mainly by ephemeral washes that flow southwest to the White River. As illustrated in Figure 3.2-1, the southeastern portion of GDBR is drained by Coyote Wash which flows into the White River. The Coyote Wash watershed has an area of approximately 228 square miles; about 57 square miles are within the GDBR.

The main tributaries to Coyote Wash which drain the GDBR include Kennedy Wash and Red Wash. Kennedy Wash drains approximately 18 square miles of the east-central portion of the GDBR. Red Wash drains about 12.5 square miles of the western portion of the GDBR. The southwestern portion of the

GDBR is drained primarily by Antelope Wash, which has a watershed area of approximately 51 square miles.

All of the streams that drain the GDBR to the White River are ephemeral and only flow in direct response to rainfall events. These streams have developed a dendritic drainage pattern with up to 5 orders of tributaries, which indicates that the area is a sediment source area. The streams are incised with rills and gullies typical of badland topography.

3.2.3.1 Surface Water Flow

The United States Geological Survey (USGS) maintains several gauging stations on the Green River. The most representative USGS gauging station (Station Number 09307000) to the GDBR is located near Jensen approximately 15 miles north of the GDBR. The elevation at this station is 4,758 ft amsl and the drainage area it gauges covers approximately 29,660 square miles. The period of record for this station is from October 1, 1946 to the present. Figure 3.2-2 shows the hydrograph for this station covering flow from October 1992 through September 2003. During this period, peak flows ranged from less than 5,000 cubic feet per second (cfs) to more than 25,000 cfs during spring runoff in response to snow melt.

Since 1923, the USGS has maintained a surface water gauging station on the White River just off Highway 45 near Watson, Utah, approximately 7 miles south of the GDBR. This station gauges a drainage basin area of approximately 4,020 square miles. The White River is considered perennial in Utah with high flows occurring in spring responding to snow melt in the mountains of Colorado. In summer, high flows occur due to short duration, high intensity thunderstorms. Figure 3.2-3 shows the hydrograph for the White River at the Watson Gauging Station for the 10-year period from October 1992 to October 2003. During this period, peak flows ranged from 500 to 4,600 cfs during peak spring runoff. The mean daily average flow during this period was 695 cfs.

The USGS also maintained a gauging station (Station Number 09306878) on Coyote Wash between October 1976 and October 1983. Figure 3.2-4 shows the hydrograph for this station and illustrates the ephemeral nature of the stream, with flows up to 600 cfs only occurring in direct response to rainfall events. The vertical nature of the peaks also indicates that the stream is susceptible to flash flooding.

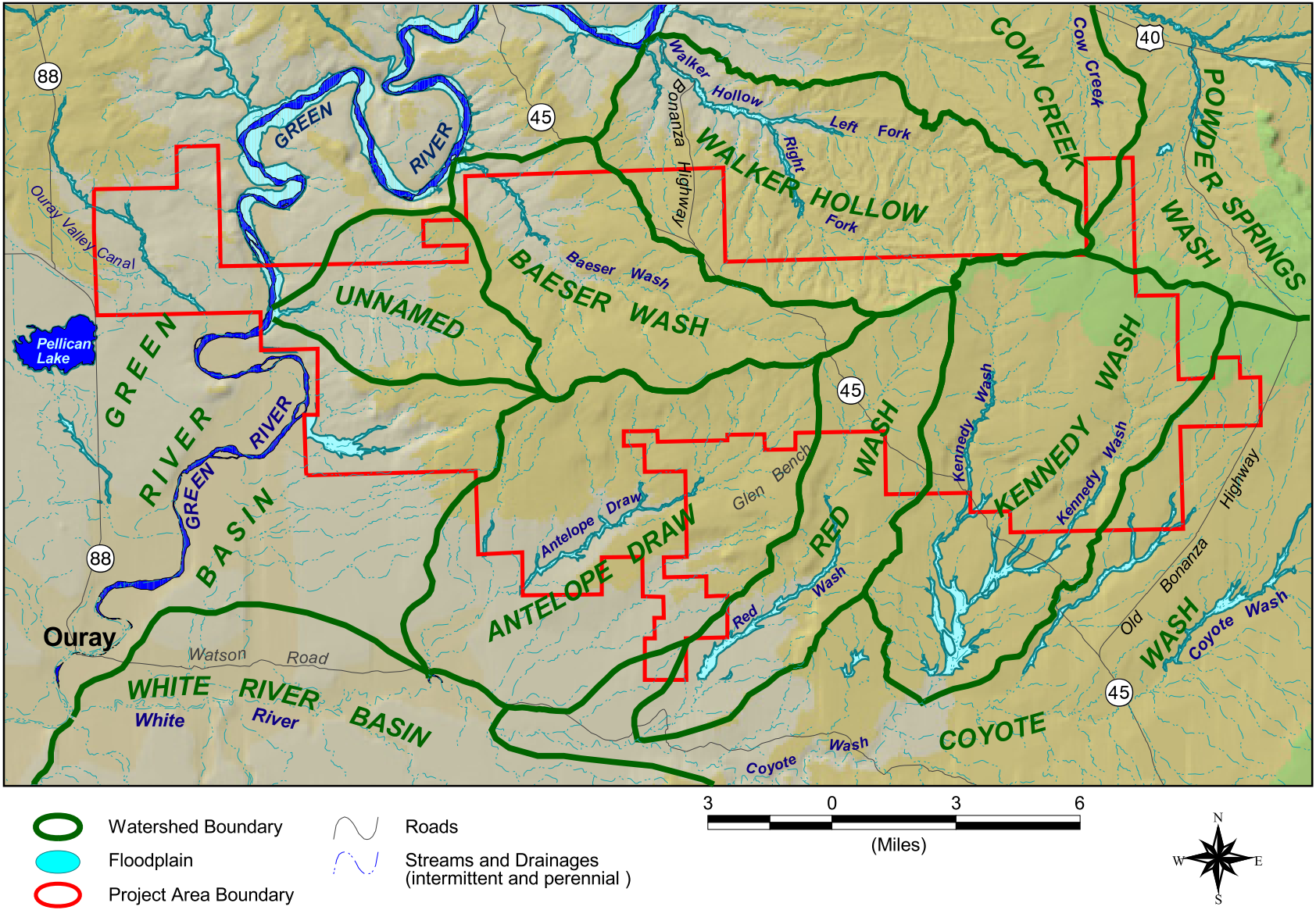

Figure 3.2-1. Mapped Hydrologic Basins and Floodplains within the GDBR.

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Figure 3.2-2 Hydrograph for the Green River near Jensen (USGS Station 09261000) for October 1992 through September 2003

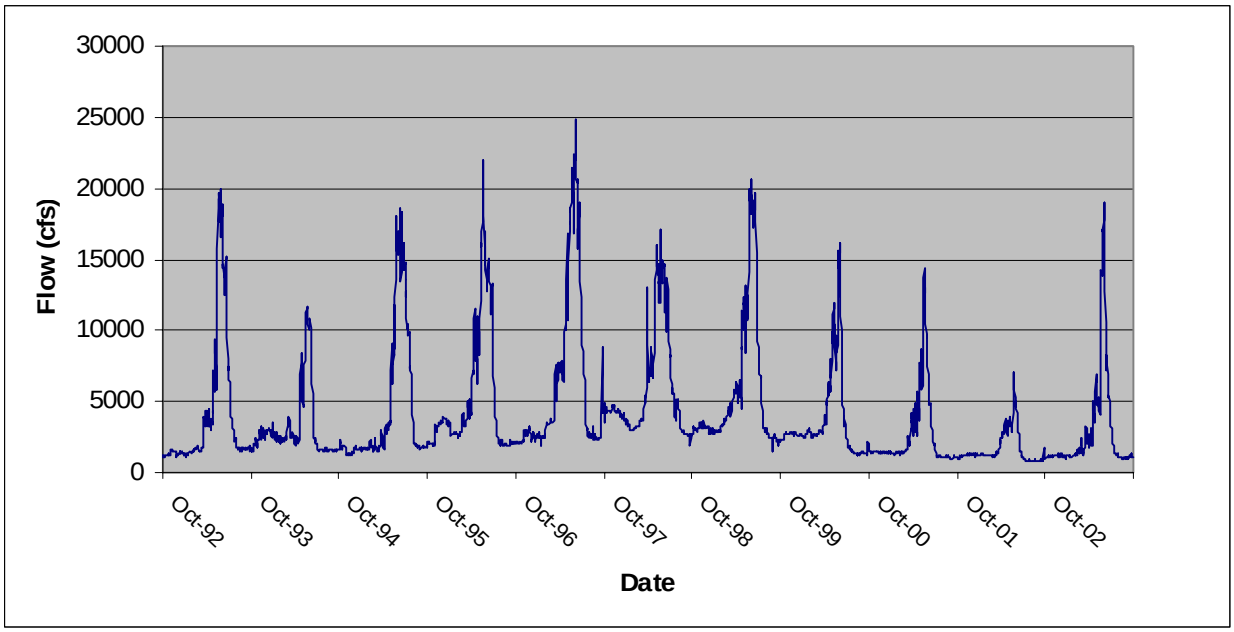


Figure 3.2-3 Hydrograph for the White River near Watson, Utah (USGS Station 9306500) for October 1992 to September 2003

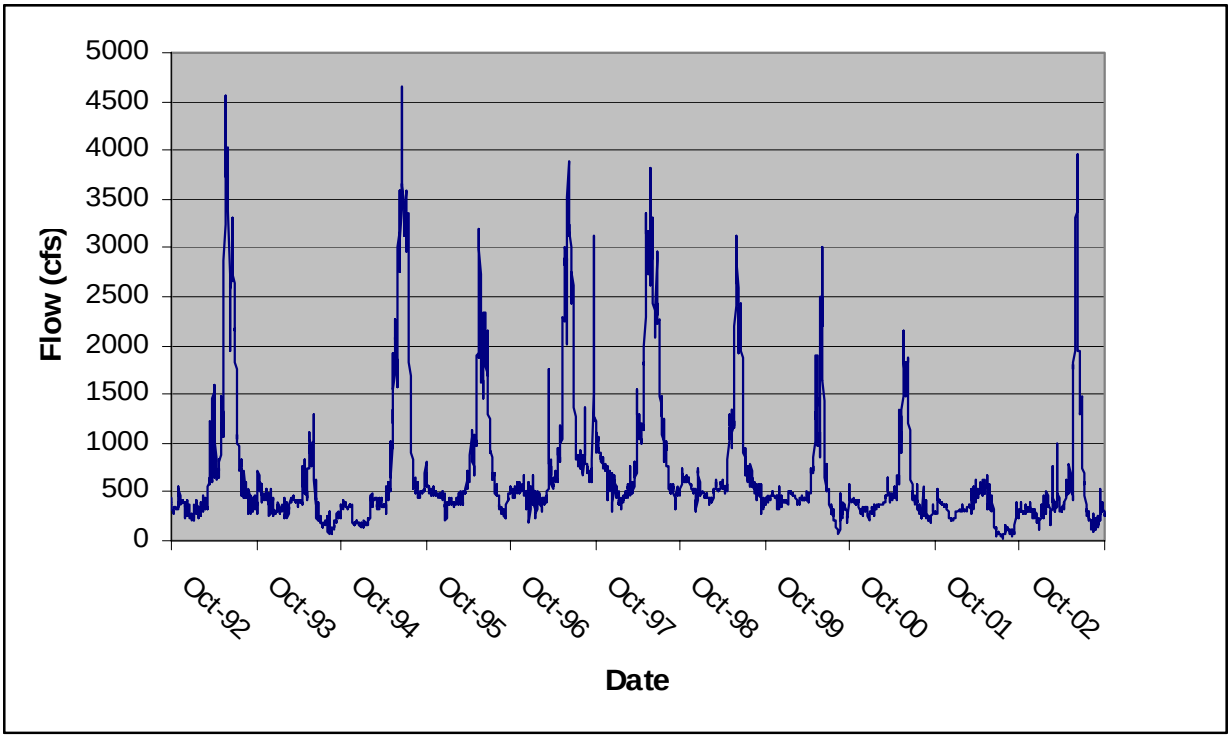
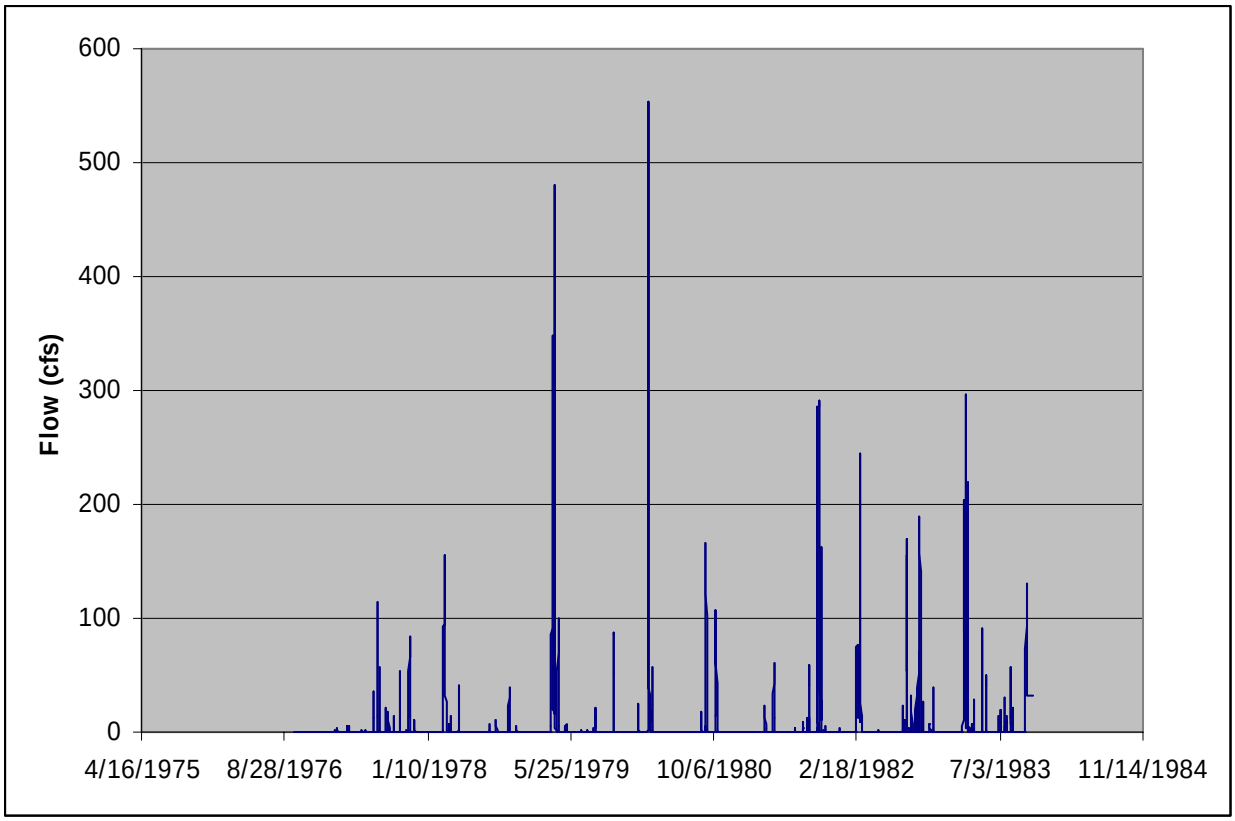


Figure 3.2-4 Hydrograph for Coyote Wash near Ouray Utah (USGS Station 09306878) for October 1976 through October 1983.



3.2.3.2 Surface Water Quality

The Utah Division of Water Quality monitors and assesses the Green and White Rivers on a regular basis to determine if the rivers are supporting their beneficial uses. Water quality data is collected from the Green River at station number 49370 and from the White River at station number 493352. Both stations are located south of the GDBR where the rivers cross Utah State Highway 88 near Ouray.

Tables 3.2-1 and 3.2-2 present a summary of water quality data from these stations for the period November 2000 through December 2002. Waters of the Green and White Rivers are similar in chemical nature with the predominant cations and anions being calcium, magnesium, and sulfate. These rivers in general meet Utah Water Quality Standards for domestic, agricultural and recreational use.
The Utah Administrative Code under Title 317 has developed Water Quality Standards for waters in the State of Utah. Under this Title, the Green River and its tributaries (except where exempted) are classified as follows:

Class 1C: Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water;

Class 2B: Protected for secondary contact recreation such as boating, wading, or similar uses;

Class 3: Protected for use by aquatic wildlife;

Class 3B: Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain; and

Class 4: Protected for agricultural uses including irrigation of crops and stock.

The White River and tributaries, from confluence with Green River to the state line is classified 2B, 3B, and 4.

For the Green River, dissolved solids range from 232 to 490 mg/L with an average of 393 mg/L. Total dissolved solids are somewhat higher for the White River and range between 248 and 692 mg/L with an average of 542 mg/L. Mean total suspended solids concentrations are 152 mg/L for the Green River and 258 mg/L for the White River.

Water quality data are not available for washes within the GDBR. When flowing in response to snowmelt or precipitation, these streams are expected to carry elevated levels of total suspended solids.

Table 3.2-1. Green River Water Quality Summary – November 2000 to December 2001 - Station Number 49370

Chemical Parameter	Number of Samples	Minimum	Maximum	Mean
Field Parameters				
Dissolved oxygen (DO) (mg/L)	8	6.81	11.7	9.3
Dissolved oxygen saturation (%)	7	78.6	102.8	92.4
pH (Standard Units)	16	7.77	8.59	8.3
Temperature (degrees Centigrade)	8	0.13	29.26	10.2
Turbidity (NTU)	8	7.86	225	79.1
Specific conductivity (umhos/cm)	16	342	722	560.4
Major Ions				
Alkalinity, Carbonate as CaCO3 (mg/l)	8	94	175	144.3
Carbonate (mg/L)	8	0	0	0.0
Carbon dioxide (mg/L)	8	1	4	1.9
Chloride (mg/L)	8	Nd	27.6	19.1
Bicarbonate (mg/L)	8	114	214	175.9
Sulfate (mg/L)	8	73.7	615	200.7
Hydroxide (mg/L)	8	0	0	0.0
Potassium (mg/L)	8	1.81	3.14	2.5
Magnesium (mg/L)	8	12.7	25.9	22.0
Sodium (mg/L)	8	23.9	58.4	46.7
Calcium (mg/L)	8	34.4	62.5	52.5
General Water Quality Indicators				
Hardness (mg/L)	8	138.1	258.2	221.6
Salinity (ppt)	7	0.18	0.4	0.3
Total Dissolved Solids (mg/L)	8	232	490	392.8
Total Suspended Solids (mg/L)	8	10	386	151.8
Nutrients				
Ammonia (mg/L)	5	Nd	Nd	Nd
Phosphorus (mg/L)	13	Nd	0.319	0.1
Trace Metals				

Chemical Parameter	Number of Samples	Minimum	Maximum	Mean
Aluminum (ug/L)	5	Nd	162	78.4
Arsenic (ug/L)	5	Nd	Nd	Nd
Barium (ug/L)	5	72	156	89.8
Cadmium (ug/L)	5	Nd	Nd	Nd
Chromium (ug/L)	5	Nd	5.2	1.7
Copper (ug/L)	5	Nd	Nd	Nd
Iron (ug/L)	5	Nd	96.7	56.0
Lead (ug/L)	5	Nd	Nd	Nd
Manganese (ug/L)	5	Nd	5	1.0
Mercury (ug/L)	5	Nd	Nd	Nd
Selenium (ug/L)	5	1	1.8	1.4
Silver (ug/L)	5	Nd	Nd	Nd
Zinc (ug/L)	5	Nd	30.5	6.1

nd - not detected
ug/L - micrograms per liter
mg/L - milligrams per liter

Table 3.2-2. White River Water Quality Summary – November 2000 to December 2001 - Station Number 493362

Chemical Parameter	Number of Samples	Minimum	Maximum	Mean
Field Parameters				
Dissolved oxygen (mg/L)	14	5.51	12.31	9.0
Dissolved oxygen saturation (%)	13	77.4	145.1	95.8
pH (Std. Units)	27	8.1	8.66	8.35
Temperature (deg C)	14	0.02	27.61	12.6
Turbidity (NTU)	14	20.8	9,970	825.1
Specific conductivity (umhos/cm)	27	249.7	1,010	747.4
Major Ions				
Alkalinity, Carbonate as CaCO3 (mg/L)	14	123	225	193.7
Carbonate (mg/L)	14	0	0	0.0
Carbon dioxide (mg/L)	14	1	3	1.8
Chloride (mg/L)	15	0	27	15.6
Bicarbonate (mg/L)	14	150	274	236.4
Sulfate (mg/L)	14	59.6	312	224.8
Hydroxide (mg/L)	14	0	0	0.0
Potassium (mg/L)	14	1.51	3.63	2.1
Magnesium (mg/L)	14	14.4	42.8	30.2
Sodium (mg/L)	14	19.5	104	75.1
Calcium (mg/L)	14	41.6	73.9	61.6
General Water Quality Indicators				
Hardness (mg/L)	13	214.2	358.7	286.1
Salinity (ppt)	13	0.12	0.5	0.4
Total Dissolved Solids (mg/L)	14	248	692	542.1
Total Suspended Solids (mg/L)	14	25.5	914	258.0

Chemical Parameter	Number of Samples	Minimum	Maximum	Mean
Nutrients				
Nitrite + Nitrate (mg/L)	14	0.1	0.45	0.23
Phosphorus (mg/L)	15	0.021	0.676	0.250
Trace Metals				
Aluminum (ug/L)	4	0	151	65.8
Arsenic (ug/L)	1	0	0	0.0
Barium (ug/L)	10	55	115	78.8
Cadmium (ug/L)	1	0	0	0.0
Copper (ug/L)	1	0	0	0.0
Iron (ug/L)	5	30.1	207	74.1
Lead (ug/L)	1	0	0	0.0
Manganese (ug/L)	2	0	7	3.5
Selenium (ug/L)	8	1.0	1.8	1.3
Silver (ug/L)	1	0	0	0.0

3.2.4 Floodplains

The U.S. Department of Housing and Urban Development (HUD) and the Federal Emergency Management Agency (FEMA) inventoried public and state lands in Uintah County in 1977 (Wright pers. comm. 2005). Based on the survey, 100-year floodplains were designated in six drainages within the GDBR along with the main floodplain along the Green River. The floodplains, shown on Figure 3.2-1, include the east and west branch of Kennedy Wash, Red Wash, Antelope Draw, Baeser Wash, and an unnamed wash leading to the Green River on the west side of the GDBR.

3.2.5 Public Water Reserve

Public water reserves are parcels of land, withdrawn from settlement, mineral location, sale, or entry, that contain a spring or water hole which is reserved for public use. Public water reserves were established by Executive Order Number 107 dated April 17, 1926. Two public water reserves occur in the GDBR: a 120-acre parcel is in T7S, R23E, Section 17, and a 40-acre parcel in T8S, R22E, Section 11. The Book Cliffs RMP designated all public water reserves with a No Surface Occupancy lease stipulation. Therefore, well pads, roads, or pipelines can’t be constructed within these public water reserves.

3.2.6 Groundwater

Groundwater aquifers beneath the GDBR are present in formations dating in age from Cambrian to recent. Water-bearing zones are found in nearly all formations in the area, but the principal aquifers include alluvial deposits along the White and Green Rivers, the Uinta Formation, the Green River Formation, sandstone beds within the Mesa Verde Formation, and the Frontier Sandstone (Schlotthauer 1981). The alluvial aquifers are usually unconfined whereas the consolidated aquifers are generally unconfined near outcrops and confined down dip. The primary permeability of these aquifers is generally low; however, fractures, bedding planes, and faults produce relatively high secondary permeability. General characteristics of these aquifers are presented in Table 3.2-3.

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Table 3.2-3. Hydrogeologic Description of Aquifers in the GDBR

Age	Geologic Unit	Approximate Thickness (ft)	Lithology	Water Bearing Characteristics
Quaternary	Alluvium	<1 – 700	Unconsolidated deposits of alluvial sand and gravels, colluvial debris including landslide and pediment deposits, glacial till and eolian sands. Often reworked into well sorted deposits of sand and gravel stratified with fine sand, silts, and clay over-bank deposits.	Principal aquifer in the region; yields small to very large in clean sand and gravel floodplain deposits.
Tertiary	Duchesne River Fm	<1 - 500	Lacustrine, fluvial, and alluvial deposits of boulders, cobbles, gravel, sand, silts, and clay. Red, gray, buff sandstone, conglomerate, and sandy shale.	Permeability generally low to moderate in sandstone beds, but locally high where fractured. Yields small to large.
	Uinta Fm	2,000 – 3,000	Reddish fluvial and lacustrine sandstone, siltstone, shale, conglomerate, and limestone.	
	Crazy Hollow Fm	ND	Red and orange sandstone, siltstone, and shale, light gray sandstone, and salt and pepper sandstone with local conglomerate and limestone.	
	Green River Formation	<1 – 700	Massive to thin bedded lacustrine shale and freshwater limestone. Minor lenses and interbeds of sandstone and conglomerate; shale, gray to green gray and limestone white to tan.	Low primary permeability in shale but moderate permeability in sandstone; acts as a barrier to groundwater flow in most places. High permeability where fractured in shale and limestone zones.
	Wasatch Fm	300 – 9,000	Limestone containing irregularly interbedded shale, siltstone, sandstone, and conglomerate.	Sandstone have low to moderate permeability and yield small to moderate quantities of water to wells and springs.
Cretaceous	Mesa Verde Fm	<1 – 2,000	Sandstone, very fine grained to coarse grained, porous, massive, interbedded with siltstone, shale, and coal.	Well yields as much as several hundred gpm. Dissolved solids range between 1,000 and 5,000 mg/L
	Castlegate SS	<1 – 400	Light colored deltaic sandstone	
	Mancos Shale	ND	Predominately shale with some sandstone	Poor water producer.
	Frontier Fm	600 – 1,000	Shale and sandstone. Shale is black, partly carbonaceous.	Yields as high as 50 gpm are possible. Dissolved solids range between 1,000 and 5,000 mg/L.
	Mowry Shale	700 – 900	Black and silver gray siliceous shale.	Low well yields of around 10 gpm with dissolved solids of greater than 2,000 mg/L.
	Dakota Sandstone	<1 – 250	Thin beds of conglomerate, sandstone, shale and coal.	Too thin to produce water in quantity.

Age	Geologic Unit	Approximate Thickness (ft)	Lithology	Water Bearing Characteristics
	Cedar Mountain – Burro Canyon Fms	<1 – 700	Sandstone and Shale.	Poor quality water – high in dissolved salts.
Jurassic	Morrison Fm	110 – 1,300	Sandstone, conglomerate, mudstone, claystone, and limestone.	Poor quality water – high in dissolved salts.
	Curtis Fm	<1 – 600	Evenly bedded gray sandstone and shaly sandstone with pebbles.	Sandstones may be water bearing locally, but many beds are thin or discontinuous and poorly sorted, most do not produce significant amounts of water.
	Entrada SS	<1 – 100	Massive cross bedded sandstone.	
	Carmel Fm	<1 – 230	Red shaly sandstone interbedded with red or buff fine grained sands.	Poor quality water.
Triassic	Navajo Sandstone	00	Massive cross bedded, fine grained, well-sorted, eolian sandstone.	Major aquifer in the region. Yields moderate to large amounts of water.

Source: Schlotthauer 1981

In the direct vicinity of the GDBR, the unconsolidated materials present in valley fill and stream channel deposits form the principal aquifers in the area. These aquifers range in thickness from about 50 to 70 feet within the stream channels to about 200 feet near the months of canyons. These alluvial aquifers can produce significant quantities of water (up to 1,000 gpm) from the floodplain deposits of the Green and White Rivers but generally produce lesser quantities from deposits located along the ephemeral or intermittent streams (Hood 1978, Schlotthauer 1981).

The Uinta Formation aquifer consists of sandstones, siltstones, shale, and limestone, and has a maximum thickness of about 4,000 ft. Hydraulic conductivities range between less than 0.5 feet/day to more than 500 feet/day. The hydraulic conductivity is enhanced by faults and fractured systems in some locations (Schlotthauer 1981).

The Green River Formation is wide spread throughout the area. It is often considered an aquiclude and prevents downward movement of groundwater, however, some zones within the formation are considered to be aquifers. The Birds Nest Aquifer, which is present beneath the GDBR, lies between the upper part of the Parachute Creek Member and the Mahogany Zone. This aquifer is characterized by nodules of nahcolite (natural sodium bicarbonate) set in marlstone overlain by thin, brittle, shale beds and fine-grained sandstone called the Horse Bench Sandstone. The aquifer is generally 90 to 205 ft. thick, with an average thickness of about 115 ft. The hydraulic conductivity of the aquifer is enhanced by the dissolution of the nahcolite and fracturing of the sandstones. Well yields from the Birds Nest Aquifer range from about 10 to 700 gallons per day (BLM 2003).

Deeper aquifers in the GDBR include sandstone zones in the Mesa Verde Formation and the Triassic Navajo Sandstone. Hydraulic conductivity of the Mesa Verde aquifers ranges from about 0.5 to 500 feet per day. Well yields from this formation can be substantial. The Navajo Sandstone aquifer has similar hydraulic conductivity as the Mesa Verde aquifers. Because of its thickness (up to 1,100 feet) and its extent in the region, it is considered to be a major aquifer (Schlotthauer 1981).

3.2.6.1 Recharge and Discharge of Aquifers

Recharge to the groundwater aquifers is principally from precipitation that falls within the basin. Most recharge occurs during the spring during snowmelt. Little recharge occurs during short duration, high intensity thunderstorms during the summer (Hood, 1978). Groundwater recharge of the consolidated aquifers occurs mainly in the mountains and flows down dip into the basin. Relatively small quantities of recharge also come from the Green and White rivers. In areas where irrigation is taking place, such as in the western portion of the GDBR, irrigation water from canals and sprinkler systems infiltrates and recharges the shallow groundwater systems.

Groundwater in shallow deposits generally flows toward and discharges into streams and the major rivers. Discharge from the consolidated bedrock aquifers is from springs and seeps to the surface, from seepage into streambeds, by upward leakage into the overlying formations, and by downward leakage into underlying formations (BLM 2003).

3.2.6.2 Groundwater Quality

Groundwater in the northern Uinta Basin ranges in chemical quality from relatively good to briny. Fresh to slightly saline water can be found in the shallow aquifers. The highest quality water occurs near the mountains which surround the basin. As the groundwater moves down gradient in the basin, it becomes increasingly saline.

Water quality from the consolidated aquifers is generally high in dissolved solids. According to Hood (1978), the principal ions in groundwater within the Uinta and Green River formations are bicarbonate, carbonate, calcium, magnesium, and sodium. Away from outcrop areas, water quality generally is poorer and becomes much higher in dissolved solids with depth. Groundwater in the Green River Formation beneath the GDBR is most likely very high in dissolved solids (>3,000 mg/L) and, for the most part, not usable. Groundwater in unconsolidated deposits generally reflects the overall water quality of the streams, river, or the recharge sources (i.e. irrigation canal).

In the GDBR, water quality data are virtually nonexistent. According to the Utah Division of Natural Resources (UDNR), all wells drilled to about 300 feet below ground surface have been dry. Therefore, water quality analyses are not available from these wells.

3.2.6.3 Groundwater Use

In the GDBR, permitted groundwater wells are held by private land owners and industries. These rights are issued for wells which are completed in shallow bedrock or unconsolidated alluvial material. Each well permitted has been dry and abandoned. A listing of these rights is presented in Table 3.2-4. Use of groundwater from the Uinta and Green River Formations is limited to livestock watering and industrial uses because of its poor quality in terms of total dissolved solids and hardness.

Table 3.2-4. Groundwater Rights in the GDBR

Applicant	Water Right Number	Point of Diversion	Total Depth of Well (feet)	Geological Unit
QEP	49-251	T8S R21E Section 6	39	NA
QEP	49-279	T8S R21E Section 6	39	NA
QEP	49-280	T8S R21E Section 6	39	NA
QEP	49-296	T8S R20E Section 6	39	NA
QEP	49-297	T8S R20E Section 1	39	NA
NA	NA	T7S, R20E, Section 13	110	Clay (abandoned)
Harvey Burfield	43554512147	T7S, R20E, Section 15	NA	NA
NA	NA	T7S, R21E, Section 20	325	Sandstone
Deseret Generation and Transmission Coop	254357899000 William Curry	T7S, R22E, Section 13	320	Clay and Sand (dry)
Techni-Cor	8012803324A	T7S,R23E, Section 23	300	Uinta Fm (dry)
Deseret Generation and Transmission Coop	254357899000 William Curry	T7S, R23E, Section 17	300	Clay, (dry)
Techni-Cor	8012803324A	T7S, R23E, Section 18	NA	NA
Chevron U.S.A. Production Co.	264357814300 M.E. Alexander	T7S, R23E, Section 21	250	Clay and Sand (dry)
Deseret Generation and Transmission Coop	254357899000 William Curry	T7S, R23E, Section 21	320	Clay and Sand (dry)

Source: http://nrwrtl.nr.state.ut.us/wellinfo/default.htm

3.3 CLIMATE AND AIR QUALITY

Climate and meteorology, the magnitude and spatial distribution of local and regional air pollution sources and chemical properties of pollutants combine to influence the air quality of a region. Within the lower atmosphere, synoptic and local scale air masses interact with regional topography to influence atmospheric dispersion and transport of pollutants. The following sections summarize the climatic conditions and existing air quality in the vicinity of the GDBR.

3.3.1 Climate

The GDBR is located in the Uintah Basin, a semiarid mid-continental climate regime typified by dry windy conditions and limited rainfall. The topography across the GDBR ranges in elevation from about 4,600 to 5,900 feet above sea level. A network of badlands and drainages encompass the area.

The closest climate measurements were recorded at Bonanza, Utah from 1948 to 1993. The Bonanza station is located approximately 16 miles southeast of the GDBR at an elevation of 5,460 feet amsl (Western Regional Climate Center 2003). Table 3.3-1 shows the mean temperature range, mean total precipitation, and mean total snowfall by month.

Air masses originating from the Pacific Ocean are typically interrupted by the western mountain ranges before reaching the Uintah Basin. As a result, the area receives relatively moderate amounts of precipitation. Summer thunderstorms can provide greater amounts of rainfall to the higher elevations of the southern portion of the Basin. The annual mean precipitation at Bonanza is 8.87 inches, and ranges from a minimum of 4.14 inches recorded in 1958, to a maximum of 13.23 inches recorded in 1957. February is the driest month with a monthly mean precipitation of 0.43 inches, and October is the wettest month with a monthly mean precipitation of 1.05 inches. The annual average snowfall is 25 inches. December, January and February are the snowiest months. A maximum annual snowfall of 38.7 inches was recorded in 1951.

The area is typically mild, with an annual mean temperature of 48.1 °F. However, abundant sunshine and rapid nighttime cooling result in a wide daily range in temperature. Average winter temperatures range from 11°F to 34°F, while average summer temperatures range from 54°F to 89°F. Recorded extreme temperatures are minus 32°F in 1990 and 106°F in 1981.

Table 3.3-1. Temperature and Precipitation and Snowfall at Bonanza, Utah (1948-1993)

Month	Average Temperature Range (° Fahrenheit)	Average Total Precipitation (inches)	Average Total Snowfall (inches)
January	7.3 – 30.4	0.58	6.4
February	13.4 – 37.2	0.43	5.3
March	25.1 – 49.9	0.70	4.3
April	34.1 – 63.3	0.79	1.0
May	42.1 – 73.3	1.03	0.0
June	50.1 – 85.3	0.73	0.0
July	57.0 – 92.3	0.83	0.0
August	54.6 – 89.6	0.91	0.0
September	46.5 – 80.9	0.83	0.0
October	35.5 – 66.2	1.05	0.5
November	23.6 – 48.3	0.49	1.7
December	12.7 – 34.8	0.52	5.3
Annual Average	**33.5 – 62.6**	**8.87**	**24.5**

Source: Western Regional Climate Center (2003). Data collected at Bonanza, Utah from 1948 to 1993.

Wind speed and direction, along with vertical profiles of temperature in the lower atmosphere, greatly affect the transport and dispersion of air pollutants. The potential for atmospheric dispersion is relatively high for the area due to the frequency of strong winds and warm temperatures. However, calm periods and nighttime cooling may enhance air stability, thereby inhibiting air pollutant transport and dilution. The area can experience frequent temperature inversions in winter when cold stable air masses settle into the valleys and snow cover and shorter days inhibit ground-level warming. During periods of atmospheric stability, cold air tends to be trapped at the surface and vertical mixing of pollutants is limited. Temperature inversions are less common during the summer months when daytime ground-level heating rapidly leads to inversion break-up and increased vertical mixing.

The nearest comprehensive meteorological data recorded near Bonanza, Utah were available for 1985, 1986, 1987, and 1992 (Utah Department of Environmental Quality - Division of Air Quality 1998). Atmospheric stability can be categorized by stability classes “A” through “F”. The “A” stability class represents a high degree of atmospheric turbulence and a very good pollutant dispersion condition. The “F” stability represents a high degree of atmospheric stability and the worst pollutant dispersion condition. The “D” stability represents a neutral atmosphere. As illustrated in Table 3.3-2, the frequency distribution favors a stable atmosphere (stability classes F and E) the majority of the time, a neutral atmosphere, and turbulent atmosphere.

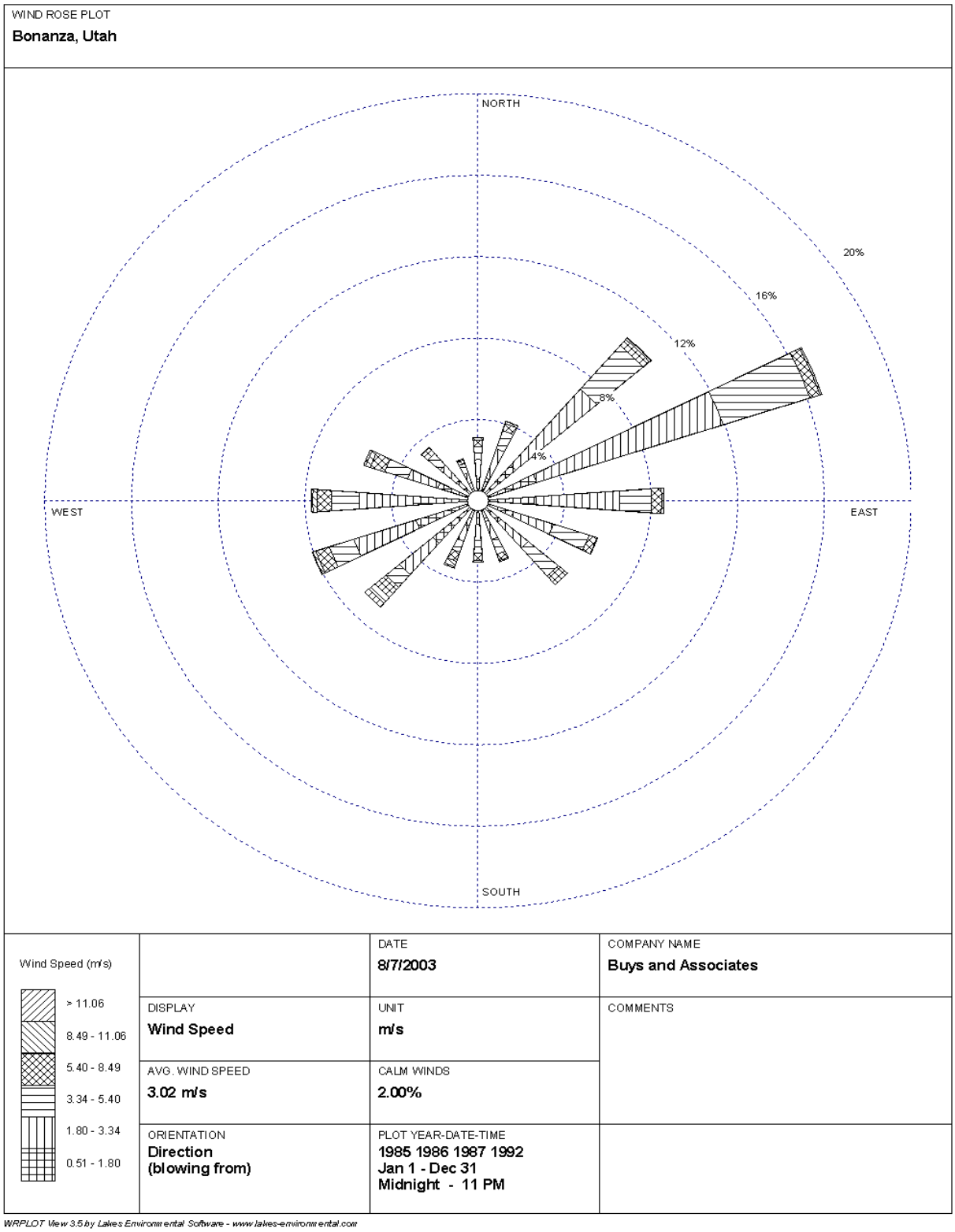
The wind data are shown on Figure 3.3-1, a wind rose depicting wind speed and direction for all four years of data. Note that the data represent the direction from which the wind is blowing. For example, winds blowing from the north would transport pollutants to the south. As shown, winds originate predominately from the east-northeast 16.7 percent of the time. The average measured wind speed is 6.8 miles per hour (3.02 meters/second).

Table 3.3-2. Atmospheric Stability Class Frequency Distribution

Stability Class	Percent Occurrence
A	9.6%
B	6.4%
C	8.3%
D	26.7%
E	31.1%
F	16.0%

Source: Utah Department of Environmental Quality - Division of Air Quality (1998). Meteorological data collected near Bonanza, UT at the Deseret Generating and Transmission power plant for the years 1985, 1986, 1987 and 1992.

Figure 3.3-1 Windrose for Bonanza, Utah



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3.3.2 Air Quality

3.3.2.1 Regulatory Environment

The Environmental Protection Agency (EPA) has primary regulatory authority for implementing various environmental statutes established by Congress. EPA retains the authority for implementing the Federal Clean Air Act (CAA) and the permitting and operational compliance of air emission sources within the GDBR.

National and Utah Ambient Air Quality Standards have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. Pollutants for which standards have been set include sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and particulate matter less than 10 or 2.5 microns in effective diameter (PM_{10} and $PM_{2.5}$). Existing air quality in the region is acceptable based on standards set for the protection of human health. Uintah County is designated as an attainment area, meaning that the concentration of criteria pollutants in the ambient air is less than the National Ambient Air Quality Standards (NAAQS). Site-specific air quality monitoring data are not available for the GDBR. However, background criteria pollutant concentrations for Uintah County (Table 3.3-3) are relatively low and consistent with a rural area having low levels of industrial development (UDAQ 2003).

Under the Prevention of Significant Deterioration (PSD) provisions, incremental increases of specific pollutant concentrations are limited above a legally defined baseline level. Many national parks and wilderness areas are designated as PSD Class I. The PSD program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Areas of the state not designated as PSD Class I are classified as Class II. For Class II areas, greater incremental increases in ambient pollutant concentrations are allowed as a result of controlled growth. The PSD increments for both Class I and II areas are presented in Table 3.3-3.

Table 3.3-3. Ambient Criteria Pollutant Concentrations, National and State Ambient Air Quality Standards, and PSD Increments

Pollutant	Averaging Period(s)	Uintah County Background Concentration[a] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	PSD Class I Increment ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
SO_2	Annual 24-hour 3-hour	5 10 20	80 365 1,300	2 5 25	512 91 20
NO_2	Annual	10	100	2.5	25
PM_{10}	Annual 24-hour	10 28	50 150	4 8	30 17
CO	8-hour 1-hour	1,111 1,111	10,000 40,000	None None	None None

[a] Source: Dave Prey, Utah Division of Environmental Quality - Division of Air Quality (UDAQ), Personal Communication, November 30th, 2005. Data represent UDAQ estimates for rural areas within the Uintah Basin.
[b] Source: EPA AirData Air Pollution Database. PM_{10} Tribal Monitor, Myton, UT, Site ID 490137011. Annual Data from 2002 through 2005 (EPA 2005). 24-hour PM_{10} represents the average of 1st maximum 24-hour values from 2002 though 2005. Annual PM_{10} represents the annual average from 2002 through 2005.

The GDBR and surrounding region is federally designated as a PSD Class II area. The nearest PSD Class I areas are Flat Tops and Maroon Bells Wilderness Areas in Colorado, and Arches and Canyonlands National Parks in Utah. Figure 3.3-2 shows the location of the GDBR with respect to Class I areas and other designated areas of special concern.

Hazardous air pollutants (HAPs) are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental impacts. The EPA has classified 189 air pollutants as HAPs. Examples of listed HAPs include formaldehyde, BTEX compounds (benzene, toluene, ethylbenzene, isomers of xylene), and normal-hexane (*n*-hexane).

The CAA requires EPA to regulate emissions of toxic air pollutants from a published list of industrial sources referred to as "source categories." As required under the Act, EPA has developed a list of source categories that must meet control technology requirements for these toxic air pollutants. Under section 112(d) of the CAA, the EPA is required to develop regulations establishing national emission standards for hazardous air pollutants (NESHAP) for all industries that emit one or more of the pollutants in major source quantities. These standards are established to reflect the maximum degree of reduction in HAP emissions through application of maximum achievable control technology (MACT). Source categories for which NESHAPs have been implemented include Oil and Natural Gas Production and Natural Gas Transmission and Storage.

HAPs associated with oil and gas development include BTEX (benzene, toluene, ethylbenzene, and xylene), formaldehyde and hydrogen sulfide. There are no applicable federal ambient air quality standards for these pollutants. Therefore, reference concentrations (RfC) for chronic inhalation exposure and Reference Exposure Levels (REL) for acute inhalation exposures are applied as significance criteria. Table 4.3-6 shows the RfCs and RELs. RfCs represent an estimate of the continuous (i.e. annual average) inhalation exposure rate to the human population (including sensitive subgroups such as children and the elderly) without an appreciable risk of harmful effects. The REL is the acute (i.e. one-hour average) concentration at or below which no adverse health effects are expected. Both the RfC and REL guideline values are for non-cancer effects.

3.3.2.2 Pollutant Sources and Characteristics

Sources of Air Pollution

Existing sources of air pollution within the GDBR and surrounding region include:

- exhaust emissions, primarily CO, oxides of nitrogen (NO_x), and HAP from existing natural gas fired compressor engines used in production and transportation of natural gas;
- natural gas dehydrator still-vent emissions of BTEX and *n*-hexane;
- gasoline and diesel-fueled vehicle tailpipe emissions of volatile organic compounds (VOC), NOx, CO, SO_2, PM_{10}, and $PM_{2.5}$;
- fugitive dust (PM_{10} and $PM_{2.5}$) from construction activities, vehicle traffic on unpaved roads, wind erosion in areas of soil disturbance, and road sanding during winter months;
- NO_x, SO_2, CO, and PM_{10} emissions from the Bonanza coal-fired power plant; and
- long-range transport of pollutants from distant sources contributing to regional haze.

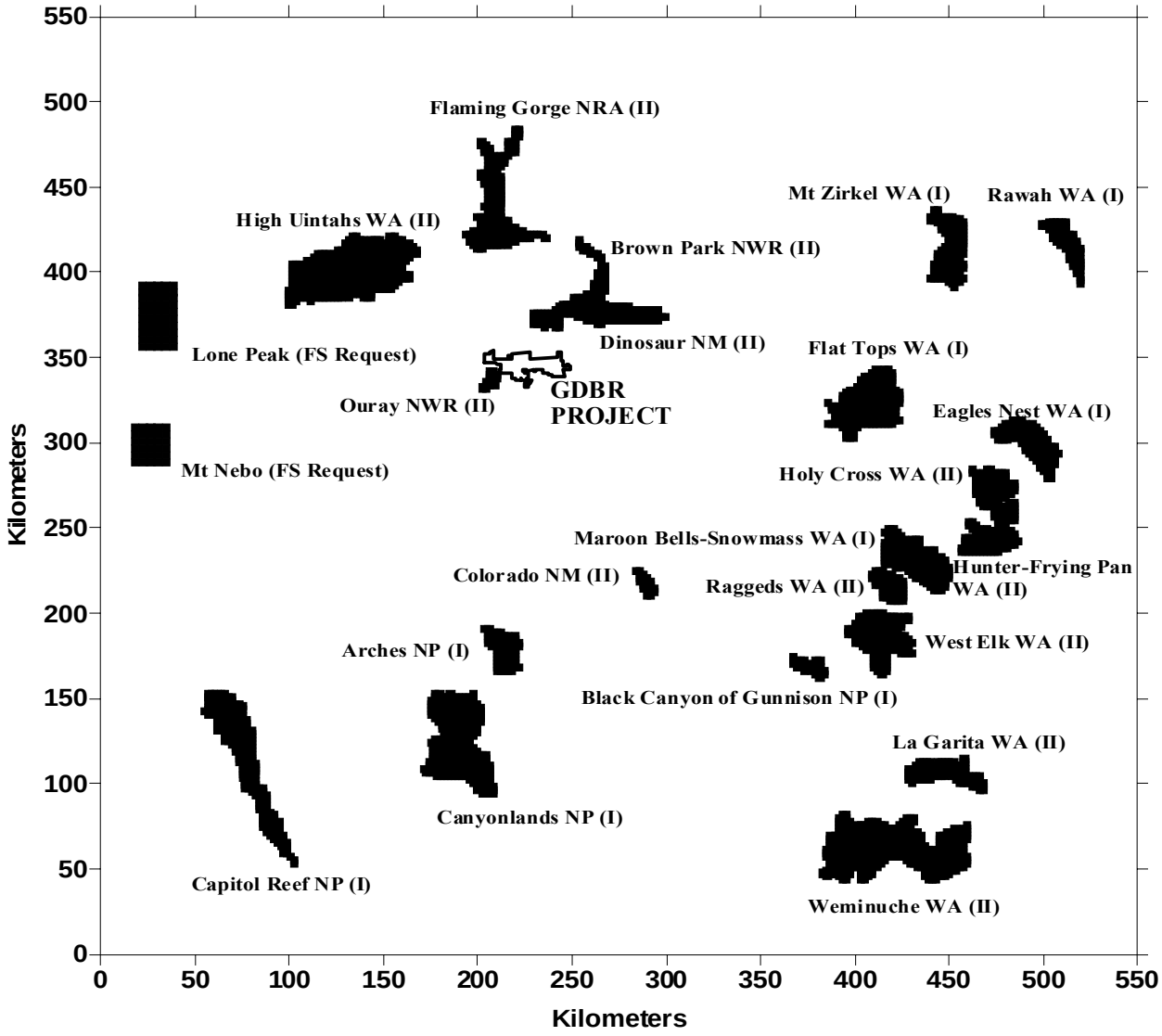

Figure 3.3-2

Nearest Class I/II Areas to GDBR

Criteria Air Pollutants

The term NO_X is used to describe the combination of nitrogen monoxide (NO), NO_2, and other nitrogen oxides including dinitrogen oxide (N_2O). The National Ambient Air Quality Standard refers only to NO_2, rather than all species of NO_X. Nitrogen oxides are by-products from the combustion of fossil fuels. The primary sources of anthropogenic NO_X include automobiles and power plants. Furnaces and gas stoves also contribute to NO_X emissions. Most NO_X emissions are emitted in the form of NO, which is not stable in the atmosphere and is eventually converted to NO_2. Nitrogen dioxide is a toxic, reddish-brown gas that is reactive in the atmosphere and plays a role in the formation of smog. Short-term human exposures (e.g. less than 3 hours) to elevated levels of NO_2 may lead to changes in airway responsiveness and lung function in individuals with pre-existing respiratory illness. Long-term human exposure to NO_2 may lead to increased susceptibility to respiratory infection and may cause alterations in the lung. Nitrogen oxides also contribute to the formation of acid rain and to visibility impairment.

Carbon monoxide is formed when fossil fuels are not burned completely. Nation-wide, the primary source of CO is automobile emissions. Other sources of CO include industrial processes, non-transportation fuel combustion and forest fires. Carbon monoxide is a colorless, odorless gas that is poisonous in high concentrations. When humans are exposed to CO, the gas enters the bloodstream through the lungs and reduces oxygen delivery to the body's organs and tissues. Reduced work capacity, reduced manual dexterity, poor learning capacity and difficulty in performing complex tasks are associated with exposure to elevated levels of CO.

Sulfur dioxide belongs to the family of sulfur oxide gases (SO_x). These gases are highly soluble in water. Sulfur is prevalent in many raw materials, including crude oil, coal, and ore that contains common metals like aluminum, copper, zinc, lead, and iron. SO_x gases are formed when fuel containing sulfur, such as coal and oil, is burned, and when gasoline is extracted from oil or metals are extracted from ore. SO_2 dissolves in water vapor to form acid, and interacts with other gases and particles in the air to form sulfates and other products that can be harmful to people and the environment. Health effects of SO_2 exposure range from short-term breathing difficultly to longer-term respiratory illness. SO_2 also contributes to the formation of acid rain and to visibility impairment.

Ground-level O_3 is not directly emitted as a pollutant from industrial sources. Rather, it is a gas created by a chemical reaction between NO_X and VOCs in the presence of heat and sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC that help to form ozone. Sunlight and hot weather cause ground-level ozone to form in high concentrations in the air. As a result, it is generally known as a summertime air pollutant. Ozone can be transported great distances and therefore contributes to air pollution issues on a regional scale. Primary health effects from O_3 exposure range from breathing difficulty to permanent lung damage. Ground-level ozone also contributes to plant and ecosystem damage.

Particulate matter, or PM**,** is the term for particles found in the air, including dust, dirt, soot, and smoke. Particulate matter is further classified as total suspended particulates (TSP), particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). Particulate matter may be emitted directly to the atmosphere from mobile and stationary sources such as cars, trucks, buses, factories, construction sites, tilled fields, unpaved roads, stone crushing, and wood burning. Additionally, PM may be generated from secondary chemical reactions in the atmosphere involving oxides of nitrogen and sulfur. The primary health hazard stems from inhalation of fine particulate matter or $PM_{2.5}$. Environmentally, particulate matter in the form of atmospheric sulfates and nitrates, organics, and elemental carbon (soot), represents the primary source of visibility impairment and contributes to acid deposition.

Hazardous Air Pollutants

Formaldehyde is an irritant to humans. Acute (short-term) and chronic (long-term) exposures can result in eye, nose and throat irritation and respiratory symptoms including coughing, wheezing and bronchitis. In addition, the Environmental Protection Agency (EPA) has classified formaldehyde as a Group A, probable human carcinogen of medium carcinogenic hazard (EPA 1994). The highest levels of airborne formaldehyde have been found in indoor air, where it is released from various consumer products (EPA 2002). One survey (EPA 1988) reports measured formaldehyde levels in homes ranging from 0.10 to 3.68 parts per million (ppm), or 122 to 4,520 $\mu g/m^3$.

Benzene emissions typically result from coal and oil combustion, volatilization from gasoline service stations, and motor vehicle exhaust. Acute inhalation exposure to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia. Adverse reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidences of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen (EPA 1994).

Additional BTEX compounds including toluene, ethylbenzene, and xylene, as well as *n*-hexane, are of concern for both acute and chronic health effects. EPA has classified these compounds as a Group D, not classifiable as to human carcinogenicity (EPA 1994). These compounds are released to the atmosphere through a variety of pathways, including volatilization through their use as solvents, as fugitive emissions from industrial sources, and through automobile exhaust.

3.3.2.3 Air Quality Related Values

Class I areas and some Class II areas of special concern are monitored for Air Quality Related Value (AQRV) impacts. These AQRVs include acidic deposition and visibility impairment.

Atmospheric Deposition

Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems, and is reported as the mass of material deposited on an area in a period of time (kilograms per hectare per year or kg/ha/yr). Air pollutants are deposited by wet deposition (precipitation) and by dry deposition (gravitational settling of particles and adherence of gaseous pollutants). Total deposition refers to the sum of airborne material transferred to the Earth's surface by both wet and dry deposition.

Acid Neutralization Capacity

Aquatic bodies such as lakes and streams are important resources in most Class I areas. Acid deposition resulting from industrial emissions of sulfur and nitrogen based compounds has a direct effect on the acid neutralization capacity (ANC) of sensitive lake ecosystems. Table 3.3-4 shows background ANC data for lakes identified by the USDA – Forest Service within PSD Class I and II area located in the project region.

Table 3.3-4. Measured Acid Neutralizing Capacity of Sensitive Lakes Within Nearby PSD Class I and II Areas

Location	Sensitive Lake	Background ANC (µeq/l)	Watershed Area (acres)
Eagle's Nest WA	Booth	84.1	138
Flat Tops WA	Ned Wilson	38.0	124
Holy Cross WA	Blodget	36.9	127
Maroon Bells WA	Moon	51.5	397
Raggeds WA	Deep Creek #1	44.3	360
West Elk WA	S. Golden	111.0	112

µeq/l – microequivalents per liter
Source: USDA-Forest Service (2001)

Visibility

Visibility is characterized by three parameters; standard visual range (SVR), the light-extinction coefficient (b_{ext}), and impairment expressed as deciview. The visual range parameter represents the greatest distance that a large dark object can be seen. The light extinction coefficient represents the attenuation of light per unit distance due to scattering and absorption by gases and particulate matter in the atmosphere. Good visibility conditions are represented by long visual ranges and low light extinction values, while poor visibility conditions are represented by short visual ranges and high light extinction.

Visibility impairment is expressed in terms of deciview (dv). The deciview index was developed as a linear perceived visual change. A change in visibility of 1.0 dv represents a "just noticeable change" by the average person under most circumstances. Increasing deciview values represent proportionately larger perceived visibility impairments.

Visibility conditions within the Uintah Basin are reported to be very good. No background visibility data is available specifically for the Project Area. However, the nearest measurements, recorded at nearby Class I areas, are available from the FLAG (2000) report. An average annual visual range of 251 km (b_{ext} of 15.6) is reported for Arches and Canyonlands National Parks (representative of central and eastern Utah), and 249 km (b_{ext} of 15.7) for Flat Tops Wilderness Area (representative of western Colorado). These areas are considered to have good visibility conditions.

3.4 SOIL RESOURCES

Elevation within the GDBR ranges from approximately 4,664 to 5,862 feet above mean sea level (amsl). The two major drainages in the GDBR include Baser Wash and Kennedy Wash. The Green River flows along the western side of the GDBR. Annual precipitation within the GDBR is less than 10 inches (Western Regional Climate Center 2003).

Soils within the GDBR are distributed according to the major soil forming factors. In this arid environment, the factors primarily include climate (effective moisture and temperature), parent material, and topographic position and slope. Baseline soil information was obtained from county-wide data (USDA-NRCS 1997) based on potential or existing agricultural mapping prompted by the 1995 Farm Bill. According to Order 3 level soil survey maps (USDA-NRCS 1981 and 1982), there are 43 soil

associations within the GDBR. The distribution of these soil types is shown on Figure 3.4-1. Some of these associations are composed of the same soil series components but occur on different slopes. Table 3.4-1 summarizes the 43 soil units identified in the Order 3 mapping and lists the map symbol, map classification, soil name, slope, drainage class, water capacity, hydrological group, runoff class, pH range, wind erodibility group, and potential erosion hazard.

The Uintah Area Soil Survey rates each of the soil series as having a slight, moderate, or severe water and wind erosion hazard. These ratings were developed using soil erodibility, water capacity, and runoff and drainage classes, as defined in the National Soil Survey Handbook (NRCS 2003). The erosion hazards become critical issues when protective vegetation is removed during and following construction activities such as road and well pad construction. Typically, soils found on steeper slopes have a high erosion hazard and soils found on gentler slopes have a low erosion hazard. Soils with more fines are at greater risk of wind erosion, and soils with more gravel and/or stones have a lower risk of wind erosion.

Hydrologic groups are used to estimate precipitation runoff where soils are not protected by vegetation. The groups (labeled A through D) are based on infiltration of water when soils are thoroughly wet. In general, the runoff amount increases with a slower the rate of infiltration. Group A soils have high rates of infiltration when thoroughly wet; Group B soils have moderate rates of infiltration; Group C soils have a slow rate of infiltration; and Group D soils have a very slow rate of infiltration. Within the GDBR, 1,520 acres have Group A characteristics, 52,340 acres have Group B characteristics, 547 acres are categorized Group C, and the remaining 47,086 acres are designated Group D. Therefore, approximately 46 percent of the GDBR has soils that demonstrate a low rate of precipitation infiltration and therefore a high rate of precipitation runoff.

Soil suitability for reclamation is described by the USFS (1979). A soil is defined as “having poor potential for reclamation” if it meets any of the following criteria:

- Clay content greater than 60 percent;
- Coarse fragments greater than 35 percent by volume;
- pH less than 4.5 or greater than 9.1; or
- Salinity greater than 9 mmhos/cm.

The soils in the GDBR have the following characteristics:

- Fourteen of the 43 soil units in the GDBR have soils that are classified as hydrological Group D;
- Eleven of the 43 soil units in the GDBR have soils that are rated as having severe erosion hazard potential;
- Seven of the 43 soil units in the GDBR are found on slopes greater than 40%;
- Six of the 43 soil units in the GDBR have soils that are rated as having a high wind erodibility factor; and
- Sixteen of the 43 soil units in the GDBR have soils that are classified as unsuitable for reclamation, based on strongly alkaline (pH > 9) soil factors.

Combining all of these soil characteristics, the erosion potential within the GDBR is severe on 47,375 acres, moderate on 37,918 acres, and slight on 13,582 acres.

BLM has developed Standards and Guidelines for Healthy Rangelands. One category of these standards includes soils management. The standard states that upland soils should exhibit permeability and infiltration rates that sustain or improve site productivity, considering the soil type, climate, and landform. Criteria to indicate the success is:

- Sufficient cover and litter to protect the soil surface from excessive water and wind erosion, promote infiltration, detain surface flow, and retard soil moisture loss by evaporation;

- The absence of indicators of excessive erosion such as rills, soil pedestals, and actively eroding gullies; and

- The appropriate amount, type, and distribution of vegetation reflecting the presence of the Desired Plant Community where identified in a land use plan or where the Desired Plant Community is not identified, a community that equally sustains the desired level of productivity and properly functioning ecological conditions.

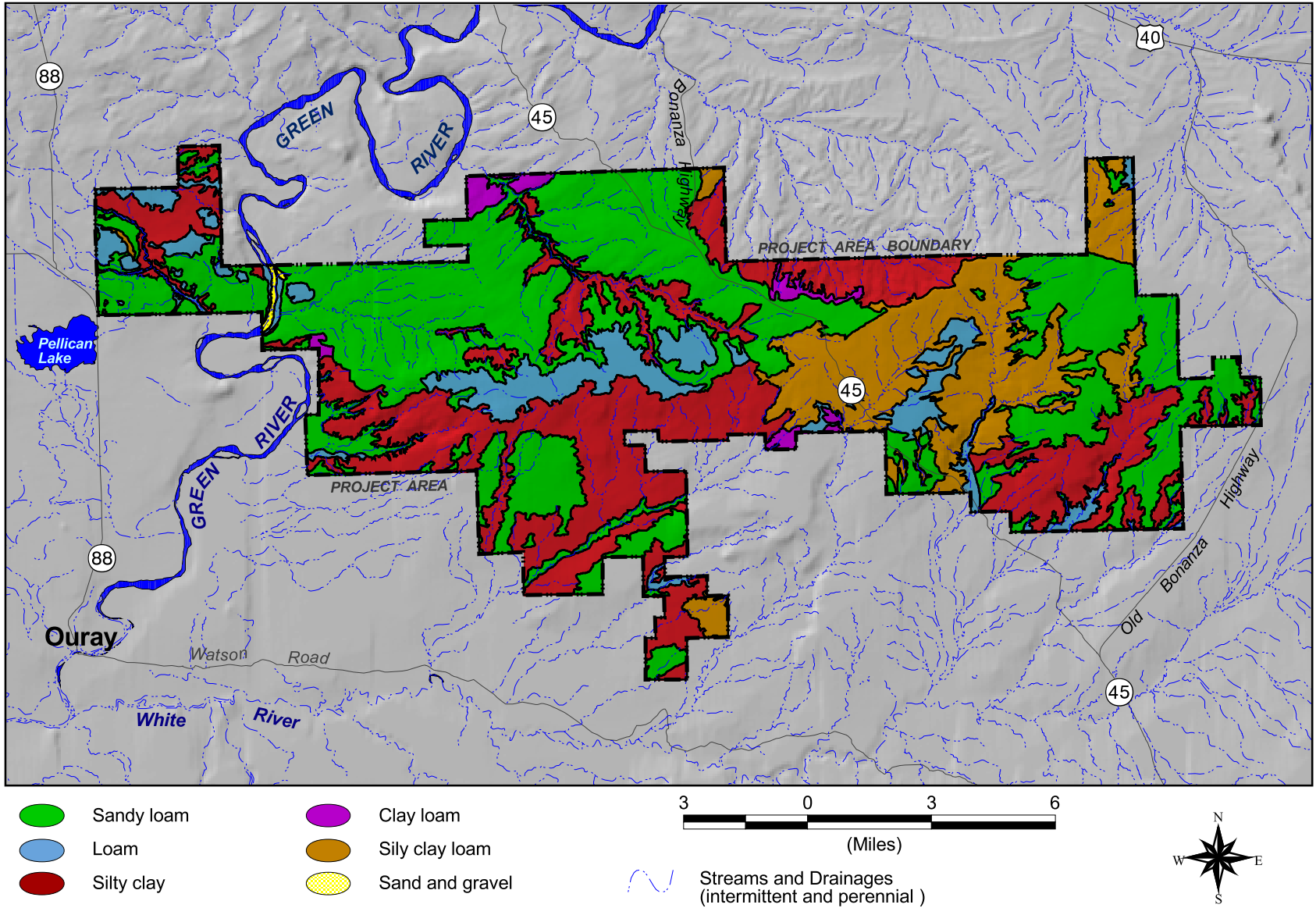

Figure 3.4-1. Mapped Soil Types within the Greater Deadman Bench Project Area.

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Table 3.4-1. Soil Characteristics of the GDBR

Map Symbol	Map Classification Unit	Soil Name	Slope	Drainage Class	Water Capacity	Hydrological Group	Runoff Class	pH Range	Wind Erodibility Group	Potential Erosion Hazard
8	Badland-Denco complex	Denco	4 to 25%	WD	Moderate	D	Very High	7.9-9	4l	Severe
9	Badland-Montwel complex	Montwel	50 to 90%	WD	Moderate	C	Very High	7.9-9	4L	Severe
15	Badland-Wentridge complex	Wentridge	50 to 80%	WD	Low	C	High	7.9-8.4	4L	Severe
65	Denco silty clay loam	Denco	8 to 25%	WD	Moderate	D	Very High	7.9-9	4L	Severe
66	Denco-Gerst complex	Denco	4 to 25%	WD	Moderate	D	Very High	7.9-9	4L	Severe
66	Denco-Gerst complex	Gerst	4 to 40%	WD	Very Low	D	Very High	7.9-9	4L	Severe
94	Greybull-Utaline-Badland complex	Greybull	20 to 50%	WD	Low	C	High	7.9-9	6	Severe
94	Greybull-Utaline-Badland complex	Utaline	8 to 25%	WD	Low	B	Med	7.9-9	6	Severe
95	Hanksville silty clay loam	Hanksville	2 to 25%	WD	Low	C	Very High	7.9-9	4L	Severe
137	Mikim loam	Mikim	3 to 15%	WD	High	B	Med	7.9-9	4L	Severe
142	Milok-Montwel-Badland association	Montwel	4 to 25%	WD	Moderate	C	High	7.9-9	4L	Severe
149	Montwel-Tipperary-Rock outcrop association	Montwel	4 to 25%	WD	Moderate	C	High	7.9-9	4L	Severe
208	Shotnick-Ioka complex	Shotnick	4 to 25%	WD	Moderate	B	Low	7.9-9	2	Severe
2	Abracon loam	Abracon loam	3 to 8%	WD	High	B	Med	7.9-9	4L	Moderate
13	Badland-Tipperary association	Tipperary	1 to 8%	SED	Low	A	Very Low	7.9-9	2	Moderate
64	Denco silty clay loam	Denco	2 to 8%	WD	Low	D	Very High	7.9-11	4L	Moderate
102	Hideout-Badland-Rock outcrop complex	Hideout	2 to 8%	WD	Very Low	D	Very High	7.9-8.4	3	Moderate
141	Milok fine sandy loam	Milok	3 to 8%	WD	Moderate	B	Low	7.9-9	3	Moderate
142	Milok-Montwel-Badland association	Milok	3 to 8%	WD	Moderate	B	Low	7.9-9	3	Moderate
149	Montwel-Tipperary-Rock outcrop association	Tipperary	1 to 8%	SED	Low	A	Very Low	7.9-9	2	Moderate

Map Symbol	Map Classification Unit	Soil Name	Slope	Drainage Class	Water Capacity	Hydrological Group	Runoff Class	pH Range	Wind Erodibility Group	Potential Erosion Hazard
160	Nakoy loamy fine sand	Nakoy	1 to 5%	WD	Moderate	B	Very Low	7.9-9	2	Moderate
163	Nolava-Nolava wet complex, 2 to 4% slopes	Nolava	2 to 4%	WD	High	B	Low	7.9-9	4L	Moderate
163	Nolava-Nolava wet complex, 2 to 4% slopes	Nolava wet	2 to 4%	MWD	High	B	Low	7.9-9	4L	Moderate
167	Ohtog-Parohtog complex, 2 to 4% slopes	Ohtog	2 to 4%	WD	High	B	Low	7.9-9	4L	Moderate
167	Ohtog-Parohtog complex, 2 to 4% slopes	Parohtog	2 to 4%	MWD	High	B	Low	7.9-9	4L	Moderate
174	Pariette loam	Pariette	2 to 4%	WD	Low	C	Med	7.9-11	4L	Moderate
206	Shotnick loamy sand, 2 to 4% slopes	Shotnick	2 to 4%	WD	Moderate	B	Very Low	7.9-9	3	Moderate
208	Shotnick-Ioka complex	Ioka	4 to 25%	ED	Very Low	A	Low	7.9-9	6	Moderate
213	Solirec-Abracon-Begay complex	Solirec	3 to 8%	WD	High	B	Med	7.4-9	3	Moderate
213	Solirec-Abracon-Begay complex	Abracon loam	3 to 8%	WD	High	B	Med	7.9-9	4L	Moderate
213	Solirec-Abracon-Begay complex	Begay	2 to 15%	WD	Moderate	B	Low	7.9-9	3	Moderate
229	Tipperary loamy fine sand	Tipperary	1 to 8%	SED	Low	A	Very Low	7.9-9	2	Moderate
241	Turzo complex	Turzo	2 to 4%	WD	High	B	Med	7.9-9	4L	Moderate
241	Turzo complex	Turzo	2 to 4%	WD	Moderate	B	Med	8.5-9	4L	Moderate
23	Blackston loam	Blackston	0 to 2%	WD	Low	B	Low	7.9-9	4L	Slight
88	Green River loam (occasionally flooded)	Green River	0 to 2%	MWD	Low	C	Low	8.5-9	4L	Slight
89	Green River loam (rarely flooded)	Green River	0 to 2%	MWD	Low	C	Low	7.9-9	4L	Slight
104	Hiko Springs fine sandy loam	Hiko Springs	0 to 2%	WD	Low	B	Very Low	7.9-11	3	Slight
120	Jenrid sandy loam	Jenrid	0 to 2%	WD	Low	B	Low	7.9-11	3	Slight
121	Jenrid-Eghelm complex	Jenrid	0 to 2%	WD	Low	B	Low	7.9-11	3	Slight
121	Jenrid-Eghelm complex	Eghelm	1 to 3%	WD	Low	B	Low	7.9-8.4	4L	Slight

Map Symbol	Map Classification Unit	Soil Name	Slope	Drainage Class	Water Capacity	Hydrological Group	Runoff Class	pH Range	Wind Erodibility Group	Potential Erosion Hazard
162	Nolava-Nolava wet complex, 0 to 2% slopes	Nolava	0 to 2%	WD	High	B	High	7.9-9	4L	Slight
162	Nolava-Nolava wet complex, 0 to 2% slopes	Nolava wet	0 to 2%	MWD	High	B	Low	7.9-9	4L	Slight
166	Ohtog-Parohtog complex, 0 to 2% slopes	Ohtog	0 to 2%	WD	High	B	Low	7.9-9	4L	Slight
166	Ohtog-Parohtog complex, 0 to 2% slopes	Parohtog	0 to 2%	MWD	High	B	Low	7.9-9	4L	Slight
176	Parohtog loam	Parohtog	0 to 2%	SPD	Moderate	C	Low	7.9-9	4L	Slight
205	Shotnick loamy sand, 0 to 4% slopes	Shotnick	0 to 4%	WD	Moderate	B	Very Low	7.9-9	2	Slight
209	Shotnick-Walkup complex	Shotnick	0 to 2%	WD	Moderate	B	Very Low	7.9-9	3	Slight
209	Shotnick-Walkup complex	Walkup	0 to 2%	MWD	Moderate	B	Very Low	7.4-8.4	3	Slight
242	Turzo loam	Turzo	0 to 4%	WD	Moderate	B	Med	8.5-11	4L	Slight
243	Turzo-Umbo complex	Turzo	0 to 2%	WD	High	B	med	7.9-9	4L	Slight
243	Turzo-Umbo complex	Umbo	0 to 2%	MWD	High	B	med	7.9-9	4L	Slight
248	Uffens loam	Uffens	0 to 3%	WD	Moderate	C	Med	8.5-11	4L	Slight
275	Wyasket loam	Wyasket	0 to 2%	PD	Moderate	D	Med	7.4-9	4L	Slight
283	Yonic sandy loam	Yonic	0 to 2%	SPD	High	C	Very Low	7.9-9	4L	Slight
8	Badland-Denco complex	Badland	4 to 25%	SED	Very Low	D	Very High	7.9-11	4	NR
9	Badland-Montwel complex	Badland	50 to 90%	SED	Very Low	D	Very High	7.9-11	4	NR
12	Badland-Rock outcrop complex	Badland	1 to 100%	SED	Very Low	D	Very High	7.9-11	4	NR
12	Badland-Rock outcrop complex	Rock outcrop	1 to 100%	SED	Very Low	D	Very High	7.9-11	8	NR
13	Badland-Tipperary association	Badland	1 to 8%	SED	Very Low	D	Very High	7.9-11	4	NR
15	Badland-Wentridge complex	Badland	50 to 80%	SED	Very Low	D	Very High	7.9-11	4	NR
94	Greybull-Utaline-	Badland	8 to 50%	SED	Very Low	D	Very	7.9-11	4	NR

Map Symbol	Map Classification Unit	Soil Name	Slope	Drainage Class	Water Capacity	Hydrological Group	Runoff Class	pH Range	Wind Erodibility Group	Potential Erosion Hazard
	Badland complex						High			
102	Hideout-Badland-Rock outcrop complex	Badland	2 to 8%	SED	Very Low	D	Very High	7.9-11	4	NR
102	Hideout-Badland-Rock outcrop complex	Rock outcrop	1 to 100%	SED	Very Low	D	Very High	7.9-11	8	NR
142	Milok-Montwel-Badland association	Badland	3 to 25%	SED	Very Low	D	Very High	7.9-11	4	NR
149	Montwel-Tipperary-Rock outcrop association	Rock outcrop	1 to 100%	SED	Very Low	D	Very High	7.9-11	8	NR
181	Gravel Pits	Gravel Pits	0 to 3%	NR	Very Low	A	NR	NR	8	NR
191	Riverwash	Riverwash	0 to 4%	NR	Very Low	D	NR	NR	1	NR

Drainage Classes: PD - Poorly Drained; SWD - Somewhat Poorly Drained; MWD - Moderately Well Drained; WD - Well Drained; SED - Somewhat Excessively Drained; ED - Excessively Drained.
Hydrological Groups: A - soils have high rates of infiltration when thoroughly wet; B - soils have moderate rates of infiltration; C - soils have a slow rate of infiltration; and D - soils have a very slow rate of infiltration.
Wind Erodibility Groups: 1-3 = low; 4-5 = medium; 6-8 = high

3.5 VEGETATION

3.5.1 Regional Overview

Various vegetative communities exist primarily because of the variation in elevation in the Uintah Basin. Arid and semi-arid desert shrub communities, primarily consisting of saltbush, shadscale, rabbitbrush, greasewood and horsebrush are found within the lower elevation areas of the Uintah Basin. As the plateau gently rises, the vegetation generally shifts to sagebrush, pinyon-juniper woodlands, and then to mixed coniferous forests. Riparian corridors and grasslands also occur along perennial streams and springs throughout the basin.

The composition and extent of native plant communities within the Uinta Basin have been modified primarily by livestock grazing and by the development and extraction of oil and gas resources. Livestock grazing has decreased native plant species composition and has promoted establishment of annual weeds such as cheatgrass, Russian thistle and halogeton. Noxious weeds such as Russian knapweed have been found in the unit in association with the oil and gas activities and existing roads. In general, while populations of undesirable weedy species are common where native plant communities have been disturbed or removed, they vary in density within undisturbed communities, depending on the health and species diversity of the native vegetative community. Past grazing and drought have also contributed to the loss of shrubs in the Desert Shrub Community type.

3.5.2 Vegetative Communities

The vegetation communities identified in this section are described using the existing Automated Geographic Reference Center (AGRC 1987) vegetative distribution data. Elevation in the GDBR ranges from 4,700 to 5,800 feet, and vegetative communities are directly related to these fluctuations. Seven vegetative communities occur within the GDBR: pinyon-juniper woodlands, sagebrush shrub, desert shrub, grassland, riparian, badlands, and desert sands (Figure 3.5-1). Each community type is described in detail below.

3.5.2.1 Pinyon-Juniper Woodlands

The higher elevation areas of the GDBR from 5,500 to 5,800 feet support mature stands of Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*), which occurs on almost all slopes and aspects at these elevations. At lower elevations, density of these species decrease, and Utah juniper dominates pinyon pine. Associated understory species include black sage (*Artemisia nova*), Wyoming big sagebrush (*Artemisia tridentate* ssp. w*yomingensis*) and shadscale (*Atriplex confertifolia*). The pinyon-juniper vegetation community is generally rooted in shallow, stony soil primarily in the northern portions of the GDBR near Walker Hollow and the head of Baeser Wash.

3.5.2.2 Sagebrush Shrub

At lower elevations in the GDBR, pinyon-juniper woodlands develop into sagebrush dominated shrublands. These shrublands contain mostly Wyoming big sagebrush and black sagebrush This community may be co-dominant with a variety of perennial grasses such as Sandburg bluegrass (*Poa secunda*), needle-and-thread grass (*Stipa comata*), sand dropseed (*Sporobolus cryptandrus*), western wheatgrass (*Agropyron smithii*), Indian ricegrass (*Stipa hymenoides*), galleta grass (*Hilaria jamesii*), and localized populations of cheatgrass (*Bromus tectorum*). The sagebrush shrub community is found in the eastern half of the GDBR primarily on the ridge tops of Kennedy Wash and on the southern portions of Walker Hollow.

3.5.2.3 Desert Shrub

The desert shrub vegetative community tends to be variable in its composition and dominance by shadscale (*Atriplex confertifolia*), fourwing saltbush (*Atriplex canescens*), rabbitbrush (*Chrysothamnus viscidiflorus*), and greasewood (*sacrobatus vermiculatus*). Soils in this community group range from shallow clay loam to deep sands, which along with soil chemistry have set the pattern of shrub dominance and species composition on various sites. Winter grazing by sheep has also changed species composition in some areas of the unit, increasing the density of greasewood, snakeweed (*Guiterrezia microphala*), and horsebush (*Tetradymia glabrata*) within the community type. The desert shrub community is the most dominant and variable vegetative community in the GDBR and is found throughout its' landscape. Transition areas of this community with Badlands and Rock Outcropping tend to have shallow soils, have low water holding capacity and are sparsely vegetated.

3.5.2.4 Riparian Corridors

Plant species found with the GDBR riparian habitats include Fremont cottonwood (*Populus fremontii*), cattails (*Typha sp.*), some willow species (*Salix sp.*), as well as characteristic sedges (*Carex sp.*), rushes (*Juncus sp.*), and saltgrass. Tamarisk (*Tamarix ramosissima*) is a County listed noxious plant that has become a dominant species in the riparian community. Russian olive (*Elaeagnus angustifolia*) and perennial pepperweed (*Lepidium latifolium*) are also becoming dominant weed species in the riparian communities, especially along the Green River. Riparian habitat is associated with the Green River, which passes through the western edge of the GDBR.

3.5.2.5 Badlands

Badlands are areas of severe erosion, usually found in semi-arid climates characterized by countless gullies, steep ridges, and sparse vegetation. Steep eroding slopes are generally devoid of vegetation except for a few annuals that emerge in the spring when moisture conditions are favorable. Gardner's saltbush (*Atriplex gardneri*) and mat saltbush (*Atriplex corrugate*) grow on the toe slopes and areas of sediment deposition. The Badlands consist of unconsolidated siltstone and claystone that are highly erodible by the generally short, heavy showers that sweep away the loose soil surfaces. Depressions gradually deepen into gullies. These areas are present throughout the central portions of the GDBR primarily around Baesar Wash and the Wonsits Valley.

3.5.3 Invasive and Noxious Weeds

Undesirable, weedy, herbaceous species occur to varying degrees within disturbed areas throughout the GDBR. The BLM Weed Management Program of inventory mapping and control measures currently shows occurrences of noxious weeds in the GDBR listed by the State of Utah including Canada thistle (*cirsium arvense*), field bindweed (*Convolvulus arvensis*), hoary cress (*Cardaria draba*), Russian knapweed (*Centaurea repens*), and perennial pepperweed (*Lepidium latifolium*). Salt cedar (*Tamarix ramosissima*) is a Uintah County listed noxious weed that occurs in the GDBR along drainages, ponds, and sites where water collects along roads. Occurrences of Canada thistle, Russian knapweed, field bindweed, and hoary cress are associated with facilities, pads and roads in the GDBR as a result of oil and gas development. Vehicles and construction equipment are the primary vectors for the seed of these species entering the area. The BLM and Uintah County work together to control weeds. Additionally, industry also controls weeds on lands they develop.

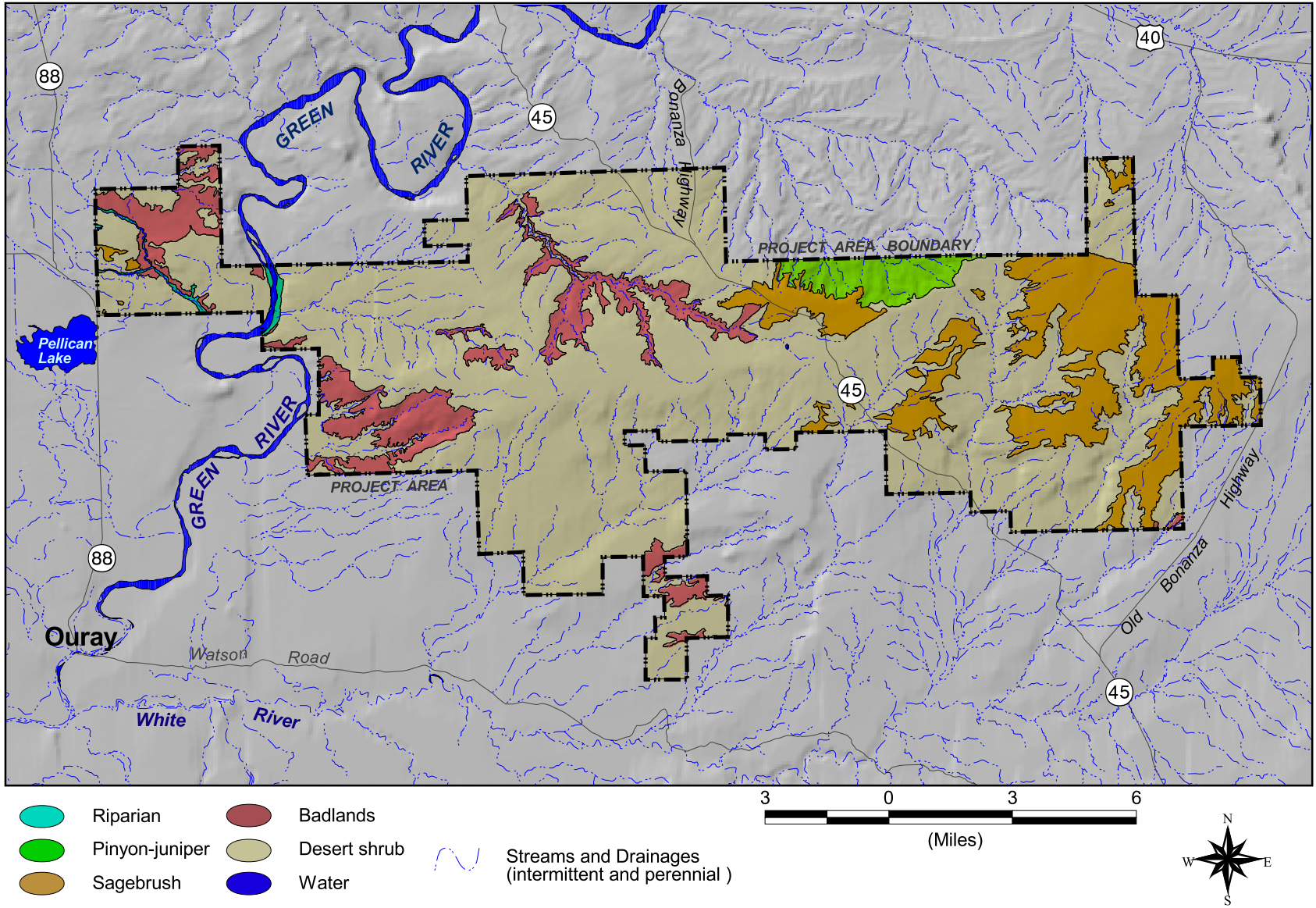

Figure 3.5-1. Vegetation Communities within the Greater Deadman Bench Project Area.

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Russian thistle (*Salsola iberica*), halogeton (*Halogeton glomeratus*), and cheatgrass (*Bromus tectorum*) are the primary invasive annual species that dominate disturbed areas throughout the GDBR. Russian thistle and halogeton are less aggressive and are generally out-competed by perennial native species. Cheatgrass is a much stronger competitor that is difficult to control once it becomes established, thus, it is commonly seen throughout disturbed portions of the GDBR. Such species, introduced primarily by disturbances from vehicles, animals, or wind, tend to dominate disturbed sites. Weed species also tend to invade newly revegetated or reclaimed sites regardless of the reclamation seed mixtures that may have been applied or the climatic regime.

3.5.4 Special Status Plant Species

Special status plants include federally listed species, species that are candidates for listing and species that are listed as sensitive by the BLM. Appendix 3.5-1 lists all the special status species listed for the Vernal Field Office and evaluates the occurrence or potential of occurrence of each species within the GDBR area. Two special status plant species occur or have the potential to occur within the GDBR, Uinta Basin hookless cactus (*Sclerocactus glaucus*) and horseshoe milkvetch (*Astragalus equisolensis*).

3.5.4.1 Uinta Basin Hookless Cactus (Sclerocactus glaucus)

The Uinta Basin hookless cactus' (federally threatened) unhooked large central spine differentiates it from other members of the *Sclerocactus* genus, which have either a hooked large central spine or none (USFWS 1990). However, at least a few individuals in most Uinta Basin hookless cactus populations possess moderately to strongly hooked spines (Goodrich and Neese 1986).

Habitat for the Uinta Basin hookless cactus generally consists of gravelly or rocky surfaces on river terrace deposits and lower mesa slopes (USFWS 1990), as well as gravel littered draws (Goodrich and Neese 1986), that are underlain by clay or silty clay. This species does not grow in sandy soils. The species occurs on varying exposures, but is more abundant on south-facing exposures, slopes to about 30 percent grade, and where terrace deposits break from level tops to steeper side slopes. The Uinta Basin hookless cactus is found at elevations from 4,500 to 5,900 feet amsl within the desert shrub vegetation community (USFWS 1990). No populations of Uinta Basin hookless cactus currently occur in the GDBR but potential habitat for the species occurs in the southern and west portions of the GDBR in the Uinta Geological formation. Populations are found adjacent to the GDBR in the west near Pelican Lake and to the southeast near the Bonanza Power Plant.

3.5.4.2 Horseshoe Milkvetch (Astragalus equisolensis)

The horseshoe milkvetch, formerly a candidate species until it was removed from the listing in September 2006, is a BLM-designated sensitive species. The species is endemic to a single location in central Uintah County (UDWR 2003) that was surveyed and delineated in 1991 by Ben Franklin of the Utah Heritage Program. This species, a member of the bean family, is a perennial herb with pink-purple ascending or spreading flowers that bloom from late April to early June. Horseshoe milkvetch grows on river terrace sands and gravels overlying the Duchesne River Formation, and on sandy-silty soils weathered directly from it. Elevations range from 4,700-5,200 feet (UDWR 2003). Approximately 1,631 acres of horseshoe milkvetch habitat occurs in the GDBR within the desert shrub community north of Baser Wash. Potential habitat may occur in the Duchesne River Formation immediately east of Johnson Bottom which has similar characteristics to the population area and has not been documented as surveyed for this species.

3.6 WILDLIFE & FISHERIES

3.6.1 Introduction

The GDBR supports a diversity of wildlife and wildlife habitats. Species' occurrences are typically dependent on habitat availability, relative carrying capacities, and degree of existing habitat disturbance. The proposed GDBR supports approximately 98,785 acres of wildlife habitat encompassing large, fairly contiguous upland habitats, dissected by incised drainages and canyon systems. Water resources are limited within the greater GDBR and therefore, provide the greatest habitat value for wildlife. For a more detailed description of the habitat types in the GDBR please refer to Section 3.5.2 (Vegetative Communities).

3.6.2 General Wildlife

Small mammals potentially found within the GDBR and surrounding region include cottontail rabbits (*Sylvilagus* spp.), black-tailed jackrabbit (*Lepus californicus*), white-tailed prairie dog (*Cynomys leucurus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), western spotted skunk (*Spilogale gracilis*), and various species of rodents and bats. Smaller migratory birds (See Section 3.6.7) common to the region include black-billed magpie (*Pica pica*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), loggerhead shrike (*Lanius excubitor*), several species of sparrow, and numerous others. Herptiles potentially found in the region include wandering garter snake (*Thamnophis elegans vagrans*), Great Basin gopher snake (*Pituophis catenifer deserticola*), Great Basin spadefoot (*Scaphiopus intermontana*), western whiptail (*Cnemidophorus tigris*), sagebrush lizard (*Sceloporus graciosus*), and shorthorned lizard (*Phymosoma douglassii*).

Although all of these species are important members of wildland ecosystems and communities, most are common and have wide distributions within the region. Consequently, the relationship of most of these species to the proposed project is not discussed in the same depth as species which are threatened, endangered, sensitive, of special economic interest, or are otherwise of high interest or unique value.

3.6.3 Big Game

Three resident big game species are commonly found in the Uintah Basin: pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*). Both pronghorn and mule deer ranges are found within the GDBR. Elk have been identified in the GDBR, but were likely passing through. Both the BLM and UDWR have not identified elk range in the GDBR. Therefore, elk are not discussed further in this document.

Both BLM and UDWR big game seasonal ranges are referenced in this EIS; however, it is important to note that while UDWR ranges are used to describe existing conditions, seasonal restrictions imposed by the BLM are applicable only to BLM-designated big game habitat. BLM rankings are defined below.

BLM- identified habitat:

Crucial: Crucial ranges are areas on which a species depends for survival; there are not alternative ranges due to climate conditions or other limiting factors.

High Priority: Wildlife habitat used intensively by one or more wildlife species. Current or potential habitat composition and biological production exists to support wildlife use during the spring, summer, and fall seasons. Note that crucial habitat is generally applied to winter use areas.

Similar to the BLM, the UDWR has identified various values of big game ranges. These ranges are ranked according to their relative biological value (Dalton et al., 1990). Each of these ranking is defined in detail below.

UDWR-identified habitat:

Crucial: Crucial value habitat is habitat on which the local population of a wildlife species depends for survival because there are no alternative ranges or habitats available. Crucial value habitat is essential to the life history requirements of a wildlife species. Degradation or unavailability of crucial habitat will lead to significant declines in carrying capacity and /or numbers of wildlife species in question.

Substantial: Substantial value habitat is used by a wildlife species but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of wildlife species in question.

3.6.3.1 Pronghorn Antelope

Pronghorn typically inhabit grasslands and semi-desert shrublands of the western and southwestern United States. This species is most abundant in short and mixed grass habitats at elevations from 4,000 to 6,000 feet amsl. Pronghorn are typically less abundant in xeric habitats, preferring areas that average 12-15 inches of precipitation per year. Home ranges for pronghorn can vary between 400 and 5,600 acres, according to factors including season, habitat quality, population characteristics, and local livestock occurrence. Typically, daily movements do not exceed 6 miles. Some pronghorn make seasonal migrations between summer and winter habitats, but these migrations are often triggered by availability of succulent plants and not local weather conditions (Fitzgerald et al. 1994).

Antelope from the Bonanza portion of the Vernal Herd Unit occupy much of the greater GDBR on a year-round basis. The BLM has identified 7,400 acres of high priority, year-long habitat occurring in the GDBR. No year-long crucial habitat has been identified by the BLM Additionally, the UDWR has identified 90,935 acres of crucial, year-long habitat and 7,168 acres of substantial, year-long habitat occurring within the GDBR. It is important to note that the BLM-identified habitat occurs only on the west side of the Green River and overlaps with the UDWR-identified substantial, year-long habitat. All pronghorn habitat found in the GDBR to the east of the Green River is composed of only UDWR-identified crucial, year-long habitat. The crucial, year-long habitat has also been identified by the UDWR as potential pronghorn fawning habitat. The extent of both the BLM and UDWR identified habitat is shown on Figure 3.6-1.

3.6.3.2 Mule Deer

Mule deer occur throughout the western mountains, forests, deserts, and brushlands. Typical habitats include shortgrass and mixed-grass prairies, sagebrush and other shrublands, coniferous forests, and forested and shrubby riparian areas. The species is common state-wide in Utah, where it can be found in many types of habitat, ranging from open deserts to high mountains to urban areas. Mule deer usually are migratory, spending the warmer months at higher elevations. During this time mule deer prefer foraging on the succulent regrowth of forbs and the new twigs of trees and shrubs. As summer progresses and the

herbaceous plants mature and dry, the diet shifts more toward woody browse. This diet then continues as the deer are driven down to foothill areas in winter (Wilson and Ruff 1999). Fawn mortality is typically due to predation or starvation. Adult mortality often occurs from hunting, winter starvation, and automobile collisions. Predation may occur from coyotes, bobcats, golden eagles, mountain lions, and bears; however these impacts would be minimal.

Mule deer from the Vernal Herd Unit occupy much of the greater GDBR on a year-round basis. No habitat within the GDBR has been identified by the BLM as crucial mule deer habitat. However, the UDWR has identified approximately 40 acres of crucial winter habitat, 1,120 acres of crucial, year-long habitat and 2,756 acres of substantial value, year-long habitat. The extent of the UDWR identified habitat is shown on Figure 3.6-1.

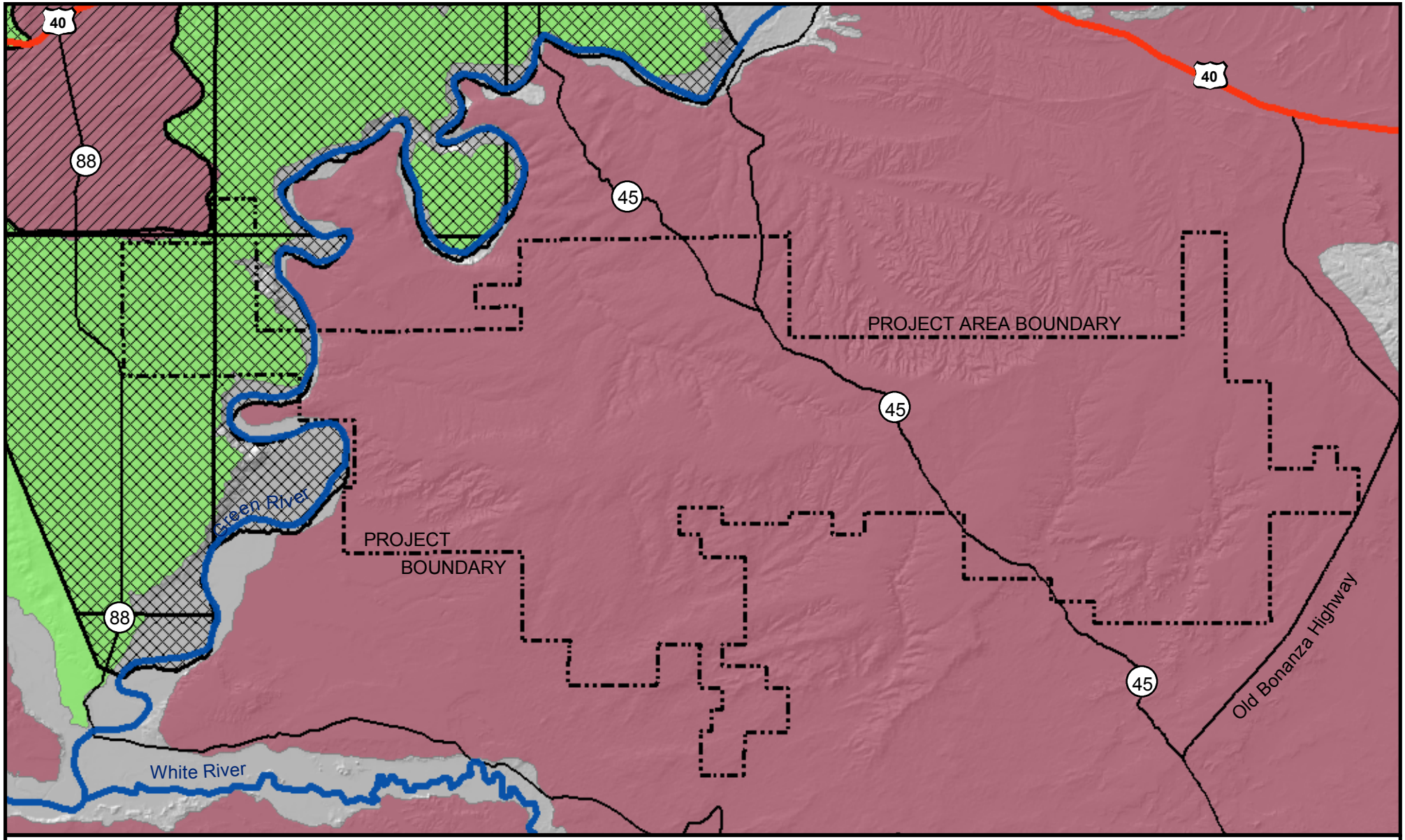
3.6.4 Raptors

Some of the more common and visible birds within the GDBR include raptors, or birds of prey. The GDBR provides diverse breeding and foraging habitat for raptors: higher elevation woodlands, cool desert shrub communities, rocky outcrops, riparian zones, and lower elevation shrublands. All raptor species and their nests are protected from take or disturbance under the Migratory Bird Treaty Act (16 USC, 703 et seq.). Raptors that commonly breed in the GDBR and surrounding region include:

- ferruginous hawk (*Buteo regalis*),
- golden eagle (*Aquila chrysaetos*),
- red-tailed hawk (*Buteo jamaicensis*),
- Swainson's hawk (*Buteo swainsoni*),
- turkey vulture (*Cathartes aura*),
- northern harrier (*Circus cyameus*),
- prairie falcon (*Falco mexicanus*),
- American kestrel (*Falco sparverius*),
- long-eared owl (*Asio otus*),
- sharp-shinned hawk (*Accipiter striatus*),
- Cooper's hawk (*Accipiter cooperii*), and
- great-horned owl (*Bubo virginianus*) (Behle and Perry 1975)

3.6.4.1 Historical Data

BLM records document a total of 166 raptor nests within a one-mile radius of the GDBR. Of these nests, only 23 have been active within the last 3 years. This total number of recently active nests includes 14 nests within the boundaries of the GDBR (seven red-tailed hawk, six ferruginous hawk, one prairie falcon), and nine nests within a one-mile radius of the GDBR (four ferruginous hawk, three red-tailed hawk, one burrowing owl, one golden eagle, and one unknown species). Based on numerous factors including habitat types, local resident species, known raptor phenology, and lack of comprehensive survey data, additional breeding raptors may have established territories within the GDBR and one-mile radius analyzed. Nest sites could occur on other cliff faces, rock outcrops, and in white-tailed prairie dog colonies.



0 1.5 3 6 9 12 Miles

BLM Data
- Year-Long, Crucial Habitat
- Year-Long, High Priority Habitat

DWR Data
- Year-Long, Crucial Habitat
- Year-Long, Substantial Habitat

N W E S

Figure 3.6-1. Pronghorn Antelope Habitat

Source: UDWR; BLM Vernal

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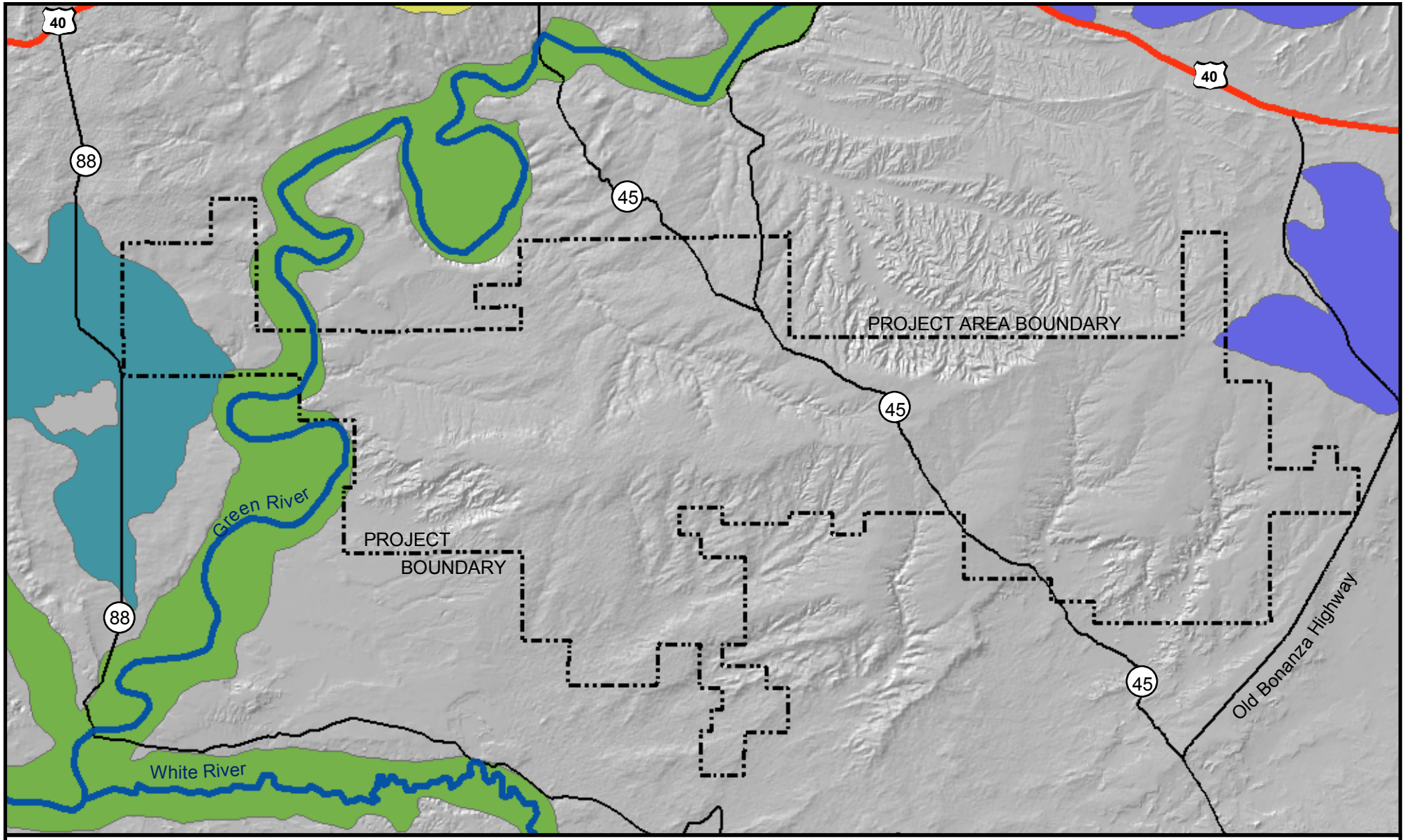

0 1.5 3 6 9 12 Miles

DWR Data*

- Winter, Crucial Habitat
- Year-Long, Crucial Habitat
- Year-Long, Substantial Habitat

N W E S

Source: UDWR

*No BLM Designated Habitat in the Project Area

Figure 3.6-2. Mule Deer Habitat

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3.6.4.2 2004 Survey Results

Buys & Associates conducted aerial and ground surveys of the GDBR and out to a one-mile radius of the GDBR in April, 2004. A total of 66 previously unidentified raptor nests were identified including 58 ferruginous hawks, five red-tailed hawks, one golden eagle, one great horned owl, and one unknown owl. Of the 66 newly identified nests, 10 (six ferruginous hawk, two red-tailed hawk, one golden eagle, and one great horned owl) were found to be active. In addition to the newly identified nests, all 166 previously identified nests were inspected to verify current activity status. Seven previously identified nests were found to be active (three red-tailed hawks, two ferruginous hawks, and two golden eagles). Fifteen artificial nesting/roosting platforms located within the GDBR were also visited to determined current usage. None of these structures were currently being used for nesting. In total, 17 active nests were identified within the GDBR and a one-mile radius. In addition, QEP installed two tall nesting platforms on tribal lands. In 2006, one nest fledged three ferruginous hawks and the other nest fledged four ferruginous hawks.

Discussions regarding federally and state sensitive raptor species potentially found within the GDBR are presented under Special Status Wildlife Species.

3.6.5 Upland Game Birds

Four species of upland game birds are known to occur in or around the GDBR: greater sage grouse (*Centrocercus urophasianus*), chukars (*Alectoris chukar*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*).

3.6.5.1 Greater Sage Grouse

The greater sage grouse has recently been classified by the state as a sensitive species (UDWR 1998) and is discussed further in Section 3.6.8.15, Special Status Wildlife Species. Sage grouse habitats within the GDBR are depicted in Figure 3.6-3.

3.6.5.2 Mourning Dove

The mourning dove is a common spring and fall migrant and summer resident occurring in appropriate habitats throughout the State of Utah (including the project area). This species is typically associated with open, upland communities with shrubs and trees that are large enough for nesting (Sibley 2003). Weed patches and grains in proximity to nesting and roosting cover provide excellent food. The Mourning dove is the most widely distributed upland game bird in North America. In addition, mourning dove populations and habitats are abundant and widely distributed throughout Utah. Habitat for this species is found in all 29 counties throughout Utah, and an estimated 250,000 mourning dove are taken annually by hunters in the state (Rawley et al., 1996).

3.6.5.3 Wild Turkey

The wild turkey is a fairly common resident in the foothills and mesas of the western states. The species' preferred habitat is the ponderosa pine community with an understory of scrub oak. Tall pine trees within this community are used for roosting. Turkeys also occur in mountain mahogany, pinyon-juniper woodlands, foothill riparian corridors, and in agricultural areas (Rawley et al. 1996). A total of 1,126 acres of critical yearlong wild turkey habitat exists in the GDBR. Turkeys have been observed along drainage bottoms and along the Green River in the GDBR.

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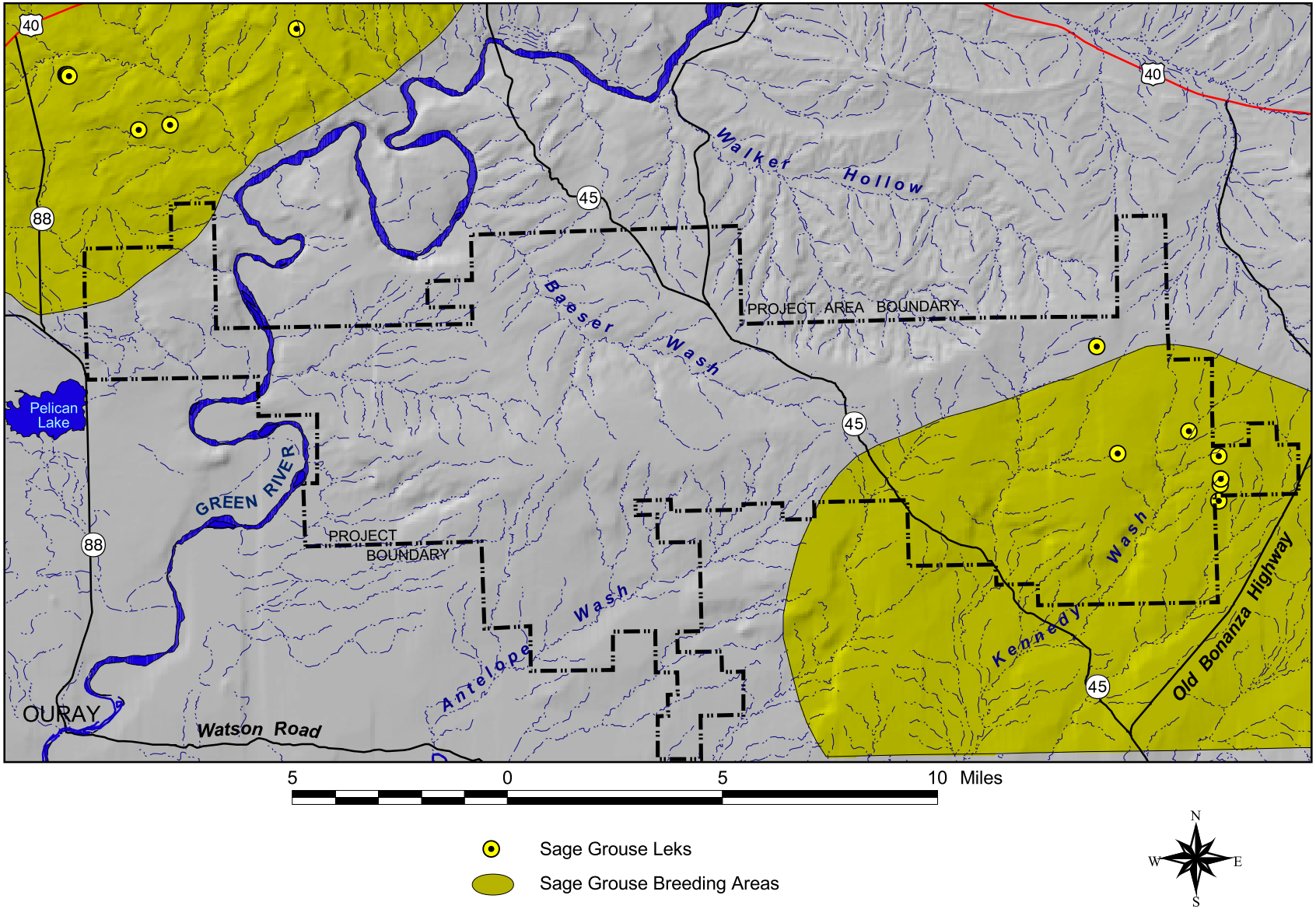

Figure 3.6-3 Sage Grouse Leks and Breeding Areas

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3.6.6 Migratory Birds

The Migratory Bird Treaty Act (MBTA), as amended, was implemented for the protection of migratory birds. Unless permitted by 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.

Numerous migratory bird species occupy the GDBR. Those migratory bird species that are federally listed under the Endangered Species Act of 1973, as amended (ESA), or listed as Sensitive by the BLM, are addressed in Section 3.6.8. This section addresses migratory birds that may inhabit the proposed GDBR, including those species classified as High-Priority birds by Partners in Flight. High-Priority species are denoted by an asterisk (*). Migratory bird species are addressed according to the habitat types found within the GDBR.

Avian species commonly associated with the desert shrub communities include the horned lark (*Eremophila alpestris*), sage sparrow (*Amphispiza belli*), vesper sparrow (*Pooecetes gramineus*), black-throated sparrow (*Amphispiza bilineata*), sage thrasher* (*Oreoscoptes montanus*), Brewer's sparrow* (*Spizella breweri*), western kingbird (*Tyrannus verticalis*), Say's phoebe (*Sayornis saya*), prairie falcon, and Swainson's hawk.

Bird species commonly associated with pinyon-juniper woodlands include the black-chinned hummingbird* (*Archilochus alexandri*), gray flycatcher* (*Empidonax wrightii*), gray vireo* (*Vireo vicinior*), Lewis' woodpecker (*Melanerpes lewis*), Clark's nutcracker* (*Nucifraga columbiana*), pinyon jay (*Gymnorhinus cyanocephalus*), western scrub jay (*Aphelocoma californica*), black-throated gray warbler (*Dendroica nigrescens*), bushtit (*Psaltriparus minimus*), juniper titmouse* (*Baeolophus ridgwayi*), northern shrike (*Lanius excubitor*), blue-gray gnatcatcher (*Polioptila caerulea*) and Say's phoebe.

Bird species commonly found in riparian habitats of the GDBR include hermit thrush (*Catharus guttatus*), veery (*Catharus fuscescens*), yellow-breasted chat (*Icteria virens*), Cordilleran flycatcher (*Empidonax occidentalis*), Lewis' woodpecker* (*Melanerpes lewis*), Wilson's warbler (*Wilsonia pusilla*), black-chinned hummingbird* (*Archilochus alexandri*), broad-tailed hummingbird* (*Selasphorus platycercus*), and Swainson's thrush (*Catharus ustulatus*).

3.6.7 Fisheries

The GDBR is located along the Upper Colorado River Basin. Sections of the Green River and drainages of the Green and White Rivers occur within the GDBR, and provide critical habitat for numerous fish species. Those fish species that are federally listed under the Endangered Species Act of 1973, as amended (ESA), or listed as Sensitive by the BLM, are addressed in Section 3.9. Table 3.6-1 lists all fish species that may be affected by development activities in the GDBR. However, these species would typically occur in the Green River and very occasionally in drainages to the Green and White during spring snow melt.

Table 3.6-1. Fish Species Potentially Affected by Development Activities in the GDBR

Common Name	Scientific Name	Status	Native/Non-Native
Bluehead Sucker	*Catostomus discobolus*	Utah State Sensitive Species	Native
Bonytail	*Gila elegans*	Federally Endangered	Native
Carp	*Cyprinus carpio*	Common	Non-Native
Channel Catfish	*Ictalurus punctatus*	Common	Native
Colorado Pikeminnow	*Ptychocheilus lucius*	Federally Endangered	Native
Cutthroat Trout	*Oncorhynchus clarki*	Common	Native
Flathead Minnow	*Pimephales promelas*	Common	Non-Native
Flannelmouth Sucker	*Catostomus latipinnis*	Utah State Sensitive Species	Native
Humpback Chub	*Gila cypha*	Federally Endangered	Native
Northern Pike	*Esox lucius*	Common	Native
Razorback Sucker	*Xyrauchen texanus*	Federally Endangered	Native
Red Shiner	*Cyprinella lutrensis*	Common	Non-Native
Roundtail Chub	*Gila robusta*	Utah State Threatened Species	Native
White Sucker	*Catostomus commersoni*	Common	Non-Native

3.6.8 Special Status Wildlife Species

This section discusses species that have a federal and/or state special-status designation. This includes:

- Species listed as threatened or endangered, proposed for listing as threatened or endangered, or considered a candidate for listing as threatened or endangered under the ESA;
- Species listed as sensitive by BLM; and
- Species listed as threatened, endangered, or a species of special concern by the UDWR.

In accordance with the ESA, the policy is to not take actions that lead to listing or that jeopardize the continued existence of listed species. Agencies can take actions that adversely affect as long as it doesn't lead to listing or jeopardy. It is BLM's current policy that USFWS candidate species and state of Utah Species of Special Concern (previously federal category 2 species) and state-sensitive species also be managed to prevent a future federal listing as threatened or endangered.

Numerous federally listed and Utah Sensitive species have the potential to occur within the GDBR. The list of Threatened, Endangered and Candidate species with the potential to occur in the GDBR was provided by the USFWS Utah Field Office (Appendix 3.5-2). The list of Sensitive species with the potential to occur in the GDBR was provided by BLM. A brief description of each of the federally listed and Sensitive Species with the potential to occur in the GDBR is presented below:

3.6.8.1 White-tailed Prairie Dog (Cynomys Leucurus)

The white-tailed prairie dog is a Utah State Sensitive Species. In Utah, white-tailed prairie dogs occur in the eastern portion of the state, primarily in the Uintah Basin and the northern portion of the Colorado Plateau. Rangewide, the white-tailed prairie dog population is estimated at 1-2 million individuals

(Knowles 2002). In northeastern Utah, the species occurs in areas around Flaming Gorge/Manila, Diamond Mountain, and in the Uintah Basin. To date, 87,524 acres of an estimated 90,000 to 100,000 acres of active prairie dog colonies have been identified in the Northeast Region. Areas that remain to be surveyed should only contain scattered, small colonies surrounded by rocky terrain that is unsuitable as prairie dog habitat.

White-tailed prairie dogs inhabit mountain valleys, semidesert grasslands, agricultural areas, and open shrublands in Western North America (Fitzgerald et al. 1994, Hall 1981). They are distributed in relatively large, sparsely populated complexes and live in loosely knit family groups or "clans" (Tileston and Lechleitner 1966). Clan boundaries are ill-defined with most activity being concentrated around feeding sites.

Breeding occurs in late March to early April after adults emerge from burrows. Females produce a single litter each year. Gestation lasts 30 days (Bakko and Brown 1967) with an average of 5.6 young born in late April to May. White-tailed prairie dogs, however, are dynamic breeders and appear to be able to adjust their reproductive output in response to resource abundance (Menkens and Anderson 1989). Reproductive success has been found to be dependent on body weight with heavier males siring more offspring, juveniles reaching sexual maturity earlier, and litter size correlating directly with female body mass (Rayor 1985, Hoogland 2001).

The main threat to White-tailed prairie dog populations has been the introduction of sylvatic plague *(Yersinia pestis)* into North America in the late 1930's (Lechleitner et al. 1968, Cully 1993). Prairie-dogs appear to have little immunity to this disease, and plague epizootics frequently kill greater than 99 percent of prairie-dogs in infected colonies (Cully and Williams 2001, Clark et al. 1989). Other threats include oil, gas, and mineral extraction, urbanization, conversion of land to agriculture, and Federal and State sponsored eradication campaigns. Recreational shooting pressure can reduce prairie-dog numbers on a local scale, in conjunction with outbreaks of sylvatic plague. However, it has not been documented to threaten population stability alone (Knowles 2002).

Although formal prairie dog colony surveys and burrow density estimates have not been completed in the GDBR, the area of active prairie dog habitat within the GDBR was estimated during field reconnaissance and from BLM records. BLM records indicate that approximately 1,827 acres of White-tailed prairie dog colonies exist within the GDBR (Sect. 3 T7S, R24E; Sect. 1, 12 T8S, R23E; Sect. 2, 5-11, 14-17 T8S, R24E) (Figure 3.6-4). Field reconnaissance also identified numerous smaller colonies throughout portions of the GDBR.

3.6.8.2 Black-footed Ferret (Mustela nigripes)

The black-footed ferret is a federally endangered species. The species' original distribution in North America closely corresponded to that of prairie dogs (Hall and Kelson 1959, Fagerstone 1987). In Utah, white-tailed prairie dog (*Cynomys leucurus*) colonies provide essential habitat for black-footed ferrets. Ferrets depend almost exclusively on prairie dogs for food and they also use prairie dog burrows for shelter, parturition, and raising their young (Fagerstone 1987). In accordance with the USFWS' current threshold for white-tailed prairie dog colonies, a minimum of 200 acres of contiguous habitat and a minimum density of eight active burrows per acre is required to sustain a viable ferret population (USFWS 1989). Although formal prairie dog colony surveys and burrow density estimates have not completed in the GDBR, the area of active prairie dog habitat within the GDBR was estimated during field reconnaissance and from BLM records. BLM records indicate that approximately 1,827 acres of white-tailed prairie dog colonies exist within the GDBR (Sect. 3 T7S, R24E; Sect. 1, 12 T8S, R23E; Sect. 2, 5-11, 14-17 T8S, R24E) (Figure 3.6.3). Field reconnaissance also identified numerous smaller colonies throughout portions of the GDBR.

In 1999, black-footed ferrets were released in Coyote Basin, an area approximately 32 miles southeast of Vernal, Utah and 5 miles from the southeastern end of the GDBR (BLM 1999). The GDBR is not within the ferret release location, but the southeast portion (i.e., T8S, R24E, Sections 2-11 and 14-17) is directly within the Coyote Basin Black-Footed Ferret Primary Management Zone (PMZ). Ferret reintroduction in the Coyote Basin PMZ was authorized by the USFWS, in cooperation with the BLM, the Colorado Division of Wildlife and the Utah Division of Wildlife Resources. Section 10j of the ESA classifies reintroduced populations such as those ferrets in the Coyote Basin as "nonessential-experimental", and these species are treated as a candidate species**.**

The BLM, USFWS, and UDWR are monitoring the released population closely and have noted that the ferrets are expanding into surrounding areas. Although ferrets have not been documented within the specific GDBR, it is possible that the species could eventually migrate into the GDBR as released populations grow and expand into other suitable habitats.

3.6.8.3 Bald Eagle (Haliaeetus leucocephalus)

The USFWS recently downlisted the bald eagle from endangered to threatened (USFWS 1995b). This raptor species is also listed as state-threatened and protected under the Bald Eagle Protection Act. Bald eagle nesting is currently limited in Utah to four known locations. No bald eagle nests have been documented within the GDBR. The closest documented bald eagle nest is located along the White River in Colorado, approximately 9 miles southeast of the GDBR.

Bald eagle wintering habitat is typically associated with food source concentrations. These areas include major rivers that remain unfrozen whereby fish and waterfowl are available, and near ungulate winter ranges that provide carrion (Montana Bald Eagle Working Group 1990). Bald eagles are often seen in and near the western portion of the GDBR during winter months, usually from early November through late March. They normally roost in cottonwoods along the Green River about ¼ mile south of the GDBR, and forage in upland habitats for carrion and small mammals. No winter roosting areas have been identified in the GDBR, although there are winter roost areas within 1/4 mile of the GDBR boundary. Cottonwood galleries are in the GDBR, and suitable roosting habitat has been identified along the Green River.

3.6.8.4 Yellow-billed Cuckoo (Coccyzus americanus occidentalis)

The western yellow-billed cuckoo, a Federal Candidate for listing under the ESA, is a riparian obligate bird that feeds in cottonwood groves and nests in willow thickets. Nest sites have been correlated with large and relatively large willow-cottonwood patches, dense understories, high local humidity, low local temperature, and in proximity to slow or standing water. In Utah, this neotropical migrant nests in riparian areas and has been documented in cottonwood habitat along the Green River (Howe and Hanberg 2000). Similar breeding habitat occurs in the western portion of the GDBR along the Green River. Therefore, the species has the potential to occur there.

3.6.8.5 Golden Eagle (Aquila chrysaetos)

The golden eagle is protected under the Bald Eagle Protection Act, based upon the similarity of the juvenile bald eagle's physical appearance to that of the adult golden eagle. Throughout the summer, golden eagles are found in mountainous areas, canyons, shrub-land and grassland. During the winter they inhabit shrub-steppe vegetation, as well as wetlands, river systems and estuaries. Golden eagles are quite common to Uintah County and the Book Cliffs resource area. A total of 17 golden eagle nests are located within the GDBR plus a one-mile buffer. Of these16 nests, only three have been documented as active within the last 3 years.

3.6.8.6 Ferruginous Hawk (Buteo regalis)

The ferruginous hawk is a State threatened raptor. Throughout their range, ferruginous hawks have been found nesting on a wide variety of substrates (Evans 1982). The ferruginous hawk is a common species in western, northeastern, and southeastern Utah. Within the State of Utah, ferruginous hawks nest on junipers, pinyon pines, cottonwoods, on the ground, on low hills and knolls, on low cliffs, and on artificial structures (Smith and Murphy 1978). Generally, this species nests where visibility is extensive and this, in part, may contribute to the species' relatively high sensitivity to human disturbance (Suter and Joness 1981). Ferruginous hawks lay eggs from mid-March through early April and the young fledge from early June to early July (Call 1978).

In the GDBR, ferruginous hawk stick nests are typically located on rock outcrops and low cliffs elevated from the surrounding terrain, as well as in isolated junipers. BLM records and Buys & Associates surveys document 171 ferruginous hawk nests within a one-mile radius of the proposed project. Notations within BLM records along with Buys & Associates ground surveillance indicate that many of these nests (155) have been inactive in the last 4 years. However, raptors will regularly return to nests even after several years of inactivity.

3.6.8.7 Western Burrowing Owl (Athene cunicularia)

The Western burrowing owl is a UDWR Species of Special Concern. Western burrowing owls are summer residents on the plains over much of Utah and usually arrive on breeding grounds from late March to mid-April (Johnsgard 1988). The species is associated with dry, open habitat that has short vegetation and contains an abundance of burrows (Thomsen 1971; Wedgwood 1978; Haug and Oliphant 1990). In Utah, prairie dog burrows are the most important source of Western burrowing owl nest sites. Western burrowing owl use of abandoned prairie dog towns is minimal, and active dog towns are the primary habitat for the owls (Butts 1973). As the range and abundance of these burrowing mammals have decreased, so too has the status of the Western burrowing owl. One active Western burrowing owl nest has been documented in the southern portion of the GDBR. Additional potential habitat exists within active prairie dog towns in the GDBR.

3.6.8.8 Greater Sage-grouse (Centrocercus urophasianus)

The greater sage grouse is an important game bird found in the Uintah Basin. Greater sage grouse, as the name implies, are restricted to sagebrush habitats. The greater sage grouse is considered a Species of Special Concern because of widespread losses of sagebrush habitat throughout the western states including Utah. From 1967 to 2001, the average number of males per breeding ground in Utah has declined by approximately 40 percent (UDSWR 2003).

Greater sage grouse habitat is primarily found in the sagebrush dominated desert shrub community found throughout the central and southeastern portions of the GDBR. Sage grouse have been recorded in these areas, and suitable nesting, brooding, and lek habitat occurs. UDWR records indicate that 14 leks exist within the 5 miles of the GDBR, half of which occur within its boundary (Figure 3.6.4). Given the abundance of sagebrush habitat along the eastern half of the GDBR, other greater sage grouse leks, nesting areas, and wintering areas may exist. Use of leks can vary from year to year. FWS indicates that in 2006, two of the 14 known leks were active.

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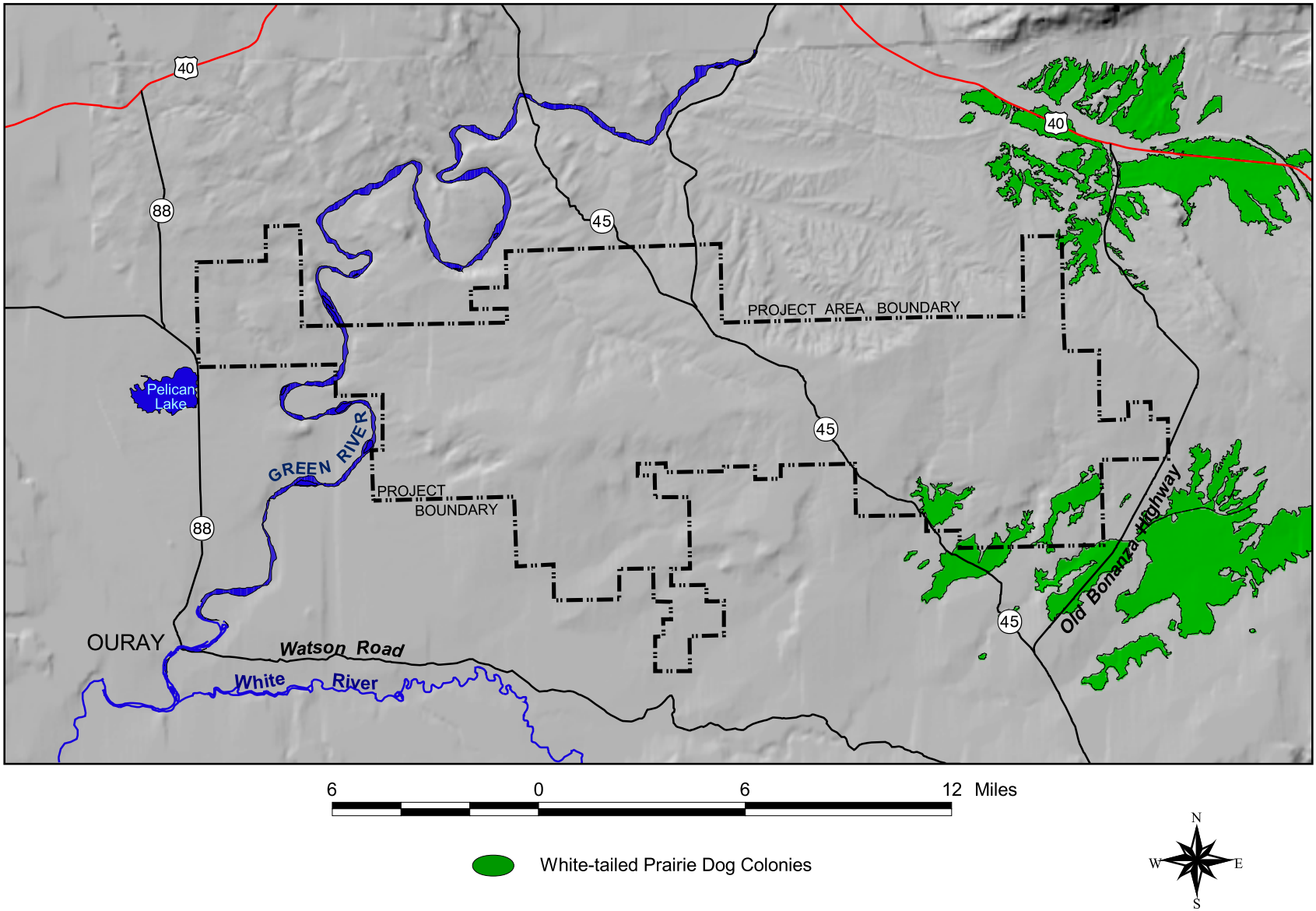

Figure 3.6-4 White Tailed Prairie Dog Habitat

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3.6.8.9 Common Yellowthroat (Geothlypis trichas)

The common yellowthroat is included on the Utah BLM's Sensitive Species list. The species occurs in Utah during the breeding and nesting season, but is declining throughout the state due to loss of riparian habitats. Preferred habitats include riparian corridors, marshes, brushy pastures, and old fields. The diet of the common yellowthroat is composed almost exclusively of spiders and insects. Breeding begins in the late spring. Nests are constructed by the female, generally in riparian vegetation or weeds and other shrubs. Nests are commonly parasitized by brown-headed cowbirds, another cause of the species decline (UDWR 2003). Suitable nesting habitat occurs in the riparian habitats of the GDBR (along the Green River), and the species has the potential to occur there.

3.6.9 Special Status Aquatic Species

The USFWS (1997) has identified four federally listed fish species historically associated with the Upper Colorado River Basin: Colorado pikeminnow (Ptychochelius lucius), humpback chub (Gila cypha), bonytail (Gila elegans), and razorback sucker (Xyrauchen texanus). These fish are federally and state-listed as endangered and have experienced severe population declines. Populations have declined since the 1960s due to impoundment of the mainstream Green River in Wyoming and Utah (Flaming Gorge Reservoir) and the Colorado River in Glen Canyon, Utah (Lake Powell) (UDWR 2003). Critical habitat has been designated for the four endangered fish in the Green River 100-year floodplain. The White River floodplain, about five miles south of the Project Area also is designated as critical habitat for the Colorado pikeminnow (USFWS 1995b).

Three additional fish species are endemic to the Colorado River Basin and have been affected by flow alterations, habitat loss or alteration, and introduction of non-native fish: roundtail chub (Gila robusta), flannelmouth sucker (Catostomus latipinnis), and bluehead sucker (catostomus discobolus). The roundtail chub is considered to be a state-listed threatened species, while the two suckers are species of special concern due to declining population numbers and distribution.

3.6.9.1 Colorado Pikeminnow (Ptychocheilus lucius)

The Colorado pikeminnow, also known as the Colorado squawfish, is federally listed as endangered by the USFWS. The Colorado pikeminnow thrives in swift flowing muddy rivers with quiet, warm backwaters. Colorado pikeminnow are primarily piscivorous (fish-eaters), but smaller individuals also eat insects and other invertebrates. The species spawns during the spring and summer over riffle areas with gravel or cobble substrate. Eggs are randomly splayed onto the bottom, and usually hatch in less than one week (Sigler and Sigler 1996).

The Colorado pikeminnow were historically found in the mainstem Colorado River and its tributaries from Wyoming to the Gulf of California. Currently, wild populations of pikeminnow persist only in the upper basin. The White River currently supports some of the highest densities of Colorado pikeminnow in the Green River sub-basin. The White River is used for year round residence and also as a migration corridor to other connected habitats in the Green and Yampa rivers. Adult Colorado pikeminnow are present in the White River upstream to the Taylor Draw Dam. Portions of the White River and its 100-year floodplain, about five miles south of the Project Area, is officially designated as critical habitat for the Colorado pikeminnow. Portions of the Green River and its 100-year floodplain in the Project Area is also officially designated as critical habitat for the Colorado pikeminnow (USFWS 2003).

3.6.9.2 Humpback Chub (Gila cypha)

The humpback chub is a federally endangered minnow found in the Upper Colorado River Basin. The humpback prefers deep, fast-moving, turbid waters often associated with large boulders and steep cliffs. Humpback chubs feed predominately on small aquatic insects, diatoms and filamentous algae. Spawning occurs between April and July during high flows from snowmelt (Sigler and Sigler 1996).

Historically, the humpback chub inhabited canyons of the Colorado River and four of its tributaries: the Green, Yampa, White and Little Colorado rivers. Today, populations currently exist near the Colorado/Utah border in Westwater Canyon in Utah and at Black Rocks, in Colorado. Smaller numbers have been found in the Yampa and Green Rivers in Dinosaur National Monument, Desolation and Gray canyons on the Green River in Utah, Cataract Canyon on the Colorado River in Utah and the Colorado River in Arizona. The largest known population is in the Little Colorado River in the Grand Canyon, where there may be up to 10,000 fish. There are no population estimates available for the rest of the upper Colorado River basin (USFWS 2003).

3.6.9.3 Bonytail (Gila elegans)

The bonytail is a federally listed endangered species found in the Upper Colorado River Basin. This fish typically lives in large, fast-flowing waterways of the Colorado River system; however, their distribution and habitat status are largely unknown. Adult bonytail feed on terrestrial insects, zooplankton, algae and plant debris. Young feed mainly on aquatic insects. Although bonytail spawning in the wild is now rare, the species does spawn in the spring and summer over gravel substrate. Many bonytail are now produced in fish hatcheries, with the offspring released into the wild when they are large enough to survive in the altered Colorado River system environment (Sigler and Sigler 1996).

Bonytail once were common in portions of the upper and lower Colorado River basins. The bonytail is now the rarest of the endangered fish species in the Colorado River basin. Upstream of Lake Powell, this fish is nearly extinct, and in the last decade only a handful have been captured on the Yampa River in Dinosaur National Monument, on the Green River at Desolation and Gray canyons and on the Colorado River at the Colorado/Utah border. In the lower basin, bonytail exist in Lake Mohave and Lake Havasu (USFWS 2003).

3.6.9.4 Razorback Sucker (Xyrauchen texanus)

The razorback sucker is a federally listed endangered species found in the Upper Colorado River Basin. This species is a large, bronze to yellow fish that grows to a weight of about 15 pounds and has a sharp-edged keel behind the head. Razorbacks are found in deep, clear to turbid waters of large rivers and some reservoirs over mud, sand or gravel. Like most suckers, the razorback feeds on both plant and animal matter. The razorback sucker spawns in the spring. Breeding males turn black up to the lateral line, with brilliant orange extending across the belly (Sigler and Sigler 1996).

Historically, the federally endangered razorback sucker inhabited the Colorado River and its tributaries from Wyoming to the Gulf of California. The current distribution of razorback suckers in the Upper Colorado River basin is confined to small groups of fish in several widely distributed locations. Most of these fish occur in an area including the lower Yampa River, and the Green River from the mouth of the Yampa River downstream to its confluence with the Duchesne River. Small populations may also occur in the lower Green River, the Colorado River at Grand Valley, and in the San Juan River upstream from Lake Powell (USFWS 1997). Portions of the White and Green rivers and their 100-year floodplains are officially designated as critical habitat for the razorback sucker (USFWS 2003).

3.6.9.5 Roundtail Chub (Gila robusta)

The roundtail chub is Utah State Threatened Species that is found in the Upper Colorado River Basin. This species is a large member of the minnow family found most often in major rivers and smaller tributary streams. Although movement patterns are poorly understood, the roundtail chub has been described as sedentary and mobile, depending on life stage and habitat conditions. Roundtail chubs typically mature from ages three to five, and fecundity varies with fish from as low as 1,000 eggs to over 40,000 eggs per female (UDWR 2003).

Extant roundtail chub populations include the Green River from the Colorado River confluence upstream to Echo Park and in the White River from the Green River confluence upstream to near Meeker, Colorado. The roundtail chub now occupies approximately 45 percent of its historical range in the Colorado River Basin. In the Upper Colorado River Basin (New Mexico, Utah, Colorado and Wyoming), it has been extirpated from approximately 45 percent of its historical range, including the Price River and portions of the San Juan, Gunnison and Green rivers. Data on smaller tributary systems are largely unavailable, and population abundance estimates are available only for short, isolated river reaches (UDWR 2003).

3.6.9.6 Flannelmouth Sucker (Catostomus latipinnis)

The flannelmouth sucker is a Utah State Sensitive Species found in the Upper Colorado River Basin. Flannelmouth suckers typically inhabit deep water habitats of large rivers, but are also found in small streams and occasionally in lakes. Flannelmouth typically spawn during March and April in the southern portions of Utah and from May to June in the North and higher elevations. Fecundity of females is proportional to fish size and varies with environmental conditions (UDWR 2003).

Extant flannelmouth sucker populations include the Green River from the Colorado River confluence upstream to Flaming Gorge Reservoir, and the White River from the Green River confluence to Kenny Reservoir, Colorado. Recent investigations of historical accounts, museum specimens, and comparison with recent observations indicate that flannelmouth suckers occupy approximately 50% of their historic range in the Upper Colorado River Basin (Utah, Wyoming, Colorado, and New Mexico). Populations have declined since the 1960s due to impoundment of the mainstream Green River in Wyoming and Utah (Flaming Gorge Reservoir) and the Colorado River in Glen Canyon, Utah (Lake Powell) (UDWR 2003).

3.6.9.7 Bluehead Sucker (Catostomus discobolus)

The bluehead sucker is a Utah State Sensitive Species found in the Upper Colorado River Basin. Bluehead suckers occur in small to large streams and rivers and tributaries in the Upper and Lower Colorado River Basin and in the Weber and Bear River drainages in the Bonneville basin. Large adult bluehead may inhabit stream environments as deep as two to three meters, although they most commonly feed in riffles and swift runs. Life expectancy is typically six to eight years. Spawning occurs in spring and early summer at lower elevations and mid- to late summer in higher, colder waters. Spawning occurs on gravel beds in shallow water (UDWR 2003).

Bluehead suckers historically occurred in the Colorado River Basin above the mouth of the Grand Canyon in mainstream and tributary habitats. In Utah, bluehead suckers continue to be found in mainstream rivers and tributary streams above Glen Canyon Dam to headwater reaches of the Green and Colorado rivers. Populations currently occur in the mainstream Green River from the Colorado River confluence upstream to Lodore, Colorado, and in the White River from the Green River confluence upstream to Meeker, Colorado. In the upper Colorado River Basin (Utah, Wyoming, Colorado, and New Mexico), bluehead suckers currently occupy approximately 45 percent of their historical habitat. Recent

declines of the species have occurred in the White River below Taylor Draw Dam, and in the upper Green River (UDWR 2003).

3.7 CULTURAL RESOURCES

3.7.1 Regional Overview

The Uintah Basin and GDBR has been a region for human activity for thousands of years. Much has been written about the prehistory and history of the eastern Utah region. Comprehensive overviews of the prehistory and history of the Uinta Basin are available in Paradigms and Perspectives, a Class I Overview of Cultural Resources in the Uinta Basin and Tavaputs Plateau (Spangler 1995, update in progress) and A History of Uintah County, Scratching the Surface (Burton 1996). Spangler incorporated data from southwest Wyoming, northwest Colorado, and areas adjacent to those administered by BLM, Vernal Field Office into his review.

Spangler divided the cultural history of the broader eastern Utah region into five basic occupation periods that are defined temporally, behaviorally, and technologically. They are largely based on differences in artifact assemblage data through time although behavior pattern data and use practice data are also taken into consideration.

The five occupation periods provided as a basic context in which to consider known cultural resources are:

- Paleoindian period 12,000 to 6,000 B.C.
- Early Archaic period 6,000 to 3,000 B.C.
- Late Archaic period 500 B.C. to 550 A.D.
- Formative stage 500 to 1300 A.D.
- Shoshonean stage 1300 A.D. to present
- Historic Euroamerican period 1776 A.D. to present.

3.7.2 Summary of Existing Cultural Resource Database

A Class 1 data review was conducted to ascertain the extent of previous cultural resource investigations within the GDBR and to determine the number, locations, types, and significance of previously documented cultural resources within the same. Archival records searches were performed at the BLM Vernal Field Office, and the State Historic Preservation Office, Salt Lake City. Of specific concern were the nature and extent of previous cultural resource inventories within the GDBR and the number and type of archaeological sites that had been previously documented. Record searches involved plotting previous project areas and archaeological sites onto 7.5 minute USGS maps and creating tables summarizing previous work and findings.

Archival record searches resulted in the identification of 158 previous cultural resource studies in the GDBR. These studies have been conducted extensively in the area since the late 1970s for oil and gas development, which has mainly involved seismic line, well pad, access road, and pipeline corridor construction. 80 percent of the previous cultural resource studies located no cultural resources. Of the 32 previous inventories (20%) that located cultural resources, only those that resulted in the new or additional documentation of cultural resources within the GDBR are mentioned below.

Prehistoric open campsites, lithic scatters, and historic sites are dominant among the identified cultural resources. Of the 63 sites documented, (Table B), prehistoric campsites number 22, prehistoric lithic scatters number 14, prehistoric lithic/ceramic scatters number 4, and historic sites number 16. One pot drop and two lithic procurement localities also are documented. Finally, four sites having both prehistoric and historic components are recorded in the GDBR. Sites are listed below by type.

- Prehistoric Campsites - 35%
- Prehistoric Lithic Scatters - 22%
- Prehistoric Lithic/Ceramic Scatters - 6%
- Prehistoric Lithic Procurement Locality - 3%
- Prehistoric Pot Drop - 2%
- Historic Sites - 25%
- Multi-component Sites - 6%

3.7.3 Likely Cultural Resources within the GDBR

An evaluation of the extent of previous cultural resource investigations within the GDBR and the number, locations, types, and significance of previously documented cultural resources within the same is essential to estimating the likelihood of encountering further cultural resources.

The 158 previous cultural resource studies resulted in the intensive inventory of approximately 24.8 square miles, or 16% of the GDBR. The previous investigations have documented 63 archaeological sites, a site density of approximately 2.54 sites/square mile. This compares closely with an overall site density of 1.78 sites/square mile calculated for a nearby oil and gas project of 29,092 acres (45.45 square miles) proposed in the Kennedy Wash area (Elkins et al. 2003).

Another estimate of site density for the GDBR derives from the 1979 study by Nickens and Associates entitled Archaeological Inventory of the Red Wash Cultural Study Tract, Uintah County, Utah (Larralde and Nickens 1980). Of the GDBRs 15,581 acres previously surveyed, slightly fewer than half (about 6880 acres) coincide with the 1979 Red Wash study, in which a ten percent stratified random sampling was conducted for the BLM. Within the GDBR, Nickens and Associates inventoried 10.75 square miles, and identified 11 archaeological sites. This translates to a site density of approximately 1 site/square mile for the acreage surveyed by Nickens and Associates that lies within the current GDBR. Analysis based on previously recorded archaeological sites in GDBR indicates that there is a tendency towards clustering of sites.

The 1979 Red Wash study (Larralde and Nickens 1980) found that 92% of the prehistoric sites were located in areas dominated by juniper or associated with sand dunes. Prehistoric lithic scatters were found to occur more frequently in juniper, campsites more frequently on dunes. Site location did not appear to be influenced by proximity to a drainage, the presence of sandstone outcrops, slope, or site orientation (Ibid:40). A 2002 geologic study of surficial and bedrock geology in T8S, R22E by Nancy Lamm concluded that areas mantled by aeolian deposits or characterized by scattered, isolated dunes should be considered to have potential for buried cultural deposits. Likewise, alluvial and colluvial deposits common along drainages in the area are active and should be considered to have potential for buried cultural deposits (ibid). Old piedmont-slope deposits and bedrock outcrops are less likely to contain buried cultural deposits.

Sites within the GDBR are dominated by three types: prehistoric campsites, prehistoric lithic and/or ceramic scatters, and historic sites. Site documentation suggests that the prehistoric campsites and lithic and/or ceramic scatters are reflective of broad temporal use of the area, but probably on an occasional and temporary basis. Diagnostic artifacts associated with specific cultural groups are few, but they indicate Archaic, Fremont, and Numic (Ute) visitation. A number of the historic sites (camps, trash scatters, etc.) also suggest use of the area that was mostly sporadic and temporary, although several canals and road segments are testimony to the Euro-American settlement of the area and the eventual permanence of human occupation.

Of the 63 sites documented within the GDBR, 24 (38%) have been recommended as eligible to the National Register of Historic Places (NRHP) and 39 (62%) have been recommended as not eligible. Fourteen of the 24 eligible sites are prehistoric campsites that may possess buried cultural remains and additional research potential. Five of the eligible sites are lithic and/or ceramic scatters, one is a lithic procurement locality, one is a lithic scatter/historic trash scatter, and three are historic sites. The remaining 39 sites have been recommended as not eligible because they fail to meet NRHP criteria.

With considerably less than 20% of the GDBR having been inventoried for cultural resources, predictions about site density, location, type, and sensitivity can be made only tentatively. Because inventories have been done mostly in response to clearances required for random individual projects, their findings may not be representative of the GDBR as a whole. Indeed, it is likely that biases have been introduced that relate to access, ruggedness of terrain, elevation, geology, and other factors. However, given the available information, the following can be estimated concerning the likelihood of encountering cultural resources within the GDBR:

- site density likely ranges from 1 to 3 sites/square mile;
- sites will likely be mostly prehistoric campsites, prehistoric lithic and/or ceramic scatters, or historic sites; and
- sensitive sites (eligible to the NRHP) having potential for additional research will likely be located in association with aeolian deposits or juniper.

3.8 PALEONTOLOGICAL RESOURCES

3.8.1 Regional Overview

The GDBR is located in the Uinta Basin of northeastern Utah, on the north edge of the Colorado Plateau province. The Uinta Basin is a asymmetric synclinal basin trending east-west immediately south of the Uinta Mountains, west of the Douglas Creek Arch, northwest of the Uncompahgre Plateau, southeast of the San Rafael Swell and Wasatch Plateau, and east of the Wasatch Mountains. This intermontane basin formed in early Tertiary times, subsiding as a response to the uplift of the Uinta Arch. Rivers in southern and eastern Utah and western Colorado drained toward the basin creating a huge fresh-water lake during the Late Paleocene. This lake, called Lake Uinta, lasted into the Late Eocene and would extend at times into the Bridger Basin in southwestern Wyoming and the Piceance Basin in western Colorado. Deposition of sediments continued during gradual subsidence of the Uinta Basin, filling it with nearly three vertical miles of lacustrine and terrestrial strata during the Tertiary (Hintze, 1964).

The GDBR occupies a small portion of the Uinta Basin, in a topographic district Clark (1957) called the Central Badlands District. This area is composed of fairly stable Pleistocene and Quaternary pediments of sand and silty soils, and erosional benches carved and dissected by ephemeral drainages, exposing vast

badland rims of variegated mudstone and thin sandstone units of the lower Duchesne River Formation (Brennan Basin Member) and inter-tongued beds of the upper Uinta Formation (Myton Member, Uinta C). These Eocene bedrock units dip gently north-northeastward, resulting in the lower units being exposed primarily in the southwest portion of the GDBA.

The Uinta Formation consists of fluvial deposits of wide meandering streams in the east and west ends of the basin and predominantly lacustrine sediments near the center of the basin, recording the last several million years of the dwindling Lake Uinta (Bryant et al, 1990; Ryder et al, 1976). Fluvial channel sands trend north-northwest and are often feldspar-rich; suggesting the source for the Uinta Formation was from the erosion of Laramide uplifts of western Colorado (Stagner, 1941; Bruhn et al, 1986). Originally, the Uinta Formation was divided into three lithologic units: Uinta A (lower), B (middle) and C (upper) (Osborn, 1895, 1929). Years later, Uinta A and B were combined into the Wagonhound Member, and Uinta C, exclusive of the lower beds of the Duchesne River Formation, was named the Myton Member (Wood, 1941). Uinta A has rarely yielded fossil mammals, but to the credit of two classic localities within the White River Pocket (in the Uinta B) and the Myton Pocket (in the Uinta C), two distinct mammalian faunas were identified. These faunas have been referred to as the early Uintan mammal and late Uintan mammal assemblages, which correlate to Uinta B and C members (Riggs, 1912; Peterson and Kay, 1931; Kay, 1934). The emphasis in more recent decades on magnetostratigraphy, radioscopic chronology, and continental biostratigraphy (Flynn, 1986; Prothero, 1990; Prothero and Swisher, 1990, 1992; Walsh, 1996) has produced better stratigraphic control. With the more recent discovery of localities throughout the Uinta Formation, the faunal turnover between early and late Uintan becomes less apparent (Rasmussen et al, 1999; Townsend et al, 2000). In addition to mammals, the Uinta bears a diverse assemblage of turtles, fish, crocodiles, flamingoes, and fresh-water mollusks.

Duchesne River Formation consists of predominantly south-southwest trending fluvial deposits of a distal alluvial plain of recycled sedimentary and low-grade meta-sedimentary rocks from the actively rising and eroding Uinta Mountains (Anderson & Picard, 1972). It is composed of pale reddish sandstones and mudstones of low gradient meandering streams and overbank floodplain deposits in a broad east-west swath across the northern part of the Uinta Basin. Four members of the Duchesne River Formation are recognized: the lower Brennan Basin Member (which includes the Randlett and lower Halfway Horizons); the Dry Gulch Creek Member (which includes the upper Halfway Horizon); the Lapoint Member; and the upper Star Flat Member (Anderson & Picard, 1972). Of these four members, the Brennan Basin Member is the most fossiliferous, with a fauna regarded as Uintan in age. The remaining members of the Duchesne River Formation contain sparse fossils, except for the Lapoint Horizon which is the basis for the type locality for the Duchesnean North American Land Mammal Age (Rasmussen et al, 1999; Clark et al, 1957).

Scientific interest in the paleontologic record of the Uinta Basin lies in the major fossil assemblages that are preserved in a fairly continuous record of deposition within a closed basin throughout Eocene times. More specifically, most of the attention has focused on the fossiliferous beds of the Uinta and Duchesne River Formations that were laid down 49 to 40 million years ago (Prothero, 1990, 1996; Prothero & Swisher, 1990, 1992). During this time, the Uinta Basin was changing from a tropical/subtropical region teeming with rich floral and faunal ecosystems to drier and more seasonal climates with corresponding changes in evolutionary trends. These changes were global, due to the separation of Europe from North America and eventually the splitting of Antarctica from Australia. These tectonic events changed the pattern of oceanic currents which had a profound effect on climates (Prothero, 1996). Changes in the ecosystems within the Uinta Basin are thought to have been compounded due to the increased elevation and rising highlands surrounding the basin (Rasmussen et al, 1999). Comparisons of coeval faunas from other parts of the country help to define these changes (Rasmussen & Townsend, 1995).

3.8.2 Paleontologic Resources

Collection of Eocene vertebrates from the Uinta Basin began with O.C. Marsh of the Yale Peabody Museum in 1870. In the 1880's, Princeton University amassed extensive collections from the Uinta Basin that were subsequently studied by Professors W.B. Scott and H.F. Osborn. Their work showed a distinctive evolutionary stage in Tertiary mammals which was later formalized as the Uintan Land Mammal Age by Wood and others in 1941 (Rasmussen et al, 1999). Brief collecting trips were conducted by the Carnegie Museum during the first half of the 20th century with an emphasis on large mammals, and then only recently by Washington University, St. Louis, for the small and minute mammalian taxa (Rasmussen et al, 1999). Other institutions have collected only briefly in the Uinta Basin over the last century (i.e., Field Columbian Museum of Chicago, Utah Museum of Natural History, Brigham Young University, and others) for a sample of Uinta Basin fossils for their collections or for samples of exhibit quality specimens. Many localities known today are a result of the collecting by the Utah Field House in Vernal and through paleontologic surveys required of oil and gas interests by the BLM before ground disturbing activities are conducted.

The GDBR is largely unsurveyed for paleontological resources. Of the 116 reported fossil localities within the boundaries of the GDBR, about 34 of them occur in the Myton member of the Uinta Formation. Uinta beds are found in the western and southwestern regions of the GDBR, inter-tongued with southwestward thinning wedges of the Duchesne River Formation. Exposures of the Brennan Basin Member of the Duchesne River are the predominant outcrop in the rest of the region. About 82 known localities of the GDBR occur in the Duchesne River Formation. Twenty three localities identified during an Archaeological inventory in the Red Wash Cultural Study Tract were not identified to geologic units (nor to taxonomic status), but many of them occur in areas that are mostly Duchesne River outcrop. Half of the known Duchesne River localities were found during a survey of a Utah State Trust Lands section (Section 16, T7S, R23E). This survey is probably the best measure of potential for the Brennan Basin Member in the GDBR, as it was conducted by a paleontologist in a block survey, as opposed to spot surveys confined to pipeline corridors or well pads for which the remaining 17 localities were discovered. Most of the State Trust section is comprised of fairly good outcrops, with nearly all of the localities occurring in the lower portion of the Brennan Basin Member in the northern half of the section. Based on numbers of localities within a broad area, the survey suggests that the lower portion of the Brennan Basin Member could have a locality occurrence of one per every 8 acres. This is especially important as the fossils of the Brennan Basin Member have been regarded as relatively uncommon and have received relatively little attention in the past (Rasmussen et al, 1999). It is only recently that the Utah Field House in Vernal and Washington University in St. Louis has recognized these beds for their paleontological potential.

3.9 LAND USE AND STATUS

The GDBR, located approximately 20 miles south of Vernal, Utah, comprises 98,975 acres entirely within Uintah County, Utah. The GDBR includes a mix of mostly federal public lands administered by the Bureau of Land Management - Vernal Field Office, State of Utah lands administered by the State Institutional Trust Lands Administration (SITLA), and various privately-owned properties. The BLM-administered lands within the GDBR lie primarily within the Book Cliffs Resource Area, with a small portion within the Diamond Mountain Resource Area on the west side of the Green River. Table 3.9-1 provides a breakdown of land ownership in the GDBR. Figure 1.2 shows the extent of federal, state, and private lands in the GDBR.

Table 3.9-1. Land Ownership in the GDBR

Ownership	Acres	Percent of GDBR
Federal – BLM Administered	83,864	85%
State of Utah	11,448	12%
Private	3,473	3%

Current land uses within and adjacent to the GDBR consist of existing oil and gas development, wildlife habitat, dispersed recreation, and sheep and cattle ranching. Apart from oil and gas facilities, there are very few developed land uses in the GDBR, giving it an open, unpopulated character. There are no commercial businesses within the GDBR and only a few occupied residences on private lands west of the Green River. The GDBR includes a total of 13 grazing allotments on public lands, which are described in detail in Section 3.11 – Range Management. There is also limited irrigated agriculture adjacent to and west of the Green River on the west side of the GDBR.

In terms of man-made structures and surface disturbance, there are approximately 278 existing oil and water injection wells, and 300 natural gas wells in the GDBR, along with an extensive road network, aboveground and buried pipelines, tank batteries, ponds, compressors, and miscellaneous oil and gas treatment equipment. There is also a high voltage transmission line and various regional pipelines that cross the GDBR. Routine operation and maintenance activities associated with existing gas exploration and production, pipelines and transmission lines generate vehicle traffic and human activity in and around the GDBR.

The BLM's Book Cliffs and Diamond Mountain Resource Management Plans (RMPs) authorize the leasing and development of federal oil and gas resources, provided appropriate protection of other resource values is incorporated into development activities. Accordingly, oil and gas development in these BLM resource areas is subject to various Lease Stipulations, Information Notices, and Conditions of Approval based on the sensitivity of resources present, and mitigation that are appropriate to address impacts that could result from oil and gas development activities. Assuming the operators comply with applicable stipulations, notices, and conditions of approval, oil and gas extraction in the GDBR is consistent with the planning objectives of the BLM.

Several existing and permitted rights-of-way were identified across BLM administered lands within the GDBR. These include roads maintained by Uintah County, resource roads used by oil and gas operators, natural gas pipelines, electric transmission lines of various voltages, telecommunications lines, and water pipelines used in oil field and nearby power generation operations (BLM 2004a). Table 3.9-2 lists existing and authorized rights-of-way granted by BLM in the GDBR.

Table 3.9-2. BLM Rights-of-Way in the GDBR

Permittee [a]	Type	Location	Acreage [b]
Deseret Generation & Transmission	Water Pipeline	T7S, R20E, 22E, and 23	665.4, 242.0, 546.3, 146.5
Moon Lake Electric Association	Transmission Lines	T7S, R20E, R21E, and 22E T8S, R21E, 22E, and 23E	29.7, 92.3 26.2, 51.5 87.2, 17.5
Uintah County	County Roads	T7S, R20E and 22E T8S, R22E and 24E	25.6, 527.3 57.6, 115.7

Permittee [a]	Type	Location	Acreage [b]
Mar/Reg Oil Co.	Resource Roads	T7S, R21E and 22E	34.6
Westport Oil & Gas Co. LP	Resource Roads, Gas Pipelines	T7S, R21E and 22E T8S, R21E and 22E	13.4, 5.82 6.5, 10.2 13.2, 16.7
Uintah Basin Telephone	Telecom. Line	T8S, R21E	1.21
Rosewood Resources	Gas Pipeline	T7S, R22E	20.1
Retamco Operating, Inc.	Resource Roads	T7S, R22E	5.8
Qwest Communications	Telecom. Lines	T7S, R22E, 23E, and 24E	24.8, 38.8, 33.1
Chevron Pipeline Co.	Oil/Gas Pipeline	T8S, R22E and 23E	186.6, 97.0
EnCana Gas Gathering SVC	Gas Pipeline	T8S, R22E	12.7
EnCana Oil& Gas (USA), Inc.	Resource Roads	T7S, R22E and 23E	13.5, 14.6
NW Pipeline Corp.	Gas Pipeline	T7S, R23E and 24E	41.7
AMOCO Production Co.	Water Pipeline	T7S, R23E	8.6
Citation O&G Corp	Gas Pipeline	T7S, R24E	25.5

Source: BLM LR2000 Database
[a] Does not include rights-of-way held by Questar/QEP
[b] Indicates acreage in multiple rights-of-way

With respect to county land use planning policies and objectives, the *Uintah County General Plan for Management of the Book Cliffs Resource Area* (Uintah County Plan) contains specific policy statements and regulations addressing land uses related to natural resource development on public lands, including natural gas extraction. In general, the Uintah County Plan supports multiple use management practices, adequate public and private access to BLM lands, responsible increases in recreational activity on public lands, and underscores the importance of oil and gas development to the local and regional economy. The plan specifically states "*Uintah County's economy is based upon extractive mineral industries and would continue to be in the foreseeable future. The County supports maintaining and increasing renewable resource values, but the vital importance of the minerals industry should be given the highest priority possible. Utilizing Best Management Practices has demonstrated that the minerals industry and renewable resources can thrive at the same time…*" (Uintah County 1996)

3.10 TRANSPORTATION

Access to the GDBR is limited to three routes (see Figure 1.1 in Chapter 1). The main access is from the north on State Highway 45 from Vernal. This highway is locally known as the New Bonanza Highway. Secondary access roads from the east and northeast are the Redwash and Old Bonanza Highways from U.S. Highway 40. An alternative, but generally longer access would be from the west along State Highway 88 (Watson Road) crossing the Green River south of the Ouray National Wildlife Refuge and then north on State Highway 45.

Use of these transportation corridors is monitored by the Utah Department of Transportation (UDOT 2002). The latest traffic volume data, expressed as average annual daily traffic (AADT), is from 2002. The AADT on these accesses to the GDBR are listed in Table 3.10-1 below.

The transportation system within the GDBR consists of approximately 600 miles of mostly unpaved access roads that service existing oil and gas operations as well as livestock transportation for grazing. The existing road network is shown on Figure 2.1 in Chapter 2. Most of these roads are included on the Uintah County Transportation Plan. The Class B roads are improved and maintained by Uintah County. However, the Class D roads, are not maintained..

Table 3.10-1. Average Daily Traffic to the GDBR

Route	AADT
South on State HW 45 from intersection of U.S. 40 and State HW 45	2055
Red Wash Highway between State HW 45 and U.S. 40	640
Old Bonanza Highway between State HW 45 and U.S. 40	1667
Watson Road east from Green River Bridge	Not monitored by UDOT

3.11 RANGELAND MANAGEMENT

The GDBR contains portions of 13 rangeland allotments. The 13 rangeland allotments range from approximately 9-17 acres/animal unit month (AUM). An AUM is defined as "the amount of forage required to support one cow, or five sheep for one month". Of the 13 allotments in the GDBR, 5 are grazed by sheep, 5 by cattle, and 3 by sheep and cattle. Grazing periods are different for each allotment. The total allotment acreage in the Project Area (99,103 acres) supports approximately 7,621 AUMs. Details pertaining to individual allotments within the GDBR are displayed in Table 3.11-1 and the extent of each allotment is shown on Figure 3.11-1.

Table 3.11-1. Grazing allotments in the GDBR

Name	Type	Grazing Period	Total Acreage	Total AUMs	Acres /AUM	Acreage in Project Area	AUMs in GDBR
Badlands	Cattle	4/6 - 5/5 11/1 - 1/17	13,422	780	17	2,914	171
Pelican Lake	Cattle	11/1 - 3/31	6,516	544	12	4,269	356
Ouray Valley	Cattle	10/15 - 10/25	416	26	16	686	43
Walker Hollow	Cattle	11/15 - 1/31	9,380	753	12	1,881	157
Bohemian Bottoms	Cattle	4/16 - 5/31 8/31 - 10/15 11/16 - 1/15	9,773	617	16	6,762	423
Horned Toad	Sheep	12/1 - 5/1	19,773	2,238	9	11,039	1,227
Bonanza	Sheep	12/5 - 5/5	24,377	1,939	13	13	1
Stateline	Sheep	12/5 - 4/30	21,840	1,713	13	3,576	275
Powder Wash	Sheep	11/1 - 5/1	22,592	2,100	11	1,591	145
Antelope Draw	Sheep	11/16 - 4/27	56,927	3,679	15	32,296	2,153
Baeser Wash	Cattle & Sheep	12/21 - 4/25 3/1 - 4/25 6/1 - 7/15	14,732	1,246	12	6,675	556
West Deadman	Cattle & Sheep	11/1 - 4/30 3/1 - 4/30 11/16 - 1/15	25,154	1,942	13	26,936	2,072

Name	Type	Grazing Period	Total Acreage	Total AUMs	Acres /AUM	Acreage in Project Area	AUMs in GDBR
Cocklebur	Cattle & Sheep	12/21 - 2/28 12/21 - 4/30	18,374	1,729	11	465	42

3.12 RECREATION

The GDBR is located primarily on public lands administered by the BLM, with some state and private properties interspersed. The majority of the GDBR is part of the Book Cliffs Extensive Recreation Management Area, which is managed to provide unstructured recreation opportunities for a diversity of uses (BLM 1985). In general, the GDBR offers abundant open lands where visitors can participate in primitive or unconfined recreational activities.

The lands in the GDBR are crossed by numerous dirt and gravel roads that provide plentiful access. However, these roads, along with existing oil and gas facilities and other man-made features, reduce the wild character of the GDBR for visitors seeking solitude and relatively pristine landscapes. Accordingly, recreational use in most of the GDBR primarily consists of off-highway vehicle use where permitted, and some hunting and shooting. Hunting activities consist mainly of small game (rabbits and coyotes) and waterfowl along the Green River. To a lesser extent, the GDBR is also used for biking and wildlife observation (BLM 2003).

Recreational activities on and adjacent to the Green River include rafting and canoeing, boating, fishing, hunting, and sightseeing along roads that parallel the river (BLM 2003a). The Ouray National Wildlife Refuge abuts the south and west edges of the GDBR along the Green River. The Refuge is an attractive recreational resource for the region as it provides abundant opportunities for wildlife viewing and photography, as well as hiking, horse riding, and rafting and canoeing on the river (U.S. Fish and Wildlife Service 2003). While it is an important resource for recreation, the Green River is not designated as a Wild and Scenic River where it passes through the GDBR.

The Pelican Lake Special Recreation Management Area (SRMA) is located just southwest, but outside, of the southwestern corner of the GDBR. Pelican Lake is used primarily for fishing and is noteworthy as a bluegill fishery in particular. Hunting and boating are also popular recreational activities at Pelican Lake. It includes a campground with 18 sites and a boat ramp for recreational visitors and, with the exception of the Ouray National Wildlife Refuge, is the only developed recreational facility in close proximity to the GDBR.

In terms of recreational off-highway vehicle (OHV) use in the GDBR, approximately half of the GDBR (the northern and northwestern portion) is designated as “open” to year-round travel, while the rest of the GDBR is designated for “limited travel” to protect resource values including important wildlife habitat, and watershed protection. Areas designated for “limited travel” restrict OHV use to designated trails and travel routes (BLM 1985, BLM 1994). Portions of section 22-27, T8S, R22E lie within the Devils Playground, an area currently open to OHV use. This area receives directed and concentrated OHV use, especially in the spring around Easter. Approximately 300 all-terrain vehicles (ATVs), including both motocross cycles and 4-runners, along with associated Recreational Vehicles, pick-up trucks, and campers may occupy this 1,200-acre area over the 7-day period around Easter. Another 500-800 people will bring ATVs to the site during the remainder of the calendar year.

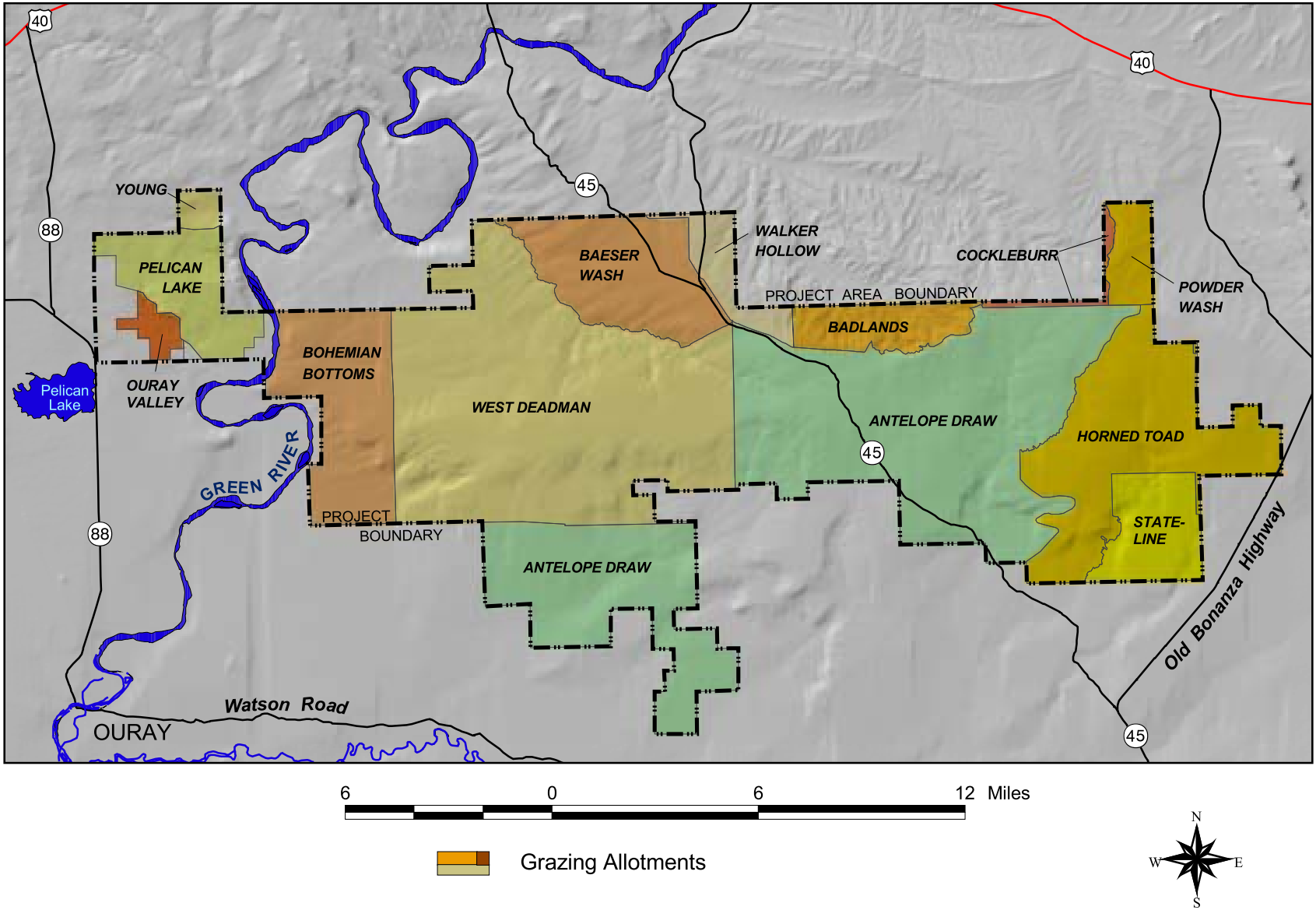

Figure 3.11-1. Grazing Allotments

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3.13 VISUAL RESOURCES

The GDBR consists of public, state, and private lands in Uintah County. The GDBR lies within the Uinta Basin physiographic unit, a distinctly bowl-shaped geologic structure (Stokes 1988). The entire Uinta Basin ecosystem is within the Green River drainage, considered to be the northernmost extension of the Colorado Plateau. As part of the Central Badlands District of the Uinta Basin, the GDBR exhibits broad erosional benches and extensive badland rims adjacent to drainages. Benches and mesas are capped with sand and silt; erosion of these surfaces forms sand dunes, sand sheets, and colluvial clays downslope. General relief is from north to south with elevation ranging from 5,860 to 4,680 feet msl. Vegetation includes scattered juniper, greasewood, shadscale, snakeweed, cheat grass, and Indian ricegrass. Existing disturbance of the landscape include livestock grazing, roads, and oil and gas facilities.

Public lands managed by BLM within the GDBR have been classified according to BLM's visual resource management (VRM) system (BLM 2004). The VRM system is an analytical process used to inventory, manage, and set management objectives for visual resources on public lands. As part of the VRM, visual management classes are identified that designate permissible levels of landscape alteration with the goal of protecting the overall visual quality of public lands. Visual management classes are as follows:

Class I: Objective: To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention

Class II: Objective: To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.

Class III: Objective: To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.

Class IV: Objective: To provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

The area classification can be used to determine the visual impact of proposed activities and to measure the amount of disturbance an area can tolerate before the proposed activity exceeds the VRM objective.

The extent of VRM classifications is shown on Figure 3.13-1. Currently, most lands within the GDBR are classified VRM Class IV (the classification V is encompassed in Classification IV) that the level of change to the characteristic landscape can be high. The small portion (2,846 acres) of VRM Class III in the southeast part of the GDBR is associated within the badlands topography within the viewing range of motorists along the New and Old Bonanza Highways.

3.14 SOCIOECONOMIC ANALYSIS

The GDBR is located in Uintah County, Utah. The following is a description of the demographics, local economy, and community services in the county that may be affected by the GDBR project.

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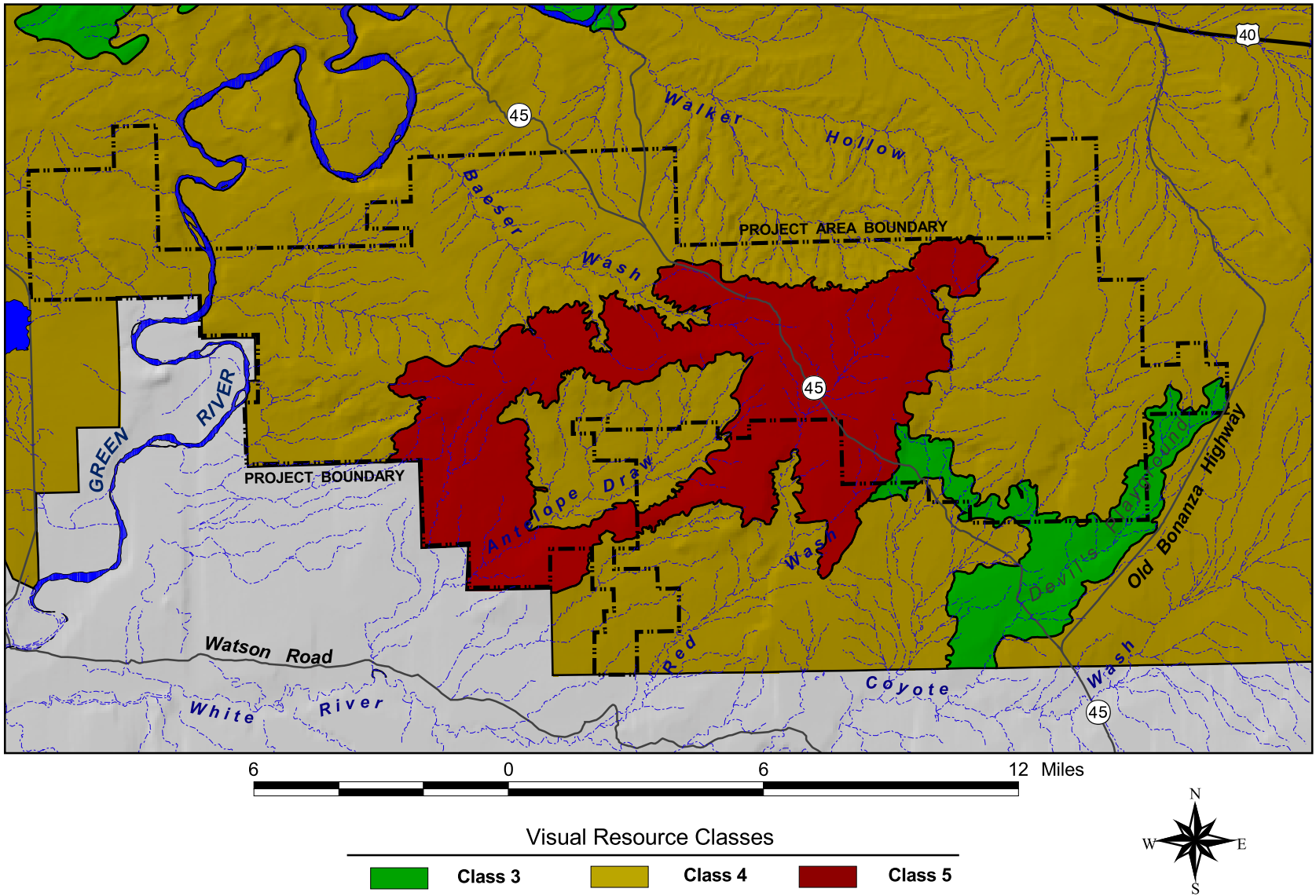

Figure 3.13-1. Visual Resource Classes

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3.14.1 Demographics

Population centers within a reasonable commuting distance of the GDBR include Vernal, Naples, and the northern part of unincorporated Uintah County. In 2002, Uintah County as a whole had a population of 26,155, while the City of Vernal had a population of about 7,879, the City of Naples had a population of about 1,378, and the Town of Ballard to the west had a population of 581. The majority of Uintah County's population is in unincorporated communities such as Maeser, Fort Duchesne, Whiterocks, Jensen, Randlett, and other rural areas, and was estimated to be approximately 16,317 in 2002 (U.S. Bureau of the Census 2002). Figure 1.1-1 shows the geographic locations of the communities in Uintah County. The vast majority of the population of Uintah County resides in communities along Highway 40 and to the north. The GDBR is located south of the more populated part of the county and is virtually uninhabited. In terms of racial composition, approximately 85.9 percent of Uintah County's population is Caucasian, 9.4 percent is Native American, and the remaining 4.7 percent is Hispanic/Latino and of other ethnicities (U.S. Bureau of the Census 2002).

Over the last 30 years, the communities in Uintah County have experienced varying degrees of population growth or decline in response to changes in the economy and the energy industry in particular. From the 1970s to 1983, the population of Uintah County grew steadily in response to employment growth in the energy industry. Following a decline in energy prices and reduced employment in the energy economic sector, the population of Uintah County declined gradually from 1983 to 1989. Throughout the 1990s and to the present, the local population has grown gradually as a result of the diversification of the regional economy and increased activity in the energy sector. This population trend is assumed to continue into the future, with gradual population growth forecasted to the year 2020 (Utah Department of Workforce Services, 2004). Table 3.14-1 provides a summary of population change in Uintah County and the City of Vernal from 1980 to 2000, and projections of future populations to the year 2020.

Table 3.14-1. Population Estimates for Uintah County, Utah 1980 – 2020

Community	1980	1990	2000	2010	2020
Uintah County	20,700	22,230	25,297	27,556	30,302

Source: U.S. Census Bureau, 2002

3.14.2 Local Economy and Employment

Uintah County has experienced broad economic swings over the last 25 years. The local economy has historically been, and remains, heavily dependent on the oil and gas industry. Economic conditions in Uintah County continue to mirror the state of that industry in good times and bad. During the late 1970s to the early 1980s, the county experienced considerable economic growth associated with the energy boom. From 1983 to 1990, the decline of the local oil and gas industry and the regional energy bust resulted in high unemployment and severe economic hardship for many area residents. Since 1990, the economy of Uintah County has diversified to some extent and grown gradually as the oil and gas industry has benefited from rising energy prices and increased profitability. Education, health services, leisure, and hospitality industries have added to Uintah County's economic diversification in recent years (Utah Department of Workforce Services, 2004). Long-term economic forecasts by the Governor's Office of Planning and Budget predict a gradual decline on the oil and gas industry in future years and growth in the lower-paying service sector (GOPB 2004).

Major sources of employment in Uintah County include the mining and oil and gas industries; local, state, and federal government; wholesale and retail trade; and services (GOPB 2004). Table 3.14-2 provides a

breakdown of nonagricultural sources of employment by economic sector in Uintah County. As of March 2004, Uintah County was experiencing an unemployment rate of 5.3 percent, which was comparable to the State of Utah and United States as a whole at 5.0 and 5.6 percent unemployment, respectively (Utah Department of Workforce Services, 2004). Total nonagricultural employment in Uintah County was approximately 10,324 as of July 2004.

Table 3.14-2 Sources of Employment in Uintah County by Sector, 2003-Present

Employment Sector	Number of Jobs	Percent of Total
Mining, Oil and Gas	1,845	17.9
Construction	551	5.3
Manufacturing	189	1.8
Trade (Wholesale and Retail), Transportation and Utilities	2,189	21.2
Information Services	133	1.3
Professional Services[a]	790	7.7
Education and Health Services	784	7.6
Services[b]	1,252	12.1
Government	2,591	25.1
Total	**10,324**	**100.0**

Source: Utah Governor's Office of Planning and Budget, 2005.
[a] Professional Services include finance, insurance, real estate, and other professional services.
[b] Services include leisure, hospitality, and other services.

Due to the prevalence of the oil and gas and trade industry in Uintah County, wages are generally higher than in other rural counties in Utah, although they are lower than in counties along the more prosperous Wasatch Front. Uintah County's average monthly wage of $2,201 ranks 11th in the state, and is about 88% of the state average of $2,510. Of the various employment sectors in the local economy, the mining (including oil and gas), transportation and utilities, and financial services sectors provide the highest wages in Uintah County, while the manufacturing, trade, education and health services sectors provide substantially lower wages. Table 3.14-3 provides a summary of monthly wages paid by the various industries that make up the Uintah County economy. Total personal income in Uintah County as of March 2004 was $502.7 million. Per capita income was about $19,374, which is lower than the state per capita income of $24,157.

Table 3.14-3. Uintah County Average Monthly Wages by Economic Sector, 2002

Sector	Average Monthly Wage
Transportation & Utilities	$3,791
Mining, Oil & Gas	$3,596
Financial Services	$2,957
Government	$2,278
Construction	$1,873
Professional & Business Services	$1,773

Sector	Average Monthly Wage
Trade	$1,746
Information Services	$1,688
Other Services	$1,697
Manufacturing	$1,549
Education & Health Services	$1,510
Leisure & Hospitality	$625

Source: Utah Department of Workforce Services, 2004.

3.14.3 Community Emergency Response Services

In general, for law enforcement and fire response in the GDBR, the BLM is responsible for those services. In some cases, the Uintah County Sheriff may respond, depending on the nature of the crime or emergency that has occurred.

Medical services are provided by Ashley Valley Medical Center in Vernal. Ambulance service to the medical center is available and provided by Gold Cross Ambulance, a contract service provider. In situations requiring rapid evacuation of an injured worker or patient in distress, CareFlight helicopter service to St. Mary's Hospital in Grand Junction, Colorado is available.

3.14.4 Local Government Fiscal Conditions and Revenues from Oil and Gas Activities

Oil and gas operations contribute considerable revenue to various local, state, and federal government entities through payment of various royalties and taxes. The following types of revenues are typically generated by oil and gas development.

3.14.4.1 Property Tax Revenue

Among the most important sources of revenue in Uintah County are property taxes levied on locally and centrally assessed property. This revenue source is used by the counties to fund a wide variety of services and community facilities. Given their generally high assessed value, oil and gas and other types of industrial operations often contribute a significant portion of a county's property tax base.

In Uintah County, approximately 57 percent of total assessed valuation is associated with centrally assessed properties including oil and extraction operations, pipelines, mining operations, electric utilities, and telecommunications facilities. Locally assessed properties include residences, local businesses, farms, and other properties that are not centrally assessed. Locally assessed properties comprise approximately 38 percent of total assessed value in Uintah County. Personal property, including machinery and tools, office equipment and furniture, and medical equipment, comprises the remaining 5 percent of assessed value in Uintah County. Oil and gas extraction operations in Uintah County contribute substantially to the local property tax base. These operations were assessed at a value of $418,801,897 in 2003, which amounts to about 26 percent of Uintah County's total assessed valuation of $1,593,779,187 (Uintah County Clerk Auditor's Office, 2004).

In Uintah County, the Uintah County School District receives the largest portion of property tax revenue, followed by the Uintah County government, State-supported schools, the Uintah County Library, various local water districts, parks and recreation facilities, and the various local city and town governments. In

total, approximately $16.6 million in property tax revenue was distributed to these entities in Uintah County in 2003 (Uintah County Clerk Auditor's Office, 2004).

In addition to ad valorem tax payments, Uintah County also collects payments-in-lieu of taxes (PILT) from the federal government for public lands within the county. In 2003, federal PILT taxes paid to Uintah County amounted to approximately $1.2 million.

3.14.4.2 Federal Mineral Lease Royalties

Federal mineral lease royalties are collected from oil and gas, gas plant products, Gilsonite, and phosphate extraction operations located on federally administered public lands in Uintah County. At present, the federal royalty rate for gas is based on a step scale that varies by production rate. Federal mineral leasing regulations require the return of 50 percent of royalties collected from these operations to the state of origin.

The 50 percent state share is apportioned as follows: 70 percent to the Permanent Community Impact Fund (PCIF), and 30 percent to the Mineral Bonus Account (30%). The Mineral Bonus Account funds are then further distributed among several agencies and funds including the Utah Department of Transportation, Utah Department of Community and Economic Development (allocated to local county special service districts), the State Board of Education, the Utah Geological Survey, and the Water Research Laboratory at Utah State University (UC 59-21).

In 2001, total federal mineral lease royalties generated by operations in Uintah County amounted to approximately $35.6 million, of which about $3.2 million returned directly to Uintah County to the county recreation and transportation special service districts (U.S. Minerals Management Service, 2002). Moreover, the PCIF provided numerous grants and loans to Uintah County and other local municipal governments for the funding of various infrastructure projects. From 1999 to 2003, the PCIF provided a total of $25.1 million to Uintah County, the Cities of Vernal and Naples, the Town of Ballard, and other water and special service districts for street improvements, water and sewer infrastructure, municipal buildings, and other facilities (Utah Department of Community and Economic Development 2004).

3.14.4.3 Sales and Use Tax Revenue

Sales taxes are paid by oil and gas operations when purchases of equipment, materials, or supplies are made in the local area. Examples of purchases that generate sales tax revenue include gravel, pipe, fuel, and other supplies purchased locally. Like property tax revenue, sales and use tax revenues are used by local cities and counties to fund a wide variety of important local services and community facilities.

Currently, the sales and use tax rate in Uintah County is 6.5 percent (4.75 percent state, 1.75 percent county/local). In 2003, taxable sales in Uintah County yielded tax revenues of approximately $2.2 million (Uintah County Clerk Auditor's Office, 2004).

3.15 NOISE

Noise is generally described as unwanted sound. Discussions of environmental noise do not focus on pure tones because commonly heard sounds have complex frequency and pressure characteristics. Accordingly, sound measurement equipment has been designed to account for the sensitivity of human hearing to different frequencies. Correction factors for adjusting actual sound pressure levels to correspond with human hearing have been determined experimentally. For measuring noise in ordinary environments, A-Weighted correction factors are employed. The filter de-emphasizes the very low and

very high frequencies of sound in a manner similar to the response of the human ear. Therefore, the A-weighted decibel (dBA) is a good correlation to a human's subjective reaction to noise.

The dBA measurement is on a logarithmic scale. To the average human ear, the apparent increase in "loudness" doubles for every 10 dBA increase in noise (Harris 1991). Taking a baseline noise level of 50 dBA in a daytime residential area, noise of 60 dBA would be twice as loud, 70 dBA would be four times as loud, and 80 dBA would be eight times as loud.

3.15.1 Regulatory Noise Standards

Noise standards have not been established within the GDBR by BLM, the State of Utah, or Uintah County. However, the Environmental Protection Agency (EPA) established a noise level of 55 dBA as a guideline for acceptable environmental noise (EPA 1974). This established noise level is used for a basis of evaluating noise effects when no other local, county, or state standard has been established. It is important to note that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value of the public health and welfare. Furthermore, this noise level is directed at sensitive receptors (residences, schools, medical facilities, recreational areas) where people would be exposed to an average noise level over a specific period of time.

In this context, public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance as well as the absence of clinical symptoms such as hearing loss or demonstrable physiological injury. A 55 dBA noise level should not be misconstrued as a regulatory goal. Rather, the 55 dBA noise level 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.

3.15.2 Common Noise Levels

The following presents a discussion of noise levels common to most people in small communities and rural areas. These levels are meant to represent the average noise levels over a given period (for example, a 24-hour interval or a yearly average) in various land use areas. Depending on the location and the quantity and type of noise sources, these levels can have a large variation but generally vary in the range of 3 to 5 dBA (EPA 1974). For a comparison to a familiar human activity, the average noise level experienced during normal conversation of two people five feet apart is 60 dBA. Table 3.15-1 shows examples of noise levels generated by commonly experienced sources and the relative strength of the "loudness" of noise levels compared to normal conversation.

Table 3.15-1. Common Noise Levels

Noise Source	Average Noise (dBA)	"Loudness" (compared to normal conversation)	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

Noise Source	Average Noise (dBA)	"Loudness" (compared to normal conversation)	Range of Noise (dBA)
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
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)

3.15.3 Existing Project Area Noise Levels

Currently, gas and oil drilling and production activities are widespread and limited in scale within and near the GDBR. No other significant noise sources are nearby. Noise levels are elevated near well pad and access road construction, drilling rigs, along access roads, and along State Highway 45, the major thoroughfare through the GDBR. However, because of the limited development, it is estimated that overall noise levels are typical of a rural area (about 40 dBA) away from natural gas development and production equipment.

3.16 HEALTH AND SAFETY

In general, existing health and safety concerns associated with oil and gas exploration and production in the GDBR include occupational hazards associated with construction, operation, and maintenance activities at natural gas well pads and associated facilities. Other health and safety issues include traffic-related accidents, manmade wildfires, potential natural gas and hydrogen sulfide leaks, and accidental spills or releases of hazardous substances.

The construction of well pads, roads, pipelines, compressors, and other oil and gas facilities and operation and maintenance of those facilities involves the use of heavy equipment, drill rigs, trucks, welding equipment, power tools, and other machinery that inherently exposes workers to risks for accidents and injuries. To date, occupational accidents elsewhere in the GDBR from existing oil and gas development have been limited in number.

Truck and other vehicle traffic using roads serving the GDBR create a risk of traffic accidents and hazards, particularly during periods of inclement weather or poor visibility. Oil and gas exploration and production inherently has the potential to cause wildfires due to the presence of flammable liquids and gasses and the use of welding equipment, vehicles, and other potential ignition sources. Accidents involving leaks of natural gas and/or hydrogen sulfide in some cases are also possible. According to the Colorado Department of Transportation statistics along the nearest major highway, U.S. Highway 40 in the vicinity of Vernal, an average of 144 traffic accidents occurred from 2002 through 2004. On the average, 33 percent of these accidents involved injuries, and 2 percent were fatal accidents.

Various hazardous materials are used in the construction, operation, and maintenance of oil and gas exploration and production projects, including, diesel fuel and gasoline, various oils and lubricants, and cleaners. In addition, natural gas production can produce liquid hydrocarbons, or condensate, which may contain compounds deemed hazardous if spilled or ingested.

Table 3.16-1. Crash History on U.S. Highway 40 from Ft. Duchesne to Vernal

Year	Total Crashes	Truck Crashes		PDO[1] Crashes	Injury Crashes		Fatal Crashes	
		Number	%		#	%	#	%
2002	146	6	4%	97	47	32%	2	1%
2003	131	7	5%	75	52	40%	4	3%
2004	155	13	8%	110	43	28%	2	1%
Average	144	9	6%	94	47	33%	3	2%

[1] Property Damage Only (PDO).
Source: UDOT. 2006. Crash Data Section. Fara Williams (UDOT)

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4.0 ENVIRONMENTAL CONSEQUENCES

Direct and indirect effects to environmental resources resulting from the Proposed Action and No Action alternatives are disclosed in this chapter. Following the drilling and initial completion activities, QEP would begin interim reclamation efforts on a portion of the pad plus the reserve pit. Interim reclamation would be attempted to reduce surface disturbance over the life of the project. Although reclamation efforts would be attempted, the probability of success would be limited due to the low annual precipitation and the physical and chemical properties of the soils. Recent BLM monitoring has documented that interim reclamation efforts in oil and gas development areas have largely been unsuccessful at reestablishing soil stability and vegetation. Accordingly, BLM field inspections are indicating that initial disturbance should be more accurately portrayed as long-term effects. Therefore, the acreage disturbed initially for construction, drilling and completion is assumed to remain void of desired vegetation for the long-term length of the GDBR project. The differences between the short-term and long-term disturbances are presented for informational purposes if reclamation would be successful.

The analysis in this chapter is based on application of the applicant-committed BMPs listed in Section 2.3. The mitigation following the effect descriptions are additional actions that BLM may impose as Conditions of Approval in the Record of Decision. The unavoidable adverse effects are effects that remain after application of the additional mitigation. The following assumptions apply to the analysis of effects for all resources:

- BLM has the discretion under the oil and gas regulations to move proposed wells up to 200 meters or delaying operations up to 60 days to avoid effects on cultural, wetland, floodplains, special wildlife habitats and other sensitive resources.
- Annual effects are based upon a regular development of about 125 wells per year for a 10-year period.
- The discussions in Chapter 4 all refer to the direct and indirect effects of the Proposed and No Action alternatives. Cumulative effects are discussed in Chapter 5.

4.1 GEOLOGY AND MINERALS

4.1.1 Direct and Indirect Effects

4.1.1.1 Proposed Action

QEP estimates that production over the 40-year life of the project would be 615.2 billion cubic feet (bcf) of natural gas and 9.52 million barrels of oil. Under the Proposed Action, fossil fuel resources would be largely depleted and therefore not available for future generations.

Potential effects to geologic resources include changes to the local topography and slope stability issues. Well pads excavated along ridge tops would cut into the sandstone and sandy shale bedrock of the Duchesne Formation. The well pad excavations would change the local topography to include square- or rectangular-shaped cuts and fills in the ridges. Undercutting of side slopes for well pad construction could occur in some locations. Undercutting of slopes has the potential to generate slope instability. Depending on the slopes involved, this instability could lead to slumping of material adjacent to the well pad. The slumps would likely occur following rainstorms or during snowmelt. However, well pad construction would be designed to minimize the potential for slumping.

Potential effects to Gilsonite resources are not anticipated from the Proposed Action. Drilling operations would avoid known veins of Gilsonite because the brittle material causes drilling difficulties, including lost circulation. In addition, as discussed in Section 3.1.4, Gilsonite has not been observed in commercial quantities at the surface within the GDBR, and it is unlikely that significant Gilsonite resources are present within the boundaries of the GDBR.

Potential effects to salable mineral resources (sand, gravel, and decorative stone) are not anticipated from the Proposed Action. There is little demand for these materials within the GDBR because more convenient supplies are located on other public lands within the Uinta Basin.

4.1.1.2 No Action

Based on a 209 well level of development, QEP estimates that production over the 40-year life of the project would be 106.8 billion cubic feet (bcf) of natural gas and 1.44 million barrels of oil. These predicted withdrawals would probably be higher because adjacent federal leases would not be developed and hydrocarbon drainage would probably occur from federal mineral rights. However, a large portion of the fossil fuel resources in the GDBR would likely not be depleted and would be available for future generations.

4.1.2 Mitigation

On slopes greater than 20 percent, an erosion control plan should be developed in conjunction with the APD process.

4.1.3 Unavoidable Adverse Effects

None

4.2 WATER RESOURCES

4.2.1 Direct and Indirect Effects

4.2.1.1 Proposed Action

This section addresses potential effects on surface and ground water resources resulting from the development of natural gas and oil in the GDBR. Potential effects for water resources include sediment loading project-wide and in separate watersheds, potential for spills contaminating surface and ground water, and loss of contaminants from pits and tanks.

<u>Surface Water</u>

The Green River is the only perennial stream within the GDBR. Effects to surface water would occur over time as water would flow into drainages and collect sediment in the numerous watersheds during snow melt and short-duration precipitation events. Sediment loss calculations resulting from the construction and operations of the Proposed Action are shown in Section 4.4 and Appendix 4-1. This section discusses the eventual fate of sediment loading on perennial water bodies near the GDBR. Over time, sediment from the GDBR facilities would reach the drainages of each watershed resulting from short-duration precipitation events and snowmelt. As precipitation events and snow melt would occur, this sediment would then be transported to the White River to the south of the GDBR and the Green River to the west.

In terms of assessing water depletion of the Green River, the GDBR project would extract a maximum of 2,408 acft/yr, approximately half of their existing water rights of 4,705 acft/yr. The total annual withdrawal for the project would represent only 0.23% of the lowest mean flow since 1947, and only 0.04% of the maximum flow during the same period.

In terms of assessing the overall effect in terms of sediment loading on the White and Green Rivers, sediment generated due to the project would be negligible. Existing sediment loading in the White River near Watson, Utah just upstream from the GDBR, averages 140,000 tons/month (ranging between 1,160 – 2,182,600 tons) or 1,680,000 tons/year (Lentsch, et al. 2000). Sediment loading in the Green River at Jensen, Utah, 20 miles upstream from the GDBR, averages around 807,000 tons/month (ranging between 52,651 and 3,231,564 tons/month) or 9,684,000 tons/year (Lentsch, et al. 2000). The highest sediment loading occurring during the months of snow melt runoff period in May and June. Sediment loading from the GDBR is expected to be no greater than 2,375 tons/yr. With the very conservative assumption that all available sediment would be transported to these rivers, the GDBR project would result in only a 0.03% increase of the existing sediment loading in both the Green and White Rivers.

Floodplains

Executive Order Number 11988 requires federal agencies to make decisions in a manner that promotes avoidance of adverse effects and reduces the risk of property loss and human safety due to floodplain development/modification, and preserves the natural and beneficial values of floodplains. Floodplain development/modification is allowed only if there are no other feasible alternatives.

According to the programmatic location of potential well pads, 22 well pads and associated roads and pipelines could be constructed within the six floodplains within the GDBR. However, based on the assumption that at the site specific review of APDs, BLM would be able to move and locate facilities outside of the floodplains except for crossing by roads and pipelines.

The construction of these facilities within floodplains would result in greater soil erosion and lead to a higher probability of hydrocarbon containment from spills or water potentially flowing across a well pad. Accidental hydrocarbon flow from a well pad would likely occur when water flow would be high during heavy spring runoff or high-intensity, short-duration thunderstorms.

Where pipelines would cross washes, potential effects would be reduced by following recommendations in the Utah BLM guidance document “Hydraulic Considerations for Pipeline Crossings of Stream Channels” (BLM 2004b). There would be short-term, localized increases in sediment during construction of pipelines and roads that would cross stream channels. No roads or pipelines would cross the Green River.

These recommendations would help prevent erosion and increased sediment yield at these locations. Best management practices would include the following:

- construct pipeline perpendicular to the wash or floodplain;
- select a location where the wash or floodplain is the narrowest;
- bury the pipeline approximately 5 feet; and
- attempt reclamation (revegetation) as soon as possible.

Public Water Reserves

Because public water reserves are withdrawn from settlement, mineral location, sale, or entry, per Executive Order Number 107 dated April 17, 1926, no well pads, roads, or pipelines can be constructed within the boundaries of the 120-acre parcel is in T7S, R23E, Section 17 and the 40-acre parcel in T8S, R22E, Section 11. E.O. 107 shall be complied with. The Book Cliff RMP designated all public water reserves with a No Surface Occupancy lease stipulation. Therefore, no effects to these parcels would occur.

Ground Water

State-of-the-art drilling and completion techniques would be used in the GDBR. Thus, the potential of affecting shallow aquifers would be minimal. Well completion would be performed in accordance with Onshore Oil and Gas Order No. #2 (43 CFR 3164.1) which states the following:

"Proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones, potentially protective zones, lost circulation zones, and any prospectively valuable deposits of minerals. The use of any isolating medium other than cement shall be approved in advance by the BLM Authorized Officer's (AO)."

To potentially protect groundwater and soil resources, a requirement for lining the reserve pit would be site-specific and would be based upon the AO's evaluation during the APD process. Generally, a pit liner would not be required in clay or bentonite soils while a liner would usually be required in sandy soil and fractured shale. If it is determined by the AO during the on-site inspection that a pit liner would be necessary, the reserve pit would be lined with a synthetic reinforced liner, a minimum of 12 millimeters thick, and sufficient bedding would be used to cover rocks. The liner would overlap the pit walls and be covered with dirt and/or rocks to hold it in place.

In the GDBR, water quality data are virtually nonexistent. According to the Utah Division of Natural Resources (UDNR), all wells drilled to about 300 feet below ground surface have been dry. Therefore, the likelihood of adverse effects to usable groundwater is virtually non-existent.

Accidental spills of hydrocarbon products would have the potential to affect ground water and potential surface waters if the spills would occur when flow would be occurring in the washes of the GDBR. QEP must implement a Spill Prevention, Control, and Countermeasure (SPCC) plan per the provisions of 40 CFR 112. QEP would construct a containment dike completely around those production facilities which contain fluids (i.e., production tanks, produced water tanks). These dikes would be constructed of compacted impervious subsoil; hold 110% of the capacity of the largest tank; and, be independent of the back cut. Facilities must implement the SPCC, including carrying out the spill prevention and control measures established for the type of facility or operations, such as measures for containing a spill (e.g., berms or secondary containment around tanks). In addition, facility owners or operators must conduct employee training on the contents of the SPCC Plan.

This regulation establishes requirements for facilities to prevent oil spills from reaching the navigable waters of the U.S. or adjoining shorelines. The rule applies to owners or operators of certain facilities that drill, produce, gather, store, process, refine, transfer, distribute, use, or consume oil. The regulation applies to non-transportation-related facilities with a total aboveground (i.e., not completely buried) oil storage capacity of greater than 1,320 gallons, or total completely buried oil storage capacity greater than 42,000 gallons. SPCC plans would be required for 200 to 400 barrel tanks to collect condensate on all natural gas wells. Individual oil well pads would not have tanks on the pad and would not require an SPCC. However, an SPCC would be required on all CTFs where oil would be collected and stored from

multiple wells. The implementation of Best Management Practices while constructing well pads and CTFs and the implementation of SPCCs would minimize the probability of any accidental spills leaving the well pad and eventually reaching the navigable waters of the U.S.

4.2.1.2 No Action

Sediment generated from the No Action disturbance would be negligible. Existing sediment loading in the White River near Watson, Utah just upstream from the GDBR, averages 140,000 tons/month (ranging between 1,160 – 2,182,600 tons) or 1,680,000 tons/year (Lentsch, et al. 2000). Sediment loading in the Green River at Jensen, Utah, 20 miles upstream from the GDBR, averages around 807,000 tons/month (ranging between 52,651 and 3,231,564 tons/month) or 9,684,000 tons/year (Lentsch, et al. 2000). The highest sediment loading occurring during the months of snow melt runoff period in May and June. Sediment loading from the GDBR is expected to be no greater than 705 tons/yr. With the very conservative assumption that all available sediment would be transported to these rivers, the GDBR project would result in only a 0.01% increase in sediment loading in both the Green and White Rivers.

Groundwater effects would be insignificant because considerably fewer well pads and wells would be developed. SPCC plans would be an EPA requirement on all wells regardless of surface ownership. However, the installation of a liner on state and private drilling pits would be directed by UDOGM as required.

4.2.2 Mitigation

Well pads and facility sites would be constructed to prevent overland flow of water from entering or leaving sites. This could be accomplished through the use of berms, terraces, and grading from depressions. These measures would prevent storm water from leaving the sites, and would divert storm water around the sites.

Well pads would be moved to avoid placement in the 100-year floodplains. If, due to topography or other environmental constraints, the well pads could not be moved out of the 100-year floodplains, the well pads would be sited as far as possible to the edge of the 100-year floodplain and designed/constructed in manner that would minimize harm to or within the floodplain.

Roads crossing floodplains would be constructed at the narrowest part of the floodplain and perpendicular to the floodplain, where feasible.

Roads crossing floodplains would be constructed with culverts as approved by the Authorized Officer.

4.2.3 Unavoidable Adverse Effects

None.

4.3 AIR QUALITY

4.3.1 Direct and Indirect Effects

4.3.1.1 Proposed Action

Project-related emissions have the potential to affect air quality on both a local and a regional scale. Emission inventories for the criteria pollutants [nitrogen oxides (NO_x), carbon monoxide (CO), sulfur

dioxide (SO_2), particulates (PM_{10} and $PM_{2.5}$)] and hazardous air pollutants (HAP) were developed for construction and operational-related activities. Pollutant dispersion modeling was performed to assess the potential air quality effects from the Proposed Action with respect to various significance criteria. The modeling assessment of the GDBR project consists of evaluating air quality effects on sub-grid, near-field, and far-field scales. The Industrial Source Complex (ISC) dispersion model was used to evaluate the sub-grid and near-field effects. The CALMET/CALPUFF dispersion model was used to evaluate far-field effects.

The sub-grid analysis modeled air quality effects from short-term activities such as well pad and road construction, well drilling, and well completion activities that would be geographically separated such that air quality effects from multiple locations would not overlap. A construction scenario was developed for each short-term activity. The sub-grid modeling also assessed effects from hazardous air pollutants (HAP).

The near-field analysis involved the effects within the GDBR, and to a distance of 10 kilometers beyond the project boundary, that would occur from permanent facilities installed for the 40 year life of the project. This analysis included all well pad, compressor station, and vehicle-related emissions that would occur after the field would be fully developed.

The far-field analysis evaluated potential air quality effects as well as air quality related values (visibility and acid deposition) at distant federal Class I and selected Class II areas. Modeling was performed to assess both construction and operational effects.

This section summarizes the air quality effects of the GDBR Proposed Action. The complete description of emissions, processes, modeling methodology, and results is found in the GDBR Air Quality Technical Support Document available from the Vernal Field Office.

Emissions

Emission inventories were developed for the Proposed Action and the alternatives. The annual emissions during both peak-year construction activities and average long-term operations are described in detail in GDBR Air Quality Technical Support Document (TSD) available from the Vernal Field Office. Project emissions would be emitted from the following activities and sources:

- Well pad and road construction: equipment producing fugitive dust while moving and leveling earth;
- Drilling: vehicles generating fugitive dust on access roads, and drill rig engine exhaust;
- Completion: vehicles generating fugitive dust on access roads and flaring emissions;
- Gas well pad operation: 3-phase separator, flashing and breathing emissions from a condensate tank;
- Oil well pad operation: pumping unit;
- Central tank facility: two 3-phase separators with boilers, flashing and breathing emissions from tanks;
- Field compressor stations: 15 2,000-horsepower compressor natural gas fired engines (total new rating of 30,150 hp).
- Fugitive dust emissions from vehicles; and

- Tailpipe emissions from vehicles.

The following tables summarize the annual emissions associated with construction and operations. Construction emissions would occur for the first 10 years while operational emissions would last for the 40-year life of the project.

Table 4.3-1. GDBR Proposed Action Annual Construction Emissions (tons/year)

Pollutant	Pad/Road Construction	Drilling	Completion	Wind Erosion	(tons/yr)
NO_X	3.5	765.0	1.8	0	770.3
CO	1.4	188.2	10.4	0	200.0
SO_2	0.1	13.0	0	0	13.2
PM_{10}	45.7	673.1	177.9	1.9	898.6
$PM_{2.5}$	11.2	115.6	27.3	0.8	154.9

Table 4.3-2. GDBR Proposed Action Annual Operations Emissions (tons/year)

Pollutant	15 Compressor Stations	15 Dehydrator Reboilers	969 Gas Well Pad Heater Separators	Vehicles	52 Oil Well Pad Pumping Units	22 CTF Heater Separator	Project Total
NO_X	291.1	4.9	159.2	1.8	40.2	7.2	504.3
CO	582.2	1.1	33.4	17.1	40.2	1.5	675.4
SO_2	0	0	0	0.1	0	0	0.1
PM_{10}	20.5	0.4	12.1	249.1	0	0.6	282.6
$PM_{2.5}$	0	0.4	12.1	38.2	0	0.6	51.2

Note: emissions based on full-field operation after all development complete

Table 4.3-3. GDBR Proposed Action Annual Operations HAP Emissions (tons/year)

HAP	Well Production	Gas Compression and Processing	Emissions (tons/year)
Benzene	7.7	2.3	10.1
Toluene	7.7	1.6	9.3
Ethylbenzene	0.2	0.1	0.3
Xylene	3.0	0.8	3.8
n-Hexane	37.4	0.2	37.6
Formaldehyde	2.1	29.1	31.3

Sub-Grid Effects

The major pollutant associated with construction and development would be PM_{10} generated by earth-moving and traffic activities. Other pollutant emissions would occur from vehicle and equipment exhaust. Based upon QEP's proposed development plan, 79 pads would be constructed annually and 125 wells would be drilled and completed. Each phase in the development of a single well (construction, drilling and completion) was modeled separately. A well pad and the nearest one mile of the adjoining unpaved access road were included in this analysis. The construction-, drilling-, and completion-related air quality effects were analyzed for one well pad and the associated access road with the assumption that one well pad and access road would be developed at any one time and construction activity would be separated by a sufficient distance and time such that the short-term effects from one construction and development site would not overlap with another site. It was also assumed that although 3 to 5 drill rigs could operate simultaneously, the drilling activity would be widespread in the GDBR and short-term effects would not overlap.

The modeling indicated that the highest fugitive dust levels would be during drilling activities that could last from 5 to 90 days at any one location. The results of all development phases (construction, drilling, and completion) are shown in Table 4.3-4. The modeling demonstrates that PM_{10} ambient air concentrations would be below standards for the lengths of these development activities. Effects would be the greatest for pad and access road construction because activities would be concentrated on the construction site. Even though these would be short-term effects, the annual PM_{10} results are also shown to demonstrate that even if these activities lasted for an entire year at one location, the effects would still be less than all applicable standards.

Near-Field Effects

Effects from the project activities were evaluated using the ISC dispersion model near the GDBR. The results indicated that the Proposed Action would be in compliance with all applicable air quality standards.

Table 4.3-4. Modeled PM_{10} Effects from GDBR Construction and Development

Activity	24-Hour Maximum Ambient Air Concentration ($\mu g/m^3$)[1]			Annual Maximum Ambient Air Concentration ($\mu g/m^3$)[1]		
	Modeled Effect	With Background[2]	Percent of 24-Hour Standard 3 (Project + Background)	Modeled Effect	With Background[4]	Percent of Annual Standard [5] (Project + Background)
Pad and Road Construction	40.7	68.7	45.8	7.2	17.2	34.4
Drilling	35.7	63.7	42.4	8.8	18.8	37.6
Completion	19.3	47.3	31.5	4.7	14.7	29.4

[1] µg/m3 is micrograms of pollutant per cubic meter of air
[2] 24-hour PM_{10} background is 28 $\mu g/m^3$
[3] 24-hour PM_{10} standard is 150 $\mu g/m^3$
[4] Annual background is 10 $\mu g/m^3$
[5] Annual standard is 50 $\mu g/m_3$
[1] Source: EPA AirData Air Pollution Database. PM_{10} Tribal Monitor, Myton, UT, Site ID 490137011. Annual Data from 2002 through 2005 (EPA 2005). 24-hour PM_{10} represents the average of 1st maximum 24-hour values from 2002 though 2005. Annual PM_{10} represents the annual average from 2002 through 2005.

Table 4.3-5. GDBR Proposed Action Predicted Effects

Pollutant	Averaging Period	GDBR Max ($\mu g/m^3$)	% of PSD Class II Increment	Project + Background ($\mu g/m^3$)	% of NAAQS (Project + Background)
NO_2	Annual	20.6	82.4	30.6	30.6
PM_{10}	24-hour	20.9	69.7	48.9	32.6
PM_{10}	Annual	5.3	31.2	15.3	30.6
CO	1-hour	985	NA	1,209	3.1
CO	8-hour	302	NA	1,413	14.1

NO2 annual background 10 $\mu g/m^3$
PM_{10} 24-hour background 28 $\mu g/m^3$
PM_{10} annual background 10 $\mu g/m^3$
CO 1-hour background 1,111 $\mu g/m^3$
CO 8-hour background 1,111 $\mu g/m^3$
NO_2 and CO Source: Dave Prey, Utah Division of Environmental Quality - Division of Air Quality (UDAQ), Personal Communication, November 30th, 2005. Data represent UDAQ estimates for rural areas within the Uintah Basin.
PM_{10} Source: EPA AirData Air Pollution Database. PM_{10} Tribal Monitor, Myton, UT, Site ID 490137011. Annual Data from 2002 through 2005 (EPA 2005). 24-hour PM_{10} represents the average of 1st maximum 24-hour values from 2002 though 2005. Annual PM_{10} represents the annual average from 2002 through 2005.

After all construction would be complete, the highest predicted ambient air concentrations of PM_{10}, NO_2, and CO near project activities is predicted to be 33 percent, 31 percent, and 14 percent, respectively, of the applicable ambient air standards. These maximum levels would all occur within the GDBR boundary. Comparisons with 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 Utah and the Environmental Protection Agency. Based upon the modeling results, it can be concluded that the Proposed Action would not contribute to any near-field exceedance of applicable air quality standards.

A “most-likely scenario” was developed to assess the HAP effects. A representative modeling grid was developed to consider the total effect of all potential HAP sources during production. The grid included two compressor stations, two CTFs, 17 gas wells, and four oil wells. The centers of these facilities were equally spaced 400 meters apart to approximate the closest spacing proposed for the GDBR project. This scenario therefore illustrates the maximum ambient air HAP concentrations that would occur in the GDBR from multiple facilities. The modeled compressor station contained a compressor engine building, a central separator and a dehydration unit. Each gas well pad contained a separator and condensate tank. The modeled CTFs contained tanks and a separator. The modeled oil wells only involved a pumping unit engine. Table 4.3-6 demonstrates that ambient air effects would be well below applicable health thresholds.

Table 4.3-6. Non-Carcinogenic Acute RELs and RfCs (Proposed Action)

HAP	REL ($\mu g/m^3$)	Modeled Maximum 1-Hour Effect ($\mu g/m^3$)	% of REL	RfC [3] ($\mu g/m^3$)	Modeled Maximum Annual Effect ($\mu g/m^3$)	% of RfC
Benzene	1,300 [1]	2.01586	<1	30	0.09297	<1
Toluene	37,000 [1]	5.08102	<1	400	0.21508	<1
Ethylbenzene	350,000 [2]	0.21598	<1	1,000	0.00891	<1

HAP	REL (µg/m^3)	Modeled Maximum 1-Hour Effect (µg/m^3)	% of REL	RfC [3] (µg/m^3)	Modeled Maximum Annual Effect (µg/m^3)	% of RfC
Xylenes	22,000 [1]	1.69187	<1	100	0.07218	<1
n-Hexane	390,000 [2]	17.3316	<1	200	0.60507	<1
Formaldehyde	94 [1]	9.39333	9.9	9.8	0.42684	4.4

[1] EPA Air Toxics Database, Table 2 (EPA, 2002)
[2] Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA, 2002b) since no available REL
[3] EPA Air Toxics Database, Table 1 (EPA, 2002a)

Since benzene and formaldehyde are carcinogenic, annual average concentrations of these two HAPs were modeled and expressed as a long-term cancer risk (based on 70-year exposure). This analysis is based on the highly unlikely scenario that someone would live adjacent to a GDBR facility for 20 to 70 years. Cancer risk was estimated for two exposure scenarios: 1) most likely exposure (MLE) corresponding to a resident that could potentially live an average of 20 years at a particular location in the GDBR, and 2) a maximally exposed individual (MEI) corresponding to an individual that could be exposed for the entire life of the project (assumed as 40 years). Resultant exposure adjustment factors for the MLE and MEI scenarios of 0.286 (20/70) and 0.571 (40/70) were applied to the estimated cancer risk to account for the actual time that an individual would be exposed during a 70-year lifetime.

Table 4.3-7 summarizes modeled HAP cancer risk for the Proposed Action. Effects are predicted to below an incremental cancer risk of 1 in a million. The significant cancer risk criterion of 1 in a million is at the low end of the range of cancer risks typically considered as acceptable when evaluating the health effects of a particular action. The range of acceptable cancer risks when evaluating the health effects of an action varies from 1 in a million to 1 in 10,000.

Table 4.3-7. Carcinogenic HAP Risk (Proposed Action)

HAP	Exposure Scenario	Unit Risk Factor (1/µg/m^3)	Exposure Adjustment Factor	Modeled Annual Effect (µg/m^3)	Cancer Risk
Benzene	MLE	7.8 x 10-6	0.286	0.09297	<1 in a million
Formaldehyde	MLE	5.5 x 10-9	0.286	0.42684	<1 in a million
Benzene	MEI	7.8 x 10-6	0.571	0.09297	<1 in a million
Formaldehyde	MEI	5.5 x 10-9	0.571	0.42684	<1 in a million

Far-Field Effects

Effects on air quality, visibility, acid deposition, and acid neutralizing capacity at high elevation lakes were evaluated at distant Class I and Class II areas using the CALMET/CALPUFF model. The modeling methodology and results for each Class I and Class II areas are described in the TSD. Predicted maximum pollutant concentrations that would occur were compared with the applicable PSD increments. Pollutant concentrations are predicted to be less than 1 percent of all applicable PSD increments except at the adjacent Ouray NWR and at Dinosaur National Monument approximately 10 miles northeast of the GDBR at its closest point. The highest predicted concentrations would be at the adjacent Ouray NWR.

However, the predicted maximum concentrations would be only 5.8 percent of the annual NO_2 PSD Class II increment and 30 percent of the 24-hour PM_{10} PSD Class II increment.

Incremental increases in total nitrogen and sulfur deposition are predicted to be well below the significance threshold (3 kg/ha-yr). In addition, potential changes in ANC at sensitive lakes were shown to be well below the USDA-Forest Service 10 percent change threshold for lakes with background ANC levels above 25 µeq/l.

The predicted maximum levels of visibility degradation during maximum construction and operational activities would be well below the "Just Noticeable Change" significance threshold of 1.0 dv in all Class I areas. In other words, the human eye would not be able to detect any difference less than a 1.0 dv. Therefore, it can be concluded that the GDBR project would not cause any perceptible degradation of visibility at Class I areas.

The results are similar for Class II areas except the Ouray NWR which is immediately adjacent to the GDBR. Maximum visibility degradation is predicted to exceed the 1.0 change in deciview on 4 days with a maximum change of deciview of 1.51. However, Class II areas have no regulatory visibility protection and that these results are provided for NEPA disclosure purposes only.

4.3.1.2 No Action

Under the No Action Alternative, 210 wells (compared to 1,239 under the Proposed Action) would be developed. Construction-related effects would be similar to the Proposed Action at each location. However, the construction period would only last 3 years instead of the 10 year construction period under the Proposed Action. Additionally, only 3 new compressor stations would be required. With approximately 80 percent fewer facilities, air quality effects would be approximately 20 percent of the insignificant levels described for the Proposed Action. Because the analysis has demonstrated that no significant air quality effects would occur from implementation of the Proposed Action, the minor emissions associated with the No Action Alternative would be insignificant both within and near the GDBR and at distant Class I and Class II areas.

4.3.2 Mitigation

Mitigation of air quality effects would be accomplished through the permitting of all regulated air pollution sources through the Environmental Protection Agency, Region 8. The construction and operating permitting processes, where applicable (compressor engines, large glycol dehydration units), typically require the use of clean burning engines and emissions controls to reduce air pollution emissions and effects to air quality. Effects are generally insignificant for minor sources of air pollution (small dehydrators, condensate tanks) and mitigation may not be warranted. The following mitigation could be implemented to reduce effects from fugitive dust:

To reduce the emission of fugitive dust from major roads, routine road watering and/or application of magnesium chloride could be considered.

4.3.3 Unavoidable Adverse Effects

Pollutant emissions from oil and gas facilities would continue for the 40-year life of the project. At the end of the GDBR project, facilities would be dismantled and emissions would cease. However, wind-blown particulate emissions could continue until long-term reclamation would be complete.

4.4 SOILS

4.4.1 Direct and Indirect Effects

4.4.1.1 Proposed Action

The Proposed Action would result in the disturbance of approximately 4,561 acres during the 10-year construction period. Effects to soils would result from vegetation removal, soil exposure, mixing of soil horizons, and soil compaction. Increased erosion could occur due to construction and operation of oil and gas facilities.

Soil erodibility is an estimate of the ability of soils to resist erosion, based on the physical characteristics of each soil. Generally, soils with faster infiltration rates, higher levels of organic matter and improved soil structure have a greater resistance to erosion. Sand, sandy loam and loam textured soils tend to be less erodible than silt, very fine sand, and certain clay textured soils.

There would be a susceptibility to erosion in newly disturbed areas. Erosion potential is high within the GDBR. As shown on Table 3.4-1, , approximately 45 percent of soils are rated with a severe erosion potential, 40 percent are rated with a moderate erosion potential, and the remaining 15 percent are rated with a slight erosion potential.

Table 4.4-1 shows the distribution of facilities that would be constructed on soils with severe, moderate, or slight erosion potential.

Table 4.4-1. Number of New GBBR Facilities on Soils with Erosion Potential

Facility	Erosion Potential		
	Severe	Moderate	Slight
New Well Pads	406	345	142
CTF	11	9	2
Compressor Station	8	7	0

<u>Water Erosion</u>

The rate and magnitude of soil erosion by water is controlled by several factors that include:

- Rainfall Intensity and Runoff
- Soil Erodibility
- Slope Gradient and Length
- Vegetation Type and Cover

The four basic types of water erosion are sheet, rill, gully, and pipe (tunnel). Sheet erosion is defined as the uniform removal of soil in thin layers from sloping land which involves the removal of soil from an area without the development of conspicuous channels. Sheet erosion becomes more serious as gradient increase but can cause problems with slope gradients of only 1 or 2 percent.

Rill erosion is the most common form of erosion. It occurs when soil is removed by water from little streamlets that run through land with poor surface draining. Rills can often be found in between crop rows or on hillsides.

Gully erosion occurs when water cuts down into the soil along a line of flow. Gullies form in exposed natural drainages, in animal trails, in vehicle ruts, and below broken man-made terraces or stock ponds. Gullies cannot be obliterated by ordinary tillage and deep gullies cannot be crossed easily. Gullies and gully patterns vary considerably. V-shaped gullies form in material that is equally or increasingly resistant to erosion with depth. U-shaped gullies form in material that is equally or decreasingly resistant to erosion with depth. The maximum depth to which gullies are cut is determined by resistant layers in the soil, by bedrock, or by the local base level. Many gullies develop headward; that is, they extend up the slope as the gully deepens in the lower part.

Piping (or tunneling) can occur in soils with subsurface layers that allow water to pass more freely than the surface horizon or layer. Runoff enters the soil through surface-connected pores such as rodent burrows. Soil material entrained in the moving water moves downward within the soil and may move out of the soil completely if there is an outlet. The result is the formation of pipes or tunnels that enlarge and coalesce. Piping is especially prevalent in badland regions such with large volumes of mudstone (an unsorted mixture of sand, silt, and clay) as in the vicinity of the GDBR. Piping is a major factor in the development of gullying by means of headward erosion along established stream courses.

Wind Erosion

Wind can also cause erosion and is affected by several factors. One factor is its erodibility. Very fine soils can be suspended by the wind and then transported great distances. Fine and medium grained soils can be lifted and deposited, while coarse particles can be blown along the surface. The abrasion that results can reduce soil particle size and further increase the soil erodibility. Soil roughness is another factor. Soil surfaces that are smooth or ridged offer little resistance to the wind. In addition, the climate in terms of the speed and duration of the wind and available moisture can have a direct affect on wind erosion. When soil moisture levels are very low at the surface of excessively drained soils or during periods of drought, wind erosion can occur more easily. This effect also occurs in freeze drying of the surface during winter months. The lack of windbreaks (trees, shrubs, residue, etc.) also allows the wind to put soil particles into motion for greater distances thus increasing the abrasion and soil erosion. Finally, lack of permanent vegetation cover can result in extensive erosion by wind. Loose, dry, and bare soil is the most susceptible. However, some types of vegetation are better than others in controlling wind erosion.

Soil Erosion Loss

Erosion can either be expressed in terms of long-term or short–term erosion rates. In the intermontane basins of the Rocky Mountains such as the Uintah Basin, Reiners and Heffern (2002) estimated a regional erosional rate from about 1,180 tons to 2,360 tons/acre/year. Short-term erosion or soil loss rates can be estimated on a site specific basis using analytical methods. Although wind erosion is a major factor for soil loss in the region, soil particles displaced by wind would be quickly redeposited in the same general area and would not be considered lost from the site.

The Revised Universal Soil Loss Equation (RUSLE2) was used to estimate soil loss and potential sedimentation loading to water bodies. This equation can be used to estimate sheet and rill soil erosion potential (soil detachment potential but not transport and deposition) based the factors described above including rainfall intensity, soil erodibility, slope steepness and length, vegetation cover, management practices and others. RUSLE2 is the latest version of the Revised Universal Soil Loss Equation (Renard

1997), which was an improvement to the earlier Universal Soil Loss Equation (Wishmeier and Smith 1978).

RUSLE2 is based on the following equation:

a = r * k * L * S * c * p

where:

a = estimated soil loss (tons/acre/year).

r = erosivity factor, an expression of the erosivity of rainfall and runoff at a particular location.

k = soil erodibility factor, an expression of the inherent erodibility of the soil or surface material at a particular site under standard experimental conditions. The value of "k" is a function of the particle-size distribution, organic-matter content, structure, and permeability of the soil or surface material.

L*S = slope length factor/slope steepness factor, an expression of the effect of topography, specifically hill slope length and steepness, on rates of soil loss at a particular site. The value of "LS" increases as hillslope length and steepness increase, under the assumption that runoff accumulates and accelerates in the downslope direction. This assumption is usually valid for lands experiencing overland flow.

c = cover-management factor, based on canopy, ground cover, surface roughness, ridges, below ground biomass and degree of soil consolidation.

p = supporting practices factor. These are management practices such as contouring, use of strip systems (buffers, filters, etc.) terraces, diversions, and impoundments.

The values used to calculate soil loss are shown in Appendix 4-2. Table 4.4-2 presents a summary of results for the RUSLE2 analysis for the GDBR. These results indicate that the average soil loss rates (tons/yr) resulting from disturbance in each watershed would be relatively low when compared to the amount of soil loss which occurs for each under naturally undisturbed conditions (ranging between 0.23 and 2.53 percent). As would be expected, the greatest soil loss due to construction activities would occur in the Baser Creek watershed where approximate 213 new facilities would be constructed. As shown on Table 4.4-3, peak soil loss would occur at Year 10 during the last year of the construction activities. After this point, most well pads would be either partially reclaimed or in the process of being stabilized.

Rangeland Soil Standards

The Standards and Guidelines for Healthy Rangelands developed for soils management would be difficult to attain or maintain in the GBDR for two reasons. The standard states that upland soils should exhibit permeability and infiltration rates that sustain or improve site productivity, considering the soil type, climate, and landform. First, the already sparse vegetation cover would be further reduced by well pad and road development. Also, although interim reclamation would be applied by reducing the well pad size and drilling and completion and then revegetating those reduced areas, the likelihood of success would be low because of the sparse precipitation. In areas of direct disturbance during the life of the project rangeland standards may not be met. However, successful reclamation is expected to return disturbed areas to a condition consistent with rangeland standards after the life of the project.

Table 4.4-2. Summary of GDBR Soil Loss for each Watershed – Proposed Action

Watershed	% of Watershed Disturbed	Soil Loss (tons/yr)				% of Natural Compared to Average Rate
		Max	Min	Average	Natural	
Walker Hollow	1.56%	48	8	33	14,407	0.23%
Baser	3.96%	536	126	372	21,536	1.73%
Antelope Draw	6.54%	579	152	402	15,909	2.53%
Red Wash	1.53%	64	17	44	8,685	0.51%
Kennedy Wash	4.71%	531	134	369	17,894	2.06%
Green River	4.32%	326	87	226	10,766	2.10%
Power Springs	4.49%	32	7	22	944	2.36%
Cow Creek	3.92%	11	3	8	477	1.61%
Coyote Wash	2.91%	52	15	36	2,766	1.31%
Unnamed Tributary	3.93%	196	53	136	6,390	2.13%
Total		2,375	602	1,649	99,774	1.65%

Table 4.4-3. Summary of Soil Loss by Watershed and Year – Proposed Action

Watershed	Acreage	Soil Loss (tons/yr) per Year of Project							
		Surface Disturbance (acres)	2	4	6	8	10	12	14
Walker Hollow	6,508	140	12	21	30	39	48	45	45
Baser	18,812	997	173	263	354	445	536	454	454
Antelope Draw	17,885	1,623	200	295	390	485	579	474	474
Red Wash	6,480	147	22	33	43	53	64	52	52
Kennedy Wash	21,324	1,260	179	267	355	443	531	441	441
Green River	15,944	875	114	167	220	273	326	264	264
Powder Springs	1,229	83	10	16	21	27	32	27	27
Cow Creek	605	45	4	6	7	9	11	9	9
Coyote Wash	3,755	161	19	27	36	44	52	41	41
Unnamed Tributary	9,237	461	69	101	132	164	196	159	159
Total		4,561	802	1,195	1,589	1,982	2,375	1,966	1,966

4.4.1.2 No Action

Using the same approach as presented for the Proposed Action, sediment yield from project activities was calculated for each watershed. It was assumed that all wells and associated access roads would be completed in a three-year period. It was also assumed that pads and wells completed on State and Private Lands would disturb approximately 5.05 acres per installation and those permitted on Federal Lands would disturb approximately 4.53 acres per well site. It was assumed that no new compressor stations or auxiliary facilities would be constructed. The number of new wells and amount of disturbance assumed for each watershed are presented below.

Table 4.4-4. Number of GDBR Facilities on Soils with Erosion Potential – No Action

Facility	Erosion Potential		
	Severe	Moderate	Slight
New Well Pads	76	95	39
CTF	1	1	1
Compressor Station	1	1	1

The No Action Alternative would result in the disturbance of approximately 548 acres Table 4.4-5 presents a summary of estimated soil loss. These results indicate that the maximum soil loss rates (tons/yr) due to disturbance in each watershed are relatively low when compared to the amount of soil loss which occurs under naturally undisturbed conditions (ranging between 0.08% and 1.51%). The maximum annual soil loss would be 705 tons/year compared that predicted for the Proposed Action of 2,375 tons/year. Peak soil loss would occur around Year 3 of the construction activities. After this point, most well pads would have been either reclaimed or in the process of being stabilized and soil loss is predicted to stabilize to 597 tons/year for the 30-year life of the production wells.

Table 4.4-5. Summary of GDBR Soil Loss for each Watershed – No Action

Watershed	% Disturbed	Soil Loss (tons/yr)					% Natural for Max Rate
		Max	Min	Average	Total	Natural	
Walker Hollow	0.44%	24	10	20	305	14407	0.17%
Baser	0.08%	18	7	15	219	21536	0.08%
Antelope Draw	1.95%	304	132	250	3750	15909	1.91%
Red Wash	0.55%	41	18	33	499	8685	0.47%
Kennedy Wash	0.59%	112	50	91	1361	17894	0.63%
Green River	0.76%	163	71	134	2015	10766	1.51%
Power Springs	0.49%	10	4	8	118	944	1.02%
Cow Creek	0.00%	0	0	0	0	477	0.00%
Coyote Wash	0.38%	20	8	16	246	2766	0.72%
Unnamed Trip	0.08%	13	6	11	169	6390	0.21%
Total		705	308	579	8682	99774	0.71%

4.4.2 Mitigation

Although the effects would be minimal, the following measures could be implemented, on a site-specific basis as determined by the AO, to reduce erosion and subsequent sediment loading.

Roads should be constructed to Gold Book Standards, BLM and USFS Publication 2006.

Well pads located adjacent to drainages should be constructed with sufficient berms to prevent pad runoff from entering the drainage.

Diversion ditches constructed to reroute drainages around well pads should be designed to divert the water back to the original channel. If the water cannot be returned to the original channel, then the water should be diverted to the nearest channel with energy dissipating devices installed to prevent channel degradation.

4.4.3 Unavoidable Adverse Effects

Soil loss would average 1,649 tons/year over the naturally occurring 99,774 tons/year. Under the No Action alternative, soil loss would average 679 tons/year.

4.5 VEGETATION

Direct and indirect effects to vegetation would result from the proposed GDBR project. Direct effects to vegetation would result from disturbance or removal of vegetation from construction of well pads, access roads, pipelines and ancillary facilities. These effects would continue for the life of the project. Indirect effects would include the introduction or spread of noxious weeds, accidental oil or gas spills, fugitive dust, and increases in incidence of fires.

4.5.1 Direct and Indirect Effect

4.5.1.1 Proposed Action

Vegetation Communities

A total of approximately 4,561 acres of vegetation would be removed during initial construction and drilling operations. Vegetative communities characteristic of this project include pinyon-juniper woodlands, sagebrush shrub, desert shrub, riparian corridors, and badlands as described in Chapter 3 of this DEIS. It should be noted that interim reclamation of wells pads would be attempted, but the past/current climatic conditions (e.g. below normal precipitation) in the GDBR do not favor successful interim reclamation. Disturbance by vegetation community type is shown in Table 4.5-1. The percentage of the occurrence of vegetation types disturbed from the Proposed Action would range from 1.8 to 5.3.

Each community type would take a different amount of time to recover. The pinyon-juniper woodlands and sagebrush shrub in the GDBR are both mature communities. It would take approximately 30-40 years for the sagebrush vegetation to reach the same stage of maturity and possibly 75-150 years for the pinyon-juniper woodlands to reach maturity (BLM 2003). If interim reclamation is not initiated soon after the completion of construction and drilling, these disturbed areas are likely to be invaded by invasive and noxious weeds. Russian thistle, halogeton and cheatgrass are the primary invasive annual species that dominate the disturbed areas throughout the GDBR. These species, especially cheatgrass, are difficult to control once they become established. As a result, the time required for the vegetation to re-establish would increase and a decrease in species diversity may result.

Table 4.5-1. Disturbance by Vegetation Community – Proposed Action

Vegetation Type	Acreage Within GDBR	Long-term Disturbance (acres)	Percentage of Total Vegetation Type (%)
Badlands	9,417	474	5.0%
Desert Shrub	75,661	3,414	4.5%
Pinyon/Juniper	2,441	44	1.8%
Riparian	431	23*	5.3%
Sagebrush	13,720	543	3.9%

* 18 acres on BLM-managed lands, 5 acres on state or private lands

The riparian habitat in the GDBR is associated with the Green River in the western portion of the unit. The Utah BLM has established a State-wide policy to protect riparian areas on BLM lands. This policy (UT-93-93) requires that riparian areas be maintained and/or improved to "Proper Functioning Condition." The policy states that no new surface disturbing activities are allowed within 100 m (330 feet) of riparian areas, unless it can be shown that there are no practical alternatives, all long-term effects can be fully mitigated, or the activity will benefit or enhance the riparian area. Disturbance allowed within the riparian community on Tribal, State and private lands would be at the discretion of the appropriate Surface Management Agency (SMA) or landowner.

If roads, pipelines, well pads, and ancillary facilities were developed in the exact locations described in the Proposed Action, approximately 23 acres of riparian habitat would be disturbed. However, as specific well locations have not been determined at this time, and as BLM has authority to move well pads on BLM-managed lands up to 200 meters from staked locations, it is likely that the federal wells and the associated roads would be moved to avoid portions of riparian vegetation, which would reduce the amount of riparian acres potentially disturbed for the long term down to 5 acres. Although construction activities associated with the Proposed Action would not directly remove/disturb riparian habitat, well pad construction and associated vegetation removal would have indirect effects to these habitats. As described in Section 4.4, soil disturbance and removal of vegetation increases surface water run-off, soil erosion, and stream sedimentation. As riparian habitats primarily exist in lowland areas, all drainage from adjacent well pads would most likely flow through/into riparian habitats. As such, riparian vegetation would be lost from erosion and increased stream turbidity caused by increased surface water run-off.

Invasive and Noxious Weeds

Disturbance is believed to be a major factor favoring weed establishment, as disturbed ecosystems often have higher susceptibility to weed invasions than those that spend long periods in late successional phases (CIPM 2006). Pickett and White (1985) define disturbance as any relatively discrete event in time that disrupts ecosystem, community or population structure and changes resources or substrate availability or the physical environment. Actions associated with the Proposed Action including clearing of vegetation and soils, addition of fill, and grading of roads and well pads would disturb portions of the GDBR creating areas of deep, bare soil that would be susceptible to exotic seed establishment (Trombulak and Frissell 2000). As such, these actions would lead to the transport and establishment of weeds throughout the GDBR. Overall, the Proposed Action would increase establishment of noxious weeds, such as Canada thistle, field bindweed, hoary cress and Russian knapweed, and invasive weeds such as Russian thistle, halogeton, and cheatgrass. These species would compete with the native vegetation and would reduce the diversity of the current communities. Specific negative effects of noxious and invasive weeds can include: 1) reduction in the overall visual character of an area; 2) competition with, or elimination of native plants; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion (Gelbard and Belnap 2003; Weller and Thompson 2002).

Based upon Applicant Committed BMPs described in Section 2.4.5, QEP would monitor and control noxious and invasive weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. On BLM administered land, a Pesticide Use Proposal would be submitted and approved prior to the application of herbicides, pesticides or other hazardous chemicals. These efforts would minimize the introduction and spread of weeds throughout the GDBR. These negative effects could also be minimized through implementation of mitigation described in Section 4.5.2. Mitigation would include activities such as power washing vehicles and interim reclamation of disturbed areas. Although traffic and new disturbance are mechanisms for the introduction of weeds, both BLM and the Uintah County work together to control weeds. Also, QEP has committed to control weeds on their rows and pads.

Special Status Plant Species

Section 7(a) of the Endangered Species Act (ESA) requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7 (a)(2) requires Federal Agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action "*may affect, is likely to adversely affect*" a federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate and BLM sensitive species are also managed to prevent a future listing as threatened or endangered. The sections below describe the special status plant species that may be affected by the Proposed Action. Effects of the Proposed Action on special status plant species are also addressed in the Biological Assessment prepared for this EIS.

As discussed in Section 3.5.4, the special status plant species potentially occurring in the GDBR include the Uinta Basin hookless cactus (*Sclerocactus glaucus*) (threatened) and the horseshoe milkvetch (*Astragalus equisolensis*) (candidate). However, the horseshoe milkvetch was removed as a candidate species in September 2006. The analysis presented represented the analysis when the species was listed as a candidate.

Uinta Basin Hookless Cactus

The Uinta Basin hookless cactus has not been reported in the GDBR and the closest known occurrences of this cactus are west and southeast of the GDBR. Potential habitat of the Uinta Basin hookless cactus is present in the southern and west portions of the GDBR in the Uinta Geological formation.

Prior to any surface disturbance, all well pad sites and access roads in potential Uinta Basin hookless cactus habitat would be examined by a botanist approved by the applicable SMA to determine if the cactus is present. These surveys would be conducted within the proper seasonal timeframe to be determined by the BLM. If the species is present, QEP would consult with the appropriate SMA prior to initiating any surface disturbance activities, and would implement appropriate avoidance or mitigation, including movement of roads, pipelines and well pads, and design modification to limit the effects of surface water flows and sedimentation to plants and habitats. Based on this applicant-committed BMP, indirect effects to occupied habitats of Uinta Basin hookless cactus would not occur. Therefore, the potential direct effects of the Proposed Action would be limited to loss or modification of potential habitat. Potential indirect effects are discussed below.

The Uinta Basin hookless cactus is a desired species among cactus collectors because of its "beautiful purplish-red flowers" (USFWS 1979). Illegal collection of the Uinta Basin hookless cactus is the primary threat to the conservation and recovery of the species on Utah BLM lands. In addition, BLM land uses may indirectly contribute to the illegal collection of the Uinta Basin hookless cactus from tracks created by seismic exploration buggies, road construction for oil and gas leases, and OHV use (BLM 2002). Under the Proposed Action, 169.1 miles of new roads would be constructed. Increased access to the GDBR via proposed roads could result in increased visitation by the public, and subsequently, result in illegal collection of special status plant species.

Increased roadway access and vehicle traffic in the GDBR may result in the spread of invasive weed species. Weed species compete with native plants and result in a deterioration of ecological conditions. Weed infestation can interfere with interim reclamation potential and can lead to weed encroachment into undisturbed areas, including threatened and endangered plant species habitats (e.g., Uinta Basin hookless

cactus). Based on this information, the potential for weed invasion into Uinta Basin hookless cactus habitat is a potential effect of the Proposed Action. However, with the implementation of the applicant committed BMPs, effects of weed invasion on threatened and endangered plant habitats would be minimized.

Changes in surface water flow regimes associated with sedimentation and precipitation may also affect the Uinta basin hookless cactus. Many of the known Uinta Basin hookless cactus populations are associated with small, ephemeral drainages or areas where stormwater flows across slopes. Surface disturbance associated with the construction of well pads, access roads, pipelines, etc., can lead to increased soil erosion, and stormwater runoff with heavy concentrations of sediment. The Uinta Basin hookless cactus is not tolerant of heavy sedimentation. The BLM has documented incidences where natural sediment deposition (i.e., sedimentation not caused by oil and gas development or other human activities) caused the loss of cacti or modified suitable habitat for the Uinta Basin hookless cactus. This example of natural sedimentation effects on the Uinta Basin hookless cactus indicates that human-induced sedimentation can have an even more detrimental effect on the species. Because of these potential effects, sedimentation potentially resulting from surface disturbance under the Proposed Action is a concern. However, several applicant-committed BMPs have been incorporated into the Proposed Action in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on Uinta Basin hookless cactus habitats.

Based on these potential effects, and the anticipated effectiveness of the mitigating measures BLM finds that the Proposed Action "***may affect, is not likely to adversely affect***" the Uinta Basin hookless cactus.

Horseshoe Milkvetch

The horseshoe milkvetch grows on river terrace sands and gravel and on sandy-silty weathered soils. It has also been reported from mixed desert and salt desert shrub communities at elevations from 4,700 to 5,200 feet amsl (UDWR 2003). Approximately 1,631 acres of horseshoe milkvetch habitat has been observed within the GDBR in the desert shrub community (Utah Natural Heritage Program 1992). In addition, potential habitat also exists in the southwest portion of the unit east of Johnson Bottom (Green River).

Prior to any surface disturbance, all well pad sites and access roads in potential horseshoe milkvetch habitat would be examined by a botanist approved by the applicable SMA to determine if the species is present. These surveys would be conducted within the proper seasonal timeframe to be determined by the BLM. Historically, these surveys have occurred from May to early June. If the species is present, QEP would consult with the appropriate SMA prior to initiating any surface disturbance activities, and would implement appropriate avoidance or mitigation, including movement of roads, pipelines and well pads, and design modification to limit the effects of surface water flows and sedimentation to plants and habitats. Based on this applicant-committed BMP and BLM's discretion under standard lease terms to implement measures to comply with the ESA, direct effects to occupied habitats of horseshoe milkvetch would not occur. Therefore, the potential direct effects of the Proposed Action would be limited to loss or modification of potential habitat. Potential indirect effects are discussed below.

The horseshoe milkvetch would be directly affected by habitat fragmentation caused by increased road and well pad development. Habitat fragmentation is one of the leading causes of plant extinction (Crooks and Soule 1996), (MacDonald et. al. 1989). Although applicant committed BMPs would avoid occupied habitats, roads and well pads surrounding these habitats would hinder the expansion of occupied territories throughout the GDBR.

An indirect effect related to increased roadway access and vehicle traffic in the GDBR is the potential for the introduction and spread of invasive weed species. Weed species can displace native plant species, often forming monocultures that alter ecosystem processes, like nutrient cycling, fire frequency, hydrologic cycles, sediment deposition and erosion (CIPM 2006). These alterations not only promote the colonization of additional invasive weed species, but also disrupt the pollination capabilities of existing native species. In addition to these effects, weed infestation can also interfere with interim reclamation potential and can lead to weed encroachment into undisturbed areas, including special status plant species habitats (e.g., horseshoe milkvetch).

Based on this information, the potential for weed invasion into horseshoe milkvetch habitat is a potential effect of the Proposed Action. However, with the implementation of the applicant committed BMPs, effects of weed invasion on special status plant habitats would be minimal.

Another potential indirect effect includes changes in surface water flow regimes associated with sedimentation and precipitation. Surface disturbance associated with the construction of well pads, access roads, pipelines, etc., can lead to increased soil erosion, and stormwater runoff with heavy concentrations of sediment. The horseshoe milkvetch is not expected to be tolerant of heavy sedimentation. The BLM has documented incidences where natural sediment deposition (i.e., sedimentation not caused by oil and gas development or other human activities) caused the loss of other special status plant species. Human-induced sedimentation may have even more detrimental effects on the species. Because of these potential effects, sedimentation potentially resulting from surface disturbance under the Proposed Action is a concern. However, several applicant-committed BMPs have been incorporated into the Proposed Action in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on the horseshoe milkvetch habitats.

Based on these potential effects, the Proposed Action “may affect individuals, but is not likely to result in a trend toward Federal listing” of the horseshoe milkvetch.

4.5.1.2 No Action Alternative

Vegetation Communities

Under the No Action Alternative, 79 wells of federal leases have been approved and those wells could be developed. In addition, 130 wells would be on State of Utah and private leases. Therefore, the No Action Alternative could result in a maximum development of approximately 209 oil and gas wells. The long-term disturbance would be 888 acres of vegetation. The acreage of disturbance to each of the vegetation communities in the GDBR (i.e., pinyon-juniper woodlands, sagebrush shrub, desert shrub, riparian corridors, and badlands) is shown in Table 4.5-2. It should be noted that interim reclamation of wells pads would be attempted, but the past/current climatic conditions (e.g. below normal precipitation) in the GDBR do not favor successful interim reclamation. The percentage of the occurrence of vegetation types disturbed by the GDBR facilities would range from 0.6 to 1.1 percent.

Table 4.5-2. Disturbance by Vegetation Community - No Action Alternative

Vegetation Type	Acreage Within GDBR	Long-term Disturbance (acres)	Percentage of Total Vegetation Type (%)
Pinyon-Juniper	2,441	24	0.9%
Sagebrush	13,720	98	0.7%

Vegetation Type	Acreage Within GDBR	Long-term Disturbance (acres)	Percentage of Total Vegetation Type (%)
Desert Shrub	75,661	693	0.9%
Riparian Corridors	431	5	1.1%
Badlands	9,417	68	0.7%

Each community type would take a different amount of time to recover. The pinyon-juniper woodlands and sagebrush shrub in the GDBR are both mature communities. It would take approximately 30-40 years for the sagebrush vegetation to reach the same stage of maturity and possibly 75-150 years for the pinyon-juniper woodlands to reach maturity (BLM 2003). If interim reclamation is not initiated soon after the completion of construction and drilling, these disturbed areas are likely to be invaded by invasive and noxious weeds. Russian thistle, halogeton and cheatgrass are the primary invasive annual species that dominate the disturbed areas throughout the GDBR. These species, especially cheatgrass, are difficult to control once they become established. As a result, the time required for the vegetation to reestablish would increase and a decrease in species diversity may result.

Riparian habitat is associated with the Green River in the western portion of the GDBR. The Utah BLM has established a State-wide policy to protect riparian areas on BLM lands. This policy (UT-93-93) requires that riparian areas be maintained and/or improved to "Proper Functioning Condition." The policy states that no new surface disturbing activities are allowed within 100 m (330 feet) of riparian areas, unless it can be shown that there are no practical alternatives, all long-term effects can be fully mitigated, or the activity will benefit or enhance the riparian area. Based on this policy, direct effects to the riparian vegetation community on BLM lands would be negligible. Disturbance allowed within the riparian community on Tribal, State and private lands would be at the discretion of the appropriate SMA or landowner.

If roads, pipelines, well pads, and ancillary facilities were developed in the exact locations described in the Proposed Action, approximately 5 acres of riparian habitat would be disturbed. However, because precise well locations have not been specifically determined at this time, and all well pads, roads, and surface pipelines could be moved from staked locations during the State permitting process, it is likely that well sites could be moved to avoid portions of riparian vegetation.

Invasive and Noxious Weeds

Roads provide a major conduit for the spread of exotic plants into natural areas, particularly in arid and semiarid landscapes of the American West (Gelbard and Belnap 2003). Plant communities that are both physically inevasible (e.g. characterized by deep or fertile soils) and disturbed appear to be most vulnerable. Clearing of vegetation and soils, addition of fill, and grading of roads and wells pads would create areas of deep, bare soil that would be susceptible to exotic seed establishment (Trombulak and Frissell 2000). As such, these actions would lead to the transport and establishment of weeds throughout the GDBR. Overall, the No Action Alternative would increase establishment of noxious weeds, such as Canada thistle, field bindweed, hoary cress and Russian knapweed, and invasive weeds such as Russian thistle, halogeton, and cheatgrass. These species would compete with the native vegetation and would reduce the diversity of the current communities. Specific negative effects of noxious and invasive weeds can include: 1) reduction in the overall visual character of an area; 2) competition with, or elimination of native plants; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion (Gelbard and Belnap 2003; Weller and Thompson 2002).

Based upon Applicant Committed BMPs described in Section 2.4.5, QEP would monitor and control noxious and invasive weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. On BLM administered land, a Pesticide Use Proposal would be submitted and approved prior to the application of herbicides, pesticides or other hazardous chemicals. These efforts would minimize the introduction and spread of weeds throughout the GDBR. These negative effects could also be minimized through implementation of mitigation described in Section 4.5.2. Mitigation would include activities such as power washing vehicles and interim reclamation of disturbed areas. Although traffic and new disturbance are mechanisms for the introduction of weeds, both BLM and the Uintah County work together to control weeds. Also, QEP has committed to control weeds on their roads and pads.

Special Status Plant Species

Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7 (a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action "*may affect, is likely to adversely affect*" a federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate and BLM sensitive species are also managed to prevent a future listing as threatened or endangered. The sections below describe the special status plant species that may be affected by the No Action Alternative. Effects of the No Action Alternative on special status plant species are also addressed in the Biological Assessment prepared for this EIS.

The special status plant species that potentially occur in the GDBR include the Uinta Basin hookless cactus (*Sclerocactus glaucus*) and the horseshoe milkvetch (*Astragalus equisolensis*). The following analyses assume that applicant-committed BMPs would be implemented.

Uinta Basin Hookless Cactus

The Uinta Basin hookless cactus has not been reported in the GDBR and the closest known occurrences of this cactus are west of the GDBR near Pelican Lake and to the southeast near the Bonanza Power Plant. Potential habitat of the Uinta Basin hookless cactus is present in the southern and west portions of the GDBR in the Uinta Geological formation.

Prior to any surface disturbance, all well pad sites and access roads in potential Uinta Basin hookless cactus habitat would be examined by a botanist approved by the applicable SMA to determine if the cactus is present. These surveys would be conducted within the proper seasonal timeframe to be determined by the BLM. If the species is present, QEP would consult with the appropriate SMA prior to initiating any surface disturbance activities, and would implement appropriate avoidance or mitigation, including movement of roads, pipelines and well pads, and design modification to limit the effects of surface water flows and sedimentation to plants and habitats. Based on this applicant-committed BMP, direct effects to occupied habitats of Uinta Basin hookless cactus would not occur. Therefore, the potential direct effects of the No Action Alternative would be limited to loss or modification of potential habitat. Potential indirect effects are discussed below.

The Uinta Basin hookless cactus is a desired species among cactus collectors because of its "beautiful purplish-red flowers" (USFWS 1979). Illegal collection of the Uinta Basin hookless cactus is the primary

threat to the conservation and recovery of the species on Utah BLM lands. In addition, BLM land uses may indirectly contribute to the illegal collection of the Uinta Basin hookless cactus, and include tracks created by seismic exploration buggies, road construction for oil and gas leases, and OHV use (BLM 2002). Under the No Action Alternative, 39.6 miles of new roads would be constructed. Increased access to the GDBR via proposed roads could result in increased visitation by the public, and subsequently, result in illegal collection of special status plant species.

A concern related to increased roadway access and vehicle traffic in the GDBR is the potential for the introduction and spread of invasive weed species. Weed species compete with native plants and result in a deterioration of ecological conditions. Weed infestation can interfere with interim reclamation potential and can lead to weed encroachment into undisturbed areas, including threatened and endangered plant species habitats (e.g., Uinta Basin hookless cactus). Based on this information, the potential for weed invasion into Uinta Basin hookless cactus habitat is a potential effect of the No Action Alternative. However, with the implementation of the applicant-committed BMPs, effects of weed invasion on threatened and endangered plant habitats would be minimized.

Another potential indirect effect includes changes in surface water flow regimes associated with sedimentation and precipitation. Many of the known Uinta Basin hookless cactus populations are associated with small, ephemeral drainages or areas where stormwater flows across slopes. Surface disturbance associated with the construction of well pads, access roads, pipelines, etc., can lead to increased soil erosion, and stormwater runoff with heavy concentrations of sediment. The Uinta Basin hookless cactus is not tolerant of heavy sedimentation. The BLM has documented incidences where natural sediment deposition (i.e., sedimentation not caused by oil and gas development or other human activities) caused the loss of cacti or modified suitable habitat for the Uinta Basin hookless cactus. This example of natural sedimentation effects on the Uinta Basin hookless cactus suggests that human-induced sedimentation can have an even more detrimental effect on the species. Because of these potential effects, sedimentation potentially resulting from surface disturbance under the No Action Alternative is a concern. However, several applicant-committed BMPs have been incorporated into the No Action Alternative in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on Uinta Basin hookless cactus habitats.

Based on the potential for modification or loss of potential habitat and increased access to potential or occupied habitats, the No Action Alternative "***may affect, is not likely to adversely affect***" the Uinta Basin hookless cactus.

Horseshoe Milkvetch

The horseshoe milkvetch grows on river terrace sands and gravel and on sandy-silty weathered soils. It has also been reported from mixed desert and salt desert shrub communities at elevations ranging from 4,700 to 5,200 feet (UDWR 2003). Approximately 1,631 acres of horseshoe milkvetch habitat has been observed within the GDBR in the desert shrub community north of Baeser Wash (Utah Natural Heritage Program 1992). In addition, potential habitat also exists in the southwest portion of the unit east of Johnson Bottom (Green River).

Prior to any surface disturbance, all well pad sites and access roads in potential horseshoe milkvetch habitat would be examined by a botanist approved by the applicable SMA to determine if the cactus is present. These surveys would be conducted within the proper seasonal timeframe to be determined by the BLM. If the species is present, QEP would consult with the appropriate SMA prior to initiating any surface disturbance activities, and would implement appropriate avoidance or mitigation, including movement of roads, pipelines and well pads, and design modification to limit the effects of surface water flows and sedimentation to plants and habitats. Based on this applicant-committed BMP, direct effects to

occupied habitats of horseshoe milkvetch would not occur. Therefore, the potential direct effects of the No Action Alternative would be limited to loss or modification of potential habitat. Potential indirect effects are discussed below.

The horseshoe milkvetch would be indirectly affected by habitat fragmentation caused by increased road and well pad development. Habitat fragmentation is one of the leading causes of plant extinction (Crooks and Soule 1996, MacDonald and al. 1989). Although applicant committed-BMPs would avoid occupied habitats, roads and well pads surrounding these habitats would hinder the expansion of occupied territories throughout the GDBR.

An indirect effect related to increased roadway access and vehicle traffic in the GDBR is the potential for the introduction and spread of invasive weed species. Weed species compete with native plants and result in a deterioration of ecological conditions. Weed infestation can interfere with interim reclamation potential and can lead to weed encroachment into undisturbed areas, including special status plant species habitats (e.g., horseshoe milkvetch). Based on this information, the potential for weed invasion into horseshoe milkvetch habitat is a potential effect of the No Action Alternative. However, with the implementation of the applicant-committed BMPs, effects of weed invasion on special status plant habitats would be minimized.

Another potential indirect effect includes changes in surface water flow regimes associated with sedimentation and precipitation. Surface disturbance associated with the construction of well pads, access roads, pipelines, etc., can lead to increased soil erosion, and stormwater runoff with heavy concentrations of sediment. The horseshoe milkvetch is not expected to be tolerant of heavy sedimentation. The BLM has documented incidences where natural sediment deposition (i.e., sedimentation not caused by oil and gas development or other human activities) caused the loss of other special status plant species. Human-induced sedimentation may have even more detrimental effects on the species. Because of these potential effects, sedimentation potentially resulting from surface disturbance under the No Action Alternative is a concern. However, several applicant-committed BMPs have been incorporated into the No Action Alternative in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on the horseshoe milkvetch habitats.

Based on these potential effects, the No Action “may affect individuals, but is not likely to result in a trend toward Federal listing” of the horseshoe milkvetch.

4.5.2 Mitigation

The following mitigation would be applied to minimize the effect of the Proposed Action and No Action Alternative to the vegetation communities.

Power washing of all construction and drilling equipment would occur prior to the equipment entering the GDBR project area from outside the Vernal Field Office area.

Over the construction, drilling and completion season, QEP could implement an intensive interim reclamation program beginning the first growing season after each segment of project completion. As applicant-committed BMPs, QEP would reseed all portions of well pads and ROWs not utilized for the operational phase of the project, as well as any sites within the GDBR determined necessary by the appropriate SMA. Reseeding would be accomplished using SMA specified plant species. Post-construction seeding applications would continue as determined necessary by the SMA.

Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer of the appropriate SMA. Weed monitoring would occur on an annual basis (or as frequently as the SMA determines) throughout the life of the project.

QEP would avoid placement of roads, pipelines, well pads, and ancillary facilities within 100 meters of riparian habitats. If avoidance is not feasible, then effects to riparian habitats would be minimized, where possible.

During the APD process, BLM should consider moving facilities up to 200 meters away from water courses, livestock corrals, BLM rain gauges, and long-term established vegetation studies. If these range facilities could not be avoided, the operators could be required to replace them.

The following mitigation has been developed by BLM and the USFWS to mitigate potential effects to the hookless cactus:

4.5.2.1 Surveys

- Pre-project habitat assessments will be completed across 100 percent of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Uinta Basin hookless cactus habitat is present.
- Within suitable habitat, site inventories must be conducted by qualified individual(s) and according to BLM and Service accepted survey protocols.
- Site inventories will be conducted in suitable and occupied habitat March 15 to June 30 for the *clerocactus brevispinus*, unless extended by the BLM.
- *Sclerocactus wetlandicus* surveys can be done any time of the year, provided there is no snow cover.
- Surveys will occur within 115 feet from the centerline of the proposed right-of-way for surface pipelines or roads; and within 100 feet from the perimeter of disturbance for the proposed well pad including the well pad.

4.5.2.2 Project Design

- Project infrastructure will be designed to minimize effects within suitable habitat.
- Well pad size will be reduced to the minimum needed, without compromising safety.
- Roads and utilities should share common right-of-ways where possible.
- The width of right-of-ways will be reduced to minimize the depth of excavation needed for the road bed.
- Where feasible, the natural ground surface will be used for the road within habitat.
- Signing will be placed in sensitive areas to limit off-road travel.
- Travel will be on designated routes and other cleared/approved areas.
- All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.
- Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect effects to populations and to individual plants:

- A buffer of at least 100 feet will be established between the edge of the right of way (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated.
- Surface pipelines will be laid such that a 100 foot buffer exists between the edge of the right of way and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population.
- Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.
- Designs will avoid concentrating water flows or sediments into occupied habitat.
- Oil, water, or condensate tanks in centralized locations will be placed away from occupied habitat.
- Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

4.5.2.3 Monitoring

- Occupied Uinta Basin hookless cactus habitats within 100' of the edge of the surface pipeline rights-of-way, 100 feet of the edge of the roads' right-of-ways, and 100 feet from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat effects relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.
- Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

4.5.3 Unavoidable Adverse Effects

The removal of vegetation for the life of the project would be an unavoidable adverse effect. Although interim reclamation would be attempted, it is doubtful that it would be successful. Therefore, the loss of vegetation would be unavoidable for the fife of the project and beyond until final reclamation would be successful.

4.6 WILDLIFE

Numerous species of wildlife inhabit the GDBR. The key wildlife species of interest include big game species, raptors, upland game birds, migratory birds, and the threatened and endangered species, including the black-footed ferret, bald eagle, greater sage-grouse, and the four species of endangered Colorado River fish.

4.6.1 Direct and Indirect Effects

Direct effects from the Proposed Action and alternatives would include increased potential for collisions with vehicles and heavy equipment. Mortality to bird species could also result from flying into reserve pits, contaminating the feathers, and therefore, the thermoregulatory ability. Accidental spills of oil, gas,

or condensate into waterbodies could result in fish kills and mortality to early stages of development of fish and amphibians. Indirect effects from the Proposed Action include displacement of wildlife, interference with breeding and reduced survival of the young, avoidance of natural habitats from human activities during the construction and drilling process, and fragmentation of habitat of wildlife species. The severity of the effects would depend on the availability of the typical food outside areas of effect, the sensitivity of the species, the timing of construction and development activities, topography, and season of the year.

4.6.1.1 Proposed Action

General Wildlife

The initial disturbance of 4,561 acres of wildlife habitat associated with the construction of wells, roads, pipelines, and related facilities would reduce habitat availability for a variety of common wildlife species. Project implementation would also indirectly increase the level of functional habitat loss and habitat fragmentation in the GDBR. Successful interim reclamation of wells pads would reestablish wildlife habitat overtime, however the past/current climatic conditions (e.g. below normal precipitation) in the GDBR do not favor interim reclamation practices. Despite this trend, the long-term reduction in habitat is not expected to negatively effect general wildlife species discussed in Section 3.6.2 because of the following considerations.

- Many of the species discussed (e.g., cottontails, jackrabbits, coyotes, skunks, rodents) are habitat generalists, meaning they are not tightly restricted to specific habitat types.
- Many of the wildlife populations in the GDBR have likely adapted to existing oil and gas exploration and production activities.
- Many of the species-specific applicant-committed BMPs and mitigation would indirectly afford some protection to the general wildlife species discussed in this document.

Disturbances from drilling activities and increased traffic could temporarily displace wildlife from habitats in areas of human activity. Construction may result in displacement from affected habitats during the entire construction phase of a well, road or pipeline (weeks); whereas production could result in displacement only during well visits (hours). When displaced, individual animals could move into less suitable habitats or into habitats where inter- and intra-specific competition may occur, resulting in subsequent effects of deteriorated physical condition, reproductive failure, mortality, and general distress. A long-term drought has already reduced forage quality and quantity in the Uintah Basin, which may increase effects associated with displacement and resulting competition among small mammals and other species falling within the “general wildlife” category.

Big Game

The key species of big game in the GDBR are the pronghorn antelope and mule deer. The effect of greatest concern is displacement of the population, an indirect effect. The displacement or avoidance would result from increased human activity, noise from equipment operation, and increased vehicular traffic.

Studies conducted of the amount of displacement resulting from disturbances, such as noise and human activity, shows that it varies with the species. The distance that mule deer moved from the disturbance was approximately 660 feet (200 meters), while pronghorn moved approximately 2,600 feet (800 meters) to avoid the disturbance. The topography of the area, presence of trees the provided some protection from

the disturbance, the intensity of the disturbance, speed of traffic, and amount of human activity influenced the distance of displacement (Rost and Bailey 1979, Ward et al 1980, BLM 2003).

The result of the displacement would be reduced use of habitats near disturbances and potential overcrowding of habitats into which the animals were displaced. The overcrowding may cause an increase in competition for space and forage, increase the stress level, and decrease the health of the animal. As a result there could be a decrease in success of reproduction and increase of winter mortality. The effects of displacement would be greatest in the crucial big game winter ranges (BLM 2003). However, the game species, such as deer and elk, will adapt to some degree to the increase in human activity, especially if the activities are predictable and constant in occurrence (BLM 2003).

Pronghorn Antelope

Antelope from the Bonanza portion of the Vernal Herd Unit occupy much of the greater GDBR on a year-round basis. The pronghorn antelope in the project area, which belong to the Bonanza portion of the Vernal Herd Unit, occupy much of the GDBR on a year-round basis. The BLM has identified 7,400 acres of high priority, year-long habitat occurring in the GDBR. Additionally, the UDWR has identified 90,935 acres of crucial, year-long habitat and 7,168 acres of substantial, year-long habitat occurring within the GDBR (see section 3.6.3 for definitions of types of ranges). The extent of both the BLM and UDWR identified habitat is shown on Figure 3.6-1.

Direct effects to pronghorn from the Proposed Action would include increased mortality resulting from collisions with vehicles and heavy equipment. Increased mortality would also result from increased accessibility of the area to hunting and illegal shooting. Indirect effects would include displacement of pronghorn from BLM-identified high priority and UDWR-identified crucial year-long and winter habitat; potential interference with breeding and survival of the young; avoidance as a result of human activities, noise, and dust emissions during the construction and drilling process; and fragmentation of the habitat. The greatest effect would result from avoidance of UDWR-identified crucial year-long and winter habitat.

Habitat fragmentation would result in a reduction in habitat use by the pronghorn near disturbed areas, increased animal densities in adjoining habitat, increased stress from intra- and inter-specific competition, and increased human-induced harassment particularly along existing and proposed new access roads. The development of new roads, in combination with existing roads, would facilitate access for other development projects, recreational uses, hunting and OHV use.

Disturbance from human activity would reduce the relative habitat value for pronghorn antelope, especially during periods of heavy snow cover and cold temperatures. Pronghorn are likely to experience severe physiological stress during winter, particularly gestating females, which require higher levels of energy for survival and successful reproduction. The increased presence of vehicles and humans utilizing the road network could result in increased energy expenditures during severe winter periods, combined with insufficient forage intake (BLM 2003).

Disturbances during the winter could prevent access to sufficient amounts of forage to sustain individual pronghorn. The ability of pronghorn to survive the winter and a female's ability to produce viable offspring depends on fat reserves, which are continuously used during the winter. Increased stress causes the fat reserves to be used more quickly and reduces the survival of the female pronghorn and its fetus (BLM 2003). The behavioral responses of pronghorn to oil and gas development would include increased energy expenditures for avoidance of human activity and alterations of normal habitat use patterns. Wintering pronghorn may vacate areas surrounding well pads during periods of concentrated human activity during construction operations.

Construction and development activities during the Proposed Action would result in loss of cover and foraging areas for pronghorn. Specifically, surface disturbance would result in a direct loss of 125 acres of BLM-identified high priority, year-long habitat, 4,436 acres of UDWR-identified crucial, year-long habitat, and 125 acres of UDWR-identified substantial, year-long habitat (Table 4.6-1). It should be noted that successful interim reclamation of wells pads would reestablish pronghorn habitat over time. However, the past/current climatic conditions (e.g. below normal precipitation) in the GDBR do not favor interim reclamation practices. Overall, considering the minimal amount of disturbance to these ranges, along with their magnitude across the Uintah Basin, the habitat losses produced by the Proposed Action are not expected to have adverse effects on pronghorn populations.

Table 4.6-1. Disturbance within Big Game Habitats - Proposed Action

Habitat	Acreage Within GDBR	Long-term Disturbance (acres)	Percentage of Total Habitat in GDBR (%)
Antelope Habitat			
BLM-identified high priority, year-long habitat	7,400	125	2%
BLM-identified crucial winter habitat	0	0	0
UDWR-identified crucial, year-long habitat	90,935	4,436	5%
UDWR-identified substantial, year-long habitat	7,170	125	2%
Mule Deer Habitat			
BLM-identified high priority, year-long habitat	0	0	None
BLM-identified crucial winter habitat	0	0	None
UDWR-identified crucial, winter habitat	40	3	7%
UDWR-identified crucial, year-long habitat	1,160	29	3%
UDWR-identified substantial, year-long habitat	2,756	23	1%

Mule Deer

Mule deer from the Vernal Herd Unit are common in the GDBR throughout the year. Most of the GDBR is characterized as year-round mule deer habitat. As previously described in Section 3.6.3.2, no habitat within the GDBR has been identified by the BLM as mule deer habitat. However, the UDWR has identified approximately 1,160 acres of crucial value habitat (40 acres of winter habitat and 1,120 acres of year-long habitat) and 2,756 acres of substantial value, year-long habitat. The extent of the UDWR identified habitat is shown on Figure 3.6-1.

Direct effects from the Proposed Action would include increased mortality resulting from collisions with vehicles and heavy equipment. Higher mortality would also result from increased predation, which could result from greater accessibility of the habitat to predators (e.g., coyotes). Indirect effects would include loss of foraging habitat in year-round habitat and substantial winter habitat. Additional effects would include potential interference with breeding and survival of the young; avoidance of natural habitat as a result of human activities, noise, and dust emissions during the construction and drilling process; and

fragmentation of the habitat. The greatest effect would result from avoidance of UDWR-identified crucial winter habitat and crucial year-long range.

Habitat fragmentation would result in a reduction in habitat use near disturbed areas, increased animal densities in adjoining habitat, increased stress from intra- and inter-specific competition and increased human induced harassment particularly along existing and proposed new access roads. The development of new roads, in combination with existing roads, would facilitate access for other development projects, recreational uses, hunting and OHV use. Studies have reported that roads generally reduce the overall habitat value for mule deer for distances from 300 feet to 0.5 mi from the road, depending on the type of traffic and adjacent habitat types (Rost and Bailey 1979, CDOW 1987, and BLM 2003).

Disturbance from human activity would reduce the relative habitat value for deer (Nicholson et al 1997), especially during periods of heavy snow cover and cold temperatures. Mule deer typically experience severe physiological stress during winter, particularly gestating does (UDWR 1997a, Karpowitz 1984), which require higher levels of energy for survival and successful reproduction. The increased presence of vehicles and humans utilizing the road network could result in increased energy expenditures during severe winter periods, combined with insufficient forage intake (Karpowitz 1984, Garrott and White 1982, BLM 2003).

Disturbances during the winter could prevent access to sufficient amounts of forage to sustain individual deer. The ability of mule deer to survive the winter and a doe's ability to produce viable offspring depends on fat reserves, which are continuously used during the winter. Increased stress causes the fat reserves to be used more quickly and reduces the survival of deer and developing fawns (BLM 2003). The behavioral responses of mule deer to oil and gas development would include increased energy expenditures for avoidance of human activity and alterations of normal habitat use patterns. Wintering mule deer have been reported to vacate areas surrounding well pads during periods of concentrated human activity during construction operations (Reeve 1996, BLM 2003).

Construction and development activities during the Proposed Action would result in loss of cover and foraging areas for mule deer. Specifically, surface disturbance would result in a direct loss of no acreage of UDWR-identified crucial winter habitat, 29 acres of UDWR-identified crucial, year-long habitat, and 23 acres of UDWR-identified substantial, year-long habitat. (Table 4.6-1). It should be noted that successful interim reclamation of wells pads would reestablish mule deer habitat over time, but the past and current climatic conditions (e.g. drought) in the GDBR do not favor interim reclamation practices. Overall, considering the minimal amount of disturbance to these ranges, along with their magnitude across the Uintah Basin, the habitat losses produced by the Proposed Action are not expected to have adverse effects on mule deer populations.

Raptors

Varieties of raptors inhabit the GDBR and make use of all habitats present. Raptor surveys of the GDBR and a one-mile buffer around the GDBR conducted in April 2004 identified 66 raptor nests which included 6 ferruginous hawks, 2 red-tailed hawks, one golden eagle, and one great horned owl active nests. Potential effects of the Proposed Action on raptor species direct loss or degradation of potential nesting and foraging habitats, and indirect disturbance from human activity (including harassment, displacement, and noise).

Project development would substantially increase road surfaces throughout the GDBR. This increase would allow greater access to the area, and would therefore likely increase traffic volumes. As vehicular access and traffic are increased so would the potential for raptor/vehicle collisions and poaching. As such, the Proposed Action would increase the potential for raptor collisions with vehicles in the GDBR.

Destruction of raptor foraging habitat would have detrimental effects to raptors utilizing the GDBR.. Studies have shown that destruction of habitat used by the raptors' prey base (e.g., mice, rabbits, ground squirrels, prairie dogs) has had the largest effect on raptor populations in the Uintah Basin (BLM 2003). Surface disturbances associated with the Proposed Action would result in the direct loss of approximately 4,491 acres of year-round habitat for prey species such as small mammals, songbirds, and reptiles. Increased dust accumulation from roads and well pads may also deter prey species from utilizing habitats adjacent to these areas. In addition, of the 4,491 acres directly removed from the Proposed Action, 221 acres are within ¼-mile of an existing (active/inactive) raptor nest (Table 4.6-2). Development or road construction in proximity of an active nest could lead to nest abandonment, thereby affecting the breeding pair and their annual productivity. Since many raptors alternate between nest sites within a breeding territory, adjacent roads and well sites could prevent inactive nests from being used in the future. These effects would continue through project operation.

Based on the applicant-committed BMP discussed in Chapter 2, direct effects on active raptor nests from well construction are not likely to occur. This measure states that QEP would implement appropriate protective measures (e.g., timing and spatial stipulations) discussed in the Book Cliffs RMP in order to prevent adverse effects on non-listed wildlife species and habitats. In conjunction with the APD, QEP will coordinate with BLM to have a survey conducted (by an approved biologist) prior to the construction of any new well to determine whether raptor nests are present within 0.5 mile of each well. If nests are determined to be present, the AO shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites for potential future nesting. Such measures may include 1) timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); 2) the use of terrain features to shield the nest site from human activities; and, 3) the construction of Artificial Nest Structures in appropriate locations." The timing limitations during which construction activities would be curtailed or eliminated are shown in Table 4.6-2.

Table 4.6-2. Raptor Protection Dates

Raptor	Seasonal Buffer		
Bald eagle	January 1	Through	August 15
Great horned owl	February 1	Through	May 15
Golden eagle	February 1	Through	July 15
Peregrine falcon	February 1	Through	August 31
Ferruginous hawk	March 1	Through	July 15
Mexican spotted owl	March 1	Through	August 31
Long-eared owl	March 15	Through	June 15
Northern harrier, osprey, prairie falcon, red-tailed hawk, Swainson's hawk	April 1	Through	July 15
Burrowing owl	April 1	Through	August 15
Short-eared owl	April 10	Through	June 15
Merlin	April 15	Through	June 25

Raptor	Seasonal Buffer		
Northern goshawk	April 15	Through	August 20
American kestrel	May 1	Through	June 30
Cooper's hawk	May 1	Through	August 15
Turkey vulture	May 15	Through	August 15
Sharp-shinned hawk	June 20	Through	August 15
Bald eagle winter roost areas	November 1	Through	March 15

Source: BLM 1994. These seasonal ½ mile buffers around occupied raptor nests have been developed and successfully applied for several years with input from, and in coordination with, the Utah Division of Wildlife Resources (UDWR) and the U.S. Fish and Wildlife Service (USFWS).

Table 4.6-3. Disturbance within Applicable Raptor Buffers - Proposed Action

Facility	Number of Facilities	Total Long-term Disturbance (acres)
New Gas Wells	23	104
New Oil Wells	20	101
Gas Wells on Existing Pads	17	12
Oil Wells on Existing Pads	0	0
Central Tank Facility	1	4
Compressor Stations	0	0
Total	**43 new wells 17 wells on existing pads A central tank facility**	**221**

While these measures would help prevent direct disturbance to active raptor nests, indirect effects such as loss or degradation of potential foraging habitats, and disturbance from human activity would still occur. These indirect effects could potentially be mitigated by avoiding the placement of well pads within 0.5 to 1 mile of raptor nests, and by locating well pads and facilities in a manner to conceal them from raptor nests by considering topographical features.

Upland Game Birds

Upland game birds within and adjacent to the GDBR include the mourning dove, wild turkey, and greater sage-grouse. The sage grouse is listed by the State of Utah as a sensitive species (UDWR 1998) and is discussed in the Special Status Wildlife Species section.

Implementation of the Proposed Action could result in both direct and indirect effects on the mourning dove. Direct effects would include the removal of potential nesting and foraging habitats. If construction, drilling and completion were to occur during the spring/summer months, the Proposed Action could result in reproductive failure of breeding adults, nest abandonment, and/or direct mortality of eggs, nestlings or fledglings through nest destruction. Direct effects could also include the potential for mourning dove mortality from contact with petroleum products in reserve pits. However, provided suggested mitigation to net reserve pits is implemented, this potential effect would not occur.

Construction, drilling and completion noise and human presence could also cause displacement from foraging or nesting habitats. Displacement may cause mourning doves to move into less suitable habitats or into habitats where inter- and intra-specific competition may occur. While these potential effects could

affect individual mourning doves, given the extent of the species and its habitat throughout the State of Utah, the Proposed Action is not likely to cause a decline in the species on a population level in Utah.

Wild turkeys have been observed in riparian habitat along drainage bottoms and the Green River within the GDBR. A total of 1,126 acres of critical yearlong habitat exists within the GDBR. Since construction activities in riparian habitats would be avoided, wild turkeys are not likely to be directly or indirectly affected by the Proposed Action and the Proposed Action is not likely to cause a decline on the population level in Utah.

Migratory Birds

Migratory bird species are commonly found within the GDBR during the spring and fall migration and include species listed as High-Priority birds by Partners-in-Flight. The migratory birds that may inhabit the GDBR are listed in Section 3.6.6.

The Proposed Action would result in direct and indirect effects to these migratory bird species. Effects to migratory birds in the GDBR would be dependent upon the seasons of construction, drilling and completion activities. If these activities are completed in the late fall, many of the migratory species would have left the GDBR for southern wintering grounds. Surface disturbance, and visual and noise effects during this time would be temporary, and project-related effects would not likely have a measurable effect on migratory bird populations as a whole or on individual species, in general. If construction, drilling and completion were to occur during the spring/summer months, the Proposed Action could result in reproductive failure of breeding adults, nest abandonment, or dispersion of the birds because of nest destruction. For example, ground-nesting bird species would be susceptible to nest destruction by construction vehicles, equipment and ATV traffic. Shrub nesting species may also be directly affected due to removal of shrub vegetation. Direct effects would also include the removal of potential nesting and foraging habitats. These effects would have a greater effect on High-Priority migratory bird species that may be nesting in the GDBR due to their smaller population sizes and limited distribution found in such special status species. Construction, drilling and completion noise and human presence could also cause displacement from foraging or resting habitats. As with other wildlife species discussed in this section, displacement may cause birds to move into less suitable habitats or into habitats where increased inter- and intra-specific competition may occur, and subsequent effects of deteriorated physical condition and general distress. To minimize migratory bird contact with construction activities, pre-construction surveys could be directed by the AO in areas that may contain numerous nesting sites for migratory birds.

Fisheries

Numerous species of fish are present in the portion of the Green River that flows through the GDBR. Direct and indirect effects would result to these fish from the Proposed Action. Direct effects would result from accidental spills of oil and condensate into the Green River potentially resulting in a fish kill. Streams within the GDBR include Powder Springs Wash, Walker Hollow Right Fork, Baeser Wash, and several small washes. These washes are ephemeral (i.e., contain water after rainfall events) and are not likely to contain any fish species. As shown in Section 4.4, increased sedimentation into the Green River from erosion resulting from the Proposed Action would only increase approximately one to two percent over the naturally occurring rate. Therefore, it is unlikely that increased sedimentation from the Proposed Action would affect fish reproduction.

Special Status Wildlife Species

Special status wildlife species include those species listed as threatened or endangered under the Endangered Species Act, species listed as sensitive by the BLM, and species listed as threatened, endangered, or species of special concern by the State of Utah. The effects from the Proposed Action to special status wildlife species are discussed below.

White-tailed Prairie Dog

Development of the Proposed Action would have both positive and negative effects on white-tailed prairie dogs in the GDBR. The principal potential negative effects include a direct loss of habitat, an increase in the potential for direct mortality caused by poaching, vehicle collisions, or exposure to toxic substances, and the decreased availability/use of certain habitats through displacement, habitat fragmentation and habitat modification. Potential positive effects of energy development on these species include habitat enhancements caused by the creation of bare ground and the establishment of regrowth vegetation.

Any direct habitat loss in existing (e.g., established prairie dog towns) or potential (e.g., short-grass prairie; low growing shrublands) habitats would negatively affect white-tailed prairie dogs in the GDBR. Prairie dog colonies located in the GDBR create a complex of approximately 16,000 acres. Of the 16,000 acres, approximately 1,830 acres are currently active. It is estimated that well pad, pipeline and road construction associated with the Proposed Action would result in disturbance of up to 73.2 acres within prairie dog colonies in the GDBR.

In addition to habitat losses, the Proposed Action could potentially increase direct mortality of white-tailed prairie dogs. Construction and operation of facilities associated with the Proposed Action would expand current roadway systems and increase both traffic and visitation to the GDBR. Increases in traffic and human presence could lead to increased mortality from vehicle collisions as well as potential poaching. In addition to direct human caused mortality, these species could also be affected through exposure to spills or other sources of petroleum products.

As mentioned previously, development of the Proposed Action would alter existing habitat in the GDBR. As traffic volumes and human presence are increased, adjacent habitats may be avoided due to human interaction, noise and the influx of invasive weeds. Although prairie dogs are often found on or near roadways, prairie dog colonies are typically fragmented by road development. When colonies are fragmented by roads, therefore reducing dispersal ability, prairie dog densities increase (Johnson and Collinge 2004). As prairie dog densities increase, so does the potential for plague transmittance and habitat degradation (e.g., decreased food resources) (Rayor 1985, Cully and Williams 2001, Johnson and Collinge 2004). Habitat quality for these species can also be degraded by the introduction of noxious and invasive weeds. Weed invasions may lead to a decrease in the amount of native perennials and bare ground therefore degrading habitat for prairie dogs by decreasing visibility, forage quality, and burrow development. Proposed management under the draft Vernal Field Office Resource Management Plan would not impose more restrictive stipulations than those that currently exist. Therefore, approval of this project is not expected to compromise our ability to protect the prairie dogs or their habitat.

Black-footed Ferret

The black-footed ferret is a federally listed endangered species, which utilizes prairie dog colonies for shelter and feeds on the prairie dogs. The BLM records indicate that approximately 1,827 acres of white-tailed prairie dog habitat are present within the GDBR in Section 3, T7S, R24E; Sections 1 and 12, T8S, R23E; Section 2, 5-11, and 14-17, T8S, R24E) (see Figure 3.6-1).

If black-footed ferrets are present in the GDBR, the Proposed Action could result in direct and indirect effects to this species. The direct effects would include mortality from construction activities that resulted in destruction of the white-tailed prairie dog colonies. Indirect effects would include loss of prairie dog colonies and disturbance due to noise from construction and human activities. Increased traffic and construction of well pads, pipelines and roads associated with the Proposed Action may cause an increase in prairie dog mortality, habitat fragmentation and loss, and colony abandonment, thereby decreasing the viability of the habitat to support black-footed ferrets. Fragmentation of habitat is of particular concern, since black-footed ferrets would need a minimum density of 8 prairie dog burrows/acre (20 burrows/ha) for the ferret population to survive (USFWS 1989).

Populations of black-footed ferrets have been introduced into the wild in Coyote Basin, south of the GDBR and are characterized as "non-essential experimental" populations. According to the FWS and the UDWR, management activities within the Coyote Basin PMZ should be conducted with the objective of maintaining a minimum of 10,000 acres of prairie dog colonies (EA No. UT-080-1999-02). Prairie dog colonies located in the PMZ and in the GDBR create a complex of approximately 16,000 acres. Approximately 1,830 acres of active prairie dog colonies exist in this area of the PMZ. It is estimated that well pad, pipeline and road construction would result in disturbance up to 73.2 acres within these sections of the GDBR. Therefore, the Proposed Action would be consistent with habitat management objectives (i.e., maintaining a minimum of 10,000 acres of prairie dog colonies) for the Coyote Basin PMZ. Based on the potential for prairie dog mortality and disturbance to the prairie dog habitat from increased traffic and construction, the Proposed Action "***may affect, is not likely to adversely affect***" the black-footed ferret.

Bald Eagle

The bald eagle is a federally listed threatened species and a State of Utah threatened species. Although no bald eagle nesting has been reported within the GDBR, wintering bald eagles have been reported to roost in cottonwood trees along the Green River and feed on carrion, fish and waterfowl within and adjacent to the GDBR.

Wintering eagles are likely to search for prey in the GDBR from early November through late March. As bald eagles are sensitive to human activity, they may avoid areas where construction activities are taking place. If construction of wells, pipelines, and access roads occurs during these months, these activities could result in short-term, temporary displacement from winter foraging habitat. In addition, roadside carrion is one of the bald eagle's primary winter food sources. Thus, the potential for roadway collisions of bald eagles would increase due to higher traffic levels associated with construction activities.

Indirect effects on bald eagles would include temporary habitat loss associated with surface disturbance and changes/losses in vegetation structure from project development. These habitat losses would in turn result in a reduction of bald eagle secondary prey species (e.g., prairie dogs, rabbits, mice, small birds). This loss of some prey species may limit foraging opportunities for individual eagles. However, with the implementation of avoidance and minimization measures identified in Section 4.6.2, the potential effects of the Proposed Action would be reduced.

Based on the potential loss of prey species and loss of habitat, the Proposed Action "***may affect is not likely to adversely affect***" the bald eagle.

Yellow-billed Cuckoo

The yellow-billed cuckoo is an obligate riparian species that feeds in cottonwood groves and nests in willow thickets. If roads, pipelines, well pads, and ancillary facilities were developed in the exact locations described in the Proposed Action, approximately 23 acres of riparian habitat would be disturbed. However, as specific well locations have not been determined at this time, and as BLM has authority to move well pads on BLM-managed lands up to 200 meters from staked locations, it is likely that the federal wells and the associated roads would be moved to avoid portions of riparian vegetation, which would reduce the amount of riparian acres potentially disturbed for the long term down to 5 acres. Based on these stipulations, the Proposed Action would have no direct effect on the western yellow-billed cuckoo and it is not likely to lead to a need to list the species.

Golden Eagle

Golden eagles are protected under the Bald Eagle and Golden Eagle Protection Act based on similarity to juvenile bald eagles. They are common to Uintah County and the Book Cliffs resource area. A total of 17 golden eagle nests were documented within the GDBR plus a one-mile buffer during a survey conducted in April 2004 (B&A 2004).

The Proposed Action could result in direct and indirect effects to golden eagles. Direct effects would include increased probability of collisions from higher traffic levels associated with construction activities and accidental or intentional shooting. Indirect effects would include displacement from foraging habitat and habitat loss associated with surface disturbance. These habitat losses would result in a reduction of the prey species (e.g., prairie dogs, rabbits, mice, and birds). In addition, golden eagles are sensitive to human disturbance and may avoid areas where construction activities are taking place.

Ferruginous Hawk

The ferruginous hawk is listed as threatened by the State of Utah. This species is common in the GDBR. BLM records and Buys & Associates surveys (2004) document 171 ferruginous hawk nests within the GDBR. Thus, the Proposed Action could result in direct and indirect effects to the ferruginous hawk.

This species is particularly susceptible to human-caused disturbances during courtship and incubation periods. A breeding pair could be disturbed by construction activities, including direct habitat removal, prey-base reduction, noise, and increased human activities, potentially resulting in nest and territory abandonment. This would result in a reduction of the breeding pair's productivity for that year, loss of nesting potential and displacement. Additional effects would include habitat fragmentation and a loss of foraging habitat (BLM 2003).

Western Burrowing Owl

The western burrowing owl is a state species of special concern. This species is often associated with prairie dog towns and uses these areas as nest sites and shelter. Direct and indirect effects could result from the Proposed Action. Direct effects would include increased mortality from collisions with construction vehicles. Indirect effects would include loss of habitat, displacement from foraging areas, interference with activities associated with reproduction, disturbance from noise and increased human activity, and fragmentation of its habitat. If breeding birds are present in the vicinity of construction activities between April 1 and July 15, the Proposed Action could result in disturbances to breeding, nesting, and fledgling success.

Greater Sage-grouse

The greater sage-grouse is considered a Species of Special Concern because of widespread losses of sagebrush habitat. UDWR records indicate that 14 leks exist within 5 miles of the GDBR, of which one-half occur within the GDBR boundary (see Figure 3.6.4). Given the abundance of sagebrush habitat along the eastern half of the GDBR, sage grouse leks, nesting areas, and wintering areas may exist within the GDBR.

The Proposed Action could result in direct and indirect effects to the sage grouse. Direct effects would include mortality of adults and fledglings resulting from vehicles and construction equipment. Indirect effects would include disturbance of courtship and nesting grounds, if construction activities occur during the breeding period from between March 1 and June 15. Breeding sage grouse may abandon the breeding grounds, if activities were to occur within 1,000 ft of an active lek during the breeding season.

The disturbance from construction and development would result in disturbance of 19 acres of sage grouse leks as presented in Table 4.6-4.

Table 4.6-4. Disturbance to Special Status Species - Proposed Action

Species/ Facility Type	Number of Facilities	Total Long-term Disturbance (acres)
Sage Grouse Leks		
New Gas Wells	3	14
New Oil Wells	1	5
Gas Wells on Existing Pads	0	0
Oil Wells on Existing Pads	0	0
Central Tank Facility	0	0
Compressor Stations	0	0
		19
Prairie Dog Colonies		
New Gas Wells	16	72
New Oil Wells	0	0
Gas Wells on Existing Pads	1	1
Oil Wells on Existing Pads	0	0
Central Tank Facility	0	0
Compressor Stations	0	0
		73

Common Yellowthroat

The common yellowthroat is listed as a sensitive species by the BLM. Preferred habitats include riparian corridors, marshes, brushy pastures, and old fields. Suitable foraging and nesting habitats occur within the GDBR. The Proposed Action could result in direct and indirect effects to the common yellowthroat. Direct effects would include mortality from construction equipment. Indirect effects would include disturbance during breeding and nesting periods, displacement of habitat, loss of foraging habitats, disturbance from noise and human activities, and fragmentation of habitat.

Endangered Colorado River Fish

The four endangered Colorado River fish species include the Colorado pikeminnow (*Ptychochelius lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*). These species have experienced severe population declines throughout their range as a result of the dams constructed along much of the Colorado River system. They continue to be affected by activities that deplete or degrade the flow of downstream waters into the Colorado River (U.S. Fish and Wildlife Service 1990a, b). Activities that cause the depletion of water in the Colorado River watershed result in direct and indirect effects to these species.

The Proposed Action would result in water depletion from removal of water from the Green River for construction and drilling operations. It is estimated that 108 acre-feet/year of water would be needed for drilling and completion operations and 2,300 acre-feet/year for waterflood operations. All of this amount could be supplied by water from the Green River through existing water rights. However, QEP could use the produced water from the Green River formation. The withdrawal of water for 10 years from the Green River would result in water depletion from the Upper Colorado River Basin according to Biological Opinions prepared by the U.S. Fish and Wildlife Service (USFWS 1994b, 1994c, 1997). These Biological Opinions specify that the Recovery Implementation Program Recovery Action Plan, initiated in 1988 (FWS 1988) had made sufficient progress to be the reasonable and prudent alternative to avoid the likelihood of jeopardy to these endangered fish species from new depletions of less than 3,000 acre-feet. The FWS determined that water depletion fees for projects annually depleting less than 100 acre-feet of water were no longer necessary (FWS 1994c). Since the Proposed Action would result in an annual water depletion of a maximum of 2,300 acre-feet, a payment of a fee of $16.30 per acre-foot for water depletion above 100 acre-feet would be required.

Indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance. However, the predicted increase would only be 0.03%, a negligible increase. Therefore, no effects would occur to fish species from increased sedimentation.

Based on the removal of water from the Green River (i.e., water depletion) for construction and drilling operations, the Proposed Action "***may affect, is likely to adversely affect***" the endangered Colorado pikeminnow, humpback chub, bonytail, and razorback sucker.

Roundtail Chub

The roundtail chub, which is found in the upper Colorado River Basin, is listed as a threatened species by the State of Utah. The decline in the roundtail chub population is attributed to the construction of dams in the Colorado River System that has resulted in water depletion.

The Proposed Action could have direct and indirect effects to the roundtail chub. Direct effects would include mortality to adults and juveniles from water depletion, which affects the entire life cycle of this species. Indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance.

Flannelmouth Sucker

The flannelmouth sucker is listed as a sensitive species by the State of Utah. This species is found in the Green River upstream from the confluence of the Colorado and Green Rivers. Recent declines of the species are attributed to the construction of the Flaming Gorge Reservoir on the Green River in Wyoming and Utah.

The Proposed Action could have direct and indirect effects to the flannelmouth sucker. Direct effects would include mortality to adults and juveniles from water depletion, which affects the entire life cycle of this species. Indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance.

Bluehead Sucker

The bluehead sucker is listed as a sensitive species by the State of Utah. This species is found in the Green River upstream from the confluence of the Colorado and Green Rivers. Recent declines of the species have occurred in the White River below Taylor Draw Dam and in the upper Green River (UDWR 2003).

The Proposed Action could have direct and indirect effects to the bluehead sucker. Direct effects would include mortality to adults and juveniles from water depletion. Indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance.

4.6.1.2 No Action Alternative

Under the No Action Alternative, 79 wells on federal leases have been approved and those wells could be developed. In addition, 130 wells would be on State of Utah and private leases. Therefore, the No Action Alternative could result in a maximum development of approximately 209 oil and gas wells. The long-term disturbance would be 888 acres. Three new 2000-horsepower compressor stations and 3 new central tank facilities would also be constructed.

General Wildlife

The general wildlife includes small mammals, smaller migratory birds, fish, reptiles, and amphibians. Direct effects from the No Action Alternative would include mortality from collisions with vehicles and heavy equipment. Mortality to bird species could also result from flying into reserve pits, contaminating the feathers, and therefore, the thermoregulatory ability. Accidental spills of oil, gas, or condensate into water bodies could result in fish kills and mortality to early stages of development of fish and amphibians.

Indirect effects from the No Action Alternative would include displacement of wildlife, interference with breeding and reduced survival of the young, avoidance of natural habitats from human activities during the construction and drilling process, and fragmentation of habitat of wildlife species. The severity of the effects would depend on the availability of the typical food outside areas of effect, the sensitivity of the species, the timing of construction and development activities, topography, climate (i.e., precipitation) and season of the year.

Big Game

Construction and development activities during the No Action Alternative would result in loss of cover and foraging areas for pronghorn and mule deer. Surface disturbance would result in a direct loss of big game habitat less than 1 percent for all categories as shown in Table 4.6-5. It should be noted that successful interim reclamation of well pads would reestablish these habitats over time. However the past/current climatic conditions (e.g. below normal precipitation) in the GDBR do not favor interim reclamation practices. Overall, considering the minimal amount of disturbance to these ranges, along with their magnitude across the Uintah Basin, the habitat losses produced by the No Action Alterative are not expected to have adverse effects on pronghorn and mule deer populations.

Table 4.6-5. Disturbance within Big Game Habitats - No Action

Habitat	Acreage Within GDBR	Long-term Disturbance (acres)	Percentage of Total Habitat in GDBR (%)
Antelope Habitat			
BLM-identified high priority, year-long habitat	7,400	24	<1%
BLM-identified crucial winter habitat	0	0	0
UDWR-identified crucial, year-long habitat	90,935	856	<1%
UDWR-identified substantial, year-long habitat	7,170	24	<1%
Mule Deer Habitat			
BLM-identified high priority, year-long habitat	0	0	None
BLM-identified crucial winter habitat	0	0	None
UDWR-identified crucial, winter habitat	40	0	None
UDWR-identified crucial, year-long habitat	1,120	6	<1%
UDWR-identified substantial, year-long habitat	2,756	12	<1%

Raptors

A variety of raptors inhabits the GDBR and makes use of all habitats present. Raptor surveys of the GDBR and a one-mile buffer conducted in April 2004 (B&A 2004) identified 66 raptor nests, of which 6 ferruginous hawk nests, 2 red-tailed hawk nests, one golden eagle nest and one great horned owl nest were active nests. Possible effects of the No Action Alternative on raptor species include direct loss or degradation of potential nesting and foraging habitats, and indirect disturbance from human activity (including harassment, displacement, and noise).

Development of the No Action Alternative would substantially increase road surfaces throughout the GDBR. This increase would allow greater access to the area, and would therefore likely increase traffic volumes. The potential for raptor/vehicle collisions and poaching would increase with the increased vehicle traffic. Therefore, the No Action Alternative would increase the potential for raptor collisions with vehicle traffic in the GDBR.

Destruction of raptor nesting and foraging habitat would have detrimental effects to raptors utilizing the GDBR. Studies have shown that destruction of habitat used by the raptors' prey base (e.g., mice, rabbits, ground squirrels, prairie dogs) has had the largest effect on raptor populations in the Uintah Basin (Grant et al 1991, BLM 2003). Surface disturbances associated with the No Action Alternative would result in the direct, long-term loss of approximately 4,491 acres of year-round habitat for prey species such as small mammals, songbirds, and reptiles. Increased dust accumulation from roads and well pads may also deter prey species from utilizing habitats adjacent to these areas. In addition, of the 548 acres directly removed from the Proposed Action, 20 acres are within 1/4-mile of an existing (active/inactive) raptor nest (Table 4.6-5). Development or road construction in proximity of an active nest could lead to nest abandonment, thereby affecting the breeding pair and their annual productivity. Since many raptors alternate between nest sites within a breeding territory, adjacent roads and well sites could prevent inactive nests from being used in the future. These effects would continue through project operation.

Based on the applicant-committed BMP discussed in Chapter 2 of this DEIS, direct effects on active raptor nests from well construction are not likely to occur. This measure states that "in conjunction with the APD, QEP will coordinate with BLM to have a survey conducted (by an approved biologist) prior to the construction of any new well to determine whether raptor nests are present within 0.5 mile of each well. If nests are determined to be present, the AO shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites for potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Structures in appropriate locations." While this measure would help prevent direct disturbance to active raptor nests, indirect effects such as loss or degradation of potential nesting and foraging habitats, and disturbance from human activity would still occur. These indirect effects could potentially be mitigated by avoiding the placement of well pads within 0.5 to 1 mile of raptor nests, and by locating well pads and facilities in a manner to conceal them from raptor nests by considering topographical features.

Table 4.6-6. Disturbance to Raptors - No Action

Disturbance Type	Number of Facilities	Total Long-term Disturbance (acres)
Permitted Federal Wells	0	0
State & Private Wells	4	20
	4 new wells	20

Upland Game Birds

Upland game birds within and adjacent to the GDBR include the mourning dove, wild turkey, and greater sage-grouse. The sage grouse is listed by the State of Utah as a sensitive species (UDWR 1998) and are discussed in Section 4.6.1.2.7, Special Status Wildlife Species.

Implementation of the No Action Alternative could result in both direct and indirect effects on the mourning dove. Direct effects would include the removal of potential nesting and foraging habitats. If construction, drilling and completion were to occur during the spring/summer months, the No Action Alternative could result in reproductive failure of breeding adults, nest abandonment, and/or direct mortality of eggs, nestlings or fledglings through nest destruction. Direct effects could also include the potential for mourning dove mortality from contact with petroleum products in reserve pits. However, provided suggested mitigation to net reserve pits is implemented, this potential effect would not occur.

Construction, drilling and completion noise and human presence could also cause displacement from foraging or resting habitats. Displacement may cause mourning doves to move into less suitable habitats or into habitats where inter- and intra-specific competition may occur. While these potential effects could affect individual mourning doves, given the extent of the species and its habitat throughout the State of Utah, the No Action Alternative is not likely to cause a decline in the species on a population-level basis.

Wild turkeys have been observed in riparian habitat along drainage bottoms and the Green River within the GDBR. A total of 1,126 acres of critical yearlong habitat exists within the GDBR. Since only 5 acres may be potentially affected by construction of State and private lands and the State has the authority to move activities from riparian areas, wild turkeys are not likely to be directly or indirectly affected by the No Action Alternative.

Migratory Birds

The Proposed Action would result in direct and indirect effects to these migratory bird species. Effects to migratory birds in the GDBR would be dependent upon the seasons of construction, drilling and completion activities. If these activities are completed in the late fall, many of the migratory species would have left the GDBR for southern wintering grounds. Surface disturbance, and visual and noise effects during this time would be temporary, and project-related effects would not likely have a measurable effect on migratory bird populations as a whole or on individual species, in general. If construction, drilling and completion were to occur during the spring/summer months, the Proposed Action could result in reproductive failure of breeding adults, nest abandonment, or dispersion of the birds because of nest destruction. For example, ground-nesting bird species would be susceptible to nest destruction by construction vehicles, equipment and ATV traffic. Shrub nesting species may also be directly affected due to removal of shrub vegetation. Direct effects would also include the removal of potential nesting and foraging habitats. These effects would have a greater effect on High-Priority migratory bird species that may be nesting in the GDBR due to their smaller population sizes and limited distribution found in such special status species. Construction, drilling and completion noise and human presence could also cause displacement from foraging or resting habitats. As with other wildlife species discussed in this section, displacement may cause birds to move into less suitable habitats or into habitats where increased inter- and intra-specific competition may occur, and subsequent effects of deteriorated physical condition and general distress.

Fisheries

Numerous species of fish are present in the portion of the Green River that flows through the GDBR. Some of these fish are of high value for recreational fishing. Direct and indirect effects could result to these fish from the No Action Alternative. Direct effects would result from accidental spills of oil and condensate into the Green River potentially resulting in a fish kill. Streams within the GDBR include Powder Springs Wash, Walker Hollow Right Fork, Baeser Wash, and several small washes. These washes are ephemeral (i.e., contain water after rainfall events) and are not likely to contain any fish species. Increased sedimentation into the Green River from erosion resulting from the Proposed Action may effect the fish by increasing sediment deposits on gravel bars and other egg-laying areas, therefore affecting fish fecundity. Since the flow of the Green River ranges from 10,000 to 31,000 cubic feet per second (cfs), it is unlikely that 0.1 percent increase in sedimentation from the No Action Alternative would affect the fish reproduction.

Special Status Wildlife Species

Special status wildlife species include those species listed as threatened or endangered under the Endangered Species Act, species listed as sensitive by the BLM, and species listed as threatened, endangered, or species of special concern by the State of Utah. The effects from the No Action Alternative to special status wildlife species are discussed below.

White-tailed Prairie Dog

Development of the No Action Alternative would have both positive and negative effects on white-tailed prairie dogs in the GDBR. The principal potential negative effects include a direct loss of habitat, an increase in the potential for direct mortality caused by poaching, vehicle collisions, or exposure to toxic substances, and the decreased availability/use of certain habitats through displacement, habitat fragmentation and habitat modification. Potential positive effects include habitat enhancements caused by the creation of bare ground and the establishment of regrowth vegetation.

Any direct habitat loss in existing (e.g., established prairie dog towns) or potential (e.g., short-grass prairie; low growing shrublands) habitats would negatively affect white-tailed prairie dogs in the GDBR. Prairie dog colonies located in the GDBR create a complex of approximately 16,000 acres. Of the 16,000 acres, approximately 1,830 acres are currently active. It is estimated that well pad, pipeline and road construction associated with the No Action Alternative would result in long-term disturbance up to 46.2 acres within prairie dog colonies in the GDBR.

In addition to habitat losses, the No Action Alternative could potentially increase direct mortality of white-tailed prairie dogs. Construction and operation of facilities associated with the No Action Alternative would expand current roadway systems and increase both traffic and visitation to the GDBR. Increases in traffic and human presence could lead to increased mortality from vehicle collisions as well as potential poaching (Laun 1957; Johnson and Collinge 2004). In addition to direct human caused mortality, these species could also be affected through exposure to spills or other sources of petroleum products.

As mentioned previously, development of the No Action Alternative would alter existing habitat in the GDBR. As traffic volumes and human presence are increased due to energy exploration, adjacent habitats may be avoided due to human interaction, noise and the influx of invasive weeds. Although prairie dogs are often observed on or near roadways, prairie dog colonies are typically fragmented by road development. When colonies are fragmented by roads, therefore reducing dispersal ability, prairie dog densities increase (Johnson and Collinge 2004). As prairie dog densities increase, so does the potential for plague transmittance and habitat degradation (e.g., decreased food resources) (Rayor 1985, Cully and Williams 2001, Johnson and Collinge 2004). Habitat quality for these species can also be degraded by the introduction of noxious and invasive weeds. Weed invasions may lead to a decrease in the amount of native perennials and bare ground therefore degrading habitat for prairie dogs by decreasing visibility, forage quality, and burrow development.

In addition to negative effects, the No Action Alternative may also produce beneficial effects to prairie dogs in the GDBR. Blading and grading of vegetation would produce numerous tracts of open areas that create ideal habitat for prairie dogs. By decreasing the vegetative height and increasing visibility around existing colonies, prairie dog habitats in the GDBR may expand. In addition, when these disturbed areas are reclaimed, the regrowth of native vegetation provides ideal forage for the prairie dog. Proposed management under the draft Vernal Field Office Resource Management Plan would not impose more restrictive stipulations than those that currently exist. Therefore, the No Action alternative is not expected to compromise our ability to protect the prairie dogs or their habitat.

Black-footed Ferret

The black-footed ferret is a federally listed endangered species, which utilizes prairie dog colonies for shelter and feeds on the prairie dogs. The BLM records indicate that approximately 1,827 acres of white-tailed prairie dog habitat are present within the GDBR in Section 3, T7S, R24E; Sections 1 and 12, T8S, R23E; Section 2, 5-11, and 14-17, T8S, R24E) (see Figure 3.6-1).

If black-footed ferrets are present in the GDBR, the No Action Alternative could result in direct and indirect effects to this species. The direct effects would include mortality from construction activities that resulted in destruction of the white-tailed prairie dog colonies. Indirect effects would include loss of prairie dog colonies and disturbance due to noise from construction and human activities. Increased traffic and construction of well pads, pipelines and roads associated with the No Action Alternative may cause an increase in prairie dog mortality, habitat fragmentation and loss, and colony abandonment, thereby decreasing the viability of the habitat to support black-footed ferrets. Fragmentation of habitat is of

particular concern, since black-footed ferrets would need a minimum density of 8 prairie dog burrows/acre (20 burrows/hectare) for the ferret population to survive (USFWS 1989).

Populations of black-footed ferrets have been introduced into the wild in Coyote Basin, south of the GDBR and are characterized as "non-essential experimental" populations. According to the FWS and the UDWR, management activities within the Coyote Basin PMZ should be conducted with the objective of maintaining a minimum of 10,000 acres of prairie dog colonies (EA No. UT-080-1999-02). Prairie dog colonies located in the PMZ and in the GDBR create a complex of approximately 16,000 acres. Approximately 1,830 acres of active prairie dog colonies exist in this area of the PMZ. It is estimated that well pad, pipeline and road construction associated with the No Action Alternative would result in long-term disturbance up to 46.2 acres within these sections of the GDBR. Therefore, the No Action Alternative would be consistent with habitat management objectives (i.e., maintaining a minimum of 10,000 acres of prairie dog colonies) for the Coyote Basin PMZ.

Based on the potential for prairie dog mortality and disturbance to the prairie dog habitat from increased traffic and construction, the No Action Alternative "***may affect, is not likely to adversely affect***" the black-footed ferret.

Bald Eagle

The bald eagle is a federally listed threatened species and a State of Utah threatened species. Although no bald eagle nesting has been reported within the GDBR, wintering bald eagles have been reported to roost in cottonwood trees along the Green River and feed on carrion, fish and waterfowl within and adjacent to the GDBR.

Wintering eagles are likely to search for prey in the GDBR from early November through late March. As bald eagles are sensitive to human activity, they may avoid areas where construction activities are taking place. If construction of wells, pipelines, and access roads occurs during these months, these activities could result in short-term, temporary displacement from winter foraging habitat. In addition, roadside carrion is one of the bald eagle's primary winter food sources. Thus, the potential for roadway collisions with of bald eagles with vehicles would increase due to higher traffic levels associated with construction activities.

Indirect effects on bald eagles would include temporary habitat loss associated with surface disturbance and changes/losses in vegetation structure from project development. These habitat losses would in turn result in a reduction of bald eagle secondary prey species (e.g., prairie dogs, rabbits, mice, small birds). This loss of some prey species may limit foraging opportunities for individual eagles. However, with the implementation of avoidance and minimization measures identified in Section 4.6.2, the potential effects of the No Action Alternative would be reduced.

Based on the potential loss of prey species and loss of habitat, the No Action Alternative "***may affect, is not likely to adversely affect***" the bald eagle.

Yellow-billed Cuckoo

The yellow-billed cuckoo is an obligate riparian species that feeds in cottonwood groves and nests in willow thickets. If roads, pipelines, well pads, and ancillary facilities were developed in the exact locations of riparian vegetation described in the No Action alternative, approximately 5 acres owned by the State of private owners would be disturbed. However, specific well locations have not been determined at this time, and the State has authority to move well pads from staked locations, it is likely that the federal wells and the associated roads would be moved to avoid portions of riparian vegetation.

Based on this stipulation, it is unlikely that the No Action would have a direct effect on the western yellow-billed cuckoo and it is not likely to lead to a need to list the species.

Golden Eagle

Golden eagles are protected under the Bald Eagle and Golden Eagle Protection Act based on similarity to juvenile bald eagles. They are common to Uintah County and the Book Cliffs resource area. A total of 17 golden eagle nests were documented within the GDBR plus a one-mile buffer during a survey conducted in April 2004 (B&A 2004).

The No Action Alternative could result in direct and indirect effects to golden eagles. Direct effects would include increased potential of vehicle collisions from higher traffic levels associated with construction activities and accidental or intentional shooting. Indirect effects would include displacement from foraging habitat and habitat loss associated with surface disturbance. These habitat losses would result in a reduction of the prey species (e.g., prairie dogs, rabbits, mice, and birds). In addition, golden eagles are sensitive to human disturbance and may avoid areas where construction activities are taking place.

Ferruginous Hawk

Ferruginous hawks are listed as threatened by the State of Utah. This species is common in the GDBR. BLM records and Buys & Associates surveys (2004) document 171 ferruginous hawk nests within the GDBR. Thus, the No Action Alternative could result in direct and indirect effects to the ferruginous hawk.

This species is particularly susceptible to human-caused disturbances during courtship and incubation periods. A breeding pair could be disturbed by construction activities, including direct habitat removal, prey-base reduction, noise, and increased human activities, potentially resulting in nest and territory abandonment. This would result in a reduction of the breeding pair's productivity for that year, loss of nesting potential and displacement. Additional effects would include habitat fragmentation and a loss of foraging habitat (BLM 2003).

Western Burrowing Owl

The western burrowing owl is a state species of special concern. This species is often associated with prairie dog towns and uses these areas as nest sites and shelter. Direct and indirect effects could result from the No Action Alternative. Direct effects would include increased mortality from collisions with construction vehicles. Indirect effects would include loss of habitat, displacement from foraging areas, interference with activities associated with reproduction, disturbance from noise and increased human activity, and fragmentation of its habitat. If breeding birds are present in the vicinity of construction activities between April 1 and July 15, the No Action Alternative could result in disturbances to breeding, nesting, and fledgling success.

Greater Sage-grouse

The greater sage-grouse is considered a Species of Special Concern because of widespread losses of sagebrush habitat. UDWR records indicate that 14 leks exist within the 5 miles of the GDBR, of which one-half occur within the GDBR boundary (see Figure 3.6.4). Given the abundance of sagebrush habitat along the eastern half of the GDBR, sage-grouse leks, nesting areas, and wintering areas may exist within the GDBR.

The No Action Alternative could result in direct and indirect effects to the sage grouse. Direct effects would include mortality of adults and fledglings resulting from vehicles and construction equipment. Indirect effects would include disturbance of courtship and nesting grounds, if construction activities occur during the breeding period from between March 1 and June 15. Breeding birds may abandon breeding ground, if activities were to occur within 1000 ft of an active lek during the breeding season.

Common Yellowthroat

The common yellowthroat is listed as a sensitive species by the BLM. Its preferred habitats include riparian corridors, marshes, brushy pastures, and old fields. Suitable foraging and nesting habitats occur within the GDBR. The No Action Alternative could result in direct and indirect effects to the common yellowthroat. Direct effects would include mortality from construction equipment. Indirect effects would include disturbance during breeding and nesting periods, displacement of habitat, loss of foraging habitats, disturbance from noise and human activities, and fragmentation of habitat.

Colorado River Endangered Fish Species

The four endangered Colorado River fish species include the Colorado pikeminnow (*Ptychochelius lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*). These species have experienced severe population declines throughout their range as a result of the dams constructed along much of the Colorado River system. They continue to be affected by activities that deplete or degrade the flow of downstream waters into the Colorado River (U.S. Fish and Wildlife Service 1990a, b). Activities that cause the depletion of water in the Colorado River watershed result in direct and indirect effects to these species.

The No Action would result in water depletion from removal of water from the Green River for construction and drilling operations. It is estimated that 18 acre-feet/year (ac-ft/yr) of water would be needed for drilling and completion operations and 387 ac-ft/yr for waterflood operations. All of this water could be supplied by the 1,068 ac-ft/yr from the Green River through existing water rights. Water requirements could also be supplied by produced water from the Green River formation. The withdrawal of 387 ac-ft/yr of water for 10 years from the Green River would result in water depletion from the Upper Colorado River Basin according to Biological Opinions prepared by the U.S. Fish and Wildlife Service (FWS 1994b, 1994c, 1997). These Biological Opinions specify that the Recovery Implementation Program Recovery Action Plan, initiated in 1988 (FWS 1988) had made sufficient progress to be the reasonable and prudent alternative to avoid the likelihood of jeopardy to these endangered fish species from new depletions of less than 3,000 acre-feet. The FWS determined that water depletion fees for projects annually depleting less than 100 acre-feet of water were no longer necessary (FWS 1994c). Since the Proposed Action would result in a water depletion of 405 ac-ft/yr, a payment of a fee of $16.30 per acre-foot for water depletion above 100 acre-feet would be required.

The predicted increase in sedimentation is only 0.1 percent, an unmeasurable amount. Therefore, no indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield.

Based on the removal of water from the Green River (i.e., water depletion) for construction and drilling operations, the No Action Alternative "***may affect is likely to adversely affect***" the endangered Colorado pikeminnow, humpback chub, bonytail, and razorback sucker.

Roundtail Chub

The roundtail chub, which is found in the upper Colorado River Basin, is listed as a threatened species by the State of Utah. The decline in the roundtail chub population is attributed to the construction of dams in the Colorado River System that has resulted in water depletion.

The No Action Alternative could have direct and indirect effects to the roundtail chub. Direct effects would include mortality to adults and juveniles from water depletion, which affects the entire life cycle of this species. Indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance.

Flannelmouth Sucker

The flannelmouth sucker is listed as a sensitive species by the State of Utah. This species is found in the Green River upstream from the confluence of the Colorado and Green Rivers. Recent declines of the species are attributed to the construction of the Flaming Gorge Reservoir on the Green River in Wyoming and Utah.

The No Action Alternative could have direct and indirect effects to the flannelmouth sucker. Direct effects would include mortality to adults and juveniles from water depletion, which affects the entire life cycle of this species. Indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance.

Bluehead Sucker

The bluehead sucker is listed as a sensitive species by the State of Utah. This species is found in the Green River upstream from the confluence of the Colorado and Green Rivers. Recent declines of the species have occurred in the White River below Taylor Draw Dam and in the upper Green River (UDWR 2003).

The No Action Alternative could have direct and indirect effects to the bluehead sucker. Direct effects would include mortality to adults and juveniles from water depletion. Indirect effects on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance.

4.6.2 Mitigation

4.6.2.1 Wildlife

Although the exact location of the proposed wells and associated facilities are not known at this time, measures taken to mitigate for effects from the Proposed Action or No Action Alternative could include the following:

- Restrict construction of well pads, access roads, and pipelines and drilling of wells on BLM-administered land during the winter months (e.g., January to March), within designated critical winter habitat of pronghorn antelope and mule deer.
- Prohibit drilling within 1 mile of an active golden eagle or ferruginous hawk nest from February 1 to July 15. Prohibit drilling within 0.5 mile from other active raptor nests between April 1 and July 15.
- Where feasible, locate well pads and facilities in a manner to conceal them from raptor nests by considering topographical features.

- Raptor nests surveys will occur on a site-specific basis in conjunction with the Application for Permit to Drill review process, and is the BLM's responsibility to determine whether a survey is required.
- Place proposed construction and human activities within already disturbed areas whenever possible.
- Place project facilities to avoid direct loss or modification of nesting and roosting habitats.
- Avoid developing closed loop roads within mule deer winter habitat and pronghorn antelope critical winter habitat.
- Construct artificial nest platforms within the GDBR in order to mitigate any unavoidable losses of potential, natural nesting areas. Details of this measure would be negotiated with BLM wildlife biologists.
- Enhance existing nest sites within the boundaries of the project area. Details of this proposal would be negotiated with BLM wildlife biologists.
- Field personnel should be encouraged to notify BLM, USFWS or UDWR when animal carcasses are seen on or along roads in the GDBR.

4.6.2.2 Special Status Wildlife

Actions that should be taken to avoid or minimize effects to endangered, threatened, and special status species would include the following:

- Remove dead animals from roads and ROWs.
- Prohibit drilling within 1/2 mile of a ferruginous hawk nest from March 1 to July 15 and allow no permanent structures within 1/4 mile, unless topography screen the nests from construction operations.
- Prohibit construction and development activities within 1/4 mile of short-eared owl nests from April 1 to July 15; for burrowing owls the dates are April 15 to August 15.
- No surface disturbance would be allowed within greater sage grouse strutting and nesting habitat between March 1 and June 30.
- No permanent facilities would be allowed within 1,000 feet of any identified greater sage grouse strutting ground.
- No powerlines or electrical transmission lines should be constructed that provide perch sites for raptors within 2 miles of sage grouse habitat (BLM 2003).

The following measures recommended by the U.S. Fish and Wildlife Service would be considered on a case-by-case basis during the APD on-site inspection for the protection of the bald eagle:

- Temporary activities within winter roost areas, e.g., cottonwood galleries, will not occur during the winter roost season from November 1 to March 31.
- No permanent facilities will be placed within 0.5 miles of winter roost areas.
- Avoid loss or disturbance to large cottonwood gallery riparian habitats.

- Use directional drilling where technically and economically feasible to reduce disturbance and drilling in suitable roosting habitat. All areas of disturbance within riparian areas and/or adjacent uplands should be revegetated with native species.

4.6.3 Unavoidable Adverse Effects

4.6.3.1 Wildlife

Unavoidable adverse effects to wildlife species from the Proposed Action or No Action Alternatives would include:

- Disturbance to raptor breeding, nesting, and foraging habitat from construction of well pads, roads, pipelines, and ancillary facilities. Approximately 43 new well pads under the Proposed Action would need to be moved or constructed outside of timing limitations to mitigate these potential adverse effects. Only 4 well pads would need mitigation under the No Action.
- Fragmentation of wildlife habitat from construction of well pads, roads, pipelines, and ancillary facilities. Approximately five times more roads would occur under the Proposed Action than the No Action.
- Displacement of wildlife species habitat from construction of well pads, roads, pipelines, and ancillary facilities. Total displacement would result from disturbance of 4,651 acres under the Proposed Action and 880 under the No Action.
- Increased disturbance from noise and human activities from construction of well pads, roads, pipelines, and ancillary facilities. Total noise effect would result from disturbance of 4,651 acres under the Proposed Action and 880 under the No Action.

4.6.3.2 Special Status Species

Unavoidable effects resulting from the Proposed Action or No Action Alternative would include the following:

- Well pad and road and pipeline construction could result in long-term disturbance to white-tailed prairie dog colonies, which would result in loss of prey, breeding habitat and shelter for the black-footed ferret.
- Drilling, completion and dust suppression activities would result in water depletion from the Green River and result in adverse effects to the endangered Colorado River fish species.

4.7 CULTURAL RESOURCES

The GDBR project is a federal undertaking in accordance with 36 CFR 800 (regulations implementing provisions of Section 106 of the National Historic Preservation Act of 1966). Any federal undertaking must consider potential effects to significant historic properties and must conform to federal regulations (particularly 36 CFR 800) in determining effects that a project may have on significant cultural resources (36 CFR 60.4) and in mitigating those effects determined to be adverse. As defined in 36 CFR 800, adverse effects to significant historic properties include physical alteration, damage, or destruction, alteration of the character of the setting of a property that contributes to its significance, or neglect that results in deterioration or destruction. All of these classes of potential adverse effects are of concern for archaeological, historical, or Native American traditional resources. Other relevant federal legislation and

implementing regulations include the Native American Graves Protection and Repatriation Act (NAGPRA) (43 CFR Part 10) and the Archaeological Resources Protection Act (ARPA) (43 CFR Part 7).

4.7.1 Direct and Indirect Effects

4.7.1.1 Proposed Action

Cultural resources are sensitive and nonrenewable resources that can be irreversibly damaged or destroyed by ground-disturbing activities, such as site and road construction, and secondary surface activities, such as vehicular and pedestrian traffic. Many of the known prehistoric and historic archaeological sites in the Uintah Basin are shallow and therefore vulnerable to the direct effects of vegetation clearing, right-of-way blading, and excavation of soils. Standing historic structures are more visible and more easily avoided by ground-disturbing activities, but these are not the predominant site type.

Cultural resources are also subject to indirect effects that frequently result from the increased vehicular and pedestrian traffic associated with development. Indirect effects resulting from vandalism, surface artifact collection, excavation, and off-road travel can include inadvertent damage, destruction, or removal of significant scientific information, the loss of research potential, the loss of interpretation possibilities, and the destruction of the character or setting of a site. These effects can be short-term or can continue well into the future as more of an area is opened and becomes increasingly popular with recreational and other users.

The GDBR has been partially developed for oil and gas production, the area is presently moderately accessible to the public via a network of both older and more recently constructed sites and roads. Many of the 63 archaeological sites (24 recommended as eligible to the NRHP) known to be within the GDBR are within reasonable driving or walking distance of an existing road or site. However, the present condition and integrity of these sites is unknown. Site density for the GDBR is estimated at 1 to 3 sites/square mile. Therefore, it is assumed that 154 to 462 sites could occur in the GDBR, perhaps 40 percent of which may be eligible to the NRHP. Because the exact locations of well pads and access roads are unknown, precise direct and indirect effects to these potential resources cannot be quantified. However, a probability of potentially disturbing a resource can be estimated.

The total disturbance to construct new facilities under the Proposed Action would be 4,561 acres (7.2 square miles), or approximately 4.7 percent of the GDBR. Based upon the estimated density of 1 to 3 sites/square mile within the GDBR, it is possible that 7 to 22 new sites could be encountered. These sites could be uncovered during the earth-moving activities required to construct well pads, access roads, pipelines, flowlines, power lines, CTFs and compressor stations.

Efforts to minimize indirect effects to known and potential sensitive archaeological sites can be made through informing workers of federal and state laws and regulations intended to protect cultural resources. However, because of the extremely dense network of roads expected in the GDBR over the next decade, indirect effects to archaeological sites resulting from potentially increased public access and use would be likely.

To avoid or minimize potential effects to cultural resources, QEP would commit to the following BMP:

> A Class III cultural resources survey, completed by a qualified archaeologist, would be conducted over all areas proposed for surface disturbance. Class III cultural resource block surveys have been conducted in portions of the proposed development area and would be utilized where applicable. If these surveys identify areas with a high probability

of encountering potentially significant subsurface archaeological sites, an archaeologist would monitor surface disturbance. QEP and their contractors would inform their employees about relevant federal regulations intended to protect cultural resources. Equipment operators would be informed that if a site is uncovered during construction, activities in the vicinity would immediately cease and the BLM's Authorized Officer (AO) would be notified. Historic properties considered eligible to the National Register of Historic Places (NRHP) would be avoided or mitigated through an approved data recovery plan.

4.7.1.2 No Action Alternative

The total disturbance to construct new facilities under the No Action alternative would be 548 acres (0.8 square miles), or less than 1 percent of the GDBR. Based upon the estimated density of 1 to 3 sites/square mile within the GDBR, it is possible that 1 to 3 new sites could be encountered. However, only 38 percent of the wells would be developed on federal lands and thus affected by Section 106 of the National Historic Preservation Act of 1966). Therefore, it is more likely that only one new site would be encountered on the federal lands. Any new sites discovered on State of Utah private lands would be evaluated under the jurisdiction of the Utah State Historic Preservation Office (SHPO).

4.7.2 Mitigation

None.

4.7.3 Unavoidable Adverse Effects

Effects that cannot be avoided by pre-construction Class III surveys, BMPs, or mitigation would result in an irretrievable loss of part of the archaeological record. Nonrecognition of significant resources, a lack of information and documentation, erosion, unauthorized collection/excavation, and inadvertent destruction would also cause loss of research potential, opportunities for interpretation, government management options, and the sense of place, setting, and feeling.

If appropriate avoidance or mitigation cannot be applied to cultural resources during construction, then the disturbance of sites, areas, and resources that may be important to Native American groups would have an adverse effect on traditional cultural values and those who practice them. The adverse effect would arise from the destruction of these sites, areas, and resources, the loss of religious values, and the loss of areas where traditional members may practice those beliefs central to their well being. A concomitant loss of ethnic identity and history could alienate the people from their past and affect their ties to the land.

Extra public access via the construction of extra access roads could result in vandalism or theft of known or newly discovered cultural resources.

4.8 PALEONTOLOGICAL RESOURCES

Previous surveys of the Uinta and Duchesne River Formations, both within and outside the GDBR, have shown these units to bear rich fossil resources. In efforts to manage paleontologic resources on public lands, several protective measures have been utilized. Fossil resources on BLM-managed Public Lands are managed under existing FLPMA, NEPA, CFR and USC codes and under other guidance as outlined in the BLM 8270 Manual and Handbook (1998) for the Management of Paleontological Resources and as

per DM 411 for the Management of Museum Collections. The BLM 8270 Handbook for the Management of Paleontological Resources ranks formations according to their paleontological potential, as follows:

Condition 1 Areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. Consideration of paleontological resources will be necessary if the Field Office review of available information indicates that such fossils are present in the area.

Condition 2 Areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. The presence of geologic units from which such fossils have been recovered elsewhere may require further assessment of these same units where they are exposed in the area of consideration.

Condition 3 Areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils based on their surficial geology, igneous or metamorphic rocks, extremely young alluvium, colluvium, or eolian deposits or the presence of deep soils. However, if possible it should be noted at what depth bedrock may be expected in order to determine if fossiliferous deposits may be uncovered during surface disturbing activities.

These classifications are currently being employed by the Vernal Field Office in consultation with the BLM Regional Paleontologist. Although these guidelines apply mostly to vertebrate fossils, they are designed to help protect rare plant and invertebrate fossils, especially existing and potential "Type" localities. Likewise, many fossils, though common and unimpressive in and of themselves, can be important indicators of paleoenvironment, depositional regime, and chronostratigraphy (i.e., temporal relationships).

Because significant fossil resources are known to occur, both the Wagonhound Member and the Myton Member of the Uinta Formation and the Brennan Basin Member of the Duchesne River Formation would be classified as Condition 1 rock units. Until identified as fossiliferous, all Quaternary geologic deposits in the GDBR would be considered Condition 3.

Prior to ground-disturbing activities in a Condition 1 area, a determination must be made by the Vernal Field Office (VFO) Paleontology Contact, in consultation with the BLM Regional Paleontologist, as to whether there is a need for an inventory to be conducted by an accredited paleontologist approved (permitted) by BLM. This determination for the need for a paleontological resources survey will be based on whether there are areas likely to yield fossils of scientific importance. Condition 1 areas void of well-developed soils, thick vegetation, and unsafe slopes should be recommended for paleontologic survey. In this way, the knowledge base of paleontological resources in the area can be built up to yield better information for making management decisions affecting these resources. When scientifically-important paleontological resources are found as the result of these surveys, or previous existing knowledge, there is a need to address avoidance, possible monitoring, or other mitigation. This benefits the fossil resource by providing protection through mitigation and ensures the leased areas are investigated for scientific value.

4.8.1 Direct and Indirect Effects

4.8.1.1 Proposed Action

Beneficial and adverse effects on paleontological resources already occur within the GDBR, both due to naturally occurring and man-made disturbances. High erosion rates on steep bedrock slopes in portions of the GDBR have the benefit of constantly exposing subsurface materials, including new fossils. Discovery and documenting these fossils during reconnaissance surveys by paleontologists increases our knowledge base and helps to preserve the resource. Effects such as mechanical breakage and disarticulation of surface fossils, due to trampling by animals and damage caused by human activities undoubtedly occur in the GDBR. Collecting of common invertebrates and plant fossils is a traditional and ongoing recreational activity in eastern Utah. Although several fossil enthusiasts have reported vertebrate and other scientifically-important fossil discoveries to land managers and BLM-permitted paleontologists, illegal collection of surface fossils still occurs and is an ongoing problem.

The Proposed Action increases both beneficial and adverse effects to the existing paleontological resources in the GDBR. Where construction of new well sites and access routes are proposed on previously disturbed areas, or where they occur within Quaternary alluvium and soils, fossil resources are unaffected. Where oil and gas activity is proposed in undisturbed areas of the Uinta and Duchesne River Formations, paleontological resources are at risk. Where fossils occur on the surface within these areas, they are potentially broken or destroyed if driven over or dozed up. Disturbance of bedrock results in the possibility of exposing, breaking, and destroying fossils. However, when a paleontologist is on-site to conduct pre-construction surveys, and where appropriate, present for monitoring of construction, the damage and loss can be minimized. On the other hand, exposing fossils increases their likelihood of being discovered. In this way, oil and gas activities benefit paleontological resources in providing a look into sediments that would not otherwise be feasible.

4.8.1.2 No Action

The scope of development would be considerably less under the No Action Alternative. Of the 209 wells that could be developed, only 79 would be on federal leases. Therefore, the likelihood of both beneficial and adverse effects to the existing paleontological resources in the GDBR would decrease because of both less opportunity for surveys and less opportunity to encounter fossils on private lands.

4.8.2 Mitigation

Under regulations by the BLM, Condition 1 geologic units require a paleontological assessment of at least a 10 acre area around each well pad, and 100-foot corridor for each road or pipeline/power line, by a qualified and permitted paleontologist prior to ground disturbing activities. If fossils are found in the area, they are identified with their geographic location, and their stratigraphic context is recorded. If a fossil site would be discovered, the immediate area may be deemed off-limits to ground disturbance and the proposed access re-routed, or well-pad moved so that the sensitive area would not be disturbed until a survey and recommendation can be conducted by a BLM permitted qualified paleontologist. If the sedimentological units bear evidence of potential fossil resources buried within the path of disturbance, a paleontologist may be required to monitor construction in efforts to locate, preserve, and collect any fossils that might be uncovered. If a significant fossil is unearthed, the construction may be halted temporarily until it is mitigated. If a significant site is uncovered (e.g. fossil bone bed, large associated skeleton, etc.) then construction must be postponed until the VFO is contacted and a determination is made whether to move the location, or to have the fossils mitigated.

4.8.3 Unavoidable Adverse Effects

Any ground-disturbing activities have the potential of adversely effecting fossil resources. Even when the presence of fossils cannot be detected on the surface, there is a real probability that fossils occur within the bedrock. It is the job of the VFO Geologist, aided by recommendations by a qualified paleontologist, and a geologist/paleontologist from the VFO BLM, to determine the preservational potential of the rocks based on the presence or absence of stratigraphy representative of favorable depositional environments. When fossils are present on the surface and/or the rock units are determined to likely be fossiliferous, a paleontologist would be required to monitor the freshly exposed rock during, and/or after, ground disturbing activities. But despite all reasonable efforts to identify and mitigate fossil resources prior, during, and after ground disturbances, fossils may inadvertently be missed and possibly destroyed. In spite of thorough pre-construction and on-site surveys during construction, fossils that are especially at high risk are the small vertebrate fossils, such as rodents, that cannot be easily recognized.

4.9 LAND USE

Existing land use within the GDBR is primarily oil and gas development and livestock grazing. Relatively modest recreational use includes off-highway vehicle use where permitted, and some hunting of small game (rabbits and coyotes) and waterfowl along the Green River. Direct effects from oil and gas development would be the removal of forage for livestock grazing and wildlife habitat.

4.9.1 Direct and Indirect Effects

4.9.1.1 Proposed Action

Under the Proposed Action, 88 percent of the total disturbance would occur on BLM-administered lands. The initial disturbance would occur during the 10-year construction period and last until interim reclamation of well pads would be complete. Of the remaining disturbance, about 9.5 percent would occur on State lands and 2.3 percent on private lands. Placement of well pads and easements on State and private lands would be negotiated with the respective land owner and secured through the permitting process of the appropriate state and local agencies. The long-term disturbance would occur for the 30-year life of the GDBR project. Table 4.9-1 shows the total long-term disturbance with respect to the land owner.

Table 4.9-1. GDBR Land Use Disturbance by Ownership – Proposed Action

Land Owner	Long-Term Disturbance (acres)	% of Total
BLM	3955	88
State	431	10
Private	105	2
Total	4491	

The major adjustment of existing land use would be the loss of livestock forage and resultant AUMS. These effects are presented in detail in Section 4.11. Effects to wildlife habitat are discussed in Section 4.6.

4.9.1.2 No Action

Under the No Action Alternative, 209 wells and associated access roads could be developed. About one-third of the total disturbance would occur on BLM-administered lands, over half would occur on State lands, and the remainder would be on private leases. The initial disturbance would occur during the 3-year construction period. Placement of well pads and easements on State and private lands would be negotiated with the respective land owner and secured through the permitting process of the appropriate state and local agencies. The long-term disturbance would occur for the 30-year life of the GDBR project. Table 4.9-2 shows the total long-term disturbance with respect to the land owner.

Table 4.9-2. GDBR Land Use Disturbance by Ownership – No Action

Land Owner	Long-Term Disturbance (acres)	% of Total
BLM	358	35%
State	540	53%
Private	121	12%
Total	1,019	

Like the Proposed Action, the major adjustment of existing land use would be the loss of livestock forage and resultant AUMS. These effects are presented in detail in Section 4.11. Effects to wildlife habitat are discussed in Section 4.6.

4.9.2 Mitigation

No extra mitigation would be applicable.

4.9.3 Unavoidable Adverse Effects

The loss of grazing forage and resultant AUMs would be unavoidable for the 40-year life of the project.

4.10 TRANSPORTATION

4.10.1 Direct and Indirect Effects

4.10.1.1 Proposed Action

Vehicle traffic would be the highest during the development stage of the GDBR project. Vehicles would be used to transport equipment and personnel to the GBDR for construction of well pads and short access roads, drilling, and completion of wells. Table 4.10-1 lists the Proponent's estimate of vehicle use during all development phases. During each year of the development phase, approximately 32,149 round trips would be required. In addition to construction-, drilling-, and completion-related traffic, average annual daily traffic required to operate and maintain the GDBR would be 40 pickups per day transporting personnel around the GDBR to service wells, 2 tanker trucks per day to collect condensate, and 20 miscellaneous vehicles per day for permanent employee transportation and material/supply deliveries.

Access to the GDBR would be generally limited to three roads. Average annual daily traffic is relatively low and traffic increases would only be 1.5 to 3.5 percent. Most of this traffic would tend to be in the

morning and evening hours as the bulk of construction-related traffic would occur as well as shift changes for the crews accomplishing drilling and completion activities. Therefore, the GDBR project would not result in a significant increase of traffic south of Vernal.

Table 4.10-1. Vehicle Usage for GDBR Project

Vehicle Type	Purpose	# Round trips/day	Vehicle Type	Annual Round Trips
Construction Vehicles (for 79 sites)				**1,422**
semi inbound	haul equipment in	5	semi inbound	
semi outbound	haul equipment out	5	semi outbound	
pick-up	worker transport	2	pick-up	
Drilling Vehicles (for 125 wells)				**22,866**
semi inbound	haul equipment in	7.5	semi inbound	
semi outbound	haul equipment out	7.5	semi outbound	
pickup	worker/others transport	5	pickup	
Larger trucks	Other equipment/fuel/water	3	larger trucks	
Completion Vehicles (for 125 wells)				**7,840**
Pickup	worker/others transport	4	worker/others transport	
rig truck	haul in, haul out	1	haul in, haul out	
Sand truck	stays on site	1	stays on site	
Pump truck	stays on site	1	stays on site	
frac truck	stays on site	1	stays on site	
fuel truck	deliver every 3 days	1	deliver every 3 days	
Water truck	deliver every 2 days	1	deliver every 2 days	
Wireline truck	stays on site	1	stays on site	
production truck	stays on site	1	stays on site	
Annual Round Trips (Development)				**32,149**
Annual Round Trips (Operations)				**22,630**
Average Daily Round Trips (Development and Full-Field Operations)				**150**
Average Daily Round Trips after Development				**62**

Table 4.10-2. Traffic Increases on Roads Servicing GDBR Project

Route	Existing AADT	GDBR AADT	Percentage Increase	GDBR AADT after Development	Percentage Increase
Highway 45	2,055	71	3.5%	29	1.4%
Red Wash Highway	640	22	3.5%	9	1.4%
Old Bonanza Highway	1,667	57	3.5%	24	1.4%

An existing road network within the GDBR consists of 40 miles of Class B roads (24 miles paved and 16 miles graveled) and 332 miles of Class D dirt roads. Under the Proposed Action, an additional 169 miles of access roads, averaging 1,000 foot length throughout the GDBR, would be constructed to tie into the existing road network. These roads would be constructed according to BLM standards to minimize disturbance and erosion potential.

New access roads on BLM surface would be crowned (2 to 3%), ditched, and constructed with a running surface of 18 feet and a maximum disturbed width of 30 feet. Graveling or capping the roadbed would be performed as necessary to provide a well constructed, safe road. Prior to construction or upgrading, the proposed road ROW would be cleared of any snow and allowed to dry completely.

The disturbed width needed may be wider than 30 feet to accommodate larger equipment where deep cuts are required for road construction, intersections or where sharp curves occur. These situations would be discussed and a decision made at the on-site. Site-specific proposals would be included in the APD. Surface disturbance and vehicular use would be limited to the approved location and access route or, as proposed by the Operator.

Access roads and surface disturbing activities would conform to standards outlined in the BLM and Forest Service publication Surface Operating Standards for Oil and Gas Exploration and Development (BLM/USFS 2006).

The road surface and shoulders would be kept in a safe and usable condition and would be maintained in accordance with the original construction standards. All drainage ditches and culverts would be kept clear and free-flowing and would be maintained according to original construction standards. The access road disturbed area would be kept free of trash during operations. All traffic would be confined to the approved road running surface. Road drainage crossings would be of the typical dry creek drainage crossing type. Crossings would be designed so they would not cause excess siltation or accumulation of debris in the drainage nor shall the drainage be blocked by the roadbed. If culverts would be needed, the location and size of the culverts would be proposed to the BLM AO during the on-site inspection for the APD.

The operator would clean and maintain approved culverts as needed. Erosion of drainage ditches by runoff water would be prevented by diverting water off at frequent intervals by means of cutouts. Should mud holes develop, the holes would be filled in and detours around the holes avoided. When snow is removed from the road during the winter months, the snow would be pushed outside of the borrow ditches, and the turnouts kept clear so that snowmelt would be channeled away from the road.

Maintenance of new roads would ultimately be the responsibility of the owner. Approximately 169 miles of new access roads would be constructed to access new facilities. The new construction would be in addition to the 40 miles of existing Class B roads (24 miles paved and 16 miles graveled) and 332 miles of Class D dirt roads within the GDBR. Uintah County is spearheading an effort to coordinate road maintenance activities and responsibilities. A Task Force consisting of the operators within Uintah

County, the Uintah County Planning Commission, and BLM is currently being organized. The purpose of the Task Force is to establish responsibilities for maintenance of roads.

4.10.1.2 No Action

Average daily traffic would be approximately 60 percent of the Proposed Action levels during the 3-year construction phase. This would be a corresponding 2.1 percent increase of AADT on roads accessing the GDBR. After construction, traffic levels would be approximately 30 percent of those projected for the Proposed Action leading to a slight 0.4 percent increase of AADT for the life of the project. Access roads that cross BLM lands would be constructed to the same standards as for the Proposed Action. Access roads crossing State or private lands would be constructed to the standards of the land owner.

4.10.2 Mitigation

QEP would include the adherence to speed limits as part of their employee training. Furthermore, QEP would include adherence to speed limits as part of their contractors' contracts.

4.10.3 Unavoidable Adverse Effects

Traffic increases would occur during the 10-year construction period but would decrease significantly after all wells would be developed. An associated slight increase in traffic incidents/accidents would probably occur.

4.11 RANGE MANAGEMENT

4.11.1 Direct and Indirect Effects

4.11.1.1 Proposed Action

The Proposed Action would result in the removal of 4,561 acres of vegetation in grazing allotments in the GDBR during the 10-year development period. As a result of long-term disturbance, there would be a temporary reduction of 347 AUMs (a 3.3% reduction). As shown in Table 4.11-1, the long-term percentage loss of AUMs would range from 0 to 7.0 percent loss of AUMS in each grazing allotment within the GDBR that would be affected by development. Changes in the grazing permits are not anticipated.

Table 4.11-1. GDBR Proposed Action Effects on Grazing Allotments

Name	Acreage within GDBR	AUMS within GDBR	Long Term Disturbance	Loss AUMs within GDBR	% AUMs Loss
Antelope Draw	32,296	1,900	1,343	79	4.2
Badlands	2,914	146	53	3	1.9
Baeser Wash	6,675	477	279	20	4.2
Bohemian Bottoms	6,762	356	364	19	5.0
Bonanza	13	1	0	0	0.0
Cocklebur	465	39	5	<1	1.0
Horned Toad	11,039	1,577	588	84	5.3

Name	Acreage within GDBR	AUMS within GDBR	Long Term Disturbance	Loss AUMs within GDBR	% AUMs Loss
Ouray Valley	686	30	9	<1	1.0
Pelican Lake	4,269	171	148	6	3.5
Powder Wash	1,591	122	69	5	4.3
Stateline	3,576	596	128	21	3.6
Walker Hollow	1,881	376	86	17	4.4
West Deadman	26,936	1,796	1,367	91	5.2
Total				**347**	**3.3**

During the 10-year construction period, potential collisions between vehicle and livestock would increase resulting in injury and mortality to livestock.

4.11.1.2 No Action

As shown in table 4.11-2, loss of AUMs would be correspondingly less. As a result of long-term disturbance, there would be a temporary reduction of 68 AUMS (a 0.9% reduction). Changes in the grazing permits are not anticipated.

Table 4.11-2. GDBR No Action Effects on Grazing Allotments

Name	Acreage within GDBR	AUMS within GDBR	Long Term Disturbance	Equivalent AUMs within GDBR	% AUMs Loss
Antelope Draw	32,296	1,900	543	32	1.7%
Badlands	2,914	146	31	2	1.1%
Baeser Wash	6,675	477	15	1	0.2%
Bohemian Bottoms	6,762	356	71	3	1.0%
Bonanza	13	1	0.00	0	0.0%
Cocklebur	465	39	0.00	0	0.0%
Horned Toad	11,039	1,577	66	9	0.6%
Ouray Valley	686	30	5	<1	0.0%
Pelican Lake	4,269	171	0.00	0	0.0%
Powder Wash	1,591	122	9	1	0.6%
Stateline	3,576	596	36	6	1.0%
Walker Hollow	1,881	376	0.00	0	0.0%
West Deadman	26,936	1,796	201	14	0.8%
Total		7,587		68	0.9%

4.11.2 Mitigation

None.

4.11.3 Unavoidable Adverse Effects

A loss of vegetation would occur under all alternatives. Additionally, an increased potential for vehicle-livestock collisions would occur for the life of the project although the probability would decrease after the 10-year construction and drilling period.

4.12 RECREATION

4.12.1 Direct and Indirect Effects

4.12.1.1 Proposed Action

The potential effects to recreation from the GDBR project would be based on lost recreational opportunities within and near the GDBR. Oil and gas exploration and development has been occurring within and adjacent to the GDBR since 1950. The existing 370 miles of primary and secondary roads provide abundant access for recreational activities. However, the existing oil and gas facilities reduce the wild character of the GDBR for visitors seeking solitude and relatively pristine landscapes. Recreational use in most of the GDBR primarily consists of OHV use where permitted, and some hunting and shooting of small game and waterfowl along the Green River. As a result, the majority of the GDBR receives modest recreation use relative to other prominent recreation areas in the region such as Dinosaur National Monument, Flaming Gorge National Recreation Area, Brown's Park, and the High Uintas Wilderness Area.

Currently, OHV activities are limited to designated trails and routes in the north and northwest parts of the GDBR and in portions of Section 22-27 T8S R22E lie within Devils Playground. In the southern half of the GDBR, the continued loss of solitude may be slightly offset by the construction of approximately 270 new miles of short access roads that may be designated trails and routes to afford new OHV activities. Additionally, the construction of surface pipelines would fragment OHV access.

Recreational activities along the Green River (rafting, canoeing, boating, fishing, and hunting) may be slightly affected when construction and drilling activities would occur in the western portion of the GDBR. Dust and noise would be noticeable during construction and drilling for those wells and access roads constructed nearest the Green River. However, these effects would be short-term in nature at each location. After construction and drilling, people enjoying recreational activities along the Green River would likely not be affected by GDBR activities. Similar effects would be encountered by recreational visitors to the adjacent Ouray National Wildlife Refuge (NWR) and Pelican Lake.

4.12.1.2 No Action

Under the No Action Alternative, 130 wells would be constructed on State and private lands and 79 would be on federal lands. As shown on Figure 2-3, most of the State and private wells, and all of the federal wells, would be constructed away from the Green River and the associated recreational activities. Therefore, recreation on and along the Green River would not be affected. The federal wells would be constructed in the southern portion of the GDBR. In this area, OHV activity is restricted to designated trails and routes. It is possible that some of the new access roads could be used for OHV activities.

4.12.2 Mitigation

To lessen the effect to the OHV recreational experience associated with Devils Playground, BLM should consider burying of all production lines to prevent contact with motorized cross country travel. During the on-sites to determine, the best placement of berms and well locations should be determined to avoid accidental jumping over hills into un-seen cut faces or onto drilling or productions facilities.

4.12.3 Unavoidable Adverse Effects

None.

4.13 VISUAL RESOURCES

The construction and maintenance of natural gas facilities would further alter the visual quality of the landscape. Well pad construction and drilling activities would be accomplished using dozers, graders, and drill rigs. Construction activities and the associated vehicle traffic would occur during daylight. Drilling activities and vehicle traffic would continue around the clock until the target reservoir is reached. Lighting associated with drilling activities would be readily visible at night from fairly long viewing distances. After construction activities would be completed, the major visual effect would be the long-term alteration of the landscape and native vegetation patterns resulting from well pad facilities, access roads, surface natural gas pipelines, surface oil flow lines, electric power lines, compressor stations, and central tank facilities.

Effects would be considered significant if the landscape as seen from sensitive viewpoints is substantially degraded or changed, or if the allowable modification to the landscape prescribed by the BLM VRM classification could not be met.

4.13.1 Direct and Indirect Effects

4.13.1.1 Proposed Action

Approximately 97 percent of the GDBR is designated VRM Class IV. The objective of VRM Class IV is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Currently, more than 600 wells have been developed in Class IV areas so many parts of the GDBR already have a mixed rural and industrial landscape. A total of 1,209 new wells would be drilled in VRM Class IV areas resulting in a higher level of the existing rural and industrial character of the landscape. The proposed development in the VRM Class IV areas would meet BLM objectives and would not be a significant effect. However, QEP's Applicant-Committed BMP to paint surface equipment, based upon the BLM recommendation during the APD process, to blend in with the surrounding area would decrease the overall visual effect of development.

VRM Class III lands encompass about 3 percent (2,846 acres) in the southeast part of the GDBR. Currently, there are 2 dry and abandoned wells and 2.6 miles of roads in the VRM Class III areas. Under the Proposed Action, 20 wells and approximately 3.8 miles of new access roads and 3.8 miles of above ground pipelines would be constructed and operated in VRM Class III lands. The objective of VRM Class III is to provide for management activities that partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. The proposed action would meet the VRMP II objective.

4.13.1.2 No Action

Under the Proposed Action, three wells on State lands would be located on lands surrounded by a BLM VRM Class III designated area. BLM would have no authority to mitigate visual effects on these lands.

4.13.2 Mitigation

Best Management Practices to reduce visual effects could be applied to the 20 gas wells proposed to be developed in the VRM Class III area to meet the management objectives. The measures include the following Best Management Practices:

- Existing vegetation should be retained to screen facilities from the viewshed of the Old and New Bonanza Highways.
- Where topography permits, well pads should be positioned away from ridgelines readily visible from the Old and New Bonanza Highways to prevent "sky lining". Where feasible, shorter tanks could be considered when sky lining could not be avoided.
- Constructing straight access roads should be avoided. Where feasible, access roads could be constructed to follow the natural contours of the landscape.
- All facilities on a well pad should be painted the same color to eliminate contrast.

4.13.3 Unavoidable Adverse Effects

Permanent above ground facilities in the VRM Class III areas would affect visual quality for the life of the project. When the project would be completed, the above ground equipment would be removed and the original visual quality would be partially restored.

4.14 SOCIOECONOMICS

This section provides an assessment of potential effects on social and economic resources including demographics, employment, wages, local economy, community services, and fiscal conditions and revenues that would be experienced with the implementation of the GDBR project. The analysis is focused on Uintah County, Utah.

4.14.1 Direct and Indirect Effects

4.14.1.1 Proposed Action

<u>Employment</u>

Implementation of the Proposed Action would create additional employment opportunities in the Uintah County region. Development of the GDBR would be completed in approximately 10 years and the production lifetime of the wells is expected to be 30 years. Both direct project employment (e.g., positions with QEP or contractors hired for construction, production and decommissioning) and indirect or secondary employment (jobs which become available in support industries as a result of project activities such as parts and materials production, equipment refueling, etc.) would increase as a result of project activities. Project work categories and associated man hours are provided in Table 2.4 in Chapter 2. It is estimated that 331 employees would be needed each year to develop well pads, roads, pipelines, and other

facilities during the 10-year construction phase. Following the construction phase, approximately 61 employees would be needed to support operations. Other vendors would be temporarily needed for maintenance activities during the 30-year life of the project

The primary influx of employment opportunities would occur during the construction phase of the project. The need for 331 construction-related employees would represent a 60 percent increase over the current levels of 551 construction employees in Uintah County but only a 3 percent increase over the current level of 10,324 employees in all categories in Uintah County. Employees and contractors would be hired by the applicants to construct and maintain roads and wells pads, water pipeline, and surface gas pipelines. Local contractor jobs would include gravel and water truck drivers, heavy equipment operators, and pipeline workers. Additionally, some employees would be necessary to perform maintenance activities. Where possible, QEP plans to use local sub-contractors and workers (i.e., Uintah County). However, some specialized construction expertise (i.e., well drilling and completion techniques) may not be available in Uintah County and "non-local" contractors would be utilized for these tasks.

Although the construction phase is 10 years, many aspects are short-term in nature. Based upon these characteristics, it can be assumed that "non-local" settlement in the area would be dependant upon individual job stability. Those having more long-term job stability may choose to move to the area and would most likely settle in communities adjacent to the GDBR. Married workers probably would bring spouses and families to the area, and settlement would most likely occur in Vernal, Roosevelt, or Jensen. It can also be assumed that short-term construction workers would not bring their families to the local area. Depending on the craft type and worker specialty, some workers may only be required for a few months, while others could be needed for many years. Short-term workers would mainly utilize motel accommodations rather than longer-term rental housings such as apartments or houses. In many cases, short-term construction workers may stay in motor homes or travel trailers parked in local trailer parks and long-term campgrounds. Since it is unclear how many short-term construction workers would be utilized, the number of motel rooms, trailer park spaces, and campsites that would be required for the construction work force cannot be accurately estimated.

Once the wells begin production, some level of sustained permanent employment would be required for operation and maintenance of the wells and pipeline, as well as gradual interim reclamation of the inactive wells and associated access roads. Only a small number of workers would be required to perform these functions. Local workers are expected to be used for these tasks.

Wages and Local Economy

The Proposed Action would contribute to the local economy through increased short- and long-term employment. Average salaries within Uintah County are currently estimated to be about $3,600 per month for oil and gas industry employees, and an average of $1,810 per month for the construction and trades industry. Assuming the employees would be equally distributed from these industries, the average monthly salary is estimated to be $2,700 for the construction-related employees. Accordingly, the estimated annual payroll during the construction phase is estimated to be $10,724,400.00 ($2,700/month x 12 months x 331 employees) which represents a two percent increase over the total personal income in Uintah County as of March 2004 of $502.7 million..

As salaries and per diem payments are spent, benefits would be felt in various retail sectors, as more goods and services are locally sold. In addition, economic benefits would also occur as a result of the companies spending on purchases of equipment and supplies from local area vendors.

The majority of workers hired during the construction, operation and interim reclamation phases of the project would be local workers. Employment of local construction workers would benefit the local

economy through direct expenditure of their earnings on housing, food and other locally provided goods and services. These workers would also pay local property and sales taxes.

Although a significant number of non-local, short-term workers may send paychecks home to families, these workers typically receive a per diem rate for daily housing and meal costs. Workers spend their per diem on motel accommodations, trailer park rentals, meals, groceries, gasoline and other goods and services while they are present in local communities.

Although QEP has not yet identified the equipment, materials and other construction supplies that would be locally purchased. Money locally spent on equipment or supplies would benefit the local economy as retail businesses sell more products and eventually hire more employees. As with construction workers salaries, money spent on local equipment purchases would then be invested benefiting other retail and wholesale sectors of the economy.

Community Emergency Response Services

Non-local construction workers would temporarily increase the populations of local communities to a very small degree. If about half of the construction workers would be non-local, this would represent a temporary population increase of only 165 people (less than one percent increase) compared to the current population of 25,297 people in Uintah County. Although the precise number of non-local construction workers cannot be estimated, workers would be distributed among the various communities and would not be expected to significantly increase the demand for local services such as law enforcement, fire protections, or medical services. Since many of the non-local construction workers are not expected to bring their families with them, no increase in demand on public schools would be expected.

In terms of local services provided by Uintah County and associated special service districts, it is possible that QEP may require the assistance of the county sheriff's department, local fire protection districts, or local ambulance services during emergencies in the GDBR. QEP would strive to minimize accidents in its workplace through employee training programs and by compliance with applicable OSHA regulations. Accordingly, the project would be expected to place minimal demands on local emergency services.

Local Government Fiscal Conditions and Revenues from Oil and Gas Activities

The GDBR project would contribute substantial revenues to various local, state, and federal government entities through payment of taxes and royalties. The following types of revenues would be generated by the proposed project.

Property Tax Revenue

Additional project revenues would be generated throughout the collection of an ad valorem/property tax levied on improvements constructed by the project applicants. Since this tax assessment is based on value added to property, revenues would increase based upon the number and location of wells. The ad valorem/property tax is based on equipment (i.e.: pump jacks, well heads, tanks, pipe, etc.) and the property tax is based on the value of reserves. The taxation is based on discounted cash flow from producing wells. Uintah County charges this tax and it is paid directly to the county. In 2003, QEP paid $1,057,291.27 to Uintah County. In 2004, QEP paid $1,154,593.53, or about 3 percent of the total assessed value of $418,801,897 (Uintah County Clerk Auditor's Office, 2004) for oil and gas extraction operations in Uintah County. Future assessed value would be determined as a percentage of actual cost of the facilities. Ad valorem tax revenues in Uintah County are distributed to the Uintah County School District, Uintah County government, State-supported schools, the Uintah County library, various local water districts, parks and recreation, and the various local city and town governments. Revenues would

gradually increase over the first 10 years, provide a steady revenue stream for a period of years, and then decline as facilities are dismantled and reclaimed. These projections are subject to the number, location and life span of facilities and gas production.

Sales and Use Tax Revenue

Sales taxes are paid by oil and gas operations when purchases of equipment, materials, or supplies are made in the local area. Examples of such materials would include gravel, pipe, fuel and other common supplies. Project construction would also result in additional sales taxes related to employee purchases of many different goods and retail services.

Like property tax revenues, sales tax revenues are used by local cities and counties to fund a variety of important local services and community facilities. To the extent that QEP purchasing activities generate sales tax revenues, the project would be a small, but unquantifiable, benefit to local residents through a slightly higher increased funding of these local services.

Severance Tax

Severance tax is a tax on production and is currently a split rate. For example, the first $13.00 per barrel of oil is taxed at 3%; everything over that is taxed at 5%. The first $1.50 per mcf of gas is taxed at 3%; everything over that is taxed at 5%. This is a State of Utah tax and is charged by and paid to the state tax commission and is put into the general fund. Based upon QEP's expected production over the life of the GDBR project, QEP would pay $123.1 million, or an average of $3 million annually for the life of the project, to the general fund. During 2005, oil and gas severance contributed over $53 million to the State's general tax fund (Utah State Tax Commission 2006). Table 4.14-1 shows an estimate of severance taxation over the life of the project.

Federal Mineral Royalties

Mineral lease royalties are collected by the Minerals Management Service, U.S. Department of the Interior, for gas and oil produced on federal leases. At full-field development, 920 gas wells and 188 oil wells would be completed on federal land in the GDBR. Substantial revenues would be generated through mineral royalty payments. Federal mineral royalties are collected at a rate of 12.5% and are split evenly between the federal government and the state of origin.

Utah's portion of the royalties is distributed in the following manner: 40% to the Utah Department of Transportation, 32.5% to the Permanent Community Effect Fund (PCIF), and 15.75% to the County of Origin (Utah Administrative Code Title 59. Revenue and Taxation. Internet http://www.code-co.com/utah/code/04/59-21.htm#TOP). Recipients of PCIF funds include counties, special service districts, cities, special improvement districts, towns, water conservancy districts, school districts, water or sewer improvement districts, building authorities, and housing authorities. Eligible projects include provision of public services, construction and maintenance of public facilities, and planning. The PCIF Board's administrative rules further define "public facilities and services" to mean public infrastructure traditionally provided by governmental entities. As a result, Uintah County and municipalities in Uintah County would be eligible for PCIF funds.

Table 4.14-2 presents the projected annual natural gas and oil production and the associated royalties. Annual gas production rates are estimated to range from 4,911 million cubic feet (MMCF) to as high as 30,127 MMCF at peak production. Annual oil production rates have been estimated to range from 20.2 million barrels (MBO) per year to as high as 690 MBO barrels per year during peak production. The annual federal mineral royalties are projected to range from $1,247,154 to $8,462,396, equating to a total

of $332,524,727, or an average of about $8 million annually, over the life of the project. In 2001, total federal lease royalties generated by operations in Uintah County amounted to about $36 million (Utah State Tax Commission 2004). Of this total amount, $140,076,041 would be paid to the State of Utah during the 40 years of project operation and $26,186,322 would be paid directly to Uintah County. Also, local agencies and governments would be eligible to apply for a portion of the $54 million in PCIF funding.

The values shown in Table 4.14-1 are projections intended only to present a general sense of the federal, state, and local funds generated by the project. The natural gas and oil prices used to calculate the annual royalties are speculative estimates by the Energy Information Administrations projected 2025 Annual Energy Outlook Prices (EIA, 2004), and could vary substantially over the life of the project. Additionally, the oil and gas annual productions are "best-case" estimates by QEP and could vary with many factors beyond the control of BLM or QEP. A natural gas price of $4.40 per thousand cubic feet and an oil price of $26.72 per barrel were used to calculate the federal mineral royalties.

Table 4.14-1. GDBR Severance Tax – Proposed Action

Year	Projected Annual Natural Gas Production (MMcf)	Projected Annual Oil Production (million barrels/year)	Estimated Value of Natural Gas Produced by the Proposed Project	Estimated Value of Oil Produced by the Proposed Project	Severance Tax Natural gas[1]	Severance Tax Oil[2]
2005	10873.0	151.7	$47,841,200	$4,052,386	$2,065,783	$163,230
2006	16965.8	269.0	$74,649,736	$7,186,560	$3,223,376	$289,475
2007	20102.6	347.5	$88,451,374	$9,285,324	$3,819,330	$374,013
2008	23525.8	430.1	$103,513,502	$11,492,591	$4,469,713	$462,922
2009	26306.4	503.1	$115,748,098	$13,443,683	$4,998,003	$541,512
2010	27816.6	564.8	$122,393,110	$15,091,184	$5,284,935	$607,873
2011	28408.0	618.9	$124,995,143	$16,537,299	$5,397,290	$666,122
2012	28758.9	638.5	$126,538,988	$17,060,850	$5,463,954	$687,211
2013	29796.4	668.4	$131,104,147	$17,860,641	$5,661,077	$719,427
2014	30127.4	690.4	$132,560,652	$18,448,292	$5,723,969	$743,097
2015	28478.0	596.8	$125,303,341	$15,946,269	$5,410,598	$642,316
2016	24734.2	520.4	$108,830,484	$13,904,535	$4,699,300	$560,075
2017	22515.7	464.4	$99,069,265	$12,409,972	$4,277,811	$499,874
2018	20854.3	419.0	$91,758,973	$11,194,487	$3,962,152	$450,914
2019	19511.9	379.9	$85,852,408	$10,151,730	$3,707,107	$408,912
2020	18360.0	345.1	$80,784,044	$9,222,215	$3,488,255	$371,471
2021	17329.5	300.9	$76,249,589	$8,039,811	$3,292,457	$323,844
2022	16387.9	261.5	$72,106,734	$6,987,515	$3,113,569	$281,457
2023	15504.2	218.7	$68,218,388	$5,844,109	$2,945,670	$235,401
2024	14683.1	183.5	$64,605,746	$4,903,289	$2,789,676	$197,504
2025	13894.7	151.4	$61,136,820	$4,045,565	$2,639,888	$162,955
2026	13147.5	122.3	$57,849,038	$3,267,355	$2,497,921	$131,609
2027	12454.5	96.1	$54,799,626	$2,567,929	$2,366,248	$103,436
2028	11803.2	76.1	$51,933,907	$2,032,937	$2,242,506	$81,887
2029	11193.7	57.8	$49,252,299	$1,544,451	$2,126,714	$62,210
2030	10608.5	41.2	$46,677,275	$1,101,111	$2,015,525	$44,353
2031	10061.1	39.2	$44,268,827	$1,046,098	$1,911,528	$42,137
2032	9541.8	37.2	$41,983,716	$993,974	$1,812,857	$40,037

Year	Projected Annual Natural Gas Production (MMcf)	Projected Annual Oil Production (million barrels/year)	Estimated Value of Natural Gas Produced by the Proposed Project	Estimated Value of Oil Produced by the Proposed Project	Severance Tax Natural gas[1]	Severance Tax Oil[2]
2033	9051.9	35.4	$39,828,516	$944,602	$1,719,795	$38,049
2034	8590.9	33.6	$37,799,838	$898,037	$1,632,197	$36,173
2035	8151.5	31.9	$35,866,489	$853,510	$1,548,715	$34,379
2036	7696.5	30.4	$33,864,449	$811,198	$1,462,267	$32,675
2037	7253.9	28.9	$31,917,152	$770,988	$1,378,183	$31,055
2038	6849.9	27.4	$30,139,393	$732,778	$1,301,419	$29,516
2039	6474.2	26.1	$28,486,348	$696,466	$1,230,040	$28,054
2040	6124.2	24.8	$26,946,398	$661,959	$1,163,545	$26,664
2041	5788.9	23.5	$25,471,248	$629,166	$1,099,849	$25,343
2042	5474.1	22.4	$24,085,872	$598,002	$1,040,028	$24,088
2043	5175.3	21.3	$22,771,499	$568,386	$983,273	$22,895
2044	4911.0	20.2	$21,608,572	$540,241	$933,058	$21,761
Total	615286.9	9519.7	$2,707,262,206	$254,367,494	$116,899,582	$10,245,923

Table 4.14-2. GDBR Oil and Gas Royalties – Proposed Action

Year	Projected Annual Natural Gas Production (MCF)	Projected Annual Oil Production (1000 barrels)	Estimated Value of Natural Gas Produced by the Proposed Project (million)	Estimated Value of Oil Produced by the Proposed Project (million)	Federal Half of 12.5% Royalties (million)	State Half of 12.5% Royalties (million)	PCIF (32.5%) (million)	UDOT (40%) (million)	Utah Department of Education, Utah Geological Survey, Utah Water Research Lab (million)	Utah Department of Community and Economic Development (County Special Service Districts) (million)	Uintah County (million)
2005	10873.0	151.7	$47.8	$4.1	$2.9	$2.9	$0.9	$1.2	$0.2	$0.1	$0.5
2006	16965.8	269.0	$74.6	$7.2	$4.6	$4.6	$1.5	$1.8	$0.3	$0.2	$0.7
2007	20102.6	347.5	$88.5	$9.3	$5.5	$5.5	$1.8	$2.2	$0.4	$0.3	$0.9
2008	23525.8	430.1	$103.5	$11.5	$6.5	$6.5	$2.1	$2.6	$0.4	$0.3	$1.0
2009	26306.4	503.1	$115.7	$13.4	$7.2	$7.2	$2.4	$2.9	$0.5	$0.4	$1.1
2010	27816.6	564.8	$122.4	$15.1	$7.7	$7.7	$2.5	$3.1	$0.5	$0.4	$1.2
2011	28408.0	618.9	$125.0	$16.5	$7.9	$7.9	$2.6	$3.2	$0.5	$0.4	$1.2
2012	28758.9	638.5	$126.5	$17.1	$8.0	$8.0	$2.6	$3.2	$0.5	$0.4	$1.3
2013	29796.4	668.4	$131.1	$17.9	$8.3	$8.3	$2.7	$3.3	$0.6	$0.4	$1.3
2014	30127.4	690.4	$132.6	$18.4	$8.5	$8.5	$2.8	$3.4	$0.6	$0.4	$1.3
2015	28478.0	596.8	$125.3	$15.9	$7.9	$7.9	$2.6	$3.2	$0.5	$0.4	$1.2
2016	24734.2	520.4	$108.8	$13.9	$6.9	$6.9	$2.2	$2.8	$0.5	$0.3	$1.1
2017	22515.7	464.4	$99.1	$12.4	$6.3	$6.3	$2.0	$2.5	$0.4	$0.3	$1.0
2018	20854.3	419.0	$91.8	$11.2	$5.8	$5.8	$1.9	$2.3	$0.4	$0.3	$0.9
2019	19511.9	379.9	$85.9	$10.2	$5.4	$5.4	$1.7	$2.2	$0.4	$0.3	$0.8
2020	18360.0	345.1	$80.8	$9.2	$5.0	$5.0	$1.6	$2.0	$0.3	$0.3	$0.8
2021	17329.5	300.9	$76.2	$8.0	$4.7	$4.7	$1.5	$1.9	$0.3	$0.2	$0.7
2022	16387.9	261.5	$72.1	$7.0	$4.4	$4.4	$1.4	$1.8	$0.3	$0.2	$0.7
2023	15504.2	218.7	$68.2	$5.8	$4.2	$4.2	$1.4	$1.7	$0.3	$0.2	$0.7
2024	14683.1	183.5	$64.6	$4.9	$3.9	$3.9	$1.3	$1.6	$0.3	$0.2	$0.6
2025	13894.7	151.4	$61.1	$4.0	$3.7	$3.7	$1.2	$1.5	$0.2	$0.2	$0.6
2026	13147.5	122.3	$57.8	$3.3	$3.4	$3.4	$1.1	$1.4	$0.2	$0.2	$0.5
2027	12454.5	96.1	$54.8	$2.6	$3.2	$3.2	$1.0	$1.3	$0.2	$0.2	$0.5
2028	11803.2	76.1	$51.9	$2.0	$3.0	$3.0	$1.0	$1.2	$0.2	$0.2	$0.5

Year	Projected Annual Natural Gas Production (MCF)	Projected Annual Oil Production (1000 barrels)	Estimated Value of Natural Gas Produced by the Proposed Project (million)	Estimated Value of Oil Produced by the Proposed Project (million)	Federal Half of 12.5% Royalties (million)	State Half of 12.5% Royalties (million)	PCIF (32.5%) (million)	UDOT (40%) (million)	Utah Department of Education, Utah Geological Survey, Utah Water Research Lab (million)	Utah Department of Community and Economic Development (County Special Service Districts) (million)	Uintah County (million)
2029	11193.7	57.8	$49.3	$1.5	$2.9	$2.9	$0.9	$1.1	$0.2	$0.1	$0.5
2030	10608.5	41.2	$46.7	$1.1	$2.7	$2.7	$0.9	$1.1	$0.2	$0.1	$0.4
2031	10061.1	39.2	$44.3	$1.0	$2.6	$2.6	$0.8	$1.0	$0.2	$0.1	$0.4
2032	9541.8	37.2	$42.0	$1.0	$2.4	$2.4	$0.8	$1.0	$0.2	$0.1	$0.4
2033	9051.9	35.4	$39.8	$0.9	$2.3	$2.3	$0.7	$0.9	$0.2	$0.1	$0.4
2034	8590.9	33.6	$37.8	$0.9	$2.2	$2.2	$0.7	$0.9	$0.1	$0.1	$0.3
2035	8151.5	31.9	$35.9	$0.9	$2.1	$2.1	$0.7	$0.8	$0.1	$0.1	$0.3
2036	7696.5	30.4	$33.9	$0.8	$2.0	$2.0	$0.6	$0.8	$0.1	$0.1	$0.3
2037	7253.9	28.9	$31.9	$0.8	$1.8	$1.8	$0.6	$0.7	$0.1	$0.1	$0.3
2038	6849.9	27.4	$30.1	$0.7	$1.7	$1.7	$0.6	$0.7	$0.1	$0.1	$0.3
2039	6474.2	26.1	$28.5	$0.7	$1.6	$1.6	$0.5	$0.7	$0.1	$0.1	$0.3
2040	6124.2	24.8	$26.9	$0.7	$1.6	$1.6	$0.5	$0.6	$0.1	$0.1	$0.2
2041	5788.9	23.5	$25.5	$0.6	$1.5	$1.5	$0.5	$0.6	$0.1	$0.1	$0.2
2042	5474.1	22.4	$24.1	$0.6	$1.4	$1.4	$0.5	$0.6	$0.1	$0.1	$0.2
2043	5175.3	21.3	$22.8	$0.6	$1.3	$1.3	$0.4	$0.5	$0.1	$0.1	$0.2
2044	4911.0	20.2	$21.6	$0.5	$1.2	$1.2	$0.4	$0.5	$0.1	$0.1	$0.2
Total	615286	9519.7	$2,707.3	$254.4	$0.0	$332.5	$54.0	$66.5	$11.2	$8.3	$26.2

4.14.1.2 No Action

Under the No Action Alternative, a maximum of 210 wells could be drilled. However, only 79 (77 gas wells and 2 oil wells) would be developed on federal lands. Workers needed to develop these wells would be similar to the levels needed for the Proposed Action but would only last for two to three years. After development, the permanent employees would be 27 people as compared to 61 for the Proposed Action. Total royalties would decrease proportionately compared to the Proposed Action. These production rates would result in royalty payments to the State of Utah of $25,836,843 and $4,069,303 to Uintah County. Severance tax payments to the Utah general fund would be approximately $21 million.

4.14.2 Mitigation

None.

4.14.3 Unavoidable Adverse Effects

Under the No Action alternative, the federal royalties of $332,524,727, or an average of about $8 million annually over the life of the project, would not be generated because oil and gas would not be extracted from most federal leases. Also, the revenues generated from property taxes and severance taxes would decrease by about 85 percent.

4.15 NOISE

Regulatory noise standards have not been established by BLM, Uintah County, or the State of Utah. The EPA established an average 55 dBA noise level as a guideline for acceptable environmental noise (EPA 1974). The 55 dBA noise level was not construed as a regulatory goal. Rather, the 55 dBA noise level 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. Therefore, a 55 dBA noise level is considered as a reasonable average level that GDBR noise sources could produce without an adverse effect to the public.

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. This method for estimating noise is:

$$L2 = L1 - 20 \times LOG (R2/R1)$$

where:

L2 = noise predicted at a selected distance R2 from the source
L1 = noise measured at a distance R1 from the source
LOG = common logarithm base 10

4.15.1 Direct and Indirect Effects

4.15.1.1 Proposed Action

Noise above existing levels would occur during construction, drilling, completion, and operation of natural gas facilities. Elevated noise from construction of well pads and roads would occur over the 4-day construction period. Elevated noise levels would occur for longer periods (10 to 30 days except up to 90 days drilling for the deep formation wells) during drilling and completion activities. After construction activities, noise near production facilities and along GDBR roads would occur for the life of the project.

Construction Noise Effects

Construction noise levels would be short-term at any given location. Based on an average construction site noise level of 85 dBA at 50 feet from the site, the noise would 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 would travel to each site. However, elevated noise levels would occur for a week at any location and would occur only during daytime because construction would not generally occur between sunset and sunrise.

Noise effects from drilling activities would be moderate and would last longer than construction activities at any one location. 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 and would last approximately from 10 to 90 days at a drilling location.

Additionally, noise levels would be elevated along access roads during the construction sequences. However, the majority of traffic would occur during the morning and evening hours as workers arrive at and leave from the construction and drilling sites.

Operational Noise Effects

After construction, drilling, and completion activities, the main operational noise would occur near compressor stations. Elevated noise would occur near compressor stations, pumping units, and along access roads from truck traffic and regular maintenance and operational checks at well sites.

The highest operational noise would occur continuously near compressor stations. Reciprocating engines rated at approximately 2,000 horsepower would be installed to facilitate transmission of natural gas.

Noise has been measured at typical compressor units (USGS 1981). A noise level of 77 dBA from one large compressor engine can be expected at 50 feet from a compressor engine. Source noise from a pumping unit is typically 65 dBA measured at 50 feet.

Based upon the published and regulatory noise level effects, the health and welfare of the general population would not be at risk from any of the identified effects of noise at that level beyond 600 feet from a largest proposed compressor station. No residences are near any of the 15 proposed compressor stations and it is highly unlikely that a residence would be built this close because the land surrounding the compressor stations is either federal or state owned. However, pumping units on oil wells in the western part of the GDBR may be audible, but below acceptable noise levels, to recreational users along the Green River and in the Ouray National Wildlife refuge.

Table 4.15-1. Predicted Noise near GDBR Compressor Stations

Distance (feet)	Predicted Noise (dBA) 1 Compressor Engine	Predicted Noise (dBA) 1 Pumping Unit
100	71.0	59.0
200	65.0	53.0
300	61.4	49.4
400	58.9	46.9
500	57.0	45.0
600	55.4	43.4
700	54.1	42.1
800	52.9	40.9
900	51.9	39.9
1000	51.0	39.0

4.15.1.2 No Action

Noise effects near oil and gas facilities would be similar to the Proposed Action. However, construction-related noise effects would be more widespread and would last for a 3-year rather than a 10-year period. Production-related noise near compressor stations would be similar to the Proposed Action.

4.15.2 Mitigation

The following mitigation could be implemented if a compressor station would have to be located closer than 400 feet to an existing residence:

- Increase the separation distance.
- Construct or use naturally-occurring obstacles in the direct path from the noise source to a receiver. However, these obstacles must be high enough to break the line-of-sight between the compressor station and the NSR. Obstacles can be tightly spaced wood fences (no gaps in the wood panels), concrete fences, earth berms, or naturally occurring hills.

4.15.3 Unavoidable Adverse Effects

Elevated noise levels near oil and gas facilities, access roads, and main trunk roads would occur for the life of the project. However, the extent and intensity of noise would decrease after the construction phase.

4.16 HEALTH AND SAFETY

4.16.1 Direct and Indirect Effects

Potential effects to human health and safety that could be associated with additional oil and gas development in the GDBR include:

- Occupational accidents that could be experienced by project workers;
- An increase in traffic hazards and accidents on public roads;
- Increased hazards related to accidental ignition of wildfires;
- Pipeline hazards and potential for accidental rupture or damage of pipelines by heavy equipment; and

- Effects to health and safety related to the use of hazardous materials and accidental spills or releases of hazardous materials.

Federal regulations related to health and safety requirements for oil and gas operations are specified under 43 CFR Ch. II, subpart 3162.5 – Environmental Obligations. These regulations require the approval of a drilling and operations plan that addresses the applicable procedures to be employed for protection of environmental quality, including control and removal of wastes, spill prevention, fire prevention and fighting procedures, and safety precautions. For this analysis, it was assumed that the oil and gas development operations in the GDBR would also comply with applicable state and federal regulations, including the Occupational Safety and Health Act (OSHA), the Resource Conservation and Recovery Act (RCRA), and the Superfund Amendments and Reauthorization Act (SARA) Title III.

4.16.1.1 Proposed Action

In general, compliance with 43 CFR Ch. II, subpart 3162.5, and other regulations related to health and safety and environmental protection would minimize risks to human health and safety. The following is a discussion of health and safety effect issues identified as concerns for the Proposed Action.

General Emergency Preparedness and Accident Prevention

In general, to reduce the risk and seriousness of accidents and injuries to workers and the public, QEP would at a minimum develop drilling and operations plans that would cover all potential emergencies, including fires, employee injuries, and chemical releases, among others as mentioned above. The plans would include phone numbers for all medical and emergency services and the people to contact in event of emergencies. In addition, QEP would not allow firearms to be brought into the area by employees and contractors. The emergency plans would be posted at QEP's local offices and field facilities.

Occupational Hazards

Construction, operation, and maintenance of the Proposed Action would utilize both contractors and traditional oil and gas workers to staff the project. Statistical data on occupational accidents and fatalities for the oil and gas extraction labor category are available from the U.S. Bureau of Labor Statistics. Nationwide, the oil and gas industry experienced an accident rate of 3.2 accidents per 100 full-time workers and 23.1 fatalities per 100,000 workers in 2001 (U.S. Bureau of Labor Statistics 2003). During the development phase of the Proposed Action, QEP would employ an average of 331 oil and gas workers per year for ten years. Based on this employment rate, it is statistically probable that about 10.6 occupational accidents would occur each year over ten years as a result of the Proposed Action, which would be a moderate effect. Similarly, based on the national rate for fatal accidents in the industry, there is about a 7 percent chance of one fatality occurring each year as a result of the Proposed Action. The number of occupational accidents would likely be higher during the earlier years of the project where construction activity and employment would be more intensive. Following the completion of all construction and drilling in the later years of the project, employment would be reduced and the number of occupational accidents is expected to decline.

OSHA, U.S. DOT and BLM regulate various safety aspects of the oil and gas industry. Compliance of QEP with applicable safety regulations would greatly reduce the probability of occupational accidents for the Proposed Action. Assuming compliance by QEP with these regulations, health and safety effects related to occupational hazards would be below the national rate for the industry and would be characterized as minor.

Increased Vehicular Traffic

Implementation of the Proposed Action would result in an increase in traffic on some of the public roads in the GDBR, along with proportionate increases in the risk of traffic accidents, fugitive dust from roads, and noise emissions from project-related vehicles. With compliance with recommended speed limits on county roads, the risk of additional accidents is expected to be low and the resulting health and safety effect would be minor.

Fire Hazards

Project-related construction and operation would increase the risk of wildfires in the GDBR due to heavy equipment and production equipment operation, welding, and other activities. Since wells and other project-related equipment would be constructed on pads cleared of vegetation, the risk of wildfires and damage to property and resulting effect on health and safety would generally be minor and short-term. To mitigate this risk of accidental ignition of wildfires, fire suppression equipment would be available during construction and maintained on-site at various facilities. In addition, implementation of a “no smoking” policy, shut down devices on gas handling equipment, and adequate training typically incorporated into oil and gas production projects would minimize the risk of fire to negligible levels.

Since gas wells and facilities are always located a safe distance from residences and other public facilities, the risk to property from fires moving off-site would be limited to range fires that would have an extremely low probability of affecting homes or other structures. Welding along pipelines has the potential for igniting grass or brushfires. Given the limited extent of public use and lack of residences in and immediately adjacent to the GDBR, the risk to the public from potential wildfires would be negligible.

Pipeline Hazards

Additional oil and gas development may increase the potential for leaks or ruptures of gas pipelines. Most ruptures occur when heavy equipment accidentally strikes a buried pipeline while operating in close proximity. These ruptures may result in a fire or explosion if a spark or open flame ignites the escaping gas.

Approximately 235 miles (193 miles of gas pipelines and 42 miles of oil flowlines) of new above ground pipelines would be associated with the Proposed Action. Safety statistics are complied only for buried oil and gas pipelines. Therefore, the safety risk factors can only be inferred for surface lines for two reasons. Based on a statistical average of one safety incident per year per 4,035 miles of total pipeline (OPS 2003), 2.3 additional pipeline safety incidents (including ruptures) are statistically probable over the entire life of the project. Given the relatively low risk of potential pipeline accidents in the GDBR, and its relatively rural character, the risk to public health and safety from pipeline hazards would be minor.

To minimize the risk of pipeline failure, materials used in the pipelines would be designed and selected in accordance with applicable standards to minimize the potential for a leak or rupture. Pipeline markers would be posted where above ground pipelines cross roads. QEP would monitor the pipeline flows by either remote sensors or daily inspections of the flow meters. Routine monitoring reduces the probability of effects to health and safety from ruptures by facilitating the prompt detection of leaks. If pressure losses were detected, the wells would be shut in until the problem is isolated and addressed.

Use of Hazardous Materials, Pesticides, and Accidental Spills and Releases of Hazardous Substances

The drilling of oil and gas wells, construction of well facilities, and gas production require the use and storage of various chemicals and compounds that are regulated hazardous materials. Petroleum, natural gas, natural gas liquids or condensates, and produced water could all contain regulated hazardous substances, such as benzene, hexane, various polynuclear aromatic hydrocarbons (PAHs), heavy metals, and other compounds. Construction and drilling equipment would require gasoline and diesel fuels, lubricants, and coolant to operate. Drilling and fracturing fluids, which include some hazardous additives or constituents, would also be required by the Proposed Action. Additional hazardous materials that are used for oil and gas development include sodium hydroxide and buffers (to regulate the pH of the drilling mud), acids for well stimulation, and surfactants (soap-like materials to remove carbon dioxide during gas processing), inert gases (not toxic, flammable, or explosive), and welding and cutting materials. Other than the minimal amounts of herbicides that are used to control noxious weeds, pesticides are not generally used for oil and gas development.

Disposal of some quantities of crude oil or condensate typically involves the sale of these wastes to a waste oil recycler. Contaminated soils are generally disposed of in an approved landfill used for non-hazardous wastes or are treated on site (through land farming or aeration) if permitted by the local regulatory agencies.

Table 4.16-1 identifies the general types of wastes generated during each phase of typical oil and gas operations.

Table 4.16-1. Waste Generation during Various Phases of Oil and Gas Development

Project Phase	Process Waste Water	Residual Wastes Generated
Well Development	Drilling muds, organic acids, alkalis, diesel oil, crankcase oils, acidic stimulation fluids (hydrochloric and hydrofluoric acids)	drill cuttings (some oil-coated), drilling mud solids, weighting agents, dispersants, corrosion inhibitors, surfactants, flocculating agents, concrete, casing, paraffins
Production	Produced water possibly containing heavy metals, radionuclides, dissolved solids, oxygen-demanding organic compounds, and high levels of salts. Also may contain additives including biocides, lubricants, corrosion inhibitors, wastewater containing glycol, amines, salts, and untreatable emulsions	Produced sand, elemental sulfur, spent catalysts, separator sludge, tank bottoms, used filters, sanitary wastes
Maintenance	Completion fluid, wastewater containing well-cleaning solvents (detergents and degreasers), paint, stimulation agents	Pipe scale, waste paints, paraffins, cement, sand
Abandoned Wells, Spills and Blowouts	Escaping oil and brine	Contaminated soils, sorbents

Source: EPA 2000.

Federal and State of Utah regulations address the transport, storage, and disposal of hazardous materials or wastes. Assuming that QEP complies with the regulations, these rules would minimize the potential for spills or contamination of surface drainages or groundwater or releases of air emissions. Regulations for handling, storage, and disposal of hazardous materials are codified at 49 CFR Parts 171 and 179. EPA

requires a Spill Prevention Control and Countermeasures Plan (SPCC) under 40 CFR Part 112 for storage of large quantities of petroleum products, such as fuels. Oil spills must be reported to the EPA National Response Center as required by 40 CFR Part 110. Federal and state operating and reporting requirements include provisions to clean up and mitigate spills or releases of chemicals, product, or wastes.

Human health and safety would likely be protected through compliance by QEP with all applicable federal and state laws concerning safe operation of oil and gas facilities. In addition, as mentioned previously, QEP would develop emergency response plans and employee-training programs that address spill prevention and control measures for hazardous materials and wastes. Accordingly, effects to human health and safety from hazardous materials, pesticides, and wastes typically associated with oil and gas development are expected to be negligible.

4.16.1.2 No Action

Under implementation of the No Action Alternative, fewer wells would be drilled and fewer well pads, pipelines, and roads would be constructed. Not only would the geographic area and roads affected be smaller than described for the Proposed Action, the duration of potential health and safety effects would be shorter due to the shorter drilling program (2 to 3 years instead of 10).

Occupational Hazards

During the 2 to 3-year development phase of this alternative, QEP would employ approximately 331 oil and gas workers per year. Based on this employment rate, it is statistically probable that about 10.6 occupational accidents would occur each of those years, which would be a moderate effect. Similarly, based on the national rate for fatal accidents in the industry, there is about a 7 percent chance of one fatality occurring each of those years as a result of the No Action Alternative. During the approximately 30-year production phase of the project, employment and intensity of worker activity would decline sharply, resulting in substantially reduced risks of occupational accidents.

OSHA, U.S. DOT, and the BLM regulate various safety aspects of the oil and gas industry. Compliance of QEP and its contractors with applicable safety regulations would greatly reduce the probability of occupational accidents for the No Action Alternative.

Increased Vehicular Traffic

Implementation of the No Action Alternative would generate vehicle traffic on roads serving the portions of the GDBR that would be developed, resulting in traffic, noise and air emissions from project-related vehicles. Assuming proper posting of speed limit signs on roads used by project-related vehicles, and compliance with those posted speed limits, the risk of additional accidents is expected to be low.

Fire Hazards

Project-related construction and operation would increase the risk of fires in the GDBR due to heavy equipment and production equipment operation, welding, and other activities. Fire suppression equipment that would be available during construction and maintained on-site at various facilities, combined with a “no smoking” policy, shut down devices on gas handling equipment, and adequate training typically incorporated into oil and gas production projects would minimize the risk of fire to negligible levels.

Pipeline Hazards

Oil and gas development under the No Action Alternative may increase the potential for leaks or ruptures of gas pipelines, which could result in fires or explosions in and around the GDBR. Approximately 40 miles of new pipeline would be associated with the No Action Alternative. Based on a statistical average of one safety incident per year per 4,035 miles of total pipeline (OPS 2003), less than one additional pipeline safety incident (including ruptures) is statistically probable over the entire life of the project. Accordingly, given the relatively low risk of potential pipeline accidents in the GDBR and its relatively rural character, the risk to public health and safety due to pipeline hazards is minor.

Use of Hazardous Materials, Pesticides, and Accidental Spills and Releases of Hazardous Substances

The drilling of oil and gas wells, construction of well facilities, and oil and gas production require the use and storage of various materials that would be characterized as hazardous. Since the No Action Alternative would involve development of fewer oil and gas wells and correspondingly lower production, it is likely this alternative would utilize lesser quantities of hazardous materials and generate smaller quantities of regulated hazardous wastes.

Human health and safety would likely be protected by QEP's compliance with all applicable federal and state laws concerning safe operation of natural gas facilities. In addition, as mentioned previously, QEP would develop emergency plans and employee-training programs that address spill prevention and control measures for hazardous materials and wastes. Accordingly, effects to human health and safety from hazardous materials, pesticides, and wastes typically associated with oil and gas development are expected to be negligible for the No Action Alternative.

4.16.2 Mitigation

As part of this analysis, two mitigation were identified to avoid, reduce, or minimize adverse effects to human health and safety:

- All employees and subcontractors would be trained in matters concerning potential emergencies and plans addressing them including fire prevention, reporting and response; employee injuries and first aid; general emergency response; and spill prevention and response for chemical spills and releases when they are hired. Refresher courses would be presented annually.
- To minimize the risks of fires and their severity, suppression equipment (fire extinguishers, fire water and hoses) would be available during construction and maintained on-site at various facilities. A "no smoking" policy, shut down devices on gas handling equipment, and adequate fire response training would also be incorporated into natural gas production operations to reduce the risk and severity of fires.

4.16.3 Unavoidable Adverse Effects

Even with the application of mitigation identified above, inherent risks associated with oil and natural gas development and production would result in an increase in potential risks to human health and safety related to occupational accidents, traffic-related accidents and hazards, wildfires, pipeline ruptures and accidents, and hazardous materials-related spills or accidental releases. Because these effects all involve an element of human error which can never be completely eliminated, potential effects to human health and safety can not be completely mitigated for any of the project alternatives.

4.17 IRREVERSIBLE AND IRRETREIVABLE EFFECTS

An irreversible or irretrievable commitment of resources would occur when a resource would be consumed, committed or lost as a result of the project. The commitment of resources would be irreversible if the project started a process (chemical, biological, or physical) that could not be stopped. As a result, the resource or its productivity or utility would be consumed, committed, or lost forever. Commitment of a resource would be considered irretrievable when the project would directly eliminate the resource, its productivity, or its utility for the life of the project and possibly beyond.

The following is a listing of effects that would occur to either resource analyzed in this EIS.

4.17.1 Irreversible Effects

- Removal of natural gas and oil;
- Accidental death of sensitive species;
- Accidental destruction of cultural resources;
- Accidental destruction of paleontological resources;
- Accidental death of livestock;
- Accidental death of big game;
- Visual quality reduction if vegetation cannot be restored.

4.17.2 Irretrievable Effects

- Loss of portions of big game range during the life of the project;
- Loss of sensitive species habitat;
- Loss of livestock and wildlife forage until reclamation would be complete;
- Slight reductions in air quality during the life of the project;
- Loss of quiet during the life of the project.

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5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

Cumulative impacts result from the incremental impacts of an action when added to past, present, and reasonably foreseeable future actions regardless of who takes the action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

The Proposed Action incorporates several Applicant-committed BMPs intended to reduce, minimize, or avoid adverse project-specific and cumulative impacts on the environment (See Section 2.3). Additional resource-specific mitigation that would further reduce adverse impacts have been recommended in Chapter 4. In addition, site-specific environmental considerations would likely be identified during the on-site process once locations and ROWs been staked and prior to any surface disturbance. This cumulative analysis assumes the unavoidable adverse impacts after application of the possible mitigating measures.

This chapter discusses cumulative impacts as the incremental effect to specific resources or issues that would occur from the Proposed Action or No Action alternative in conjunction with other cumulative actions. In support of the cumulative impact discussion, this chapter provides discussion on past and present oil and gas activities in the Uinta Basin, both of which serve as introductions to the outlook for reasonably foreseeable future development (RFD) in the GDBR and the greater Uinta Basin. The cumulative impact and RFD analysis is based upon the level of activities and actions identified in the Draft Vernal Resource Management Plan (RMP) and Draft EIS (BLM 2005). Of all activities considered, projected oil and gas activity would be the most significant expected in the Vernal Field Office area. Other significant activities would be livestock grazing, vegetative management through prescribed burning, and recreational projects. The Cumulative Impact Analysis Area (CIAA) for most resources is the Vernal Resource Area. The CIAA essentially includes identified actions in Uintah County and the neighboring Duchesne County to the west. For some resources, the CIAA is much larger. For example, the air quality modeling domain extends throughout northeast Utah into north central Colorado.

5.2 CUMULATIVE ACTIVITIES AND IMPACTS

5.2.1 History Leading to Present Situation of Oil and Gas Development

Oil and gas exploration and development within the Uinta Basin was initiated in the late 1920s. The first well to discover gas, the Continental Oil #1, was located within the Chapita Wells Unit and was drilled and completed in 1952. Reserves from this historical natural gas well were depleted within a few months. The Continental Oil #2 well, also located within the Chapita Wells Unit was completed in 1955 and was a productive natural gas well for several decades. Since these initial discoveries, about 15 gas fields have been discovered in the Greater Natural Buttes Gas field.

In the earlier years of Uinta Basin oil and gas development, the market for oil and gas fluctuated, was seasonal, and poorly priced because of the lack of a strong market. Tax incentives for “tight sands” gas development led to a spurt of drilling in the 1990s.

<u>Pipeline Infrastructure</u>

Historical pipeline and ROW development within the Uinta Basin was commensurate with the fluctuating market and oil and gas development. The first pipeline to take gas from the Uinta Basin was built by Northwest Pipeline in 1956. This 26-inch diameter pipeline ran from the San Juan Basin in New Mexico,

through the Uinta Basin, to the Pacific Northwest. Two additional major pipelines were built in the 1960s; the Questar Mountain Fuel and Sinclair Oil Mesa pipelines. The Questar (Mountain Fuel) pipeline was constructed in order to take gas from the basin to the Wasatch front area in Salt Lake City. The Sinclair Oil (Mesa) pipeline was constructed in order to take gas from the basin to the Pacific Northwest.

By the 1980s, ROWs within the basin consisted of several hundred miles and continued to increase with increased oil and gas development. ROWs were, and continue to be, used for a variety of purposes, including oil and gas pipelines, communication lines, power lines, water pipelines, railroads, and roads.

In 1984, the two major north-south ROW corridors within the basin included the Seep Ridge Road in the central portion of the Uinta Basin and the Mapco pipeline route near the Utah-Colorado border, both of which served oil and gas pipelines. The State Highway 45 Vernal to Bonanza road running north-south shared a corridor with a water pipeline. In 1991, Colorado Interstate Gas built a 20-inch diameter pipeline to take gas from the basin to south-central Wyoming and then move gas east.

The Deseret-Western Railway is an electrical loop-to-loop railroad line that is actively used to ship coal 35 miles from the Deserado Coal Mine near Rangely, Colorado, to the Bonanza Power Plant near Bonanza, Utah, in the Uinta Basin. Although a 135-mile railroad line linking Vernal, Utah, to Rifle, Colorado, through Rangely was proposed in 2000, public opposition and lack of funding to complete feasibility studies have delayed the project indefinitely.

Designated corridors are currently BLM's preferred locations for placement of two or more linear ROWs that are similar, compatible, or identical. A major oil pipeline traverses east-west through the Uinta Basin. Major gas transmission lines travel north-south through the eastern part of Uintah County, and then east-west through the southern parts of Uinta and Duchesne counties (Chidsey 2003).

Most of the ROWs granted since 1984 have been for oil and gas gathering systems or roads, most of which were outside of designated corridors. Applications are currently being made by producing companies to construct and operate natural gas gathering systems particularly in the less-developed Uintah and Ouray Reservation. Gathering lines continue to be installed on the surface while larger pipeline (10+ inches) are buried. Existing utility windows, ROW concentration areas, and communication sites are the preferred locations for future ROW grants.

Additional natural gas transportation capacity is being planned to accommodate increasing production in the Uinta Basin. A 128-mile, 20 or 24-inch pipeline is planned to provide a direct link from the Basin to trading points in the Rocky Mountain region and give customers across the country additional access to Uinta Basin gas supplies. The new pipeline will add capacity of between 250,000 to 350,000 mmcfd (RigZone 2005).

ROWs are also being considered for projects other than the transportation of hydrocarbons. Additional early and late season irrigation water in addition to municipal and industrial water is needed to support moderately steady population growth in the Basin. A pipeline to transport water from lakes in the Uinta Mountains to locations in the Uinta Basin for municipal and agricultural use is currently being evaluated (CUWCD 2003).

Road Infrastructure

The major east-west corridor through the Uinta Basin was and continues to be U.S. Highway 40/191. The major north-south corridors continue to include Utah State 88 (south from U.S. 40 through Ouray), Utah State 45 (southeast from Vernal to Red Wash and Bonanza), and County Road 262 (north-south from U.S. 40 to Utah 45). Unpaved, gravel and natural material roads provide access to most of BLM-managed

lands. Some historically unimproved roads have been recently surfaced to accommodate increased travel volumes by oil and gas personnel and equipment.

Compressors

Over the past several decades, installation of compressors throughout the oil and gas development areas in the Uinta Basin has increased to meet the demand of transporting the additional gas resulting from increased drilling. Emissions from compressors were not considered as significant pollutants in the early 1980s, when the primary pollutant of concern was particulates generated by the use of unimproved roads. Ambient air concentrations of criteria pollutants were, and remain today, within NAAQS standards. Currently, the main sources of emissions in the Basin consist of oil and gas production facilities, compression stations, the Deseret Power Plant, and mining sites.

Summary of Present Oil and Gas Infrastructure

At present, approximately 2,800 oil and gas wells are active within the Vernal Resource Area. Over the span of oil and gas development in the Vernal Resource Area, approximately 19,783 acres and 1,724 miles have been disturbed. Existing sources of oil and gas related surface disturbance include: approximately 33 compressor sites (approximately 2 acres of surface disturbance per site), existing pipelines such as gathering/injection lines (approximately 0.47 acres disturbed per well); transportation lines (approximately 0.15 miles disturbed per well, with 0.79 acre of surface disturbance per well); and approximately 73 miles of power lines (0.25 acres of surface disturbed per mile).

5.2.2 History Leading to Present Situation of other Public Land Activities

Along with oil and gas development, the basin has a rich history of other public land uses, all of which have contributed to the present situation within the GDBR and greater Uinta Basin. Some of the more significant historical activities in the basin and their present situations are discussed in the following sections.

Livestock Grazing

Twenty years ago, the BLM managed grazing lands according to common resource characteristics. By the mid-1990s, the BLM evaluated allotments according to seral stages. In order to manage grazing lands as integrated parts of an ecosystem, the BLM in Utah developed Standards for Rangeland Health and Guidelines for Grazing Management (1997), which described desired conditions of rangeland in consideration of watershed management.

Livestock grazing remains a permitted use of public lands. Although some minor changes may be expected over the next few years, it is reasonable to expect that livestock grazing will continue. Grazing allotments are currently evaluated as to desired conditions and whether their resource conditions should be maintained, improved, or placed in custodial management. The Vernal Field Office (VFO) currently administers grazing on 153 allotments. Of these, five grazing allotments (Dry Creek, Hoy Flat, Offield Mountain, South Pot Creek, and Wild Mountain–Colorado) are located entirely outside the VFO boundary and two allotments (Max Canyon and Blind Canyon) are located entirely on private land inholdings within the VFO boundary. The 143 allotments within the VFO boundary designated for livestock grazing encompass approximately 2,216,764 acres (1,670,877 acres of BLM land; 545,887 acres of private, state, and tribal lands).

Within the grazing allotments managed by the Vernal Field Office, 146,220 animal unit months (AUMs) are allocated for livestock, but active permitted use for the 146 allotments is currently 137,897 AUMs.

However, the demand for forage resources by livestock (the total average actual use) for the past 10 years was only 78,500 AUMs. Suspended use for the 160 allotments is currently 26,364 AUMs.

Weed Management

Noxious and undesirable weeds have become recently been recognized as threats to native vegetation in many areas of the Uinta Basin. Collaborative weed management agencies have been formed during the last 20 years to pool resources for weed control and public education. These agencies include the National Park Service (NPS), BLM, U.S. Forest Service (USFS), UDWR, the Ute Indian Tribe, and SITLA. Weed infestation in the Uinta Basin has been exacerbated by increasing human activities such as OHV use, construction resulting in soil disturbance, and wildlife and domestic livestock grazing activities.

Fire Management and Prescribed Burning

From 1973 to 1984, an average of 7.6 wildfires occurred annually in the basin, burning an average of 137.4 acres each year. Prescribed burning was limited to sagebrush canyon bottoms to increase access and forage for deer and elk during summer months. Fire suppression was limited by a lack of funds. Since that time, fire management policy on BLM-administered lands has evolved and included the development of a State-wide Fire Management Plan, which included fire prevention, preparedness, suppression, and use as well as subsequent restoration and rehabilitation. The plan is currently implemented on an interagency basis. More than 1,000,000 acres have been identified in the Uinta Basin as currently needing fire treatments to reduce fuel loads (including some oil and gas fields and popular hunting and fishing areas) and increase forage for livestock and wildlife.

Prescribed burning continues to be BLM's primary method of vegetative treatment in the Vernal Resource Area. This treatment method results from BLM's acknowledgement of, and directives to use, fire as an integral tool to maintain and/or improve native rangelands. To meet management objectives, current BLM projects prescribed fires on 155,425 acres per decade, or an average of 15,542 acres per year. Target vegetation communities include pinyon-juniper, oak, aspen, and conifer. Although fire initially destroys plant material, the vegetation eventually recovers and returns to a more native plant community except where invasive annuals such as cheatgrass have invaded.

Recreation

BLM-managed lands in the Uinta Basin have provided opportunities for dispersed recreation over the last 20 years. Dispersed recreation opportunities have historically consisted primarily of hunting, ORV use, sight-seeing, fishing, and river floating. Musket Shot Springs and PR Spring contained limited developed facilities on BLM lands. Other recreation areas in the Uinta Basin include Steinaker Red Fleet Reservoir, Dinosaur National Monument, and the Ashley National Forest. Recreational use of lands in the basin has been rising in popularity with users originating from throughout the intermountain west. Dispersed activities remain similar to those in the past. Casual use of the White and Green Rivers has been increasing recently. Tourism in the Uinta Basin in general has been increasing.

Current recreation proposals potentially affecting cumulative impacts in the Vernal RMP area include proposed designations of Backcountry Byways and Special Recreation Management Areas (SRMAs), trail and cabin development, and mitigation of noise and light. These designations and developments would have beneficial impacts on recreation and would also affect the management of other resources in the CIAA.

Socioeconomics

During the latter decades of the 20th century, minerals development has replaced agriculture as the basin's most important private industry. As energy-related development grew and traditional farming and ranching lost its importance, the standard of living increased. Availability of housing, capacity of schools, and availability of medical care have been driven by cycles in the petroleum industry activity. As the national demand for energy grew, counties in the Basin have grown in population and economic vitality. As the oil and gas and public land industries grew, retail trade, private services and government services also grew.

5.2.3 Current Situation

The Energy Crisis

The U.S. currently faces an energy challenge. As recently as April 5, 2005, Federal Reserve Chairman Alan Greenspan commented extensively on this challenge. He stated, "Markets for oil and natural gas have been subject to a degree of strain over the past year not experienced for a generation. Increased demand and lagging additions to productive capacity have combined to absorb a significant amount of the slack in energy markets that was essential in containing energy prices between 1985 and 2000 (Greenspan 2005a)."

Despite diminishing available supplies and rising costs, the U.S. currently consumes over seven billion barrels of oil a year. U.S. crude oil production, which declined following the oil price declines in 1986, leveled off in the mid-1990s, and began falling again following the sharp decline in oil prices of late 1990s. During 2003, the U.S. produced around 7.8 million barrels per day (bbl/d) of oil, of which 5.7 million bbl/d was crude oil, and the rest natural gas liquids and other liquids. U.S. total oil production in 2003 declined sharply (around 2.8 million bbl/d, or 26%) from the 10.6 million bbl/d averaged in 1985. U.S. crude production, which averaged 5.4 million bbl/d during the first ten months of 2004, is now at 50-year lows (EIA, 2005).

From 1990 through 2003, natural gas consumption in the U.S. increased by about 15 percent. In 2002, the U.S. used about 22.8 Tcf of natural gas, making it one of the worldwide leaders in natural gas consumption. Factors determining the short-term demand for natural gas include weather, fuel switching, and the national economy. Factors determining more recent shortfalls in available energy supplies include but are not limited to loss of production due to Hurricane Katrina, increased transport of Rocky Mountain-produced oil and gas to eastern states, and rising import costs. For example, since 1978, the largest oil disruption occurred at the time of the 1978-1979 Iranian revolution, followed by the Gulf War in 1991, and the Iran-Iraq War in 1981. Hurricane Katrina shut down oil and gas production from the Outer Continental Shelf in the Gulf of Mexico, the source for 25 percent of U.S. crude oil production. Several oil refineries that provide a significant share of the nation's refined petroleum products were still shut down as recently as September 2005 along the Gulf Coast in Louisiana and Mississippi (IEA 2005). In addition to these factors, the following five observed gas industry features and trends support the argument that there exists a serious and persistent gas supply and demand crisis (Bamberger et. al. 2005):

- Prevailing future prices and forward price curves of natural gas;
- Gas demand growth expectations;
- The near exhaustion of storage inventories over past winter seasons;
- Rapid deliverability decline rates from recently drilled gas wells; and

- The inability to muster a timely industry response for faster natural gas production.

Today, hydrocarbon extraction is increasingly influenced by worldwide energy prices. The immediate demand for and solutions for adequate supply of crude oil and natural gas is uncertain. However, home to vast reserves of traditional fossil fuels, the Rocky Mountain region, including the Uinta Basin, is emerging as a strategic place in the evolving national energy picture. Forecasts by the USGS predict that known reserves from the region could keep the U.S. at current levels of demand, supplied with natural gas for eight years.

Global Response to the Energy Crisis

Individually and collectively, nations have responded to energy supply disruption by increasing the available market supply of oil and gas. The International Energy Agency (IEA), an intergovernmental body committed to advancing the security of energy supply, has led efforts to formulate international agreements defining contingency plans that provide for the immediate availability of reserved hydrocarbons. During periods when global oil markets were tight and affected by low inventories and high uncertainty, reserved hydrocarbons were released from stockpiles. Crude oil and products were made available in response to supply disruptions caused by Hurricane Katrina. IEA response preparations include the reinforcement of the efforts of oil-producing countries by committing to increased indigenous production (IEA 2005). Increasing indigenous production within the U.S., including production in the Uinta Basin, is a direct response to shortfalls in the national supply.

Nationally, government directives were issued to address procedural mechanisms that facilitate the exploration and production of hydrocarbons within the U.S. The National Energy Policy Development (NEPD) Group recommended in 2001 that the President issue an Executive Order to direct all federal agencies to include in any regulatory action that could significantly and adversely affect energy supplies, distribution, or use, a detailed statement on: (1) the energy impact of the proposed action, (2) any adverse energy effects that cannot be avoided should the proposal be implemented, and (3) alternatives to the proposed action. The NEPD Group also recommended that the President direct the executive agencies to work closely with Congress to implement the legislative components of a national energy policy.

The Bush administration on August 7, 2003, announced new policies to streamline the oil and natural gas permitting process on federal lands overseen by the BLM. The BLM was instructed not to unduly restrict access to oil and natural gas on federal lands. The new policies explicitly directed the BLM to act most expeditiously on permit applications where unnecessary delays could result in the suspension or abandonment of a proposed energy recovery project. The Bush administration singled out seven geographic areas as a primary focus for the new instructions, one of which was the Uinta Basin. The mean estimate for energy reserves in all seven focus areas is 5.5 billion barrels of oil and 184 trillion cubic feet of natural gas. The natural gas reserves represent more than 800 percent of the nation's annual natural gas consumption (White House, 2001).

The Energy Policy Act of 2005 is a statute which was passed by the U.S. Congress on July 29, 2005 and signed into law on August 8, 2005. The Act is intended to combat growing energy problems. The President's National Energy Policy outlined a number of recommendations to diversify and increase energy supplies, encourage conservation, and ensure environmentally responsible production and distribution of energy. As a result, the BLM developed a plan containing 54 tasks designed to implement the President's directives. The Director of the BLM sent out the new guidance September 30, 2005. In 2004, the BLM approved 6,052 drilling permits from about 7,000 applications submitted, a 60 percent jump in new permits over those issued in 2003. This year, BLM expects it will approve 7,000 of the 8,000 new applications (NewsMax 2005).

BLM and Industry's Response to the Energy Crisis

Shortfalls in the oil and gas industry are found in the production and infrastructure of supply of oil and natural gas, principally with lack of excess oil refining capacity. However, given existing and expected demand for oil and natural gas into the future, extensive investment is needed in oil and natural gas exploration, technology, and production, and transportation, as well as in refining capabilities.

The major challenge facing the oil and natural gas industry is to ensure that existing and newly discovered resources can be produced in an economically and environmentally sound manner to meet increasing demand and offset the field decline. To increase oil and gas supply (both reserves and resources) to meet the future demand, the industry has and will continue measures that include the following:

- Expand exploration activities, at greater depths on land and in deeper water at sea, and at more substantial distances from consuming markets;
- Maintain vigorous programs in research and development;
- Develop new and better technologies for exploration and production;
- Improve recovery in existing fields;
- Improve existing environmental safeguards and develop new environmental protection techniques to allow for access to environmentally sensitive areas, such as Alaska, off-shore California and Florida, and in other parts of the world;
- Reduce public and governmental fears about environmental impacts to allow for greater access to potential exploration targets;
- Lower costs and increase operational efficiency;
- Work out reasonable tax and fiscal regimes that recognize the capital intensity, cost structure, long pre-production time periods and risks associated with the industry; and,
- Work for political stability in key energy-producing regions such as in Russia and the Middle East.

With higher prices now prevailing, secondary and tertiary recovery techniques are anticipated to boost future production rates and ultimate recovery from known gas fields. Higher gas price expectations have prioritized many marginal high risk/high reward projects as exploration and production companies review and pursue their prospect inventories. Favorable economics have allowed and encouraged Uinta Basin operators to utilize technologies to maximize production and drill to deeper natural gas targets that may previously have been unfeasible. Structural controls are a major factor in exploration of the deep over-pressured plays in the Uinta Basin. The best practices for current recovery often include waterflood, CO_2 injection, and horizontal drilling. Recent successes of new technology in the Uinta Basin have included gas production from the deep Triassic Wingate and the Jurassic Entrata formations (DOE 2005).

Proven reserves for Utah are relatively high, at 283 million barrels. Utah oil fields have produced a total of 1.2 billion barrels of oil. However, the 13.7 million barrels of oil production in 2002 was the lowest level in over 40 years and continued the steady decline that began in the mid-1980s. In 2003, 138 Bcf of natural gas were produced on public lands in Utah, providing enough energy to heat more than 1.6 million homes, twice as many homes as there are in Utah. Four million barrels of oil were also produced on Utah public lands in 2003, enough to produce 79.6 million gallons of gasoline and 38 million gallons of diesel/heating fuel as well as other products.

The Role of the Uinta Basin in the Current Energy Crisis

The Uinta Basin is a significant source of natural gas and oil, and it is currently one of the most active oil and gas producing areas in the onshore U.S.

In September 2004, the Utah BLM's quarterly oil and gas lease sale broke the record of most acreage, revenues, and bidders for any lease sale. The focus of the bidding seemed to be both on known producing areas in the Uinta Basin and in frontier areas in the central portion of the state. In the case of the Uinta Basin, past exploration has been in shallow areas up to 8,000 feet. Companies are just now beginning to tap the huge gas reserves that are 10,000-20,000 feet deep due to new technology and economics (BLM 2004b).

Oil and gas development is at an all-time high in the basin, with more rigs operating, and more applications for permit to drill (APDs) being processed than ever before. For example, over half (i.e., 8,737 wells) of the total oil and gas wells drilled in Utah between 1911 and November of 2000 were drilled within the Uinta Basin. APDs and ROWs processed by the BLM VFO have illustrated a significant upward trend, estimated to be approximately 15 percent annually. At this time, more than 5,800 wells (including the wells proposed by this action) associated with 11 different projects are being proposed for drilling in the Uinta Basin by various oil and gas operators (BLM 2005). These 11 projects, summarized in Table 5-1 below, are being evaluated under the authority of NEPA prior to approval of project-specific APDs. The BIA was contacted concerning future development of the Noval Oil Shale Reserve #2. The BIA had no definite plans for development at this time.

Because horizontal and vertical hydrocarbon occurrence in the Uinta Basin is well understood, exploration and development within the Uinta Basin allows for lower risk projects than exploration in other unproven areas. Three fields in this Uinta Basin (i.e., Altamont, Bluebell and Cedar Rim) have produced about 31 percent of Utah's oil. Wells in the Altamont-Bluebell Field, which historically has produced over 350 million barrels of oil equivalent, are currently being recompleted in additional zones in the Green River Formation to further increase daily production potential. Due to the over-pressured, fractured nature of the reservoir in the field, as well as the large vertical extent of potential pay zones, many of the wells have formation damage resulting from past high drilling mud weights and cementing operations. These conditions have left many zones unable to produce to their potential. However, a variety of conventional and innovative proprietary techniques are expected to reduce the effects of formation damage and increase oil and gas recovery.

Table 5.1. Existing and Ongoing Oil and Gas Field Development Projects in the CIAA

Project	Lead Agency	Date of Decision Record / ROD or Anticipated Completion Date	Number of Approved / Proposed Well Pads*
Existing Oil and Gas Field Development NEPA Documents			
EA (No. 3) of Oil and Gas Development in the Duchesne River Area	BLM	Jan-82	41
Antelope Creek Oil and Gas and Secondary Recovery Applications from Water Flooding EA	BIA	Jan-95	193
Monument Butte / Myton Bench EA (EA No. UT-080-1994-77)	BLM	Jun-95	296
Brundage Canyon Oil and Gas Field Development	BLM/BIA	Jan-97	120
Chapita Wells EA	BLM	Jan-98	99
Wexpro Company EA Island Unit (EA No. UT-	BLM	Apr-99	97

Project	Lead Agency	Date of Decision Record / ROD or Anticipated Completion Date	Number of Approved / Proposed Well Pads*
080-1997-51)			
Final EA of Coastal's Proposed Development of the Ouray Field	BIA	Jan-00	232
Chapita Wells Unit Infill Development EA (EA No. UT-080-1999-32)	BLM	Apr-00	161
North Hill Creek Field Development EA	BIA	Nov-02	150
Antelope Creek Field Expansion EA	BIA	Jan-03	478
EA for the Antelope Creek Field Expansion	BIA	Jan-03	288
Supplemental EA for Modifications to the Antelope Creek Oil and Gas Field Expansion / Infill and Thermal Recovery Projects	BIA	Mar-04	445
Tabby Canyon Oil and Gas Field Development EA	BIA	Sep-04	24
Castle Peak and Eight Mile Flat Oil and Gas Expansion Project EIS	BLM	Aug-05	776
Castle Peak and 8-Mile Flat EIS	BLM	Aug-05	920
West Brundage Canyon Oil and Gas Field Development EA	BIA	Sep-05	72
	Total Approved Wells		**4,392**
Ongoing Oil and Gas Field Development NEPA Documents			
North Chapita Natural Gas Field Development EA	BLM	Jan-06	264
West Bonanza EA	BLM	Jul-06	133
Bonanza Area EA	BLM	Oct-06	94
Chapita Wells-Stagecoach Area EIS	BLM	Oct-06	627
Greater Deadman Bench EIS	BLM	Oct-06	1,239
Resource Development Group EIS	BLM	Aug-06	420
Sowers Canyon Oil and Natural Gas EA	USFS	Aug-06	14
Love Unit EA	BLM	Oct-06	130
Riverbend Natural Gas Drilling Project EA	BLM	Sep-06	49
LCU/HCU/BPU EA	BLM	Sep-06	513
Gasco Development EIS	BLM	Oct-07	1,500
	Total Proposed Wells		**4,983**

* Number of proposed wells includes best estimate at the time of publication of this EIS.

Many of the wells in the Uinta Basin are drilled in and around producing gas fields with an established midstream infrastructure. These types of prospects were first brought on-stream as a result of a multi-month price spike, such as the 2000-2001 gas price excursion during the California power crisis. These gas wells are predominantly field extensions or infills and are low-risk targets designed to capture a short-term opportunity. Increased demand, however, has highlighted constraints in the existing gas transmission infrastructure of the Uinta Basin, attracting capital to capture the large price differentials that develop when gas volumes are too high for available pipeline capacity, such as in the Rocky Mountain states (Linden 2003). Areas of infill drilling in the Uinta Basin are located primarily in its eastern portion.

Exploratory drilling is currently proposed in the western and southwestern portions of the Uinta Basin, including BLM, Tribal and National Forest lands. Exploration projects consist of larger and more expensive prospects. Production of exploratory wells typically lags discovery by many years. These exploratory wells are typically characterized by larger, deeper, more remote locations requiring greater

per-well expenditures, potential delays in infrastructure access and, therefore, greater financial risk (Linden 2003).

5.2.4 Future Situation / Reasonably Foreseeable Development

The immediate demand for and solutions for adequate supply of crude oil and natural gas is uncertain. The longer-term outlook for oil and gas is even more conjectural and will largely depend on the response of demand to price. The resolution of current major geopolitical uncertainties will materially affect oil prices in the years ahead and will significantly influence the levels of investments over the next decade in raising crude oil productive capacity and investment in refining facilities (Greenspan 2005b). In the future, domestic supplies of oil and gas are expected to remain inadequate to meet national demand. Over the past few years, notwithstanding markedly higher drilling activity, the U.S. natural gas industry has been unable to noticeably expand production. The reality is that our domestic production is declining. “We now produce nearly 40 percent less oil than we did in 1970. The projection is just over five million barrels per day by 2020, down from a high of 9.4 million barrels per day 30 years ago. Failure to meet this challenge may harm our prosperity, damage our national security, and may affect the way we live our daily lives (Norton, 2001)." North America, however, still has numerous unexploited sources of gas production. The North American resource base, variously estimated at 1,500 to 2,000 Tcf, indicates a domestic industry entering the decline mode some 20-30 years in the future. Incremental, market-based capital investment accelerating exploration and development of available North American gas resources would help to alleviate future shortfalls (Linden 2003).

Future oil and gas production estimates fall into three categories: proven reserves, inferred reserves, and undiscovered resources. Utah's inferred or grown reserves are not publicly available since these data are proprietary. However, using publicly available production records, field age records, and proven reserve estimates, an estimate for inferred oil and gas projects that an additional 641 MMBO and 6.08 TCF of gas will be extracted from within or immediately adjacent to existing fields in addition to the proven reserves. Thus, the total amount of oil and gas in or near the existing areas of large-scale production is estimated at 912 MMBO and 10.68 TCF respectively. Undiscovered resources reflect estimates of oil and gas in areas distinct from existing oil and gas fields. The estimated amount of technically recoverable undiscovered resources in the entire state of Utah is 436 MMBO and 15,668 BCF of natural gas. These estimates represent technically recoverable resources, i.e. resources producible using existing technology without regard to the economic viability of recovering the resource (Lemkin, N.D.).

Factors determining the long-term demand for natural gas include residential and commercial demand, industrial demand, electric generation demand, and transportation sector demand. U.S. natural gas consumption and imports are expected to expand substantially in coming decades, with the fastest volumetric growth resulting from additional natural gas-fired electric power plants. Increased U.S. natural gas consumption will require significant investments in new pipelines and other natural gas infrastructure. The Energy Information Administration (EIA), in its Annual Energy Outlook 2004, estimates that natural gas demand in the U.S. could be 31.41 Tcf by the year 2025. That is an increase of 38 percent over 2002 demand levels of 22.8 Tcf. That is compared to an expected total energy consumption increase (from all sources) of 40 percent (from 97.7 quadrillion British thermal units to 136.5 by 2020). The EIA predicts a 1.4 percent annual increase in demand over the next 21 years. While forecasts made by different Federal agencies may differ in their exact expectations for the increased demand for natural gas, one thing is common across studies: demand for natural gas will continue to increase steadily for the foreseeable future (Natural Gas Supply Administration, 2004).

Future oil and gas development in the Uinta Basin will depend upon the feasibility of exploration as determined by the underlying geology and further infill development projects within the Basin. Future development will be dependent upon the geologic feasibility each prospect, the cost to develop the

resources, and engineering technological advancements. Development of Tribal lands will continue and perhaps increase as exploratory wells are drilled in the Hill Creek Extension. Drilling in the Ashley National Forest will likely increase with new leasing and management strategies.

RFD on Tribal and USFS-Administered Lands

The Uinta Basin includes the Uintah and Ouray Indian Reservation, which has been drilled for hydrocarbons from the 1940s to the present. However, little oil and gas development occurred after the 1970s, and large areas of the 1.2 million-acre Indian reservation remain unexplored. Even after a large natural gas pipeline was constructed nearby, oil and gas development was slow until recently because of weak gas markets. Today, there are several ongoing or recently approved oil and gas exploration and development projects on Tribal lands, including the Brundage Canyon, West Brundage Canyon, Tabby Canyon, and Antelope Creek projects (BIA 2005). Oil and gas development on Tribal lands is expected to grow over the next several years. Three-dimensional (3D) seismic surveying techniques are now being used extensively on the Uintah and Ouray Indian Reservation to identify future drilling targets (NETL 2004), the results of which are expected to increase development in such areas as the Tumbleweed Field and the former Naval Oil Shale Reserve #2. However, no firm plans are in place for NOSR #2.

The Uinta Basin also includes public lands managed by the USFS, where oil and gas leasing, seismic exploration, exploratory drilling, and gas field development are also expected to increase over the next several years. For example, on the USFS' Schedule of Proposed Actions (SOPA) for the Ashley National Forest, two exploratory gas well projects and one 2-D seismic exploration project were proposed between April 2005 and November 2005. In the Uinta National Forest, one exploratory gas well and one leasing proposal were listed on the SOPA between April 2005 and November 2005 (http://www.fs.fed.us/sopa.shtml).

RFD on BLM-Administered Lands

As part of the ongoing Vernal RMP Revision, the Vernal BLM Geologic and Engineering Team developed a RFD scenario for oil and gas development. The RFD projects that 6,530 oil and gas wells (2,055 oil wells, 4,345 gas wells, and 130 CBM wells) will likely be drilled applying the management directives under the Preferred Alternative. The majority (4,800 wells) of the oil and gas development activity is expected to occur in the Monument Butte-Red Wash exploration and development area, which contains the GDBR project in the eastern part of this region. Thus, the GDBR would constitute 25.8 percent of the level of RFD expected in the Monument Butte-Red Wash exploration area, and 18.9 percent of overall development in the Vernal Resource Area. Some of the currently proposed projects comprising this reasonably foreseeable disturbance are included in the list of NEPA projects outlined in Table 5-1.

Recent BLM monitoring has documented that interim reclamation efforts in oil and gas development areas have largely been unsuccessful at reestablishing soil stability and vegetation. Accordingly, BLM field inspections are indicating that initial disturbance should be more accurately portrayed as long-term impacts for the life of the project. Therefore, the acreage initially disturbed for construction, drilling, and completion would potentially remain void of desired vegetation for the long-term length of oil and gas development in the Vernal Resource Area. Thus, from past activities, the following surface disturbance assumptions have been applied regarding future construction associated with oil and gas development:

- Surface disturbance for a well pad: 2.0 acres;
- Surface disturbance for an access road: 1.5 acres/well;
- Surface disturbance for pipelines and flowlines: 0.47 acres/well;

- Surface for compressor stations: 2 acres;
- Surface disturbance for water pipelines: equals disturbance for oil well roads; and
- Surface disturbance for new sales pipelines: 0.47 acres for every new well.

Based on these assumptions, the cumulative surface disturbance of reasonably foreseeable oil and gas development would be approximately 31,175 acres. Disturbance associated with the GDBR project is estimated to be 1,736 acres (5.6 percent of the cumulative total). The individual components of reasonably foreseeable surface disturbance are shown in Table 5.2.

Table 5.2. RFD Surface Disturbance

Type of Well	# Wells	Well Pads (acres)	Access Roads (acres)	Surface Pipelines (acres)	Compressor Stations (acres)	Water Pipelines (acres)	Sales Pipelines (acres)
Oil	2,055	4,100	3,082	966		3,082	
Gas	4,345	8,690	6,517	2,042	138		2,042
CBM	130	260	195	61			
Total Disturbance (Acres)		13,050	9,794	3,069	138	3,082	2,042
Total RF Surface Disturbance (acres)		**31,175**					

5.3 CUMULATIVE IMPACTS ASSOCIATED WITH THE PROPOSED ACTION

5.3.1 Geology and Minerals

Cumulative impacts on geology and mineral resources in the CIAA would primarily occur as a result of oil and gas development, which would deplete recoverable oil and gas from the formations underlying the CIAA and alter local topography due to surface disturbance. Extraction of mineral resources from formations underlying the CIAA would be irreversible and would cumulatively add to depletions of oil and natural gas resources across the CIAA. Cumulative impacts to surficial geology would result from the approximately 50,310 acres of past, present and reasonably foreseeable surface disturbance in the CIAA associated with oil and gas development, its associated road development, and other mining and industrial activities (including for example, potential gilsonite leasing of up to 520 acres). Many of the NEPA projects listed in **Table 5-1** discuss direct, indirect, and cumulative impacts to geology and minerals in qualitative terms, and the reader is referred to those individual documents for project-specific discussions on these resources.

Minerals development in the CIAA has been extensive and is expected to continue at this level. Exploration for oil and gas reserves has diminished as infill projects are developed in known fields. Infill drilling continues to be proposed on decreased spacing, resulting in increasingly greater density of surface disturbance and installation of facilities.

No geologic hazards were identified in the CIAA by the Mineral Potential Report for the Vernal Planning Area (BLM 2004e) that would be exacerbated by oil and gas development.

5.3.2 Water Resources

Cumulative impacts to water resources in the CIAA would result from agriculture, livestock grazing, vehicular traffic, oil and gas development, and other mining and industrial activities. Surface disturbance resulting in effects to water resources in the CWSA would contribute incrementally to those cumulative impacts analyzed for the CIAA by increasing erosion into the White River and its tributaries, increasing potential for water quality degradation, and contributing to depletions of the Upper Colorado River Basin.

Many of the more recent NEPA documents outlined in **Table 5-1** (i.e., Tabby Canyon Oil and Gas Field Development EA, Castle Peak and Eight Mile Flat Oil and Gas Expansion Project EIS, West Brundage Canyon Oil and Gas Field Development EA, Chapita Wells/Stagecoach Area EIS, West Bonanza EA, Bonanza Area EA, Resource Development Group EIS, Sowers Canyon Oil and Natural Gas EA, Love Unit EA, Riverbend Natural Gas Drilling Project EA, LCU/HCU/BPU EA, and Gasco Development EIS) include project-specific discussions on soil loss, and sediment yield.

According to the Vernal RMP analysis, approximately 391,000 acres within the Vernal Resource Area would be susceptible to erosion. However, the location of individual facilities on these erodible soils is unknown. The soil erosion analysis, using the Revised Universal Soil Loss Equation, for GDBR indicated an average annual soil loss of 1,649 tons for 1,239 wells, or 1.331 tons/acre/year/well and associated access road. Soil loss resulting from oil and gas activities within the entire Vernal Resource Area can be estimated using the value calculated for GDBR. The RFD well projection is 6,218 wells and associated facilities. Therefore, the average annual increase in soil loss resulting from the reasonably foreseeable oil and gas activities would be 8,276 tons/year the GDBR would contribute 20% of the increase or 1,649 tons/year.

Over time, this sedimentation would be carried to the tributaries of the Green and White Rivers and eventually to the Green River. Sediment loading in the Green River at Jensen, Utah, 20 miles upstream from the GDBR, averages around 807,000 tons/month (ranging between 52,651 and 3,231,564 tons/month) or 9,684,000 tons/year (Lentsch, et al. 2000). If all of the sedimentation from RFD activities would eventually reach the Green River, sediment loading would increase by only 0.09 percent.

5.3.3 Air Quality

Sources within 50 kilometers of the GDBR were included in the near-field air quality cumulative analysis. These sources were identical to the ones being evaluated for the Vernal RMP. Two source groups were considered. The first group was sources that had had been identified or permitted but were not yet in operation during the year that the background data was determined. The second source consisted of compressor stations and dust-producing activities that would be operated as part of the oil and gas RFD. The total of these sources within 50 kilometers of GDBR would be 243 tons per year of NO_x, 785 tons per year PM_{10}, and 694 tons per year CO. These sources are described in the GDBR Air Quality Technical Report, Appendix 4.1.

The incremental cumulative effect of the other sources in addition to GDBR sources is very small. As shown in Table 5-3, increases would be small.

Table 5-3. GDBR Proposed Action vs. Cumulative Impact Comparison

Pollutant	Averaging Time	Project Maximum Predicted Impact (µg/m^3)	Project plus Cumulative Sources Maximum Predicted Impact (µg/m^3)	% of NAAQS	Incremental Increase of Cumulative Sources (µg/m^3)
NO_2	Annual	20.56	20.70	20.7%	0.14
CO	1-hour	984.7	985.1	2.5%	0.4
	8-hour	301.3	301.8	3.0%	0.5
PM_{10}	Annual	4.68	4.89	9.8%	0.21
	24-hour	15.77	22.17	44.3%	6.40

The Vernal RMP air quality analysis identified cumulative sources based on the RFD and new sources that were permitted to or had actually begun operations after 2001, the baseline year. Additionally, RFD sources were identified in the Glenwood Springs Resource Area as well as other cumulative sources in Colorado. The methods of the emissions inventories and the CALPUFF modeling methodologies are presented in the Vernal RMP Air Quality Technical Report. The results are shown to indicate the magnitude of impacts identified and the insignificant cumulative contribution of the proposed GDBR project. In most cases, the impacts from the GDBR project would be 2 to 3 orders of magnitude less than the cumulative effect.

Table 5-4. Comparison of Pollutant Concentrations at Class I/II Areas

Area	NO_2 Annual Average		PM_{10} Annual Average		PM_{10} 24-Hour Maximum	
	All (µg/m^3)	GDBR (µg/m^3)	All (µg/m^3)	GDBR (µg/m^3)	All (µg/m^3)	GDBR (µg/m^3)
Class I Areas						
Arches NP	0.0179	0.00028	0.0225	0.00102	0.2604	0.00304
Black Canyon of the Gunnison NP	0.0043	0.00002	0.0395	0.00046	0.9189	0.00272
Canyonlands NP	0.0210	0.00018	0.0189	0.00066	0.2892	0.00224
Capitol Reef NP	0.0005	0.00004	0.0036	0.00043	0.1470	0.00270
Eagle's Nest WA	0.0100	0.00002	0.0454	0.00005	0.4452	0.00053
Flat Tops WA	0.0181	0.00006	0.1029	0.00080	0.6003	0.00775
Maroon Bells-Snowmass WA	0.1887	0.00002	0.0562	0.00045	0.4717	0.00109
Mt Zirkel WA	0.0963	0.00013	0.0925	0.00058	0.7351	0.00152
Rawah WA	0.0020	0.00008	0.0033	0.00037	0.1072	0.00126
Class II Areas						
Brown Park NWR	0.0087	0.00393	0.0234	0.00627	0.2163	0.00918

Area	NO_2 Annual Average		PM_{10} Annual Average		PM_{10} 24-Hour Maximum	
	All (µg/m^3)	GDBR (µg/m^3)	All (µg/m^3)	GDBR (µg/m^3)	All (µg/m^3)	GDBR (µg/m^3)
Colorado NM	0.0403	0.00014	0.0661	0.00132	0.5945	0.02570
Dinosaur NM	0.0309	0.03772	0.0742	0.04420	0.8658	0.12900
Flaming Gorge NRA	0.0058	0.00289	0.0171	0.00452	0.1552	0.00806
High Uintas WA	0.0116	0.00054	0.0103	0.00132	0.2029	0.01180
Holy Cross WA	0.0085	0.00002	0.0471	0.00036	0.3946	0.00161
Hunter-Frying WA	0.0039	0.00001	0.0351	0.00033	0.3129	0.00075
La Guirta WA	0.0004	0.00001	0.0104	0.00023	0.1982	0.00057
Ouray NWR	0.0963	0.00011	0.0925	0.00071	0.7351	0.00268
Ragged WA	0.0044	0.21621	0.0388	0.94000	0.4032	0.12300
Weminuche WA	0.0005	0.00001	0.0082	0.00016	0.1690	0.00193
West Elk WA	0.0026	0.00002	0.0278	0.00020	0.5039	0.00065

NO_2 Class I increment = 2.5 µg/m^3
PM_{10} Annual Class I Increment = 4 µg/m^3
PM_{10} 24-Hour Class I increment = 8 µg/m^3

Table 5-5. Comparison of Nitrogen Deposition at Class I/II Areas

Class I/II Area	All Sources		GDBR	
	(kg/ha/yr)	Percent of Significance Threshold	(kg/ha/yr)	Percent of Significance Threshold
Class I Areas				
Arches	3.83E-03	0.128%	1.77E-04	0.006%
Black Canyon	3.34E-03	0.111%	1.39E-04	0.005%
Canyonlands	3.73E-03	0.124%	1.61E-04	0.005%
Capitol Reef	2.85E-04	0.010%	2.48E-05	0.001%
Eagle's Nest	7.90E-03	0.263%	1.35E-04	0.005%
Flat Tops	1.15E-02	0.383%	2.33E-04	0.008%
Maroon Bells-Snowmass	4.95E-03	0.165%	1.16E-04	0.004%
Mt Zirkel	6.00E-02	2.000%	2.98E-04	0.010%
Rawah	1.19E-02	0.397%	1.99E-04	0.007%
Class II Areas				
Brown Park NWR	5.68E-03	0.189%	2.13E-03	0.071%
Colorado NM	8.74E-03	0.291%	1.79E-04	0.006%
Dinosaur	1.30E-02	0.433%	9.05E-03	0.302%
Flaming Gorge NRA	7.90E-03	0.263%	1.38E-03	0.046%
High Uintas	4.34E-03	0.145%	2.61E-04	0.009%

Class I/II Area	All Sources		GDBR	
	(kg/ha/yr)	Percent of Significance Threshold	(kg/ha/yr)	Percent of Significance Threshold
Holy Cross	5.84E-03	0.195%	1.36E-04	0.005%
Hunter-Frying	4.53E-03	0.151%	1.28E-04	0.004%
La Guirta	2.21E-03	0.074%	1.28E-04	0.004%
Ouray NWR	1.70E-02	0.567%	2.65E-02	0.884%
Ragged	3.72E-03	0.124%	9.72E-05	0.003%
USFS Request	1.74E-03	0.058%	1.68E-03	0.056%
Weminuche	2.93E-03	0.098%	1.15E-04	0.004%
West Elk	5.68E-03	0.189%	2.13E-03	0.071%

Table 5-6. Comparison of Visibility Impairment

Class I/II Area	GDBR		All Sources	
	Highest Δdv	Number of Days with Δdv > 1.	Highest Δdv	Number of Days with Δdv > 1.0
Class I Areas				
Arches	.08	0	1.17	1
Black Canyon	.04	0	2.87	2
Canyonlands	.07	0	.75	0
Capitol Reef	.07	0	.25	0
Eagle's Nest	.03	0	.62	0
Flat Tops	.05	0	1.17	1
Maroon Bells-Snowmass	.03	0	.72	0
Mt Zirkel	.06	0	1.35	1
Rawah	.04	0	.33	0
Class II Areas				
Brown Park NWR	.17	0	.39	0
Colorado NM	.06	0	2.39	3
Dinosaur	.42	0	1.44	3
Flaming Gorge NRA	.10	0	.52	0
High Uintas	.44	0	.05	0
Holy Cross	.04	0	.05	0
Hunter-Frying	.03	0	.04	0
La Guirta	.02	0	.04	0
Ouray NWR	1.51	4	1.30	3
Ragged	.02	0	.05	0
USFS Request	.02	0	.03	0
Weminuche	.04	0	.05	0
West Elk	.04	0	1.39	1

5.3.4 Soils

Cumulative impacts to soils would result from surface disturbance associated with oil and gas development, road and other construction activities in and around CIAA communities, construction of recreation facilities in more rural areas, such as campgrounds and trails, off-road vehicle travel, and livestock grazing.

Many of the more recent NEPA documents outlined in Table 5-1 (i.e., Tabby Canyon Oil and Gas Field Development EA, Castle Peak and Eight Mile Flat Oil and Gas Expansion Project EIS, West Brundage Canyon Oil and Gas Field Development EA, Chapita Wells/Stagecoach Area EIS, West Bonanza EA, Bonanza Area EA, Resource Development Group EIS, Sowers Canyon Oil and Natural Gas EA, Love Unit EA, Riverbend Natural Gas Drilling Project EA, LCU/HCU/BPU EA, and Gasco Development EIS) include project-specific and cumulative impacts discussions on soil loss, and sediment yield.

As discussed in Section 5.3.2, approximately 391,000 acres within the Vernal Resource Area would be susceptible to erosion. However, the location of individual facilities on these erodible soils is unknown. The soil erosion analysis, using the Revised Universal Soil Loss Equation, for GDBR indicated an average annual soil loss of 1,649 tons for 1,239 wells, or 1.331 tons/acre/year/well and associated access road. Soil loss resulting from oil and gas activities within the entire Vernal Resource Area can be estimated using the value calculated for the GDBR. The RFD well projection is 6,218 wells and associated facilities. Therefore, the average annual increase in soil loss resulting from the reasonably foreseeable oil and gas activities would be 8,276 tons/year the GDBR would contribute 20% of the increase or 1,649 tons/year.

Many of the Uinta Basin soils have limitations on rehabilitation after disturbance, which is one of the primary factors in evaluating the effects of resource management decisions on soil function. Soil function can be defined as its ability to:

- **Regulate water:** Soil helps control where rain, snowmelt, and irrigation water go. Water and dissolved solutes flow over the land or into and through the soil.
- **Sustain plant and animal life:** The diversity and productivity of living things depends on soil.
- **Filter potential pollutants:** The minerals and microbes in soil are responsible for filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.
- **Cycle nutrients:** Carbon, nitrogen, phosphorus, and many other nutrients are stored, transformed, and cycled through soil.
- **Support structures:** Buildings need stable soil for support, and archeological treasures associated with human habitation are protected in soils.

Much of the CIAA exhibits low to moderate slopes, minimizing the need for extensive cut-and-fill; however, changes in topography resulting from slope alteration from either oil and gas development activities or mining may exacerbate slope stability in areas of steep slopes and unstable soils.

Vegetation disturbance, erosion, and sediment yield within the CIAA are likely to increase due to surface disturbance associated with oil and gas activities, livestock grazing/management, recreational activities, and naturally occurring erosion that are reasonably certain to occur. Many of the soils in the CIAA are derived from shale formations and are, therefore, highly erodible. Erosion results in direct soil loss where it occurs.

Grazing and other agricultural activities would also contribute to the loss of vegetation that would consequently impair soil function through diminished ability to cycle nutrients and regulate water. Increased competition for available forage may result if allocated AUMs are not decreased according to loss of forage from increased construction activities. Consequent impacts to soils could consist of increased sediment yield and loss of productivity.

As the demand for recreational opportunities increases within the CIAA, facilities such as campgrounds or other recreational development may be constructed near the White or Green rivers to facilitate convenient fishing opportunities or support White or Green River floating trips. The use of existing and newly constructed roads would increase access throughout the CIAA, possibly providing new access opportunities for recreationists. Although road densities contribute to the magnitude of erosion, construction of all-weather roads would reduce sediment loss. Off-highway vehicle use may also contribute to erosion and sediment yield into drainages that feed into water bodies in the CIAA.

5.3.5 Vegetation

The Vernal RMP analysis indicates direct surface disturbance and removal of vegetation from cumulative activities would be 187,363 acres (30,938 acres from oil and gas and 156,425 acres per decade from prescribed burns) over the next decade. Oil and gas activities would account for 16.5 percent of the total vegetation impact, and the GDBR project would account for about 2.5 percent. The nature of widespread oil and gas development would fragment native vegetation communities and suitable plant habitats, which could affect seed dispersal and limit distribution of native plant species.

According to BLM data files of mapped horseshoe milkvetch habitat, the proposed Greater Deadman Bench project is the only field development project that overlaps horseshoe milkvetch habitat. However, there are 13 plugged and abandoned wells, four producing wells, two temporarily abandoned wells, and two plugged wells within milkvetch habitat. Potential cumulative impacts to horseshoe milkvetch include loss or modification of potential habitat, habitat fragmentation caused by increased road and well pad development, the potential for the introduction and spread of invasive weed species, and sedimentation.

Prescribed burns are designed to be low-intensity burns to clear understory and weedy species in order to enhance or maintain rangeland conditions. Fire would initially destroy plants and would result in an adverse, short-term effect immediately following treatment. An increased risk of weed infestations would also occur. However, as the vegetation would recover and plant communities would return to a natural fire regime, long-term beneficial effects on the vegetation could occur except where invasive annuals such as cheatgrass would invade. Conversely, the loss of vegetation from oil and gas activities would be long-term, perhaps 30 years for the average life of a well. After reclamation, the recovery of vegetation would be on the order of years to decades.

Before any oil and gas development on federal lands, surveys would be required to determine the presence of federally-listed or sensitive plant species. These practices are generally effective in minimizing the potential effects to sensitive plant species because locations of pads and roads can be moved a maximum of 200 meters within a lease. Therefore, direct impacts to sensitive plant species should be minimal.

5.3.6 Wildlife

Direct cumulative impacts would primarily include loss of wildlife habitats through surface disturbing activities. As discussed in Section 5.3.3, direct surface disturbance and removal of vegetation from cumulative activities in the Vernal RMP area would occur on 187,363 acres over the next ten years. Oil

and gas activities would account for 16.5 percent of the total vegetation impact, and the GDBR project would specifically account for about 2.5 percent. While vegetation disturbance does somewhat correspond to associated wildlife habitat loss, accurate calculations of cumulative habitat loss are not determinable because the direct impacts of habitat disturbance are species-specific and dependent upon (1) the status and condition of the population(s) or individual animals being affected; (2) seasonal timing of the disturbances; (3) value or quality of the disturbed sites; (4) physical parameters of the affected and nearby habitats (e.g., extent of topographical relief and vegetative cover; (5) value or quality of adjacent habitats; (6) the type of surface disturbance; and (7) other variables that are difficult to quantify. As indicated in the Vernal RMP analysis, activities leading to direct vegetation loss would primarily include oil and gas development. Overall, ongoing and reasonably foreseeable oil and gas activities (e.g., construction of well pads, roads, and pipeline ROWs) would directly reduce the amount of available hiding and resting habitats, foraging and/or hunting habitats, and breeding, nesting and rearing habitats for a large variety of wildlife species.

Direct cumulative impacts from ongoing and reasonably foreseeable surface disturbing activities could also lead to mortality of small or slow-moving wildlife that are in the path of construction equipment or vehicles.

Special status wildlife species would also be cumulatively affected by RFD and the resulting direct impacts discussed above. However, on federal lands, surveys are generally required in suitable or occupied habitats of threatened, endangered or otherwise special status species. These surveys would help determine the presence of any special status wildlife species or its habitat, and protective measures would generally be taken to avoid or minimize direct disturbance in these critical areas.

Indirect cumulative impacts from ongoing activities and RFD would include (1) fragmentation or degradation (or functional habitat loss) of areas adjacent to direct disturbance; (2) decreased use of certain habitats through displacement of some wildlife species resulting in potential inter- and intra-species competition, and subsequent effects of deteriorated physical condition, reproductive failure, mortality, and general distress; (3) a decrease in reproductive success and nutritional condition from increased energy expenditure due to physical responses to disturbance; (4) an increase in the potential for collisions between bald eagles, big game, or slow-moving wildlife and motor vehicles because of increased traffic associated with RFD activities; and (5) an increase in the potential for poaching and harassment of wildlife because of increased human presence in the Vernal RMP area.

Based on these direct and indirect cumulative impacts, ongoing and RFD (including the GDBR project) in the Vernal RMP would cumulatively and incrementally reduce the productivity of wildlife habitats in the Vernal RMP area for the lifetime of oil and gas development and production (potentially 50 years or more).

5.3.7 Cultural Resources

Cultural resources are generally encountered during surveys before activities on federal lands. Additionally, more resources may be discovered during construction and subsequent operational activities. Short-term direct effects could occur during the discovery process if relevant cultural resource laws and guidelines are not followed. Potential long-term effects would involve the physical alteration or destruction of sites. Although it is not possible to totally avoid the potential for inadvertent destruction of sites, the planning process results in a relatively low rate for negative effects. Indirectly, the increased access resulting from new road construction for oil and gas activities would lead to vandalism and looting of newly discovered sites. Four types of activities would occur in the Vernal Resource Area that would result in the potential of either discovering cultural resources or inadvertently destroying them.

The Vernal RMP cultural resource analysis indicated that 4.87 sites/square mile may be in high density areas and 0.93 sites/square mile may be in low density areas. Based on this distribution of cultural sites, it was estimated that 96 sites may be discovered during oil and gas operations. Of the 96 potential sites, 70 could be in the Monument Butte area that contains the GDBR. By comparison, the analysis for the GDBR indicated that 7 to 22 sites would be discovered.

Rangeland improvement is another activity that could potentially lead to discoveries of cultural sites. Rangeland activities such as construction of fences, pipelines, and ponds on 935 acres could lead to a discovery of 7 sites based on an estimated site density in these areas of 2.9 sites/square mile.

A third activity with the potential for discovering cultural sites would be prescribed burning. BLM estimates prescribed burning would occur on 156,425 acres per decade. Because prescribed fires often occur at lower temperatures than wildfires, it is less likely that cultural sites would be damaged. At the same time, the reduction of ground cover can have an effect by uncovering sites that were previously obscured by vegetation. Furthermore, surveys would be conducted in areas with known high-density sites. Based on an average site density of 2.9 sites / square mile, there would be a possibility of finding 707 new sites in the 10-year burning period.

New and updated motorized and non-motorized trails would be a fourth venue for the discovery of cultural sites. Travel would be allowed in 300-foot buffers along these trails. Activities in these buffers could potentially result in a discovery of 481 sites. At the same time, there would be an increased chance of theft or vandalism of known and newly discovered sites as public access would increase along and near these trails.

The implementation of all these activities could potentially result in the discovery of 1,291 new sites. Although oil and gas activities would account for only 96 of these sites, the probability of discovering new sites on lands needed for oil and gas facilities would be the highest because of the site-specific cultural surveys that would be required.

5.3.8 Paleontology Resources

Cumulative impacts to paleontological resources of the CIAA would primarily result from activities associated with surface and subsurface disturbance associated with oil and gas development, recreational use/OHV travel, and fire management.

Oil and gas activities, including gas development in the CWSA, could have short- and long-term adverse cumulative effects on paleontological resources in the CIAA. Surface disturbance that results from oil and natural gas development could affect paleontological resources by damaging or destroying fossils. Adverse effects include physical damage to or destruction of fossils, as well as increased vandalism and theft that result from improved access to fossil localities. However, similar to cultural resources, site-specific paleontological surveys are generally required prior to oil and gas surface disturbing activities. When these surveys follow the procedures for assessment and mitigation found in the BLM Manual H-8270-1, Chapter III (1998b), they reduce or eliminate the potential for adverse impacts to fossil resources. Exploration for and development of mineral resources can also have a cumulative beneficial effect on paleontological resources by drawing the attention of a qualified paleontologist to areas that are not currently being researched, resulting in the collection of specimens and data that would not otherwise be recovered.

Because of the rich paleontological history of the Uinta Basin, paleontological resources are often one of the key issues addressed in NEPA documents for oil and gas development. Most of the existing field development NEPA documents listed in Table 5-1 include at least some discussion on paleontology and

fossil resources. Many of the more recent NEPA documents outlined in Table 5-1 (i.e., Tabby Canyon Oil and Gas Field Development EA, Castle Peak and Eight Mile Flat Oil and Gas Expansion Project EIS, West Brundage Canyon Oil and Gas Field Development EA, Chapita Wells/Stagecoach Area EIS, West Bonanza EA, Bonanza Area EA, Resource Development Group EIS, Sowers Canyon Oil and Natural Gas EA, Love Unit EA, Riverbend Natural Gas Drilling Project EA, LCU/HCU/BPU EA, and Gasco Development EIS) include detailed discussions on direct, indirect and cumulative impacts to fossils and paleontological resources.

5.3.9 Land Use

The potential for increased productivity and resulting economic viability that oil and gas resources in the CIAA provide would encourage mineral lessees to effectively develop and drain their leased resources. Consequently, potential cumulative impacts of the past, present and future activities (including the Proposed Action) on land use would involve a more prominent use of the CIAA for oil and gas development. Based on past, present and reasonably foreseeable surface disturbance estimates discussed in the Mineral Potential Report for the Vernal Planning Area, approximately 50,310 acres would be used for oil and gas development over the next 15 to 20 years, approximately 1,735 acres of which, or 3.4 percent of the cumulative surface disturbance, would occur in the CWSA.

City and county land use plans are anticipated to adjust according to the level of oil and gas development in the CIAA in order to accommodate anticipated community growth. In general, an increased level of development is expected to occur in areas adjacent to communities in the CIAA, resulting in a more urbanized local appearance. An increasingly aggressive oil and gas development scenario may result in land acquisitions to create or protect recreational or other opportunities in areas of the CIAA containing unique resources. These acquisitions could involve Federal lands, Indian trust lands, state lands, or privately owned lands. The potential for consolidating land ownership patterns could result in increased development in more remote areas, including recreational development.

The scope and depth of discussion on land use in the NEPA documents listed in Table 5-1 is highly variable. The more detailed accounts of land use and impacts to land uses are generally included in the EISs (e.g., Castle Peak and Eight Mile Flat Oil and Gas Expansion Project EIS, Chapita Wells/Stagecoach Area EIS, Resource Development Group EIS) and EAs on Tribal/allotted lands (e.g., Tabby Canyon Oil and Gas Field Development EA, West Brundage Canyon Oil and Gas Field Development EA). Most of the remaining NEPA documents listed in Table 5-1 include or will likely include at least some discussion on land use, however, quantitative cumulative impacts analyses on this rather intangible issue are limited or non-existent.

5.3.10 Transportation

Cumulative impacts to transportation in the CIAA from would result from past, present, and reasonably foreseeable construction of roads to support a growing population, construction of roads to support increased mineral resource development, and designation of special resource-value roads and trails to support recreational opportunities. Adverse cumulative impacts would include increased traffic and increased potential for vehicular accidents. Beneficial impacts would include improved road surfaces which would facilitate increased vehicle use and access throughout the CIAA.

Extensive oil and gas development already exists in and near the CWSA and throughout most leased areas of the CIAA that have already seen oil and gas development. Road networks and traffic associated with developed oil and gas fields are already established. Additional oil and gas development in existing fields would primarily result in the construction of additional, short dead-end roads used to access well

locations. As oil and gas development is extended into areas of the CIAA that have seen the development of only exploratory wells, arterial roads would be constructed, and the web of primarily dead-end well access roads would be constructed thereafter. Vehicle traffic to oil and gas locations would be the highest during construction, drilling, and completion operations and would substantially decrease once construction activities diminish and wells are put on production. Traffic to well locations would decrease as telemetry is installed by some operators to allow remote monitoring.

Construction of roads in rural areas would provide easier access for recreational users and OHV users. Hunters may be able to access more remote areas in the Book Cliffs to increase their opportunities for success. Hikers may be able to more easily access the canyons along the Green River. Use of roads constructed for oil and gas development by recreational users may result in conflicts or accidents as passenger vehicles are confronted with large trucks transporting water, chemicals, and/or heavy machinery.

Most roads in the CIAA are claimed by the counties as county roads. Increased use of roads by all users would result in increased maintenance obligations to ensure a safe running surface.

Discussions on transportation and transportation-related cumulative impacts are somewhat limited in the NEPA documents listed in **Table 5-1**. Similar to land use, more detailed accounts of transportation and transportation related impacts are generally included in the EISs (e.g., Castle Peak and Eight Mile Flat Oil and Gas Expansion Project EIS, Chapita Wells/Stagecoach Area EIS, Resource Development Group EIS). However, quantitative calculations of cumulative transportation-related impacts are not available.

5.3.11 Rangeland Resources

Cumulative impacts to livestock and grazing resources in the CIAA would primarily be caused by road and trail construction and maintenance, well pad and access road construction, vehicle traffic, accidental spills of potentially hazardous material, and noxious weed infestations primarily resulting from oil and gas development. Forage for livestock would continue to be removed from available use as oil and gas development continues to expand. AUMs directly relate to forage amounts needed to support one animal, either grazing animal or wildlife individual, for one month. A reduction in the amount of available forage, therefore, results in a reduction of the number of AUMs supportable by a particular allotment.

Livestock grazing is a permitted use of public lands. Although some minor changes may be expected over the next few years, it is reasonable to expect that livestock grazing will continue. Annual grazing potential within the Vernal Resource Area is predicted to be 138,987 AUMs for livestock, and 104,930 for wildlife. The AUMs under the Proposed Action would be 4,602, or 1.9 percent of the cumulative total. Oil and gas operations and other land uses would directly affect livestock and wildlife grazing by the removal of forage.

The development of roads has had, and will continue to have, both adverse and beneficial impacts on the livestock grazing activities and resources. Roads would beneficially provide additional access to portions of the allotments that currently do not have access. Roads also have the ability to increase livestock distribution in some areas, but can also disrupt distribution patterns. Increased livestock distribution could occur in some areas that have previously been inaccessible due to terrain limitations, distance from water, or a combination of both. Livestock distribution would be adversely disrupted in some areas because livestock would move along the road network, thereby missing available forage, or livestock could gain access to areas that are not desirable or are too fragile for grazing. Roads would also allow increased vehicular traffic, contributing to potentially adverse disturbance to livestock from OHV users and those seeking dispersed recreational opportunities.

5.3.12 Recreation

Cumulative impacts to recreational resources in the CIAA would be caused by oil and gas development, cultural and paleontological resource protection, fire management, construction and/or designation of roads and trails, mineral resource development, changes in recreational opportunities, designation of ACECs, and management actions taken by the Ashley National Forest and counties within the CIAA. Adverse impacts associated with these activities would mainly include short and long-term recreational closures, restrictions, and/or a diminished recreational experience due to the presence of noise and human activity. Continued promotion by the State of Utah of the Uinta Basin and vicinity as "Dinosaurland" could result in conflicts between tourism and oil and gas development in the more rural areas of the CIAA. BLM, National Forest, and county plans are anticipated to provide for the availability and quality of recreation in consideration of increasing oil and gas development in the CIAA. For people not negatively influenced by development and the presence of infrastructure, increased road surfaces in the CWSA would increase recreational access to the area.

Cumulative oil and gas activities, in general, are increasingly modifying the natural landscape through surface disturbance, construction and installation of facilities, pipelines and roads, and degradation of air quality resulting in visibility impairment, all of which could affect the quality of a recreational experience in particular areas where recreational opportunities are also available. The addition of 6,530 wells to an already highly developed oil and gas activity area would increase the existing impacts from such development. The addition of QEP's proposed wells to existing and reasonably foreseeable oil and gas operations in the CIAA would have minimal cumulative impacts on recreational resources in the CIAA. As discussed in Section 4.12, potential impacts include temporary and long-term displacement of recreation opportunities in the CWSA. Short-term impacts would primarily occur during the initial construction and drilling phases of the project. Long-term impacts would occur as a result of people avoiding areas of human infrastructure.

The scope and depth of cumulative impact discussions for recreation in the NEPA documents listed in **Table 5-1** is dependent upon the level of recreational activity within each area-specific document. For example, where oil and gas development is proposed near the White River, the associated NEPA document tends to include rather detailed (albeit mainly qualitative) analyses of impacts to recreation (e.g., Chapita Wells/Stagecoach Area EIS, West Bonanza EA). Where development is proposed in areas with little recreational activity, the NEPA documents in **Table 5-1** devote little or no attention to the analysis of recreational impacts.

5.3.13 Visual Resources

The current management objective for visual resources in the CIAA is to manage the public lands in such a way as to preserve those scenic vistas that are deemed most important and to design or mitigate all visual intrusions so that the intrusions do not exceed the established VRM class objectives. Activities within the CIAA that could potentially cause visual intrusions and have an impact on scenic quality are primarily surface-disturbing activities, including minerals exploration and development, OHV use, trail and/or road development, and fire management. Generally, the greater the degree of surface disturbance, the greater the impact would be to scenic quality.

Oil and gas activities are the predominant source of modification to the landscape and visual environment of rural areas of the CIAA in the Uinta Basin. Past, present, and future oil and gas development in the CIAA would have both direct and indirect impacts on visual quality. The cumulative effects on visual quality would include strong visual contrasts from (and not limited to) the construction of well pads, access roads, drilling rigs, pipelines, and processing and support facilities. Indirect impacts to visual quality, both short-term and long-term, would occur as a result of soil erosion from disturbed areas,

fugitive dust from disturbed areas, and/or regional haze from compressor and generator emissions that could obscure or degrade scenic vistas.

Oil and gas activities would be required to conform to the VRM Class Objectives in visually sensitive areas, Class III VRM and higher. Therefore, a cumulative visual deterioration would not occur because mitigation would be applied as necessary. Such measures would include:

- Repeat elements of form, line, color, and texture;
- Repeat landscape color and shade;
- Paint all facilities on pad same color;
- Repeat landscape lines by following contours;
- Avoid ridge lines and hill tops to avoid skylining;
- Install low structures;
- Bury utility lines, pipelines, and flow lines in visually sensitive areas;
- When a new road is created to replace an existing one, reclaim and revegetate the old road;
- Avoid locating roads on steep slopes;
- Where possible, avoid large pads on steep slopes; and
- Apply interim reclamation as soon as possible.

5.3.14 Socioeconomics

The economy of Uintah and Duchesne Counties are largely driven by the oil and gas industry. Therefore, this cumulative economic analysis has the emphasis on the oil and gas industry. Other minor actions related to recreation and rangeland management may have a small effect but would be much less than the oil and gas industry.

The GDBR would constitute about 23 percent of gas wells and 5 percent of oil wells predicted in the Vernal Resource Area. Based on QEP's estimates of mineral withdrawals for a 30-year life of production for each well, QEP royalties would amount to $140.1 million to the State of Utah and $26.2 million to Uintah County. Applying the assumption that similar mineral withdrawal rates would be applicable for the RFD wells, and all of the RFD wells would be federal minerals, $1.009 billion in royalties would be paid to the State of Utah. Wells in Uintah and Duchesne Counties are assumed to be equally distributed so each county would receive $79.5 million. In addition, local agencies and governments would be eligible to apply for a portion of the $327.9 million in PCIF funding.

Job creation for the RFD is predicted to be 211,369 over the initial 20-year period for an average of 10,568 per year. Job creation for QEP is predicted to be 311 per year for the first 10 years and then decrease to 61 per year afterwards to operate the field.

5.3.15 Noise

Noise sources associated with oil and gas activities would occur 1) near construction, drilling, and completion of wells; 2) near compressor stations; and 3) along access roads where project-related vehicles would travel to sites. Cumulative noise effects from oil and gas activities would be minor because there would be sufficient distance between project construction sites and operational compressor stations, as

well as sufficient distance between activities in adjacent fields. Noise would increase along major thoroughfares within the Vernal Resource Area that would provide access to oil and gas activities.

5.3.16 Health and Safety

Potential cumulative effects to human health and safety that could be associated with oil and gas development in the CIAA include:

- Occupational accidents that could be experienced by project workers;
- An increase in traffic hazards and accidents on public roads;
- Pipeline hazards and potential for accidental rupture or damage of pipelines by heavy equipment; and
- Effects to health and safety related to the use of hazardous materials and accidental spills or releases of hazardous materials.

In general, compliance with 43 CFR Ch. II, subpart 3162.5, and other regulations related to health and safety and environmental protection would minimize risks to human health and safety. The following is a discussion of health and safety impact issues identified as concerns in the CIAA. In general, to reduce the risk and seriousness of accidents and injuries to workers and the public, operators would be required to develop drilling and operations plans that would cover all potential emergencies, including fires, employee injuries, and chemical releases, among others as mentioned above.

Occupational Hazards

Statistical data on occupational accidents and fatalities for the oil and gas extraction labor category are available from the U.S. Bureau of Labor Statistics. Nationwide, the oil and gas industry experienced an accident rate of 3.2 accidents per 100 full-time workers and 23.1 fatalities per 100,000 workers in 2001 (U.S. Bureau of Labor Statistics 2003). As shown in Section 5.3.14, it is estimated that job creation for the CIAA is predicted to be 211,369 over the initial 20-year period for an average of 10,568 per year. Based on this employment rate, it is statistically probable that about 338 occupational accidents would occur each year. Similarly, based on the national rate for fatal accidents in the industry, there is about a 11 percent chance of one fatality occurring each year. The number of occupational accidents would likely be higher during the earlier years of the project where construction activity and employment would be more intensive. Following the completion of all construction and drilling in the later years of the project, employment would be reduced and the number of occupational accidents is expected to decline. Compliance of the operators with applicable safety regulations would reduce the probability of occupational accidents.

Increased Vehicular Traffic

Development would result in an increase in traffic on roads in the CIAA, along with proportionate increases in the risk of traffic accidents. With compliance with recommended speed limits on county roads, the risk of additional accidents is expected to be low and the resulting health and safety impact would be minor.

Pipeline Hazards

Oil and gas development would increase the potential for leaks or ruptures of gas pipelines. Most ruptures occur when heavy equipment accidentally strikes a buried pipeline while operating in close proximity. These ruptures may result in a fire or explosion if a spark or open flame ignites the escaping gas. Safety statistics are complied only for buried oil and gas pipelines. Therefore, the safety risk factors can only be inferred for surface lines. Based on the RFD, approximately 1,405 miles of new oil and gas pipelines would be installed (see Table 5-2 where 5,111 acres disturbance is predicted for pipelines which results in 1,405 miles assuming 30-foot ROW). Based on the statistical average of one safety incident per year per 4,035 miles of total pipeline (OPS 2003), seven additional pipeline safety incidents (including ruptures) are statistically probable over the next 20 years. Given the relatively low risk of potential pipeline accidents in the CIAA , and its relatively rural character, the risk to public health and safety from pipeline hazards would be minor. The risk would be minimized by the design of pipelines in accordance with applicable standards to minimize the potential for a leak or rupture. Pipeline markers would be posted where above ground pipelines cross roads. Operators would monitor the pipeline flows by either remote sensors or daily inspections of the flow meters. Routine monitoring would reduce the probability of effects to health and safety from ruptures by facilitating the prompt detection of leaks. If pressure losses were detected, the wells would be shut in until the problem is isolated and addressed.

Use of Hazardous Materials, Pesticides, and Accidental Spills and Releases of Hazardous Substances

Petroleum, natural gas, natural gas liquids or condensates, and produced water could all contain regulated hazardous substances, such as benzene, hexane, various polynuclear aromatic hydrocarbons (PAHs), heavy metals, and other compounds. Construction and drilling equipment would require gasoline and diesel fuels, lubricants, and coolant to operate. Drilling and fracturing fluids, which include some hazardous additives or constituents, would also be required. Disposal of some quantities of crude oil or condensate typically involves the sale of these wastes to a waste oil recycler. Contaminated soils are generally disposed of in an approved landfill used for non-hazardous wastes or are treated on site (through land farming or aeration) if permitted by the local regulatory agencies.

Federal and State of Utah regulations address the transport, storage, and disposal of hazardous materials or wastes. Assuming that QEP complies with the regulations, these rules would minimize the potential for spills or contamination of surface drainages or groundwater or releases of air emissions. Regulations for handling, storage, and disposal of hazardous materials are codified at 49 CFR Parts 171 and 179. EPA requires a Spill Prevention Control and Countermeasures Plan (SPCC) under 40 CFR Part 112 for storage of large quantities of petroleum products, such as fuels. Oil spills must be reported to the EPA National Response Center as required by 40 CFR Part 110. Federal and state operating and reporting requirements include provisions to clean up and mitigate spills or releases of chemicals, product, or wastes.

Human health and safety would likely be protected through compliance by operators with all applicable federal and state laws concerning safe operation of oil and gas facilities. In addition, as mentioned previously, operators would develop emergency response plans and employee-training programs that address spill prevention and control measures for hazardous materials and wastes. Accordingly, impacts to human health and safety from hazardous materials, pesticides, and wastes typically associated with oil and gas development are expected to be negligible.

6.0 COORDINATION AND CONSULTATION

6.1 PUBLIC INVOLVEMENT

A legal Notice of Intent (NOI) was published in the Federal Register on December 19, 2003 to prepare an EIS on the QEP proposal for the GDBR project. Additionally, a scoping packet with a letter inviting participation in public scoping was mailed to approximately 80 individuals, groups, and agencies. A formal scoping notice was then distributed to interested individuals and organizations. BLM conducted a public scoping and information open house at the Uintah County Building in Vernal, Utah on January 14, 2003. From November 14, 2003 through February 4, 2004, BLM conducted internal and public scoping to solicit input and identification of environmental issues and concerns associated with the proposed QEP Project. BLM then prepared a scoping information packet and provided copies of it to federal, state, and local agencies, and members of the general public.

The Vernal Field Office received letters commenting on the proposed GDBR project. The contents of these letters may be found in the project record at the Vernal Field Office. In general, the concerns and comments about the proposed project are summarized in Section 1.6 of this EIS.

The formal DEIS was published on February 10, 2006. Written comments were accepted form February 10 to April 27, 2006 on the DEIS. Seven comment letters were received. A formal public meeting for the receipt of oral or written comments was held on the DEIS in Vernal, Utah, on March 1, 2006. Written DEIS and project maps were made available. Members of BLM, Uintah County as a cooperating agency, and Buys & Associates were available for questions and comments. Except for two QEP representatives, no one from the public or other government agencies attended the public meeting. The seven written comments received were reviewed and issues to be addressed for the FEIS were identified.

The list of persons, groups, and agencies that were sent a copy of the DEIS and the FEIS is shown below. Table 6-1 lists the summary of the comments received on the DEIS and the responses to these comments. The copies of the letters received are on file at the Vernal BLM Field Office in Vernal, Utah.

Utah Wildlife
Po Box 1227
Fillmore UT 84631

Ashley National Forest
355 North Vernal Ave
Vernal, UT 84078

Bureau Of Indians Affairs
Uintah And Ouray Agency
Ft. Duchesne, UT 84026

Daggett County Commissioners
Po Box 219
Manila, UT 84047

Utah State Division Of History
Antiquities Section
300 Rio Grande Ave
Salt Lake City, UT 84101

Deseret News
30 East 100 South
Salt Lake City, UT 84111

Dinosaur National Monument
Po Box 210
Dinosaur, Co 81610

Duchesne County Commissioners
Po Box 270
Duchesne, UT 84021

Uintah County Library
155 East Main Street
Vernal, UT 84078

KVEL Radio
Po Box 307
Vernal, UT 84078

KNEU Radio
Route 2 Box 2384
Roosevelt UT 84078

High Country News
Box 1090
Paonia, Co 81428

SUWA
1471 South 1100 East
Salt Lake City, UT 84105

Mr. Herb Mcharg
SUWA
76 South Main Street – Suite 9
Moab UT 84532

Sierra Club
2120 South 1300 East
Suite 204
Salt Lake City, UT 84106

The Nature Conservancy
Utah Field Office
559 East South Temple
Salt Lake City, UT 84102

The Wilderness Society
1660 Wynkoop Street #850
Denver, Co 80202-1269

The Salt Lake Tribune
143 South Main
Salt Lake City, UT 84111

Chief NEPA Unit
U.S. EPA, Region 8
999 18th Street, Suite 500
Denver, Co 80202-2405

Uintah Mountain Club
Box 782
Vernal, UT 84078

Uintah Basin Standard
268 South 200 East
Roosevelt, UT 84066

Vernal Area Chamber Of Commerce
Conservation Issues Committee
134 West Main Street
Vernal, UT 84078

Vernal Express
Po Box 1000
Vernal, UT 84078

UDWR
152 East 100 North
Vernal, UT 84078

Dept Of Botany/ Range Science
BYU
Provo, UT 84601

Dept Of Zoology
BYU
Provo, UT 84601

Utah Environmental Congress
1817 South Main Street, Suite 9
Salt Lake City, UT 84115

Utah Rivers Council
1471 South 1100 East
Salt Lake City, UT 84105

Duchesne County Planning, Zoning
Public Lands & Community Dvlpmt
Po Box 317
Duchesne, UT 84021

Dinosaur Travel Board
25 East Main
Vernal UT 84078

Uintah County Public Lands Committee
152 East 100 North
Vernal, UT 84078

Uintah County Planning Office
152 East 100 North
Vernal, UT 84078

Oil & Gas Accountability Project
PO Box 1102
Durango, Co 81302

NRDC
1200 Ny Ave. Nw Suite 400
Washington, Dc 20005

Center For Native Ecosystems
P O Box 1365
Paonia, Co 81428

Center For Native Ecosystems
1536 Wynkoop Street, Suite 301
Denver Co 80202

National Trust For Hist. Pres. Law Dept.
1785 Massachusetts Avenue, Nw
Washington, Dc 20036

Forest Guardians
Hamilton Smith
312 Montezuma Avenue, Suite A
Santa Fe Nm 87501

James M. Lekas
Lexco, Inc.
P.O. Box 1198
Vernal UT 84078

Weston W. Wilson
Environmental Engineer
Environmental Protection Agency
Region 8 (8epr-N)
999 18th Street, Suite 300
Denver Co 80202-2466

Lavonne Garrison
Sitla
675 East 500 South, Suite 500
Salt Lake City UT 84102

Congressman Rob Bishop
124 Cannon House Office Building
Washington Dc 20515

Congressman Chris Cannon
118 Cannon House Office Building
Washington Dc 20515

Congressman Jim Matheson
410 Cannon House Office Building
Washington Dc 20515

The Honorable Robert Bennett
431 Dirksen Senate Office Building
Washington Dc 20510

The Honorable Orrin Hatch
131 Dirksen Senate Office Building
Washington Dc 20510

National Trust For Historic Preservation
Law Department
1785 Massachusetts Avenue, Nw
Washington Dc 20036

NRDC
1200 Ny Avenue Nw Suite 400
Washington, Dc 20005

PAW
951 Werner Court, Suite 100
Casper, Wy 82601

PGS Onshore Inc.
P.O. Box 549
7765 Windwood Way
Parker, Co 80134

PLA
1410 Grant Street, Suite B-305
Denver, Co 80203

State Of Utah
Department Of Community And Economic Development
Division Of State History
Utah State Historical Society
300 Rio Grande
Salt Lake City, UT 84101-1182

State Of Utah
Governor's Office Of Planning & Budget
RDCC
1594 West North Temple, Suite 3710
P.O. Box 145610
Salt Lake City, UT 84114-5610

State Of Utah
SITLA
675 East 500 South, Suite 500
Salt Lake City, UT 84102

USDI
Forest & Rangeland Ecosystem Science Center
Canyonlands Field Station
2290 South West Resource Blvd.
Moab, UT 84532

Utah Cattlemen's Association
150 South 600 East # 10-B
Salt Lake City, UT 84102

Utah Environmental Congress
1817 South Main Street, Suite 9
Salt Lake City, UT84115

Washington Wilderness Coalition
4649 Sunnyside Avenue N #520
Seattle, Wa 98103

Moab Field Office
82 East Dogwood
Moab UT84532

Blm Grand Junction Field Office
2815 H Road
Grand Junction Co 81506

Blm White River Field Office
73544 Highway 64
Meeker Co 81641

Mark Belles
9318 Willard Street
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10400 Academy Ne, Suite 310
Albuquerque Nm 87111

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5231 S Quebec Street
Greenwood Village Co 80111

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Cathy O'Bryant
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Payson UT84651

Danny Widner
RDG
Po Box 1668
Vernal UT84078

Louise Sandberg
Trace Energy
187 East 1975 North
Centerville UT84014

David Tobert
3115 South 2900 East
Salt Lake City UT84109

H. Wilson
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Park City UT84090

Doug Tharp
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Salt Lake City UT84103

Bob Arrington
1216 Fourth Avenue
Salt Lake City UT84103

Jerry Bergosh
1961 Scenic Drive
Salt Lake City UT84108

David Morrision
1986 Douglas Street
Salt Lake City UT84108

Tom Morrison
3048 South Plateau Drive
Salt Lake City UT84108

Randy Long
8610 Kings Hill Drive
Salt Lake City UT84121

Dominion Exploration & Production, Inc.
Four Greenspoint Plaza
16945 Northchase Drive Suite 1750
Houston Tx 77060-2133

Trc Mariah Association Inc.
Attn: Roger Schoumacher
605 Skyline Drive
Laramie Wy 82070-8909

John Dyer
Miller, Dyer & Co. Llc
475 17th Street Suite 420
Denver Co 80202

Stephanie Tomkinson
QEP Uinta Basin, Inc.
11002 East 17550 South
Vernal UT84078

USFWS
Don Peterson (Stephanie Nash)
4401 North Fairfax Drive - Ms 400
Arlington Va 22203

National Park Service
Jake Hoogland (Dale Morlock)
1849 C Street Nw
Nps-23 10 - Ms 2749
Washington Dc 20240

GS
Celso Puente
12201 Sunrise Valley Drive
Ms 423
Reston Va 20192

BLM
Carol Macdonald
1620 L Street Nw - Ms 1075
Washington Dc 20036

BR
Roy Arnold
1849 C Street Nw
Ms 7612
Washington Dc 20240

BIA
Don Sutherland
1849 C Street, Nw
Ms 4513
Washington Dc 20240

MMS
Geore Valiulis
381 Elden Street
Ms 4042
Herndon, Va 20070-4817

OSM
Sam Bae
1951 Constitution Avenue Nw
Ms 10
Washington Dc 20240-0001

DOI Regional Environmental Officer
Robert F. Stewart
Po Box 25997 (D-108)
Denver Federal Center
Denver Co 80225-007

Natural Resources Library
Department Of Interior
1849 C Street Nw
Mail Stop 2258
Washington Dc 20240
Department Of Interior – OEPC
Attn: Gwen Wilder
1849 C Street Nw Ms 2342
Washington Dc 20240

U.S. EPA
Office Of Federal Activities
Eis Filing Section
Mail Code 2252-A Room 7241
Area Rios Building (South Oval Lobby)
1200 Pennsylvania Avenue, NW
Washington Dc 20460

Brad Boyce
OSO Energy Resources Corporation
900 Main Avenue Suite D
Durango Co 81301

John Hunting
78 West 3325 North
Vernal UT84078

Bjork, Lindley, & Little
Attn: Linda Vanderveer
1600 Stout Street, Suite 1400
Denver Co 80202
303/892-1400

EOG Resources.Inc
Toni Miller
600 17th Street, Suite 1100 N
Denver, Co 80202

Earthjustice
Att: Edward B. Zukoski
1400 Glenarm Plaza
Suite 300
Denver Co 80202-5050

Ziegler Chemical & Mineral Corporation
366 North Broadway - Suite 210
Jericho, Ny 11753 400

Jayne Belnap
2290 S. Resource Blvd.
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Larry H. Robinson
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The list of responses to the comments received are shown below.

Table 6-1. Comments and Responses on the GDBR DEIS.

Comment	Response
U.S. Environmental Protection Agency (EPA) Region 9 999 th Street – Suite 300 Denver, CO 80202-2466	
EPA 1. The DEIS fails to compare the proposed action to any alternative that meets the purpose of QEP utilizing its valid existing rights. EPA suggests that the following alternatives should be analyzed in a Supplemental Draft EIS or the Final EIS:	Additional alternatives were considered. The mitigation identified in chapter 4 comprise an alternative to the proposed action that resolves relevant environmental impacts. The other alternatives considered are described in the Alternatives Considered but not Evaluated in Detail Section. Section 2.4 has also been revised to include the alternatives suggested by EPA.
EPA 2. A Phased Development Alternative could decrease the distances between each new rig setup, address issues of unitization and gas capture, and reduce field-related vehicular traffic. Phased development would also allow time for additional technical advances, such as improving directional drilling techniques, which could result in increased oil and gas production with fewer environmental impacts.	It is unclear how this alternative would reduce impacts. The 10-year developmental phase of the GDBR project is a type of phased development. As improved drilling techniques would become available over the 10-year period, QEP would apply these techniques if enhanced recovery of the reserves would occur and the new methods would be economically feasible. However, it appears that the EPA-recommended phased development would restrict exploration and development in distant areas until all development within a given area would be complete. As a result, the phased development scenario would deny the operator the opportunity to expand far enough out from existing development to drill exploratory type of wells. These exploratory wells are needed to determine the extent, quantity, and quality of oil and gas potential reserves at locations distant from existing development. The exploratory drilling may indeed lessen overall impacts if it is found that the exploratory wells would not have the desired economic potential. In a phased development scenario, the traffic would tend to be more concentrated in distinct areas thereby increasing traffic impacts on the roads in the vicinity of the construction and development.
EPA 3. A Directional Drilling Alternative should be considered in areas where there are low risks such as infill locations and within the “exceptional recovery areas”.	Currently, QEP has drilled and completed 7 directional gas wells. These wells were each drilled on an existing pad that had another vertical well. Four of these directional wells were 40-acre spacing (due to topography) and three were on 20 acre spacing (infill drilling). QEP has also identified the portion of the field that has the topography and infill potential characteristics and the DEIS analyzes them

Comment	Response
	as directional wells from an existing pad. As for considering directional drilling field wide, the DEIS on page 2-31 specifically states, "As shown on Figure 2-5 in the DEIS, the Estimated Ultimate Recovery of directional wells would have to exceed 1.1 billion cubic feet for wells with a probability of success greater than 85%. This is generally not the case for the GDBR wells." However, under the Proposed Action, the use of directional drilling may still be considered on a case-by-case basis as necessary to reduce impacts to resources of concern.
EPA 4. A Minimum Setback Distances Alternative should be considered that assures adherence to all minimum setback distances from riparian zones, floodplains, springs, or sensitive wildlife, geologic, and cultural resource areas that could be used to highlight where such conflicts may occur. EPA recommends this alternative to analyze the difference in environmental effects compared to the Proposed Action and other alternatives.	It is unclear how this alternative would reduce impacts. Minimum setback distances are part of the Proposed Action. Setbacks are already incorporated into the proposed action. Regulations at 43 CFR 3101.1-2 dictate that facilities can be moved 200 meters to reduce or avoid any impacts. The mitigation and applicant committed measures take into account many of the suggested setback distances, both in time and space. The well pad and access road locations in this document are conceptual, so that the need for setbacks will be identified and analyzed through additional NEPA documentation on a site-specific basis during the review phase of the specific project Application. As stated on page 4-3 of the DEIS, "Executive Order 11988 requires federal agencies to make decisions in a manner that promotes avoidance of adverse impacts and reduces the risk of property loss and human safety due to floodplain development/modification, and preserves the natural and beneficial values of floodplains. Floodplain development/modification is allowed only after there are no other feasible alternatives." Since the minimum setback distances alternative is incorporated into the proposed action so there is no need to address minimum setbacks as a separate alternative.
EPA 5. A Green River Protection Alternative should be considered that provides for no development within the Green River floodplain and riparian corridor.	The comment is unclear how the suggestion will reduce impacts. However, a Green River Protection alternative is not needed because this document is a conceptual analysis. This alternative is similar to the setback alternative. As noted above, the onsite, plus 43 CFR 3101.1-2 allows for 200 meter movement during the onsite survey to avoid violating riparian policy. Since the vegetation extends east and west from the banks of the Green River, it is likely that

Comment	Response
	moving all of the facilities 200 meters east would probably alleviate, if not eliminate, any impacts to riparian vegetation. Furthermore, the movement of facilities 200 meters east could move these facilities from the Green River floodplain.
EPA 6. Since the project area is located on Indian lands within the exterior boundary of the Uintah and Ouray Indian Reservations, EPA directly implements federal environmental protection programs with regard to activities associated with the proposed project. This includes permitting authority for the proposed water injection wells for enhanced recovery and any produced water disposal wells pursuant to the Underground Injection Control (UIC) program.	None of the surface or mineral ownership in the GDBR is Indian land, but is located on lands within the exterior boundary. EPA Region 8, has jurisdiction for water injection permitting actions for all portions of the lands south of Vernal and east of the Uintah and Ouray Indian Reservation to the Utah/Colorado border. Therefore, Table 1.1 has been changed to identify EPA as the permitting agency for water wells and the Underground Injection Control Program.
EPA 7. Under Section 365 of the Energy Policy Act, the Vernal Field Office has been designated as a pilot project office. It may be possible to improve the efficiency of field inspections regarding environmental compliance based on the additional staffing provided to pilot offices. EPA requests that the Final EIS specify the number of staff and percentage of time allocated to enforcement inspection.	The information requested by EPA is administrative in nature and is not necessary since the analysis assumes that sufficient staff and funding would be available to monitor project development and enforce the required mitigation.
EPA 8. EPA believes that it is important to specifically designate which entity (BLM, the Operators, resource organizations, or some combination) will have responsibility for implementing activities that require management, mitigation, and monitoring of construction and operational impacts, as well as reclamation status and effectiveness. All of these activities should be verifiable and an agency/entity needs to be held accountable for performance oversight both throughout the life of the project and after the project has been decommissioned. EPA also recommends that BLM provide public disclosure of these performance oversight activities.	On BLM-administered land, the BLM is responsible for approving a project component's final APD, the surface use and subsurface drilling programs, and appropriate mitigation, compliance, and reclamation measures. BLM records regarding oversight of field development are available to public inspection and review, subject to restrictions for proprietary information and privacy act considerations. EPA and the public may request such information at any time.
EPA 9. The project area should be difficult to revegetate due to high erosion potential, poor topsoil, and soils with a potential for severe water erosion in about 45% of the GDBR. Studies show that new roads can become a pathway for the spread of noxious weeds. The Final EIS should address the control of such intrusions via new roads during the initial review and planning stages and document the implementation of proper management and mitigation.	The DEIS discloses the potential effects of intrusions of noxious weeds. Furthermore, the operator's committed BMP indicates the following: "QEP would monitor and control noxious and invasive weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. On BLM administered land, a Pesticide Use Proposal would be submitted and approved prior to the application of herbicides, pesticides

Comment	Response
	or other hazardous chemicals." This procedure would be included in the Surface Use Plan developed for the APD.
EPA 10. Page 1-11, Table 1-1. Since the project area is located entirely on Indian lands within the exterior boundary of the Uintah and Ouray Indian Reservations, EPA has the authority to approve and issue Underground Injection Control (UIC) permits for the produced water disposal wells. EPA also has jurisdiction over the National Pollutant Discharge Elimination System, General Permit for Storm Water Discharges, and the New Source Review and Prevention of Significant Deterioration air permitting programs. The Final EIS should list these permits under EPA authority, as appropriate.	Table 1.1 has been corrected to reflect EPA as the lead agency for these matters. This does not change the analysis since it is assumed that the applicant will obtain all necessary permits and authorizations.
EPA 11. Page 2-30. The economic rationale used to reject the full-field directional drilling alternative is unclear. For deep oil wells, the analysis indicated that a directional well would cost $190,000 more than a vertical well. Despite increased drilling costs, the economic analysis indicates that "unrisked" directional wells in the exceptional recovery zone would have a favorable return on investments exceeding 20% based on a gas price of $4.84/Mcf. Current limitations regarding the technical and economical aspects of directional drilling should be updated because advances in directional drilling technology are very rapid.	No deep oil wells are anticipated within this field. The analysis on deep wells is for gas wells. The DEIS (see page 2-30) provides technological data as to why shallow oil wells cannot be directionally drilled. As many as 132, 20-acre wells are to be considered as a part of this Proposed Action. These 20-acre infill wells would typically be drilled directionally off of the same 40-acre spaced well pads, requiring no additional surface disturbance. Since the 2004 QEP report on directional drilling, there have not been any significant, cost reducing technological advances. In fact, due to supply and demand for directional drilling crews, the cost has more than doubled. The cost for drilling a directional well is now an additional $300,000.00 more than a vertical well. OPAL spot gas prices have only gone up slightly, varying between $5.00 and $6.00 per thousand cubic feet (mcf). The increase in spot gas pricing is not commensurate with the increased costs of directional drilling. Also see response to comment EPA 1.
EPA 12. Page 33-3, Table 3.3-3. The source of background data, as well as the statistics selected, need to be included as footnotes to this table as well as Tables 4.3-4 and 4.3-5.	The tables have been updated. The background values reflect the most current data for the Uinta Basin obtained from the Utah Department of Environmental Quality, Utah Division of Air Quality.

Comment	Response
EPA 13. Page 4-8. The percentage of air quality standards in the text are not consistent with the results shown in Table 4.3-5.	The table is correct. The text has been changed to agree with the table.
EPA 14. Page 4-11. The results indicate that the maximum visibility impact at the Ouray National Wildlife Refuge would be 4 days having a visibility reduction of over 1.0 deciviews with a maximum impact being 1.51 deciviews. Please clarify whether this would be a direct impact from project emissions and not a cumulative effect.	As indicated in the introduction to Chapter 4, the~~se~~ discussions in Chapter 4 all refer to the Direct and Indirect Impacts of the Proposed and No Action alternatives. Cumulative impacts are discussed in Chapter 5.
EPA 15. Page 4-11. Section 4.3.2 begins with the reference that the permitting authority is the Utah DEQ, Division of Air Quality. EPA has the authority for air permits in Indian Country on the Uintah and Ouray Reservations.	The text has been corrected to reflect EPA as the lead agency for these matters. Although none of the surface or mineral ownership in the GDBR is Indian, EPA Region 8, in an agreement with the State of Utah, has jurisdiction for air permitting actions for all portions of the lands south of Vernal and east of the Uintah and Ouray Indian Reservation to the Utah/Colorado border.
EPA 16. Page 4-12. There is no figure 3.4-3 that illustrates erosion potential.	Figure 3.4-1 shows the dominant soil type distribution within the GDBR, and is found on page 3-41 of the DEIS. Table 3.4-1 shows soil characteristics of the GDBR and is found on page 3-42. Page 4-12 has been changed to reflect this information.
EPA 17. Page 4-18. Utah has a state-wide policy (UT-93-93) that protects riparian habitat on BLM lands. This policy "requires" that riparian areas be maintained and/or improved to Proper Functioning Condition".	This information can be found in the DEIS on page 4-18. Given BLM's discretion to move operations up to 200 meters, oil and gas activities would be located outside riparian areas on BLM lands, and the requirements of the riparian policy would be met.
EPA 18. Page 5-9. The list of proposed projects should include the BIA projects mentioned on page 5-11. The list should also include Ute/FNR's gas development project on the former Naval Oil Shale Reserve #2 with the notation that federal action is not required for oil and gas development on these lands.	These projects have been added to Table 5.1. However, the BIA was contacted concerning future development on the NOSR #2. They did not respond with any specific plans at this time.
Office of the Governor The Resource Development Coordinating Committee Public Lands Section 5110 Sate Office Building PO Box 141407 Salt Lake City, UT 84114-1107 Comments by: Department of Environmental Quality Division of Water Quality	

Comment	Response
UDEQDWQ 1. Vegetative and/or structural measures to control erosion should be implemented within 60 days of initial disturbance to prevent erosion leaving the site from exceeding tolerable rates defined by the Natural Resource Conservation Service.	The need for erosion control is identified at the onsite, and is put in place at the time of construction. BLM has used the NRCS website to obtain the natural soil erosion conditions as defined through the Russell System. The majority of the soils in this area are rated by the NRCS as either moderately or severely erodible soils, which means that natural erosion rates exceed the tolerable rate of erosion. Therefore, reducing erosion to levels below the tolerable rates defined by the NRCS may not be a realistic goal. However, a prime consideration of land management is the control of erosion and potential sedimentation to nearby water bodies. To that end, mitigation which have been developed to reduce or contain soil erosion are described in detail throughout the DEIS.
UDEQDWQ 2. If vegetation surrounding the well pad does not provide at least 60% cover, engineering practices such as mulching, use of fiber mats, cross slope trenching, contour furrows, rock dams, and terracing, should be implemented within 60 days to control erosion.	The need for erosion control is identified at the onsite, and is put in place at the time of construction. Vegetation in the GDBR is mostly sagebrush, desert shrub and badlands which are relatively void of vegetation. Also, when reclaiming areas disturbed by the oil or gas activities, the goal is to return the disturbed area to original conditions as much as possible.
UDEQDWQ 3. No disturbance or degradation should be permitted beyond the defined well pad or permitted road.	Permitted activities will be restricted to those that have been analyzed. Additional activities are beyond the scope of this document, and would be analyzed separately.
UDEQDWQ 4. No spills nor runoff of chemicals including hydrocarbons, lubricants, salts, antifreeze or other potentially damaging materials should be permitted.	Spills are not permitted activities. However, they accidentally happen from time to time. Measures to reduce the potential impact of spills are described in the DEIS.
UDEQDWQ 5. Before well pad use is discontinued, permit holder should restore the site to prevent stormwater runoff from exceeding water quality standards.	See page 2-18 of the DEIS for a description of the reclamation processes that would be implemented prior to final abandonment of any well location, access road, or other facility. The applicant has committed to clean up any spills, if they should occur, so that exceedance of water quality standards is not expected.
UDEQDWQ 6. The use of new roads created should be limited in duration to not extend beyond the life of the	If access roads on BLM-administered lands no longer have a beneficial use, the roads would be

Comment	Response
mineral lease. Access road and pipeline easements should include restrictions and requirements to prohibit erosion rates from exceeding the tolerable erosion rate as established by the USDA/NRCS. The restrictions and requirements might include: a. Revegetation of ground cover equal to or greater than the conditions before pipeline installation. b. Structural BMPs to infiltrate runoff from slopes greater than 5% for greater than 10 feet in pipeline excavation. c. Maintaining the erosion rate on the pipeline below the standard NRCS acceptable level. d. Structural BMPS to capture sediment and suspended solids in runoff before it would enter intermittent or perennial streams, or washed, or gullies.	reclaimed as near to the original condition as possible. However, BLM may decide through separate future decisions to retain some roads for recreation or other uses. Measures, as described throughout this document, will be taken site-specifically to minimize erosion rates on disturbed areas. See UDEQDWQ 1 for a discussion on the tolerable erosion rates. a. See UDEQDWQ 2. b., c., and d. All of these measures are included in the "Gold Book"(BLM and USFS 2006) and are therefore a part of this document as the company has committed to have all roads meet the standards in the Gold Book. See section 2.1.1.
UDEQDWQ 7. It would be prudent to consult with USDA/NRCS to consider appropriate standards of erosion control to adopt into such requirements.	Standards are developed during the onsite process and are implemented during construction. Fieldwide standards were developed through the RMPs. BLM land managers and resource specialists regularly confer with other land managers in the federal government, state agencies, and private industry to discuss all aspects of land management.
UDEQDWQ 8. It would be beneficial to implement the road standards (Hydrologic Modification for Roads) similar to those required on roads on the Price District of BLM lands. Leasors have found that the initial costs are higher, but maintenance costs are lower. Leasors have also found that roads constructed to these standards are more accessible during unfavorable weather conditions and seasons. The UDEQDWQ recommends and strongly advises that provisions similar to the Price Field Office be included in all future mineral leases offered through Trust Land Administration.	Vernal BLM requires roads to be built to the Gold Book standard, as well as other applicable policies on a site-specific basis in the development and maintenance of roads. BLM has no authority to require SITLA to apply any particular road standards as part of their leases.
Uintah County County Building 152 East 100 North Vernal, UT 84078	
Uintah County 1. Page 4-26. Soft wording is used to describe mitigation. The word "could" begs the question "will, or will not" mitigation be used to address such impacts.	Mitigation methods result from the analysis of impacts in the NEPA process. Mitigation is developed to minimize the impacts of construction, development, operation, interim reclamation, and final reclamation. Mitigation are taken into consideration by the Decision Maker for the EIS process. In the Record of Decision, those mitigation

Comment	Response
	that are adopted by the Decision Maker are disclosed in the affirmative form using the wording "will", "shall", etc. These mitigation will then be incorporated into APDs and ROWs for individual well pads, access roads, pipelines, central tank facilities, compressor station sites, and utility lines.
Uintah County 2. Page 4-82. The loss of vegetation, until reclamation, does not appear to be an irretrievable effect. Reclamation makes it retrievable as most of the losses reported are to be mitigated or would be prevented through proper reclamation.	The loss of vegetation during the life of the project is irretrievable but is not irreversible as vegetation may be re-established over the long term. The loss of vegetation over a period of time is correctly characterized as an irretrievable loss. From page 4-86 of the DEIS "Commitment of a resource would be considered irretrievable when the project would directly eliminate the resource, its productivity, or its utility *for the life of the project* and possibly beyond."
Uintah County 3. Anywhere where BMPs are addressed, they must be adopted for local conditions. We object to the utilization of national BMPs until they have been analyzed and adjusted to be compatible with local conditions, both environmental and type of development.	QEP has committed to several BMPs (section 2.3) designed specifically for this project. If the Proposed Action is chosen in the Record of Decision, BLM may require the application of those BMPs when and where appropriate. The terminology BMPs may be confusing. The description of the Applicant-Committed BMPs in Section 2.3 uses the terminology "BMP" to indicate those measures that the applicant has voluntarily agreed to. Furthermore, terminology BMP is used rather than the traditional NEPA wording "applicant committed mitigation" because BMPs indicate procedures that will be done in advance to eliminate the need for mitigation later. This document in no way blindly adopts the national BMPs. The national BMPs recommended in the document "Best Management Practices for Fluid Minerals, Parts 1-4" are intended as guidelines. Any mitigation developed from the impact analysis are intended for use in the Uintah Basin.
Uintah County 4. Page 2-34. It states that the operators in the Uinta Basin and Uintah Basin officials are developing a comprehensive list of improved standard operating practices and additional BMPs. To our knowledge, this process has come to a halt. Thus, the statement should be struck.	The process was temporarily halted. The mitigation developed through this document is not dependent on that process. Such measures, if developed, would be considered site-specifically.
United States Department of the Interior Bureau of Indian Affairs Uintah and Ouray Agency P.O. Box 130, 988 East, 7500 South Fort Duchesne, UT 84026-0130	

Comment	Response
BIA 1. The Bureau of Indian Affairs, the Uintah and Ouray Agency, wishes to be a cooperating agency on this project. BIA apologizes for any inconvenience this causes at this late date. Please update all areas of this document. Comments are being prepared through the Uintah and Ouray Agency.	As of May 19, 2006, the Uintah and Ouray Agency Bureau of Indian Affairs is a cooperating agency, and is identified as such in appropriate areas in this document.
BIA 2. The following Tribal and Allotted lands should be include as part of the Proposed Action: T8S R21E, Sections 1, 10-16, and 19-23; T 8S R22E Sections 3, 5-8, 16-19, 27 and 30; T8S R20E Section 34. Please extend the estimates for surface damage for well pads, access roads, and pipelines and number of wells, and associated analysis/effects (air quality, surface and subsurface hydrologic issues, water depletion issues, erosion, wildlife, socio-economics, and AUM reduction, etc.) to the Proposed Action. BIA's Record of Decision will be issued through the Western Regional Office. All further comments assume that the Indian lands will be added and a new DEIS would be prepared because of the much larger project boundary.	No Tribal lands are included in the Proposed Action boundary. Any facilities on Tribal lands would be outside the boundary and would have a separate purpose and need so would not be reasonably connected to the Proposed Action.
BIA 3. State how this document conforms to the new RMP.	This document conforms to the Book Cliffs RMP and Diamond Mountain RMP decisions. As the draft Vernal RMP is not yet signed, there is no decision for this document to conform to. However, relevant information on the resources and values of the public lands in the project area, and BLM's ability to select an alternative have not been precluded by this proposal.
United States Department of the Interior Fish and Wildlife Service Utah field Office 2369 West Orton Circle, Suite 50 West Valley City, UT 84119	
USFWS 1. The abstract, Table S-1, and Table 2-3 have well count discrepancies.	The correct numbers are 1,020 new gas wells and 893 new pads. The values have been corrected.
USFWS 2. USFWS recommends following the Utah Oil, Gas and Mining Environmental Handbook for considering whether a liner is needed for reserve pits. USFWS recommends consideration of distance to groundwater, distance to other water wells, distance to surface water, and fluid type among others.	As described in Section 2.1.1.1 Well Pad and Access Roads, the decision for a liner is made during the on-site inspections for the APD process. All of the mentioned factors are considered.
USFWS 3. USFWS recommends that success criteria, frequency of control, and monitoring protocols be incorporated into the Pesticide Use Proposal.	These procedures are Standard Operating Procedures for inclusion in the weed control programs. The contents of the required plans are listed on page 4-26 and 4-27 of the DEIS.
USFWS 4. USFWS recommends the extra mitigation to	These mitigation are generally applied on a case-by-

Comment	Response
mitigate potential effects to bald eagles: 1. Temporary activities within winter roost areas, e.g., cottonwood galleries, will not occur during the winter roost season from November 1 to March 31. 2. No permanent facilities will be placed within 0.5 miles of winter roost areas. 3. Avoid loss or disturbance to large cottonwood gallery riparian habitats. 4. Use directional drilling where technically and economically feasible to reduce disturbance and drilling in suitable roosting habitat. 5. All areas of disturbance within riparian areas and/or adjacent uplands should be revegetated with native species.	case basis, as necessary to reduce impacts, and have been added into the mitigation section. No winter roosting areas have been identified in the GDBR, although there are winter roost areas within ½ mile of the GDBR boundary. Cottonwood galleries are in the GDBR, and suitable roosting habitat has been identified along the Green River. BLM agrees that reclamation should include native species, however non-native species may be included where deemed necessary to allow for stabilization of a site with high potential for weed invasion. These procedures are described on page 4-26 of the DEIS.
USFWS 5. USFWS recommends using the Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances.	Raptor guidelines within the Vernal Field Office are determined by the provisions listed in the Diamond Mountain RMP. These provisions are described on pages 4-31 and 4-32 of the DEIS.
USFWS 6. USFWS requests copies of all reports indicating the presence of the Horseshoe Milkvetch. USFWS does not recommend mechanical or herbicide treatments for noxious weeds in horseshoe Milkvetch habitat.	The reports have been provided. Plants would be avoided through the onsite inspection. Pesticide Use Permits are required prior to herbicide treatments, and include guidelines to minimize drift. For areas known to be habitat, PUPs will develop a protocol to avoid accidental spraying of the milkvetch.
USFWS 7. The analysis does not consider the effect of development within the floodplain of the Green River. USFWS recommends that no development should occur in the 100-year Green River floodplain. USFWS recommends directional drilling to avoid the floodplain.	See response to EPA comment 5.
USFWS 8. USFWS recommends removing crested wheatgrass from the seed mixes listed in Attachment 2 as this introduced species has not been shown as occurring in the area.	Based on field experience in this area, crested wheatgrass competes better with weeds than many of the native species. Crested wheatgrass, in proper amounts, can also act as a nurse crop for native species. .
U.S. Department of the Interior U.S. Geological Survey Reston, VA 20192	
USGS 1. Potential hydrologic effects of the proposed water usage are not described. Further assessments could address possible changes to the potentiometric surface of affected aquifers and the direction of groundwater flow, effects on spring or seep flows in the area, and potential effect of pumping water from deep production wells located within 100 yards of the Green River.	Potential hydrologic effects include water depletion from the unconfined aquifer of the Green River. This information has been included in the document in the Endangered Colorado River Fish on page 4-38 and 4-39 in the DEIS. The total annual withdrawal for the project would represent only 0.23% of the lowest annual mean flow since 1947,

Comment	Response
	and only 0.04% of the annual maximum flow during the same period. Deep ground water would not be affected due to compliance with Onshore Order 2. The procedures to protect or isolate groundwater resources are completely described in Appendix 2-1 Questar Exploration and Production Standard Operating Procedures and Surface Use Plan.
USGS 2. The USGS gauging station near Jensen should be numbered 09261000. The peak flow for this station is misleading. The lowest "annual" peak during the period was 7,250 cfs	The correct gauging station number has been inserted. Along with the graph showing daily flow over a 10-year period, the text indicates that the daily flow ranges from less than 5,000 cfs to over 25,000 cfs during spring runoff.
USGS 3. If the intent is to compare the overall flow conditions at this site, a discussion of monthly mean or daily streamflow data may be more appropriate. Monthly mean streamflows of less than 1,000 cfs were measured during the summer of 2002, with some daily streamflows below 850 cfs.	The intent of the discussion is to give an indication of general flow of the River with particular emphasis on the periods when flow would be the highest and the lowest. Figure 3.2-3 clearly shows well below average flow in both the Green and White Rivers from October 2001 to October 2002.
USGS 4. Similarly, the description of the White River flow is misleading.	See response to USGS 3.
USGS 5. A peak streamflow of 852 cfs was reported on October 5, 1981, which is larger than the "up to 600 cfs" reported on page 3-16. Instantaneous peak flow information can be found on the NWIS website.	The website was rechecked. The information in the DEIS for Coyote Wash is correct.
Questar Exploration and Production Company Independence Plaza 1050 17th Street, Suite 500 Denver, CO 80265	
Questar 1. The abstract states, "In addition to QEP's commitment to voluntarily apply Best Management Practices, mitigation has been disclosed to lessen the environmental effects." This leads the reader to believe that QEP will apply all Best Management Practices and that the mitigation disclosed will be carried out. This should be rewritten for clarification: "In addition to QEP's commitment to voluntarily apply selected Best Management Practices, mitigation has been disclosed, that if applied, could lessen the environmental effects."	This sentence will be rewritten to: "In additional to QEP's commitment to voluntarily apply selected Best Management Practices of those identified in the BLM Washington Office Instruction Memorandum 2002-194 listed in Chapter 2 of this document, mitigation has been disclosed, that once directed by the Decision of Record could lessen the environmental effects.
Questar 2. Page 2-33, Section 2.4.6 Best Management	Section 2.4.6 has been changed to quote WO IM

Comment	Response
Practices: Paragraph 1 defines Best Management Practices as "innovative, dynamic, and economically feasible mitigation applied on a site-specific basis…" QEP feels it is necessary, to reiterate that Best Management Practices (BMPs) must be economically feasible and that they should also be technically feasible. BLM Instruction Memorandum No. 2004-194 refers to BMPs that field offices and operators are encouraged to consider and provides the following criterion before listing examples of typical case-by-case BMPs: "Other BMPs are more suitable for Field Office consideration on a case-by-case basis depending on their effectiveness, the balancing of increased operating costs vs. the benefit to the public and resource values, the availability of less restrictive mitigation alternatives, and other site specific factors.	2004-194. It now reads: "Other BMPs are more suitable for Field Office consideration on a case-by-case basis depending on their effectiveness, the balancing of increased operating costs vs. the benefit to the public and resource values, the availability of less restrictive mitigation alternatives, and other site specific factors. Examples of typical case-by-case BMPs include, but are not limited to the following:"
Questar 3. Page 3-21, Section 3.2.6 Groundwater, 4th paragraph: The text inaccurately states that the Birds Nest aquifer may be present beneath the GDBR, leading the reader to question its existence below the project area. The Birds Nest is present beneath the GDBR and provides important technical rationale for not being able to directionally drill. The text should be changed to: "The Birds Nest Aquifer, which is present beneath the GDBR…"	The text has been corrected to include the Birds Nest Aquifer.
Questar 4. Page 3-72, Section 3.6.8.8 Greater Sage-grouse (Centrocercus urophasianus), 1st paragraph, last sentence: This section claims, "Since 1967, the abundance of male grouse attending breeding grounds in Utah has declined by approximately 50 percent." Please site the source for this data.	The reference is: UDWR 2001. Sage-Grouse in Utah, Utah Division of Wildlife Resources, 9 November 2001. The text is changed to the more precise statement "From 1967 to 2001, the average number of males per breeding ground in Utah has declined by approximately 40 percent."
Questar 5. Page 3-72, Section 3.6.8.8 Greater Sage-grouse (Centrocercus urophasianus), 2nd paragraph: "UDWR records indicate that 14 leks exist within 5 miles of the GDBR, half of which occur within its boundary (Figure 3.6.4)." Figure 3.6.4 depicts White Tailed Prairie Dog Habitat; a map of Greater sage-grouse leks is not provided. Of the 14 leks that exist within 5 miles of the GDBR, please indicate which leks are active vs. inactive. Appendix 3.5.2, USFWS T&E Species Consultation letter states on page 2, last paragraph: "There are two active sage grouse leks in the project area."	A map of Greater sage-grouse leks is provided as Figure 3.6.3. The text has been corrected to reflect the correct figure number. Because the use of leks vary from year to year, the current activity of a lek would need to be determined during the APD phase.
Questar 6. Page 4-5, Section 4.2.2 Mitigation [Water Resources]: The text states, "Roads crossing floodplains would be constructed at the narrowest part of the floodplain as designated by the Authorized Officer."	The change has been made.

Comment	Response
While attempts to follow this guidance will be made, it should be recognized that site-specific conditions would dictate the road construction location. The text should be changed to read, "Roads crossing floodplains would be constructed at the narrowest part of the floodplain and perpendicular to the floodplain, where feasible."	
Questar 7. Page 4-26, Section 4.5.2 Mitigation [Vegetation], paragraph 2: The text states, "All construction equipment and vehicles could be power-washed prior to the start of construction. Any construction or operational vehicles traveling between the GDBR and outside areas should be power-washed on a weekly basis". This mitigation measure should be removed from the final EIS. QEP employees typically wash their vehicles once per week but QEP cannot control whether and how often contractors wash their vehicles. QEP will encourage its contractors and vendors to comply with this guideline; however this requirement is unenforceable either by QEP or the BLM.	The text has been deleted and changed to that listed below. However, Questar is responsible for treating weeds on permitted activities. Power washing of all construction and drilling equipment would occur prior to the equipment entering the GDBR project area from outside the Vernal Field Office area.
Questar 8. Page 4-27, Section 4.6.1, Direct and Indirect Effects [Wildlife]: There are several statements that imply certain consequences "would" take place. It should not be assumed that indefinite consequences such as mortality or displacement "would" take place; indefinite consequences "could" take place. The first sentence should be changed to read, "Direct impacts from the Proposed Action and alternative could include…." The 4th sentence should be changed to read, "Indirect impacts from the proposed action could include…." The same comment applies to all indefinite consequences in this section found in pages 4-27 through 4-48.	The analysis is based on assumptions regarding the development of the proposed action and the application of measures. In most cases, these effects would always take place as land is disturbed and human activity takes place in an area. The purpose of the analysis is to determine whether these effects are significant and what mitigation could be applied to lessen significant impacts.
Questar 9. Page 4-49, Section 4.6.2.1 Wildlife [Mitigation]: Bullet #3: "Avoid placing well pads within 0.5 to 1 mile of raptor nests, depending on the species." This mitigation measure should clarify active vs. inactive nests and should be rephrased: "Avoid placing well pads within 0.5 to 1 mile of active raptor nests, depending on the species." Bullet #6: "Conduct annual raptor nest activity and winter roosting inventories of their project area plus a one-mile radius during the seven-year drilling and construction phase." This mitigation measure does not state who will pay for this survey although it is implied that QEP would bear the expense. Annual surveys would impose an	Bullet #3 – The change has been made. Bullet #6. The requirement for QEP to complete an annual survey was removed from the document, as nest activity is tracked by the UDWR and BLM. Also, site specific raptor nest surveys will occur on a site specific basis in conjunction with the Application for Permit to Drill review process, and is the BLM's responsibility. The text has been changed to reflect this. Bullet #12. The wording is changed to "Field personnel should be encouraged to notify BLM, USFWS or UDWR when animal carcasses are seen on or along roads in the GDBR."

Comment	Response
unnecessary expense because raptor nest and winter roosting inventories are already performed with every on-site inspection by a BLM wildlife biologist. This mitigation measure should be removed from the final EIS. Bullet #12: "Where such actions would not endanger human safety, require field personnel to remove animal carcasses along lease roads within the project area and place them at least 100 feet from the road." Because this action could potentially endanger human safety and health at any time, could violate state game laws, and could result in conflicts with provisions of the Endangered Species Act, this mitigation measure should be removed from the final EIS.	
Questar 10. Page 4-50, Section 4.6.2.2 Special Status Wildlife: Bullet #1: "Remove dead animals from roads and ROWs to prevent mortality to the raptors." Again, because this action could potentially endanger human safety and health at any time, could violate state game laws, and could result in conflicts with provisions of the Endangered Species Act, this mitigation measure should be removed from the final EIS.	See response to Questar 9 Bullet #12.
Questar 11. Page 4-50, Section 4.6.3.1 Wildlife and Section 4.6.3.2 Special Status Species [Unavoidable Adverse Impacts]: Again, it should not be assumed that indefinite consequences "would" take place; indefinite consequences "could" take place. The first sentence in each section should be rephrased: "Unavoidable adverse impacts to wildlife species from the Proposed Action or No Action Alternative could include:"	See the response to Questar 8.
Questar 12. Page 4-60, Section 4.10.2 Mitigation [Transportation]: "QEP should implement and enforce speed limits for their employees and contractors while driving on roads within the GDBR." While efforts are made by all to maintain proper speed limits, QEP does not have the authority to implement and enforce speed limits.	The wording has been changed to "QEP would include the adherence to speed limits as part of their employee training. Furthermore, QEP would include adherence to speed limits as part of their contractor contracts."
Questar 13. Page 5-19, Section 5.4.6 Visual Resources [Cumulative Impacts Associated with the Proposed Action]: The first paragraph states, "…the Uinta Basin Best Management Practices that are currently being developed would be applied…." and "Such measures would include:" These sentences should be restated as "could be applied" and "could include". Use of the word "would" implies that these considerations are mandatory	The reference to the Uinta Basin BMPs was erroneous. The listed measures are standard operating procedures, and would be implemented as necessary. See Section 5.3.6.

Comment	Response
when in fact, they are examples given for consideration, are voluntary, and acceptable only when technically and economically feasible.	
Center for Native Ecosystems 1536 Wynkoop, Suite 302 Denver, CO 80202	
CNE 1. The BLM presents only the preferred alternative and a No Action alternative, both of which involve drilling in sensitive habitats. Many other alternatives could have been considered which conserve irreplaceable resources and meet the stated purpose and need: "to extract and transport oil and natural gas, at a profit, from the portions of the GDBR leased by its companies" (p. 1-1). Therefore, the FEIS must consider additional alternatives, including delaying approval until the RMP revision is complete and prohibiting surface disturbance in habitat for special status species, floodplains, and in other sensitive areas - these can all be accommodated with QEP still making a profit.	A separate alternative to avoid sensitive areas is not needed because BLM retains the ability to protect sensitive areas as part of the proposed action. The regulations at 43 CFR 3101.1-2 dictate~~s~~ that facilities can be moved 200 meters to reduce or avoid any impacts. The mitigation developed in the DEIS and the applicant committed BMPs take into account the need for pre-construction surveys to identify TES plant populations and minimize/avoid disturbance to TES plants. The well pad and access road locations in this EIS are conceptual, so that the need for setbacks would be identified and analyzed through additional NEPA documentation on a site-specific basis during the review phase of the specific project application. Finally, concerning the issue of floodplain development, it is stated on page 4-3 of the DEIS, "Executive Order 11988 requires federal agencies to make decisions in a manner that promotes avoidance of adverse impacts and reduces the risk of property loss and human safety due to floodplain development/modification, and preserves the natural and beneficial values of floodplains. Floodplain development/modification is allowed only after there are no other feasible alternatives." Also see the responses to EPA-4,EPA-5, EPA-17, USFWS-4, USFWS-5 and USFWS-7. This EIS has been developed under the provisions of the existing Book Cliffs and Diamond Mountain RMPs. These RMPs are the guiding directive of the Vernal Field Office until a new plan revision takes effect. However, under all Draft RMP alternatives, the same mineral management prescriptions/restrictions that are in place under the Book Cliffs RMP are carried forward, so that management of the area would not change.
CNE 2. Horseshoe milkvetch is only found in one site, which includes part of the planning area. Figure 3.1-4 suggests that all of its habitat is found within the Horseshoe Bend oil and gas field. We are currently evaluating whether an emergency listing petition is warranted for this species, and this project's proposed	The following paragraph was added to Section 5.3.3: According to BLM data files of mapped horseshoe milkvetch habitat, the proposed Greater Deadman Bench project is the only field development project that overlaps horseshoe milkvetch habitat. However, there

Comment	Response
disturbance of over 1000 acres of potential habitat argues for the need for immediate protection. The DEIS claims that there will be no direct impacts, but page 3-54 acknowledges that the actual extent of the occupied habitat in the project area is not known. The DEIS provides no information on how the potential habitat in this project area compares to the total potential habitat believed to be available. There is no discussion of cumulative impacts from other oil and gas drilling, including wells approved outside of field development projects. I think this is the fourth time we've argued this in the past week - the BLM must disclose not just the estimated extent of the potential impacts in the project area; it must also give the public some context as to what this means for the species as a whole, or at the very least, within the Field Office. How does the BLM arrive at the conclusion that there is a 4% chance of taking horseshoe milkvetch (p. S-16), especially if the potential habitat has not been surveyed for the plant? This is a Candidate species found in a single site. Allowing surface disturbance in potential habitat shows that the BLM lacks the regulatory mechanisms necessary to recover the species, and that the agency is contributing to the need to list this wildflower under the Endangered Species Act. Instead, the BLM should not approve any surface disturbance in potential (or occupied) habitat and should immediately begin working on a comprehensive conservation plan for horseshoe milkvetch. We are participating with the BLM in the Uinta Basin Rare Plant Forum, and strongly encourage the agency not to allow this surface disturbance which will further imperil one of the most at-risk plants in the basin.	are 13 plugged and abandoned wells, four producing wells, two temporarily abandoned wells, and two plugged wells within milkvetch habitat. Potential cumulative impacts to horseshoe milkvetch include loss or modification of potential habitat, habitat fragmentation caused by increased road and well pad development, the potential for the introduction and spread of invasive weed species, and sedimentation. Since the issuance of the DEIS, the USFWS has reviewed the status of this species, and has removed it from the candidate species list. However, this species remains a special status species. The Final EIS reflects this change in status. The DEIS discloses that direct impacts should not occur to the Horseshoe milkvetch because surveys would be conducted during the site-specific onsites to determine the presence or absence of plants on the staked well pads, access roads, surface pipeline corridors, central tank facilities, and compressor stations. Modifications to the placement and design of the facilities would be evaluated to avoid direct impacts to the plants. Horseshoe milkvetch is endemic to a single population in central Uintah County east of Horseshoe Bend The Proposed Action could also result in the introduction of noxious weeds into occupied and/or potential habitats. However, QEP would implement mitigation methods to minimize the introduction and spread of invasive weeds. Based on these potential impacts, the Proposed Action may affect the horseshoe milkvetch. However, the Proposed Action is not likely to result in a loss of viability of this species in the Book Cliffs and Diamond Mountain resource areas, nor cause a trend to federal listing or a loss of species viability, rangewide. The reference to the 4% chance of taking the plant is incorrect and has been deleted from the Final EIS. The discussion refers to the pre-construction surveys and modifications to the placement and design of facilities in potential habitat to minimize or avoid direct impacts to the plant. These measures are the BLM's mechanism to protect the species while allowing the proponent's access to valid lease rights.

Comment	Response
CNE 3. The Vernal Field Office's track record on raptors is appalling. Page 3-62 indicates that only 17 of 232 nests in the project area (plus one-mile buffer) are presently active - about 7%. None of the 15 Artificial Nest Structures in the project area showed signs of use. Yet page 4-42 states that "appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites for potential future nesting" may include "the construction of Artificial Nest Structures in appropriate locations". NEPA requires that mitigations be effective, and the existing ANSs in the project area itself are demonstrably ineffective. The DEIS tries to downplay the effects of additional disturbance on raptors because "overall abundance of nests should result in small overall effect" (p. S-16). Well, not if one of the 17 active nests is impacted, not if most of the 232 nests have already been impacted by other drilling, and not if the limiting factor isn't availability of nests but rather of undisturbed nests. The BLM must do a better job of analyzing the real impacts of approving this action. The DEIS states on page 2-36 that "43 new wells and associated access roads would be constructed within raptor guideline buffers." The BLM must not violate the MBTA, or its special status species Manual obligations.	The reference to the raptor survey on page 3-62 is based on the April 2004 aerial and ground survey. The survey found 66 previously unidentified nests and confirmed the status of another 166 nests previously identified. This survey simply acts as a “snapshot in time” to serve as the current inventory. The DEIS states the following on page 4-42: “If nests are determined to be present, the AO shall determine appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites for potential future nesting. Such measures may include: timing limitations on new construction and surface-disturbing activities within 0.5 mile of known nests (1.0 mile for nesting peregrine falcons); the use of terrain features to shield the nest site from human activities; and, the construction of Artificial Nest Structures in appropriate locations.” The construction of artificial nest structure is just one of the many mitigation available. For example, QEP installed two tall nesting platforms on tribal lands. In 2006, one nest fledged three ferruginous hawks and the other nest fledged four ferruginous hawks. The reference to the 43 wells is based on the conceptual location of proposed wells. The provisions of 43 CFR 3101.1-2 dictate that any facility can be moved 200 meters to reduce or avoid any impacts. This provision, in addition to the proposed mitigation for active raptor nests to include distance and timing restrictions that would be considered for each and every APD, would virtually eliminate the overall negative impact to raptors.
CNE 4. This is just one of a flurry of projects that are being approved during plan revision, which makes the planning process essentially irrelevant. The project area includes white-tailed prairie dog ACECs that the RMP process may designate - this is just one of the potential improvements in oil and gas management that waiting until after revision could provide. Field Managers have discretion to delay decisions while under plan revision, and Vernal should take advantage of that opportunity. Staff already are overwhelmed with processing and monitoring all the already-permitted projects.	The Book Cliffs RMP, that provide land management guidance for the area, is valid until superseded. As noted, the planning process for the Vernal Field Office RMP is underway. The potential ACECs considered in that document are not official until approved through the formal process, in this case the signing of the ROD for the Vernal RMP. The white-tailed prairie dog ACEC referenced is referenced in the Draft RMP as the potential Coyote Basin ACEC. The Draft RMP alternatives range from not designating the ACEC to designating the ACEC including up to 124,161 acres. The value for which the ACEC was nominated is the white tailed prairie dog and it’s habitat. However, under all

Comment	Response
	Draft RMP alternatives, the same mineral management prescriptions/restrictions that are in place under the Book Cliffs RMP are carried forward, so that management of the area would not change even if the ROD selected the largest ACEC alternative. The impacts to white tailed prairie dogs and their habitat are disclosed in section 4.6 of this Final EIS.
CNE 5. The BLM must carefully consider impacts to air quality, and obtain the proper state permits.	See Sections 4.3 and 5.3.1 of the DEIS. Air quality impacts have been disclosed in detail. BLM does not obtain air permits. Air permits are the responsibility of the proponent. A correction to the DEIS indicates that the EPA Region 8 is the permitting authority for new facilities in the GDBR, not the State of Utah Department of Environmental Quality.
CNE 6. This DEIS analyzes impacts assuming that interim reclamation will occur. However, the Chapita Wells DEIS that we commented on recently acknowledges that interim reclamation has been ineffective, and that impacts should be considered long-term. This view is borne out by other portions of the Greater Deadman Bench DEIS that discuss the near impossibility of preventing weed infestation once soils have been disturbed. The BLM must revise this section to be in keeping with the more honest Chapita Wells analysis; doing otherwise would clearly be arbitrary and capricious and thus violate the APA.	Discussions of short- and long-term disturbance and potential success of interim reclamation are discussed throughout the document. To avoid further confusion with BLM's position, the following statement (and repeated as key locations within the document) has been placed at the beginning of Chapter 4. "Although interim reclamation efforts would take place within the GDBR, the percent of success would be limited due to the low annual precipitation and the physical and chemical properties of the soils. Recent BLM monitoring has documented that interim reclamation efforts in oil and gas development areas have largely been unsuccessful at reestablishing soil stability and vegetation. Accordingly, BLM field inspections are indicating that initial disturbance should be more accurately portrayed as long-term impacts for the life of the project. Therefore, for the sake of analysis in this document, the acreage initially disturbed for construction, drilling and completion would remain void of desired vegetation for the long-term length of the GDBR project. The difference between the short-term and long-term disturbances are presented for informational purposes if reclamation would be successful."
CNE 7. The DEIS suggests that white-tailed prairie dogs will thrive if their forage is removed and they are left with bare ground to make a living on. Again, the BLM takes the inconsistent view that these areas will be successfully reclaimed, rather than becoming dominated by cheatgrass: "when these disturbed areas are reclaimed, the regrowth of native vegetation provides ideal forage for the prairie dog" (p. 4-35). That would be nice, but the real story in	The DEIS does not suggest that white-tailed prairie dogs will 'thrive" if some areas are bladed and used for oil and gas development. This was mentioned as a possible positive impact by providing larger tracks of bare ground for prairie dog colony development. However, this positive impact is highly speculative and unrealistic. The paragraph has been removed.

Comment	Response
the basin involves massive die off of native sagebrush and noxious weed proliferation, not recolonization of disturbed areas by natives.	

6.2 CONSULTATION

The following organizations were contacted or consulted with during the scoping process and the preparation of the EIS.

- Federal Offices
- The National Park Service was sent a copy of the Scoping Notice. They responded that they had no concerns.
- The U.S. Forest Service was also contacted during the scoping process and responded that they had no concerns.
- The U.S. Fish and Wildlife Service was notified during the scoping process. The USFWS responded with a letter (see Appendix 3.5.2) indicating the requirement for formal consultation under Section 7 of the Endangered Species Act and the requirement for a Biological Assessment to be prepared in conjunction with the EIS process. Consultation was initiated by a letter dated January 18, 2004 that requested a list of species. A reply, including a list of species was received on February 3, 2004. Formal consultation was initiated on January 23, 2007. The response and Biological Opinion were received on May 15, 2007. Conservation measures were identified in the Opinion. Those will be incorporated into the ROD as conditions of approval. Consultation may be reinitiated as necessary during the site specific review phase of individual applications.
- The U.S Environmental Protection Agency Region 8 was contacted during the scoping process. They did not respond until the draft EIS was issued. EPA's comments and BLM's responses are shown later in this chapter.

State Offices

On December 9, 2003, a briefing of the Proposed Action was made to the State of Utah Resource Development Coordinating Committee (RDCC). This briefing included representatives of State of Utah agencies that may have an interest in the EIS.

- The Utah Division of Wildlife Resources provided data concerning big game ranges and other terrestrial species in the GDBR.
- The Utah Department of Environmental Quality provided water quality data and background air pollutant levels for the Uintah Basin.
- Neither the Utah Division of Oil Gas and Mining nor the Utah School and Institutional Trust Lands Administration provided input for the EIS.
- During the scoping period, and in a letter dated January 8, 2004, BLM initiated consultation with the Utah State Historic Preservation Office. A reply was received on January 26, 2004 stating that statements in the scoping notice were accurate, and that consultation concerning the undertaking would occur as the undertaking was developed. A second letter requesting consultation was sent on February 13, 2005. No reply was received from that office. Consultation is therefore considered to be closed. However, consultation may be reinitiated as necessary during the site specific review phase of individual applications.

Potential Permitting Agencies

Permitting agencies that would issue permits concerning the GDBR project are listed in Table 1-8 in Chapter 1 of this EIS. All of these permits would be issued during and after the APD process when final plans are completed.

Tribes

During the scoping period, and in a letter dated January 8, 2004, BLM initiated consultation with the following Native American Tribes: Southern Ute Tribe, Navajo Nation, Paiute Indian Tribe of Utah, Pueblo of Zuni and Ute Mountain Ute, Hopi Tribe, Northern Ute Tribe, Shoshone-Bannock Tribe, and the Ute Indian Tribe. Scoping letters were received from the Hopi, Paiute, and the Southern Ute Tribes. The Southern Ute Tribe stated that no known impacts to sites sensitive to the tribe were expected to occur, but that new discoveries should be reported immediately. The Paiute Tribe expressed interest in the project and its impacts, and asked for future copies of the document. No specific concerns were identified. The Hopi Tribe expressed support for the identification and avoidance of prehistoric archaeological sites, and expressed interest in the need to identify and avoid those sites. Additional consultation occurred with the tribes during the public comment period. No responses were received. Consultation is therefore considered to be closed. However, consultation may be reinitiated as necessary during the site specific review of individual applications

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7.0 LIST OF REVIEWERS AND PREPARERS

BLM List of Reviews	
Name	**Responsibilities**
William Stringer, BLM	Decision Maker
Jean Nitschke-Sinclear, BLM	NEPA Compliance, Project Management
Robert Specht, BLM	Vegetation, T&E Species
Kyle Smith, BLM	GIS, Maps
Tim Faircloth, BLM	Wildlife, T&E Species
John Mayers, BLM	Geology, Paleontology
Marc Stavropoulos, BLM	Rangeland Management
Kim Bartel, BLM	Recreation
Blaine Phillips, BLM	Cultural Resources
Karl Wright, BLM	Water Resources
Darlene Burns, Uintah County	Cooperating Agency
Chester Mills, Superintendent, Bureau of Indian Affairs, Uintah and Ouray Agency, Fort Duchesne, UT	Cooperating Agency

Buys & Associates List of Preparers		
Name	**Education and Experience**	**Responsibilities**
Marty Buys	M.S. Environmental Science 26 Years Experience	Project Director
Don Douglas	M.S. Atmospheric Science 33 Years Experience	Project Manager, NEPA Compliance, Air Quality, Noise, Transportation, Visuals
Chris Freeman	B.S. Environmental 15 Years Experience	Socioeconomics, Recreation, Health & Safety, Land Use
Andy Dworak	B.S. Natural Resource Management 4 Years Experience	Vegetation
Kirby Carroll	M.S. Zoology 5 Years Experience	Wildlife, Vegetation, Soils, Rangeland Management.
Dawn Martin	M.S. Wildlife Biology 10 Years Experience	Wildlife, BA, Technical Editor
Philip Brown	M.S. Environmental Engineering 29 Years Experience	Hydrology
Roger Melick	B.A. Geology and Chemistry 15 Years Experience	GIS, Cartography
Marion Fischel	Ph D, Aquatic Biology 24 Years Experience	Wildlife, BA
Dave Nicholson	M.S. Environmental Engineering and Geology, 15 Years Experience	Geology
Keith Montgomery	Montgomery Archaeological Consultants, M.S. Anthropology 30 Years Experience	Cultural Resources
Danni Langdon	Montgomery Archaeological Consultants M.S. Anthropology 15 Years Experience	Cultural Resources
Ron Sheetz	Montgomery Archaeological Consultants Ph D. Paleontology 15 Years Experience	Paleontology

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8.0 ACRONYMS AND GLOSSARY

ACRONYMS

AADT	Annual Average Daily Traffic
ACEC	Areas of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ANC	Acid Neutralization Capacity
APD	Applications for Permit to Drill
AQR	Air Quality Related Value
AUM	Animal Unit Month
BA	Biological Assessment
bbls	Barrels
BCF	Billion Cubic Feet
BLM	Bureau of Land Management
BMP	Best Management Practices
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CAA	Clean Air Act
$CaCO_3$	Calcium Carbonate
CASTNet	Clean Air Status and Trends Network
CDP	Census Designated Place
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CO	Carbon Monoxide
CWA	Clean Water Act
dBA	A-weighted Decibel
UDEQ	Utah Department of Environmental Quality
DOE	U.S. Department of Energy
DOI	U.S. Department Of the Interior
dv	Deciview
EDA	Economic Development Agency
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
FWS	Fish and Wildlife Service
FR	Federal Register
gpm	Gallons Per Minute
GPS	Global Positioning System
HAP	Hazardous Air Pollutant
IDT	Interdisciplinary Team

IMPROVE	Interagency Monitoring of Protected Visual Environments
LOP	Life Of Project
mcf	Million Cubic Feet
Meq/L	Milliequivalents per Liter
mg/L	Milligrams per Liter
µg/l	Micrograms per liter
$\mu g/m^3$	Micrograms of pollutant per cubic meter air
MMBTU	Thousands British Thermal Units
MSDS	Material Safety Data Sheet
N/A	Not Applicable or Not Available
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NEPA	National Environmental Policy Act
NG	Nongame Species
NHPA	National Historic Preservation Act
NOS	Notice Of Staking
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OHWM	Ordinary High Water Mark
ORV	Off-road Vehicles
OSHA	Occupational Safety and Health Administration
POD	Plan Of Development
PM_{10}	Particulate Matter Less Than 10 Microns Diameter
PPM	Parts Per Million
PPP	Pollution Prevention Plan
PSD	Prevention of Significant Deterioration
QEP	Questar Exploration and Development, Inc.
RCRA	Resource Conservation and Recovery Act
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right Of Ways
RUSLE2	Revised Universal Soil Loss Equation Version 2
SGU	Small Game Unit
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control, and Countermeasure Plan
TCF	Trillion Cubic Foot
TCP	Traditional Cultural Properties
TDS	Total Dissolved Solids
TG	Trophy Game

TSP	Total Suspended Particulates
T&E	Threatened and Endangered
USDA	United States Department of Agriculture
USDC	United States Department of Commerce
USDI	United States Department of the Interior
USDOE	United States Department of Energy
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator Coordinates
UW	University of Wyoming
VOC	Volatile Organic Compound
VR	Visual Range
VRM	Visual Resource Management

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GLOSSARY

ADAPTATION. Adjustment to environmental conditions.

AERIAL COVERAGE. The ground area circumscribed by the perimeter of the branches and leaves of a given plant or group of plants.

ASTHETICS. Relates to the pleasurable characteristics of a physical environment as perceived through the five senses of sight, sound, smell, taste, and touch.

ALLUVIUM. Unconsolidated terrestrial sediment composed of sorted or unsorted sand, S.H, gravel, and clay that had been deposited by water.

AMBIENT. The environment as it exists at the point of measurement and used as a basis to measure changes or impacts. Synonymous with background.

AMBIENT NOISE LEVEL. Cumulative effect from all noise generating sources in the area.

ARTHROPODS. Insects, mites, scuds and crayfish.

ANTICLINAL. Pertaining to anticline which is a convex upward rock fold in which strata have been bent into an arch; the strata on each side of the core of the arch are inclined in opposite directions away from the axis or crest; the core contains older rocks than does the perimeter of the structure.

AQUIFER. A body of rock or unconsolidated sediments that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC). Areas within the public lands where special management attention is required to protect or prevent irreparable damage to important resources.

ARROYO. A watercourse (as a creek) in an arid region, or a water-carved gully or channel.

ARTESIAN AQUIFER. Synonymous with confined aquifer.

ARTESIAN WELL. A well deriving its water from an artesian or confined aquifer, in which the water level stands above the top of the aquifer.

ASSOCIATION. Organisms living together in any given combination of environmental conditions.

ATMOSPHERIC DEPOSITION. Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems, and is reported as the mass of material deposited on an area (kilograms per hectare or kg ha^{-1}). Air pollutants are deposited by wet deposition (precipitation) and by dry deposition (gravitational settling of particles and adherence of gaseous pollutants).

ATMOSPHERIC DISPERSION. The process by which pollutants are transported and vertically mixed in the atmosphere.

ATMOSPHERIC STABILITY. A measure of turbulence in the atmosphere. Three general classes of stability include neutral, unstable, and stable. Influenced by vertical temperature gradients and wind profiles.

BACKGROUND. The environment as it exists at the point of measurement and used as a basis to measure changes or impacts.

BENTONITE. Absorbent aluminum silicate clay formed from volcanic ash.

BERM. A barrier constructed to confine water or other substances.

BEST MANAGEMENT PRACTICES (BMP). Improved actions developed to produce improved results. BMPs include construction techniques designed to reduce the "footprint" of oil and gas activities or reduce negative effects of construction and operation.

BIOTA. The plant and animal life in an area.

BROOD. Hatchlings in a given nest or being raised by a given female bird.

BROWSER. An animal, which feeds on leaves, wigs, and young shoots of trees or shrubs; i.e., deer.

CARNIVORE. An organism, which acquires life-sustaining nutrients by using animals as food.

CATION. An ion that has a positive electrical charge. That is, an atom that has lost one or more electrons.

CHARACTERISTIC LANDSCAPE. The established landscape within an area being viewed. This does not necessarily mean a naturalistic character. It could refer to an agricultural setting, an urban landscape, a primarily natural environment, or a combination of these types.

CHERT. A sedimentary form of amorphous or extremely fine-grained siliceous, partially hydrous, found in concretions and beds.

CLAYSTONE. A consolidated rock that consists of any mineral fragments smaller than 1/255 mm in diameter.

CLEAN AIR ACT (CAA). Public Law 84-159, established July 14, 1955, and amended numerous times since. The Clean Air Act establishes federal standards for air pollutants emitted from stationary and mobile sources; authorizes states, tribes, and local agencies to regulate polluting emissions; requires the agencies to improve air quality in areas of the country which does not meet federal standards; and to prevent significant deterioration in areas where air quality is cleaner than the standards.

CLIMATOLOGY. Science of climate and its causes.

CLUTCH. The eggs of birds, reptiles, or amphibians of a given nest.

COLLUVIUM. Unconsolidated terrestrial sediment composed of sorted or unsorted sand, S.H, gravel, and clay that had been deposited due to the action of gravity.

COMMERCIAL WATER USE. Water for motels, hotels, restaurants, office buildings, other commercial facilities, and institutions. The water may be obtained from a public supply or may be self-supplied.

COMMUNITY. A group of plants and animals, which occupy a given locale.

COMPRESSOR BUILDING. A building or cluster of buildings, that house the required equipment to pressurize underground gas lines for the purposes of gas transport.

COMPRESSOR PLANT (STATION). A facility consisting of one or more compressors, auxiliary treatment equipment, and pipeline installations to pump natural gas under pressure over long distances.

CONDENSATE. A low-density liquid hydrocarbon phase that generally occurs in association with natural gas. Its presence as a liquid phase depends on temperature and pressure conditions in the reservoir allowing condensation of liquid from vapor.

CONFINED AQUIFER. An aquifer bounded above and below by impermeable beds or by beds of distinctly lower permeability than that of the aquifer itself; an aquifer containing confined groundwater.

CONFINING BED. A body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

CONGLOMERATE. A clastic sedimentary rock composed of lithified beds of rounded gravel mixed with sand.

CONSUMPTIVE USE. Recreational activities, such as hunting, fishing and trapping, that involves the taking of wild animals.

CONTRAST. Opposition or unlikeness of different forms, lines, colors, or textures in a landscape.

CONTRAST RATING. A method of analyzing the potential visual impacts of proposed management activities.

COVER. That part of the environment, living or dead, utilized by animals for resting, feeding, nesting, and protection.

COVER-TYPE. The part of the environment or landscape characterized by a predominant plant community.

CRITERIA POLLUTANTS. Six common air pollutants for which the Environmental Protection Agency (EPA) has established national air quality standards, including (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$), and lead.

CROSS-BEDDED. An arrangement of laminations of strata transverse to the main planes of stratification.

CRUCIAL RANGE. Any particular seasonal range or habitat component that is documented as the determining factor in a big games species' ability to sustain a viable population. A viable population is defined as the species' capability to maintain and reproduce itself at a certain population level specific to that species.

CULTURAL MODIFICATION. Any man-caused change in the landform, water form, vegetation, or the addition of a structure, which creates a visual contrast in the basic elements (form, line, color, texture) of the naturalistic character of a landscape.

CUMULATIVE IMPACT. The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taken place over a period of time (40 CFR 1508.7).

DECIBEL (dB). The measurement unit commonly used to describe sound levels. The A-weighted decibel (dBA) scale is a logarithmic function that emphasizes the audio frequency response curve audible to the human ear and thus more closely describes how one perceives sound.

DECIVIEW (dv). A unit of measure for visibility. The deciview index was developed as a linear perceived visual change.

DIRECT IMPACTS. Effects that are caused by the action and occur at the same time and place (40 CFR 1508.8).

DIRECTIONAL DRILLING. The intentional deviation of a wellbore from vertical to reach subsurface areas some distance from the well pad.

DISSOLVED SOLIDS. The portion of solids in water that can pass through a 0.45-micron filter.

DOLOMITE. A mineral, calcium-magnesium carbonate (Ca, $Mg[CO_3]_2$); also the name applied to sedimentary rocks composed largely of the mineral. It is white, colorless, or tinged yellow, brown, pink or gray; has perfect rhombohedral cleavage; appears pearly to vitreous; effervesces feebly in cold dilute hydrochloric acid.

DOMESTIC WATER USE. Water for household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Also called residential water use. The water may be obtained from a public supply or may be self-supplied.

DRAIN. A ditch that removes surplus water from irrigated land and returns it to the surface watershed.

EASEMENT. An interest in land owned by another that entitles its holder to a specific limited use or enjoyment.

ECOSYSTEM. A system of biological communities interacting with each other and with their nonliving surroundings

ECOSYSTEM INTEGRITY. A measure of the health of an entire area or community based on how much of the original physical, biological and chemical components of the area remain intact.

EPHEMERAL. A stream that flows only in direct response to a runoff event.

EPIFAUNA. Part of the benthos living on the sediment surface.

EVAPORATION POND (PIT) OR RESERVE PIT. A pit dug to contain drilling fluids, drill cuttings, and other wastes from drilling operations that disposes of the liquids by evaporation. Some evaporation ponds are lines with plastic or asphalt to keep water from filtering through and contaminating nearby aquifers.

FAUNA. All animal life associated with a given habitat.

FLORISTIC. All plant life associated with a given habitat.

FORAGE. Vegetation utilized by animals as food.

FORB. Flowering herbaceous plants.

FUGITIVE DUST. Dust that escapes the general vicinity of an area where activity is occurring. Dust can be generated by construction traffic, surface clearing operations etc., and can then by carried by wind into the air, creating a plume that may be visible from greater distances than the activity directly causing the dust.

GEOMORPHOLOGY. The study of landforms.

GROUNDWATER, CONFINED. Confined groundwater is under pressure substantially greater than atmospheric throughout, and its upper limit is the bottom of a bed of distinctly lower permeability than that of the material in which the confined water occurs.

GROUNDWATER, UNCONFINED. Unconfined groundwater is water in an aquifer that is under atmospheric pressure and is considered under water table conditions.

HABITAT. A place where a plant or an animal lives.

HAZARDOUS AIR POLLUTANTS (HAPs). Pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental impacts. The Environmental Protection Agency (EPA) has classified 189 air pollutants as HAPs.

HERBACEOUS. Having little or no woody tissue and persisting usually for a single growing season.

HERBIVORE. An organism, which acquires life-sustaining nutrients by feeding on vegetation.

HYDROCARBONS. An organic compound containing only carbon and hydrogen and often occurring in petroleum, natural gas, and coal.

HYDROGRAPH. A graph showing fluctuations in stream flow, stream level, or water levels in wells over time.

INDIRECT IMPACTS. Effects, which are caused by the action bit occur later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include reduced reproduction, population density or growth rate in wildlife. Other effects may be related to induced changes in the patterns of land use and effects on air, water, and other natural systems, including ecosystems (40 CFR 1508.8).

INDUSTRIAL WATER USE. Water used for industrial purposes such as fabrication, processing, washing, and cooling, and includes such industries as steel, chemical and allied products, paper and allied

products, mining, and petroleum refining. The water may be obtained from a public supply or may be self-supplied.

INSTREAM WATER USE. Water that is used, but not withdrawn from a groundwater or surface water source for such purposes as hydroelectric power-generation, navigations, water-quality improvement, fish propagations, and recreation. Sometimes called non-withdrawal use or in-channel use.

INTERBEDDED. Rock beds that lie within rock beds of different material.

INTERDISCIPLINARY TEAM. A group of individuals with different training, representing the physical sciences, social sciences, and environmental design arts, assembled to solve a problem or perform a task. The members of the team proceed to a solution with frequent interaction so that each discipline may provide insights to any stage of the problem and disciplines may combine to provide new solutions.

IRRETRIEVABLE. A term that applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.

IRREVERSIBLE. A term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time.

INTERMITTENT. A stream that flows only part of a year along which the bed intercepts the groundwater table.

INVERTEBRATES. All animals without vertebrae.

LANDSCAPE CHARACTER. The arrangement of a particular landscape as formed by the variety and intensity of the landscape features and the four basic elements of form, line, color, and texture. These factors give the area a distinctive quality, which distinguishes it from its immediate surroundings.

LANDSCAPE FEATURES. The land and water form, vegetation, and structures which compose the characteristic landscape.

LEKS. A place where males of some species of birds, such as grouse gather and perform courtship displays in a group.

LINE. The path, real or imagined, that the eye follows when perceived abrupt differences in form, color, or texture. Within landscapes, line may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.

LITHOLOGY. The systematic description of rocks, in terms of mineral composition and texture.

LIMESTONE. A sedimentary rock composed principally of calcium carbonate (CaCO2), usually as the mineral calcites, and poultry. Also included are animal specialties.

LONG TERM IMPACTS. Effects that persist beyond the construction, drilling and reclamation phases, or continue for the life of the project.

MANAGEMENT ACTIVITY. A surface disturbing activity undertaken on the landscape for the purpose of harvesting, traversing, transporting, protecting, changing, replenishing, or otherwise using resources.

MASSIVE. Sandstone rock without any distinctive bedding planes.

MITIGATION. Avoiding**,** minimizing, reducing, rectifying, or compensating for impacts to resources from an action. The complete definition is provided in 40 CFR 1508.8.

MITIGATION. Methods or procedures designed to reduce or lessen the adverse impacts caused by management activities.

NATIONAL AND COLORADO AMBIENT AIR QUALITY STANDARDS (NAAQS and CAAQS). The allowable concentrations of air pollutants in the air specified by the federal government (and the State of Wyoming). The air quality standards are divided into primary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public health) and secondary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public welfare from any unknown or expected adverse effects of air pollutants).

NIGHT-LIGHTING. Lights used to illuminate facilities for work or safety. These lights can be mounted on poles, buildings, other equipment and fences. The lighting can consist of two types: area and accent. Area lighting provides general illumination over a broad zone for safety, while accent lighting provides concentrated illumination for work areas, doorways, pathways, stairs and other areas that require distinction.

NON-CONSUMPTIVE USES. Recreational activities, such as wildlife observation and wildlife photography, where wild animals are not taken.

OUTCROP. Rock strata exposed at the surface.

PARTURITION AREAS. Documented birthing areas commonly used by females. These areas may be used as nursery areas by some big game species.

PERENNIAL. A stream or river that flows all year.

PERMEABILITY. The capacity of material to transmit water or other fluids. Primary permeability is the capacity of interconnected pores to transmit fluids and Secondary permeability is the capacity of interconnected fractures, bedding planes, solution voids, etc. to transmit fluids.

pH. A measure of the acidity or alkalinity of water. It is defined as the negative logarithm of the hydrogen-ion concentration. This parameter is dimensionless and generally has a range from 0 to 14, with a pH of 7 representing neutral water. A pH of greater than 7 indicates the water is alkaline, whereas a pH value of less than 7 indicates acidic water.

PHYSIOGRAPHIC PROVINCE. An extensive portion of the landscape normally encompassing many hundreds of square miles, which portrays similar qualities of soil, rock, slope, and vegetation of the same geomorphic origin (Fenneman 1946, Sahrhaftig 1975).

PHYSIOGRAPHY. The study and classification of the surface features of the Earth.

PLANT ASSOCIATION. The basic unit of vegetation classification representing a plant community containing a defined flora, composition, and uniform habitat conditions (Reid et al. 2002).

PLANT COMMUNITY. A group of plants that occupy a given locale.

POTENTIOMETRIC SURFACE. A groundwater surface that describes the static head, as related to an aquifer, it is defined by the levels to which water will rise in tightly cased wells. A water table is a particular potentiometric surface.

PREVENTION OF SIGNIFICANT DETERIORATION (PSD). A regulatory program under the Clean Air Act (Public Law 84-159, as amended) to limit degradation of air quality in areas that currently achieve the National Ambient Air Quality Standards. The PSD program established air quality classes that allow differing amounts of additional air pollution above a legally defined baseline level. Almost any additional air pollution would be considered significant in PSD Class I areas (certain large national parks and wilderness areas in existence on August 7, 1977, and specific tribal lands redesignated since then.) PSD Class II areas allow deterioration associated with moderate, well-controlled growth (most of the country).

RANGELANDS. Typically non-irrigated lands managed primarily for grazing cattle, sheep, goats, horses etc.

REHABILITATION. A management alternative and/or practice, which restores landscapes to a desired scenic quality.

RELIEF. The vertical difference in elevation between the highest and lowest points of a land surface within a specified horizontal distance or in a limited area.

SANDSTONE. A sedimentary rock composed of mineral grains from 1/16 to 2 millimeters in diameter, bound together by a cement of silica, carbonate, or other minerals or a matrix of clay minerals.

SECONDARY COVER-TYPE. Land cover type occupying the second largest area within the polygon (WYNDD 2003).

SEDIMENTARY ROCK. A rock formed by the accumulation and cementation of mineral grains transported by wind, water, or ice to the site of deposition or chemically precipitated at the depositional site.

SHALE. A fine-grained sedimentary rock formed by the consolidation (esp. by compression) of clay, silt, or mud. It is characterized by finely laminated structure, approximately parallel to the bedding, along which the rock breaks readily into thin layers.

SHORT-TERM IMPACT. Effects of short duration that occur during construction, drilling, completion and reclamation of a well.

SIDE-SLOPES. The rising area of land that forms the transition between a relatively flat condition and a hilltop, mesa top or ridgeline.

SILTSTONE. A rock composed of silt having the texture and composition of shale but lacking its fine lamination or fissility.

SPECIES. The basic category of biological classification intended to designate a single kind of animal or plant.

SPECIFIC CAPACITY. The rate of discharge of water form a well divided by the drawdown of the water level within the well.

SPECIFIC CONDUCTANCE. A measure of the water's ability to conduct an electrical current. Specific conductance is expressed in microsiemens per centimeter (µS/cm) at 25 degrees Centigrade (25° C). For water containing between 100 and 5,000 mg/L of dissolved solids, specific conductance in µS/cm at 25° C multiplied by a factor between 0.55 and 0.71 will approximate the dissolved solids concentration in mg/L. For most water, reasonable estimates can be obtained by multiplying the specific conductance value by 0.44 to obtain dissolved solid concentrations.

STRATIGRAPHIC UNIT. A body of rocks recognized as a unit in the classification of the rocks of Earth's crust with respect to any specific rock character, property, or attribute or for any purpose such as description, mapping, and correlation.

STRATIGRAPHY. The science of the description, correlation, and classification of rock strata, including the interpretation of the depositional environments of those strata.

TEMPERATURE INVERSION. An atmospheric condition in which warmer air lies above colder air and is said to have an ``inverted'' temperature gradient, where temperature increases with altitude.

TERRITORY. An area defended by a male, both members of a pair or an unmated species.

TEXTURE. The visual manifestations of the interplay of light and shadow created by the variations in the surface of an object or landscape.

TOTAL DEPOSITION. Total deposition refers to the sum of airborne material transferred to the Earth's surface by both wet and dry deposition.

UNCONFINED AQUIFER. An aquifer that has a water table.

UPLAND BIRDS. Game birds such as sage grouse, chukar and partridge.

VIEWSHED. The landscape that can be directly seen under favorable atmospheric conditions, from a viewpoint or along a transportation corridor.

VISIBILITY. The ability or inability to view scenic vistas. It is usually characterized by two parameters, visual range (VR) and the light-extinction coefficient (b_{ext}). The visual range parameter represents the greatest distance that a large dark object can be seen. The light extinction coefficient represents the attenuation of light per unit distance due to scattering and absorption by gases and particulate matter in the atmosphere.

VISITOR DAY. A Standard measure of visitor use equal to one person visiting a site for 12 hours

VISUAL IMPACT. Any modification in landform, water bodies, or vegetation, or any introduction of structures, which negatively interrupts the visual character of the landscape and disrupts the harmony of the basic elements (i.e., form, line, color, and texture).

VISUAL RESOURCE. The visible physical features on a landscape (e.g., land, water, vegetation, animals, structures, and other features).

VISUAL RESOURCE MANAGEMENT (VRM). The inventory and planning actions taken to identify visual values and to establish objectives for managing those values; and the management actions taken to achieve the visual management objectives.

VISUAL RESOURCE MANAGEMENT CLASSES. Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes. Each class has an objective, which prescribes the amount of change allowed in the characteristic landscape.

WATERS OF THE US – Includes 1) all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; 2) all interstate waters including wetlands; 3) all other waters, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce……..; 4) all impoundments of waters otherwise defined as waters of the United States under the definition; 5) tributaries of waters identified in paragraphs (a) (1)-(4) of this section; 6) territorial seas; 7) Wetlands adjacent to waters (other than waters that are themselves wetlands); 8) Waters of the United States do not include prior converted cropland (33 CFR Part 328).

WATERSHED. The line of division between two adjacent rivers or lakes with respect to the flow of water by natural channels into them; the natural boundary of a basin.

WATER TABLE. The water table is that surface in an unconfined water aquifer at which the pressure is atmospheric. It is defined by the levels at which water stands in wells that penetrate the water body just far enough to hold standing water.

WETLANDS. Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR Part 328).

WILDLIFE. In this summary, the term "wildlife" refers to any wild plant, mammal, bird, reptile, amphibian, or other aquatic or terrestrial organism.

WINTER RANGE. The range that large game animals use in substantial numbers only during winter periods.

9.0 REFERENCES

Anderson, D.W., and Picard, M.D., 1972. Stratigraphy of the Duchesne River Formation (Eocene-Oligocene?), Northern Uinta Basin, Northeastern Utah. Utah Geological and Mineralogical Survey Bulletin, 97:1-28.

Automated Geographic Reference Center (AGRC). 1987. Vegetation Distribution (ST500.VGDIS). State of Utah SGID. Salt Lake City, UT. http://www.its.state.ut.us/agrc/html/data_layers1.html

Bakko, E.B., and L.N. Brown. 1967. Breeding biology of the white-tailed prairie dog, Cynomys leucurus, in Wyoming. Journal of Mammalogy 48(1):100-112.

Bruhn, R.L., Picard, M.D., and Isby, J.S., 1986. Tectonics and Sedimentation of Uinta Arch, Western Uinta Mountains and Uinta Basin. In: J.A Peterson, editor, Paleotectonics and Sedimentation in the Rocky Mountain Region, United States. Association of Petroleum Geologists Memoir, 41:333-352.

Bryant, B., C.W. Naeser, R.F. Marvin, H.H. Mehnert, 1989. Upper Cretaceous and Paleogene Sedimentary Rocks and Isotopic Ages of Paleogene Tuffs, Uinta Basin, Utah. And Ages of Late Paleogene and Neogene Tuffs and the Beginning of Rapid Regional Extension, Eastern Boundary of the Basin and Range Province near Salt Lake City, Utah. In: Evolution of Sedimentary Basins-Uinta and Piceance Basins. United States Geological Survey Bulletin 1787-J,K.

Burton, D., 1996 A History of Uintah County. Utah Centennial County History Series.

Butts, K. O. 1973. Life history and habitat requirements of Burrowing Owls in western Oklahoma. M.S. thesis. Oklahoma State University, Stillwater, Oklahoma. 188 pages.

Call, M.W. 1978. Nesting Habitats and Surveying Techniques for Common Western Raptors. U.S. Department of the Interior, Bureau of Land Management Technical Note TM-316. Denver Services Center. 115pp.

Center for Invasive Plant Management (CIPM). 2006. Invasive Plant Management: CIPM Online textbook. Accessed July 2006. http://www.weedcenter.org/textbook/

Central Utah Water Conservation District (CUWCD). April 2003. Uinta Basin Replacement Project. Orem, UT. HTTP://CUWCD.COM

Chidsey, Thomas C. April 2003. Major Oil Plays in Utah and Vicinity, Quarterly Technical Progress Report. Utah Geological Survey. Salt Lake City, UT. http://geology.utah.gov/emp/pump/PDF/pumrpt2/PDF

Clark, J., 1957. Geomorphology of the Uinta Basin, In: Guidebook to the Geology of the Uinta Basin, Intermountain Association of Petroleum Geologists, Eighth Annual Field Conference, pp. 17-20.

Clark, T. W., D. Hinckley, and T. Rich (EDS.). 1989. The prairie dog ecosystem: managing for biological diversity. Montana Bureau of Land Management Wildlife Technical Bulletin 2:1–55.

Crooks, J., and M.E. Soule. 1999. Lag times in population explosions of invasive species: causes and implications. In: O.T. Sandlund, S.J. Schei, and A. Vikens (eds.), Invasive species and biodiversity management. Kluwer Academic Publishers, The Netherlands, pp. 103-125.

Cully, Jack F., Jr. 1993. Plague, Prairie Dogs, and Black-footed Ferrets.

Cully, J. F., Jr., and E. S. Williams. 2001. Interspecific comparisons of sylvatic plague in prairie dogs. Journal of Mammalogy 82:894–905.

Dalton, L.B., J. Price, and L.A. Romin. 1990. Fauna of Southeast Utah and Life Requisites Regarding Their Ecosystems. Publication 90-11. Utah Department of Natural Resources – Division of Wildlife Resources. 326pp.

Edison Electric Institute 1996. Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996. Avian Power Line Interaction Committee, the Edison Electric Institute, and the Raptor Research Foundation, Washington, D.C., 1996.

Elkins, Melissa and Keith Montgomery 2002. CRI of Shenandoah Energy's Eight Well Locations on Glen Bench (T8S, R22E, Sections 10, 15, and 21), Uintah County, Utah. Montgomery Archaeological Consultants, Moab, Utah. Project No. U-01-MQ-0432b,s.

Ellison-Manning, A.E., and C.M. White. 2001. Breeding Biology of Mountain Plover (Charadrius montanus) in the Uinta Basin. W.N.A. Nat. 61 (2):223-228.

Elkins, Melissa and Mark Bond 2003. CRI of Shenandoah Energy's Fourteen Well Locations on Glen Bench (T8S, R22E, Section 14), Uintah County, Utah. Montgomery Archaeological Consultants, Moab, Utah. Project No. U-03-MQ-0399b.

Energy Policy Act of 2005. Public Law 109-58 signed August 8, 2005.

Environmental Protection Agency (EPA) 1974. U.S. Environmental Protection Agency. Information on Noise Levels Identified as Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. EPA-550/9-74-004, Arlington, VA, 1974.

Environmental Protection Agency (EPA). 1988. Health and Environmental Effects Profile for Formaldehyde. EPA/600/x-85/362.

Environmental Protection Agency (EPA). 1994. Health Effects Notebook for Hazardous Air Pollutants-Draft. EPA-452/D-95-003. December 1994.

Environmental Protection Agency 2000. EPA Office of Compliance Sector Notebook Project. Profile of the Oil and Gas Extraction Industry. October. .

Environmental Protection Agency (EPA). 2002. Formaldehyde - EPA Air Toxics Website. Website: www.epa.gov/ttn/atw/hlthef/formalde.html

Environmental Protection Agency, 2002a. Air Toxics Database. Dose-Response Assessment for Assessing Health Risks Associated with Exposures to Hazardous Air Pollutants Prioritized Dose-Response Values, Table 1. Office of Air Quality and Planning Standards

Environmental Protection Agency, 2002b. Air Toxics Database. Dose-Response Assessment for Assessing Health Risks Associated with Exposures to Hazardous Air Pollutants, Acute Dose-Response Values Table 2. Office of Air Quality and Planning Standards

Environmental Protection Agency (2005). Technology Transfer Network (TTN) Air Quality System (AQS) Internet http://www.epa.gov/ttn/airs/airsaqs/detaildata/, accessed February 2005.

Evans, D. L. 1982. Status reports on twelve raptors. U.S. Department of the Interior Special Science Report 238. 68 pp.

Fagerstone, K.A. 1987. Black-footed Ferret, Long-tailed Weasel, and Least Weasal. Pages 548-573 in M. Novak, J.A. Baker, M.E. Obbard, and B. Mallock, editors. Wild Furbearer Management and Conservation in North America. Ministry of Natural Resources, Ontario.

Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado. Niwot, CO. 467pp.

FLAG 2000. Federal Land Managers' Air Quality Related Values Workgroup (FLAG) - Phase I Report (December 2000). USDI-National Park Service, Air Resources Division. Denver, CO. Website http://www2.nature.nps.gov/ard/flagfree/FLAG--FINAL.pdf

Flynn, J.J. 1986. Correlation and Geochronology of Middle Eocene Strata from the Western United States. Palaeogeography, Palaeoclimatology, Paleoecology, 55:335-406.Garrott, R.A., and G.C. White. 1982. Age and sex selectivity in trapping mule deer. Journal of Wildlife Management 46:1083-1086.

Fouch, T.D. 1992. Hydrocarbon and Mineral Resources of the Uinta Basin. Utah Geological Association Guidebook 20. 1992 Field Symposium.

Goodrich, S., and Neese, E. 1986. Uinta Basin Flora. USDA Forest Service- Intermountain Region-Ogden, Utah 1986 in cooperation with USDA FS- Ashley National Forest & USDI BLM - Vernal District.

Greenspan, Alan. April 12, 2005. Oil Shale and Oil Sands Resources Hearing. U.S. Senate Committee on Energy & Natural Resources. Washington D.C. http://energy.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=1445&Witness_ID=2934

Hall, E.R. and K.R. Kelson. 1959. The Mammals of North America. The Ronald Press Company, New York. 1083pp.

Hall, E.R. 1981. The mammals of North America. John Wiley and Sons, New York. 1181 pp.

Harris 1991. Cyril M. Harris, Handbook of Acoustical Measurements and Noise Control, McGraw-Hill, Inc., New York, NY, 1991.

Haug, E., and L. W. Oliphant. 1990. Movements, activity patterns, and habitat use of Burrowing Owls in Saskatchewan. Journal of Wildlife Management 54:27-35. Hintze, L.F., 1964. Structural Behavior of Utah. In: Guidebook to the Geology and Mineral Resources of the Uinta Basin, Intermountain Association of Petroleum Geologists, Thirteenth Annual Field Conference, pp. 41-45.

Hintze, L.F., 1964. Structural Behavior of Utah. In: Guidebook to the Geology and Mineral Resources of the Uinta Basin, Intermountain Association of Petroleum Geologists, Thirteenth Annual Field Conference, pp. 41-45.

Hood, J.W., and Fields, F.K., 1978, "Water Resources of the Northern Uinta Basin Area, Utah and Colorado, with Special Emphasis on Ground-Water Supply," TECHNICAL PUBLICATION No. 62, State of Utah Dept of Natural Resources.

Hoogland, J. L. 2001. Black-tailed, Gunnison's, and Utah prairie dogs all reproduce slowly. Journal of Mammalogy 82:917-927.

Howe, F.P. and M. Hanberg. 2000. Willow Flycatcher and Yellow-billed Cuckoo Surveys Along the Green and San Juan Rivers in Utah, 2000. Utah Division of Wildlife Resources Publication Number 00-31.

Johnsgard, P.A. 1988. North American Owls: Biology and Natural History. Smithsonian Institute Press, Washington. 295pp.

Karpowitz, J.F. 1984. Book Cliffs big game inventory and productivity study. Utah Division of Wildlife Resources. Publ. 84-10.

Kay, J.L., 1934. The Tertiary Formations of the Uinta Basin, Utah. Annals of the Carnegie Museum, 23:357-371.

Knowles, C.J., C.J. Stoner, and S.P. Gieb. 1982. Selective Use of Black-tailed Prairie Dog Towns by Mountain Plovers. Condor 84: 71-74.

Knowles, C.J. and P.R. Knowles. 1984. Additional Records of Mountain Plovers using Prairie Dog Towns in Montana. Prairie Naturalist 16(4): 183-186.Knowles C. 2002. Status of white-tailed and Gunnison's prairie dogs. Missoula (MT):National Wildlife Federation; Washington (DC): Environmental Defense. 30 p.
Online: http://www.environmentaldefense.org/documents/2473_prairiedogreport.pdf

Lechlietner, R.R., L. Kartman, M.I. Goldenberg, and B.W. Hudson. 1968. "An Epizootic Plague in Gunnison's Prairie Dogs (*Cynomys gunnisoni*) in South-Central Colorado." Ecology 49:734-43.

Lentsch, L.d., Hoskins, B.G, and Lubomusrov, L.M, 2000, The White River and Endangered Fish Recover – A Hydrological, Physical and Biological Synopsis Final Report, Prepared for: Recovery Implementation Program for Endangered Fish Species of the Upper Colorado River.

Menkens, G.E., Jr., and S.H. Anderson. 1989. Temporal-spatial variation in white-tailed prairie dog demography and life histories in Wyoming. Canadian Journal of Zoology 7:343-349.

Montana Bald Eagle Working Group. 1990. Bald Eagles of the Upper Columbia Basin: Timber Management Guidelines. USDA-Forest Service, Billings, MT.

National Energy Technology Laboratory (NETL). 2005. Major Oil Plays in Utah and Vicinity. www.netl.doe.gov/scngo/Petroleum/publications/projfactsheets/E&P/15133UTGS.pdf

National Energy Technology Laboratory (NETL). July 2004. Project Facts, North Hill Creek 3-D Seismic Exploration. www.netl.doe.gov

Natural; Gas Supply Administration. 2004. Natural Gas Demand. http://www.naturalgas.org/business/demand.asp

Nickens and Associates 1979. Archaeological Inventory in the Red Wash Cultural Study Tract, Uintah County, Utah, 1980. BLM Cultural Resource Series No. 5

Nicholson, M.C., R.T. Bowyer, and J.G. Kie. 1997. Habitat selection and survival of mule deer: tradeoffs associated with migration. J. Mammal. 78(2):483-504.

NewsMax.com Wires. Oct. 18, 2005. Energy Demand Opens More Land to Oil Drilling. http://www.newsmax.com/archives/articles/2005/10/18/143540.shtml

Osborn, H.F., 1895. Fossil Mammals of the Uinta Basin; Expedition of 1894. Bulletin of the Osborn1929. The Titanotheres of Ancient Wyoming, Dakota and Nebraska. Volume 1. United States Geologic Survey, Monograph 55. 701pp.

Osmond, J., 1992, Hydrocarbon and Mineral Resources of the Uinta Basin, Utah and Colorado, Utah Geological Association Handbook 20, Fouch, T.D., ed., pp. 143-163.

Pera, F.M., Smedley, J.E., Decicco, D.A., Allen, E.G., Lutz, G.A., 1977, Leasable Mineral and Waterpower Land Classifications of the Grand Junction Quadrangle, Colorado and Utah, USGS Open File Report OFR 77-304

Peterson, O.A. and Kay, J.L., 1931. The Upper Uinta Formation of Northeastern Utah. Annals of the Carnegie Museum, 20:293-306.

Pickett, S.T.A., and P.S. White. 1985. The Ecology of natural Disturbance and Patch Dynamics. Academic Press, Orlando, FL.

Prothero, D.R., 1990. Magnetostratigraphy of the Middle Eocene Uinta Formation, Uinta Basin, Utah. Journal of Vertebrate Paleontology, 10(3):38A.

Prothero, D.R. and Swisher, C.C., III., 1990. Magnetostratigraphy and 40Ar/39Ar Dating of the Middle Eocene Uinta Formation, Utah. Geological Society of America, Abstracts with Programs, 22(7):A364.

Prothero, D.R. and Swisher, C.C, III., 1992. Magnetostratigraphy and Geochronology of the Terrestrial Eocene-Oligocene Transition in North America. In: D.R. Prothero and W.A. Berggren (eds.), Eocene-Oligocene Climatic and Biotic Evolution. Princeton University Press, Princeton, NJ. pp 74-87.

Rasmussen, D.T. and Townsend, K.E., 1995. New Small-Bodied Mammals from the Uinta Formation, Uintah Basin, Utah, Contrast with the Coeval Small Mammals of California. Journal of Vertebrate Paleontology, 15(supp. 3):49.

Rasmussen, D.T., Conroy, G.C., Friscia, A.R., Townsend, K.E., and Kinkel, M.D., 1999. Mammals of the Middle Eocene Uinta Formation. In: D.D. Gillette, (editor), Vertebrate Paleontology in Utah.. Miscellaneous Publication 99-1. Utah Geological Survey, pp. 401-427.

Rawley, E. V., W. J. Bailey, D. L. Mitchell, J. Roberson, and J. Leatham. 1996. Utah Upland Game. Publication number 63-12. Utah Division of Wildlife Resources, Salt Lake City.

Reeve, A.F. 1996. Mule deer response to oil and gas well recompletions and winter habitat use on the Birch Creek Unit, Big Piney-Labarge winter range complex, during winter 1990-1991. Unpublished report prepared for Bureau of Land Management, Pinedale, and Wyoming Game and Fish Department, Jackson.

Renard, K/G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, 1997. Predicting soil erosion by water. U.S. Department of Agriculture, Agriculture Research Service, Agriculture Handbook 703.

Riggs, E.S., 1912. New or Little Known Titanotheres from the Lower Uintah Formations. Field Museum of Natural History Geological Series, 159:17-41.

RigZone. November 10, 2005. El Paso Expands Uinta Basin Gas Transportation Capacity. http://rigzone.com/news/article.asp?a_id=26827

Rost, G.R. and J.A. Bailey 1979. Distribution of Mule deer and Elk in Relation to Roads. Journal of Wildlife Management 43:634-41.

Ryder, R.T., Fouch, T.D., and Elison , J.H., 1976. Early Tertiary Sedimentation in the Western Uinta Basin, Utah. Geological Society of America Bulletin 87:496-512.

Schlotthauer, William E., 1981, Identification And Characteristics Of Aquifers In Utah, Utah Division of Water Rights, Salt Lake City, Utah, July, 1981.

Sibley, D. A. 2003. The Sibley Field Guide to Birds of Western North America. Alfred A. Knopf, New York. 471pp.

Smith, D.G. and J.R. Murphy. 1978. Biology of the Ferruginous Hawk in Central Utah. Sociobiology 3:79-95.

Spangler, J., 1995 Paradigms and Perspectives: A Class I Overview of Cultural Resources in the Uinta Basin and Tavaputs Plateau, Volume II. Uintah Research, Salt Lake City, Utah.

Spenser, L.W., Wilson, R.J., 1988, Petroleum Geology and Principle Exploration Plays within the Uinta-Piceance-Eagle Basin Province, Utah and Colorado, USGS Open File Report OFR-88

Stagner, W.L., 1941. The Paleogeography of the Eastern Part of the Uinta Basin during Uinta B (Eocene) Time. Annals of the Carnegie Museum, 28:273-308.

Stokes, W.L., 1988, Geology of Utah, Occasional Paper Number Six of the Utah Museum of Natural History, University of Utah and Utah Geological and Mineral Survey, Department of Natural Resources, Salt Lake City, Utah, 2nd Printing

Suter, G.W., H, and J.L. Joness. 1981. Criteria for Golden Eagle, Ferruginous Hawk, and Prairie Falcon Nest Site Protection. J. Raptor Res. 15: 12-18.

The White House. 2005. Reliable, Affordable, and Environmentally Sound Energy for America's Future. Washington D.C. http://www.whitehouse.gov/energy

Thomsen, L. 1971. Behavior and Ecology of Burrowing Owls in the Oakland Municipal Airport. Condor 73: 1777-192.Tileston, J.V. and R.R. Lechleitner. 1996. Some comparisons of the black-tailed and white-tailed prairie dogs in north-central Colorado. Amer. Midl. Nat. 75:292-316.

Townsend, K.E., Friscia, A.R., and Rasmussen, D., 2000. Local Biostratigraphy of the Uinta B and the Uinta C Rocks in the Uinta Formation, Utah. Journal of Vertebrate Paleontology, 20(supp. 3):74.

Uintah County, Utah 1996. Uintah County General Plan for Management of the Book Cliffs Resource Area.

Uintah County Clerk Auditor's Office, 2004. Assorted data on county revenue and expenditures for calendar year 2004 and prior years.

U.S. Bureau of the Census 2002. Sub-county Population Estimates 2000 – 2002, State of Utah.

U.S. Bureau of Land Management (BLM). 1985. Record of Decision and Rangeland Program Summary for the Book Cliffs Resource Management Plan.

U.S. Bureau of Land Management (BLM). 1988. Diamond Mountain Resource Area Resource Management Plan and Record of Decision.

U.S. Bureau of Land Management (BLM) 1988a). National Environmental Act Handbook (H-1790-1_, Bureau of Land Management, Washington, D.C.

U.S. Bureau of Land Management and U.S. Forest Service (2006). Surface Operating Standards for Oil and Gas Exploration and Development (The "Gold Book").

U.S. Bureau of Land Management (BLM). 1994. Diamond Mountain Resource Area Resource Management Plan and Record of Decision.

U.S. Bureau of Land Management (BLM). 1999. Environmental Assessment and Finding of No Significant Impact for the Book Cliffs Resource Area Management Plan Amendment – Black-Footed Ferret Reintroduction. Coyote Basin Area, Utah. EA No. UT-080-1999-02.

U.S. Bureau of Land Management (BLM) 2003. Resource Development Group Uinta Basin Natural Gas Project Draft Environmental Impact Statement UT-080-2003-0300V. July 2003.

U.S. Bureau of Land Management (BLM). 2003a. Personal communication between Kim Bartell, BLM Vernal Field Office, and Chris Freeman, Buys & Associates.

U.S. Bureau of Land Management (BLM). 2004. Best Management Practices for Fluid Minerals, Parts 1-4. BLM Washington Office – Fluid Minerals Group, Washington, D.C. Website: www.blm.gov/bmp/

U.S. Bureau of Land Management (BLM). 2004a. Online database search of authorized rights-of-way using the BLM's LR2000 system. Website: www.blm.gov/lr2000/.

U. S. Bureau Of Land Management (BLM 2004b). September 9, 2004. Utah BLM Has Record-Breaking Oil And Gas Lease Sale.
HTTP://WWW.UT.BLM.GOV/LEASESALESEPT2004/NRSEP9.HTM

USDA-Forest Service. 2001. Personal correspondence (telefax) from Marcus Schmidt to Scott Archer providing Class I Wilderness Lake Modeling Data, dated October 16, 2001. Rocky Mountain Region. Lakewood, Colorado.

U.S. Department of Agriculture, Natural Resources Conservation Service, (NRCS 2003). National Soil Survey Handbook, title 430-VI.U.S. Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS). 2004. Soil Survey Geographic (SSURGO) database for Uintah Area, Utah - Parts of Daggett, Grand and Uintah Counties. Fort Worth, Texas. Updated December 10, 2004.

U.S. Department of Energy. Energy Information Administration (EIA). 2004. Annual Energy Outlook 2004 with Projections to 2025. Website: www.eia.doe.gov/oiaf/aeo/index.html.

U.S. Department of Energy. Energy Information Administration (EIA 2005). Country Analysis Briefs. http://www.eia.doe.gov/emeu/cabs/usa.html

U.S. Fish and Wildlife Service (USFWS). 1989. Black-Footed Ferret Survey Guidelines for Compliance with the Endangered Species Act. U.S. Fish and Wildlife Service, Denver, Colorado and Albuquerque, New Mexico. April 1989.

U.S. Fish and Wildlife Service. (USFWS). 1990. Uinta Basin Hookless Cactus (Sclerocactus glaucus) Recovery Plan. Denver, Colorado. 26 pp.

U.S. Fish and Wildlife Service. (USFWS). 1995a. Ute ladies'-tresses (*Spiranthes diluvialis*) recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 46 pp.

U.S. Fish and Wildlife Service (USFWS). 1995b. Endangered and Threatened Wildlife and Plants: Final Rule to Reclassify the Bald Eagle from Endangered to Threatened in All of the Lower 48 States. Federal Register, Final Rule, Vol. 60, No. 133, 36000-36010.

U.S. Fish and Wildlife Service (USFWS) 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildlife Service, Utah Field Office, Salt Lake City, Utah, January 2002 update.

U.S. Fish and Wildlife Service. 2003. Visitor information for Ouray National Wildlife Refuge. Reviewed online at http://ouray.fws.gov/VisitorActivities.htm.

USGS 1981. U.S. Department of Interior, Geologic Survey, Report on Climate, Air Quality, and Noise for the Cache Creek-Bear Thrust Environmental Impact Statement, Open-File Report by Paul Kruger, Billings, MT, June 1981

USGS 2006. U.S. Geological Survey, USGS Water Data for the Nation. http://waterdata.usgs.gov/nwis/annual.

U.S. Minerals Management Service. 2002. Federal Mineral Revenue Disbursements Identified by County of Origin, 2001. Website: www.mms.gov/.

Utah Department of Environmental Quality - Division of Air Quality (UDAQ). 1998. Electronic files consisting of four years of meteorological data measured at the Deseret Power Plant near Bonanza, Utah.

Utah Department of Community and Economic Development 2004. Unpublished Permanent Community Impact Fund loan and grant distribution data entitled, Five Year Funding Summary – Fiscal Years 1999 – 2003, Uintah County. Provided by Ms. Gayle Gardner.

Utah Department of Transportation Traffic Statistics 2002 UDOT 2002. Salt Lake City, UT. Website: www.udot.utah.gov/progdev/traffic/touh02.htm.

Utah Department of Workforce Services, 2004. Economic Information / Labor Market Information, State County and Local Information, Uintah County Demographic & Economic E-Profile (http://jobs.utah.gov/wi/Regions/eastern/uintah/uintahprof.pdf), March 2004 unemployment data.

Utah Division of Wildlife Resources (UDWR). 1997a. Utah Big Game Annual Report. October 1997. 322pp.

Utah Division of Wildlife Resources. 1998. Utah Sensitive Species List. February 12, 1998.

Utah Division of Wildlife Resources. 2000. Pronghorn Antelope Habitat Data. Salt Lake City, UT.

Utah Division of Wildlife Resources 2001. Sage-Grouse in Utah, Utah Division of Wildlife Resources, 9 November 2001.

Utah Division of Wildlife Resources. (UDWR). 2003. Utah Data Conservation Center. http:// dwrcdc.nr.utah.gov/ucdc/default.asp.

Utah Division of Wildlife Resources, Utah Natural Heritage Program. (UNHP). 2003. Unpublished data: Maps of Barneby, clay and shrubby reed-mustard populations provided to B&A from UNHP.

Utah Governor's Office of Planning and Budget (GOPB), 2004. 2004 Economic Report to the Governor.

Utah Natural Heritage Program 1992. Franklin, M.A. Report for 1991 Challenge Cost Share Project USDI Bureau of Land Management – Target Species: *Astragalus equisolensis* Neese & Welsh (Horseshoe milkvetch). Utah Natural Heritage Program, Utah Department of Natural Resources. January 1992.

Utah State Tax Commision 2006. Utah State Tax Commission Annual Report for Fiscal Year 2004-2005. Available at www.tax.utah.gov.

Utah, State of, 2000, Utah Administrative Code under Title 317 - Water Quality Standards of Quality for Waters of the State.

Ward, A.L. N.E. Fornwalt, S.E. Henry, and R.A. Hodorff 1980. Highway Operation Practices and Facilities on Elk, Mule Deer, and Pronghorn Antelope. Report No. FHWA-RD-143. National Technical Information Service, Springfield, VA>

Wedgwood, J.A. 1978. The Status of Burrowing Owl In Canada. A Report Prepared for the Committee on the Status of Endangered Wildlife in Canada. Can. Wildl. Surv. Ottowa, ON. 83pp.

Western Regional Climate Center (WRCC). 2003. Historical climate data for Bonanza, Utah. Western Regional Climate Center WWW Server. Online. http://www.wrcc.dri.edu

Willey, D. 1995. Radiotelemetry Monitoring of Adult and Juvenile Mexican Spotted Owls in Southern Utah.

Wischmeier, W.H., and D.D. Smith. 1978. Prediction rainfall erosion losses. U.S. Department of Agriculture, Agricultural Research Service, Agriculture Handbook 537.

Wood, H.E., II, Chaney, R.W., Clark, J., Colbert, E.H., Jepsen, G.L., Reeside, J.B., Jr., and Stock, C., 1941. Nomenclature and Correlation of the North American Continental Tertiary. Geological Society of America Bulletin, 52:1-48.

APPENDIX 2-1
QUESTAR EXPLORATION & PRODUCTION
STANDARD OPERATING PRACTICES
&
SURFACE USE PLAN

QUESTAR EXPLORATION & PRODUCTION (QEP)
FOR GREEN RIVER FORMATION WELLS LOCATED IN RED WASH, WONSITS VALLEY, GYPSUM HILLS, WHITE RIVER, GLEN BENCH, AND UNDESIGNATED FIELDS IN TOWNSHIPS 07 AND 08 SOUTH, RANGES 21 TO 24 EAST

Uintah County, Utah

STANDARD OPERATING PRACTICES

DRILLING PROGRAM

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, and the approved plan of operations. The Operator is fully responsible for the actions of his subcontractors. A copy of these conditions will be furnished to the field representative to insure compliance.

BLM Notification Requirements

All notifications will be during normal working hours, Monday through Friday.

Location Construction:	At least 48 hours prior to construction of location and access roads including notification, if applicable, to other surface management agencies such as the Ute Tribe Energy and Mineral Department, State of Utah, or private surface owner.
Location Completion:	Prior to moving the drilling rig.
Spud Notice:	At least 24 hours prior to spudding the well.
Casing String & Cementing: casing strings	At least 24 hours prior to running casing and cementing all
BOP & Related Equipment Tests:	At least 24 hours prior to initiating pressure tests.
First Production Notice:	Within 5 days after new well begins or production resumes after well has been off production for more than 90 days.

Details of the on-site inspection, including date, time, weather conditions, and individuals present, will be submitted with the site-specific APD.

1. Estimated Tops of Important Geologic Markers:

Formations and depths will be submitted with the site-specific APD.

2. Anticipated Depths of Oil, Gas, Water, and Other Mineral Bearing Zones

Formations and depths will be submitted with the site-specific APD.

All usable (<10,000 ppm TDS) water and prospectively valuable minerals (as described by BLM representatives at the on-site) encountered during drilling will be recorded by depth and

adequately protected. All oil and gas shows will be tested to determine commercial potential. This information shall be reported to the BLM Vernal Field Office (BLM/VFO).

All water shows and water bearing geologic units will be reported to the geologic/engineering staff of the BLM/VFO prior to running the next string of casing or before plugging orders are requested. Usage of the State of Utah form Report of Water Encountered is acceptable, but not required.

All water shows will be reported within 1 (one) business day after being encountered.

Detected water flows shall be sampled, analyzed, and reported to the geologic/engineering staff of the BLM/VFO. The office may request additional water samples for further analysis.

The following information is requested for water shows and samples where applicable:

Location
Temperature
Hardness
Flow Rate
Date Sampled
Sampled Interval
pH

Water Classification (according to State of Utah)

Dissolved Iron (Fe) (ug/l)
Dissolved Magnesium (Mg) (mg/l)
Dissolved Sulfate (SO_4) (mg/l)
Dissolved Total Solids (TDS) (mg/l)
Dissolved Calcium (Ca) (mg/l)
Dissolved Sodium (Na) (mg/l)
Dissolved Bicarbonate ($NaHCO_3$) (mg/l)
Dissolved Carbonate (CO_3)(mg/l)
Dissolved Chloride (Cl) (mg/l)

3. Pressure Control Equipment: (Exhibit A)

QEP's minimum specifications for pressure control equipment are as follows:

The BOP and related equipment shall meet the minimum requirements of Onshore Oil and Gas Order No. 2 for equipment and testing requirements, procedures, etc., for a 2M system when the well is drilled to the base of the Green River Formation and individual components shall be operable as designed. Chart recorders will be used for all pressure tests.

Test charts, with individual test results identified, shall be maintained on location while drilling and will be made available to a BLM representative upon request.

All required BOP tests and/or drills will be recorded in the IADC report.

If an air compressor is on location and is being utilized to provide air for the drilling medium while drilling, the special drilling requirements in Onshore Oil and Gas Order No. 2, regarding air or gas shall be adhered to. If a mist system is being utilized, the requirement for a deduster shall be waived.

4. Proposed Casing and Cementing Program:

a. The proposed Casing Program will be as follows:

Purpose	Depth	Hole Size	Casing Size	Type	Connection	Weight (lb/ft)
Surface	450'	12¼"	9_"	K-55	LT&C	36 (new)
Production	TD	7"	5½"	K-55	LT&C	1.5 (new)

The proposed casing and cementing program shall be conducted as approved to protect and/or isolate all usable water 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.

All casing, except conductor casing, shall be new or reconditioned and tested. Used casing shall meet or exceed API standards for new casing. If drive pipe is used, it may be left in place if 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.

At a minimum, usable water zones shall be isolated and/or protected by having a cement top for the production casing at least 200 feet above the base of the usable water. If gilsonite is encountered while drilling, it shall be isolated and/or protected via the cementing program.

Surface casing shall have centralizers on the bottom three (3) joints, with a minimum of one (1) centralizer per joint.

Top plugs shall be used to reduce contamination of cement by displacement fluid. A bottom plug or other acceptable technique, such as a suitable preflush 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.

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.

Casing design will be subject to revision based on geologic conditions encountered.

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

b. The Cement Program will be as follows:

Surface	Fill	Type & Amount
0-450'	450'	A minimum of 175 sx Premium Plus Type V +2%$CaCl_2$, 15.6 ppg, 0.25 poly flake 1.18 cf/sx (cement will be circulated to surface, about 25% excess)

Production	Type & Amount
500' above productive internal-surface	Lead: Extended, Lite, or Hi-Fill cement +additives, 11 or 12 ppg, 3.81 cf/sx.
TD-500' above productive interval	Tail: Extended Class "G" or 50:50 Poz +additives, 14 ppg; or RFC, 14.0-14.5 ppg, 1.25 cf/sx.

For production casing, actual cement volumes will be determined from the caliper log plus 10 - 15% excess.

For surface casing, waiting on cement time will be adequate to achieve 500 psi compressive strength at the casing shoe prior to drilling out.

Anticipated cement tops will be reported as to depth, not the expected number of sacks of cement to be used. The BLM/VFO shall be notified, at least 24 hours, in order to have a BLM/VFO representative on location while running all casing strings and cementing.

After cementing the surface pipe and/or any intermediate strings, but before commencing any test, the casing string shall stand cemented until the cement has reached a compressive strength of at least 500 psi at the shoe. WOC time shall be recorded in the Driller's Log.

c. The following reports shall be filed with the BLM/VFO within 30 days after the work is completed:

Progress reports, Form 3160-5, "Sundry Notices and Reports on Wells," will include the following information:

Setting of each string of casing showing the size; grade; weight of casing set; setting depth; amounts and type of cement used; whether cement circulated or the top of the cement behind the casing; depth of the cementing tools used; casing testing method and results; and, the date of the work done. Spud Date will be shown on the first reports submitted.

d. Auxiliary well control equipment to be used:

1. Kelly cock.
2. A bit float is not deemed necessary.
3. A sub with a full opening (TIW) valve having threads compatible with drill string tubulars.

5. Drilling Fluids Program:

a. Green River wells:

Interval	Type	Mud Weight
0' – TD	Water/LSND (as hole conditions warrant).	8.7 to 12 ppg

b. No chromate additives will be used in the mud system on Federal and/or Indian lands without prior BLM approval to ensure adequate protection of fresh aquifers.

c. No chemicals subject to reporting under SARA Title III in an amount equal to or greater than 10,000 pounds will be used, produced, stored, transported, or disposed of annually in association with the drilling, testing, or completing of this well. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, will be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completing of this well.

6. Evaluation Program:

a. Logging Program:

DLL/CALIPER: TD to base of surface casing.

FDC/CNL/GR: TD - 2,500'

Drill Stem Tests: As deemed necessary.

Cores: As deemed necessary.

When cement has not been circulated to surface, the cement top will be determined by either a temperature survey or cement bond log. Should a temperature survey fail to locate the cement top, a cement bond log will be run. A field copy will be submitted to the BLM/VFO Authorized Officer (AO).

The Evaluation Program may change at the discretion of the well site geologist with approval by the BLM/VFO AO.

When utilized, mud or lithology logs will be submitted to the BLM/VFO AO.

Drill stem tests, if they are run, will adhere to the following requirements:

Initial opening of the drill stem test tools shall be restricted to daylight hours unless specific approval to start during other hours is obtained from the Authorized Officer. However, DSTs may be allowed to continue at night if the test was initiated during daylight hours and the rate of flow is stabilized and if adequate lighting is available (i.e., lighting which is adequate for visibility and vapor-proof for safe operations). Packers can be released, but tripping shall not begin before daylight, unless prior approval is obtained from the Authorized Officer. Closed chamber DST's may be performed day or night.

Some means of reverse circulation shall be provided in case of flow to the surface showing evidence of hydrocarbons.

Separation equipment required for the anticipated recovery shall be properly installed before a test starts.

If a drill stem test is performed, all engines within 100 feet of the wellbore that are required to be operational during the test shall have spark arresters or water-cooled exhausts.

Daily drilling reports shall be submitted to the BLM/VFO after drilling operations are completed for each well, and daily completion records shall be submitted with the completion report for each well.

b. Whether the well is completed as a dry hole or a producer, the "Well Completion and Recompletion Report and Log" (Form 3160-4) will be submitted not later than 30 days after completion of the well or after completion of operations being performed, in accordance with 43 CFR 3164. One copy of all logs, core description, and all other surveys or data obtained and compiled during the drilling, workover, and/or completion operations will be filed with Form 3160-4. Samples (cuttings, fluids, and/or gases) will be submitted when requested by the BLM/VFO AO.

7. Abnormal Conditions:

No abnormal temperatures or pressures are anticipated. No hydrogen sulfide has been encountered or is known to exist from previous drilling in the area at this depth. Maximum anticipated bottomhole pressure will approximately equal total depth in feet multiplied by a 0.4 psi/foot gradient. These pressures will be expressed in psi in each site-specific APD.

8. Anticipated Starting Dates and Notification of Operations:

a. Drilling Activity

Anticipated Commencement Date:	Upon approval of the site-specific APD.
Drilling Days:	Approximately 10 days.
Completion Days:	Approximately 7 days.

b. Notification of Operations

The BLM/VFO will be notified at least 24 hours **prior** to the commencement of spudding the well (to be followed with a Sundry Notice, Form 3160-5), of initiating pressure tests of the blowout preventer and related equipment, and running casing and cementing of all casing strings. Notification will be made during regular work hours (7:45 a.m.-4:30 p.m., Monday - Friday except holidays).

No location will be constructed or moved, no well will be plugged, and no drilling or workover equipment will be removed from a well to be placed in suspended status without prior approval from the BLM/VFO AO. If operations are to be suspended, prior approval of the BLM/VFO AO will be obtained and notification given before resumption of operations.

A completion rig will be used for completion operations. All conditions of this approved plan will be applicable during all operations conducted with the completion rig.

Immediate Report: Spills, blowouts, fires, leaks, accidents, or any other unusual occurrences shall be promptly reported in accordance with the requirements of NTL-3A or its revision.

The Operator will report production data to the MMS pursuant to 30 CFR 216.5 using form MMS/3160. In accordance with Onshore Oil and Gas Order No. 1, a well will be reported on form 3160-6, "Monthly Report of Operations," starting with the month in which operations commence and continue each month until the well is physically plugged and abandoned. This report will be filed with the BLM/VFO.

The date on which production is commenced or resumed will be determined for oil wells as the date on which liquid hydrocarbons are first sold or shipped from a temporary storage facility, such as a test tank, and for which a run ticket is required to be generated, or the date on which liquid hydrocarbons are first produced into a permanent storage facility, whichever occurs first; and for gas wells, as the date on which associated liquid hydrocarbons are first sold or shipped from a temporary storage facility, such as a test tank, and for which a run ticket is required to be generated, or the date on which gas is measured through permanent metering facilities, whichever occurs first.

Should the well be successfully completed for production, the BLM/VFO AO will be notified when the well is placed in a producing status. Such notification will be sent by written communication not later than 5 days following the date when the well is placed on production.

Pursuant to Onshore Order No. 7, with the approval of the BLM/VFO AO, produced water may be temporarily disposed of into unlined pits for a period of up to 90 days. During this period, an application for approval of the permanent disposal method must be submitted to the BLM/VFO AO.

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

A schematic facilities diagram, as required by 43 CFR 3162.7-5(b.9.d), shall be submitted to the BLM/VFO AO within 60 days of installation or first production, whichever occurs first. All site security regulations, as specified in Onshore Oil & Gas Order No. 3, shall be adhered to. All product lines entering and leaving hydrocarbon storage tanks will be effectively sealed in accordance with 43 CFR 3162.7-5(b.4).

Well abandonment operations shall not be commenced without the prior approval of the BLM/VFO AO. In the case of newly drilled dry holes or failures, and in emergency situations, oral approval will be obtained from the BLM/VFO AO. A "Subsequent Report of Abandonment", Form 3160-5, will be filed with the BLM/VFO AO within 30 days following completion of the well for abandonment. This report will indicate placement of the plugs and current status of the surface restoration. Final Abandonment will not be approved until the surface reclamation work required by the approved APD or approved abandonment notice has been completed to the satisfaction of the BLM/VFO AO or representative, or the appropriate surface managing agency.

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

9. Variances:

Drilling operations may be conducted without an automatic ignitor while drilling with an air/mist medium.

If a mist system is used, the requirement for a debuster shall be waived.

The straight-run blooie line requirement will be waived. Where ever possible, a straight-run blooie line will be used.

10. Other Information:

All off-lease storage, off-lease measurement, or commingling on-lease or off-lease will have prior written approval from the BLM/VFO Authorized Officer (A).

The oil and gas measurement facilities will be installed on the well location. The oil and gas meters will be calibrated in place prior to any deliveries. Tests for meter accuracy will be conducted following initial installation and at least quarterly thereafter. The BLM/VFO AO will be provided with a date and time for the initial meter calibration and all future meter proving schedules. A copy of the meter calibration reports will be submitted to the BLM/VFO. All meter measurement facilities will conform with Onshore Oil & Gas Order No. 4 for liquid hydrocarbons and Onshore Oil & Gas Order No. 5 for natural gas measurement.

The use of materials under BLM jurisdiction will conform to 43 CFR 3610.2-3.

The BLM/VFO AO shall approve deviations from the proposed drilling and/or workover program. Safe drilling and operating practices must be observed. All wells, whether drilling, producing, suspended, or abandoned, will be identified in accordance with 43 CFR 3162.

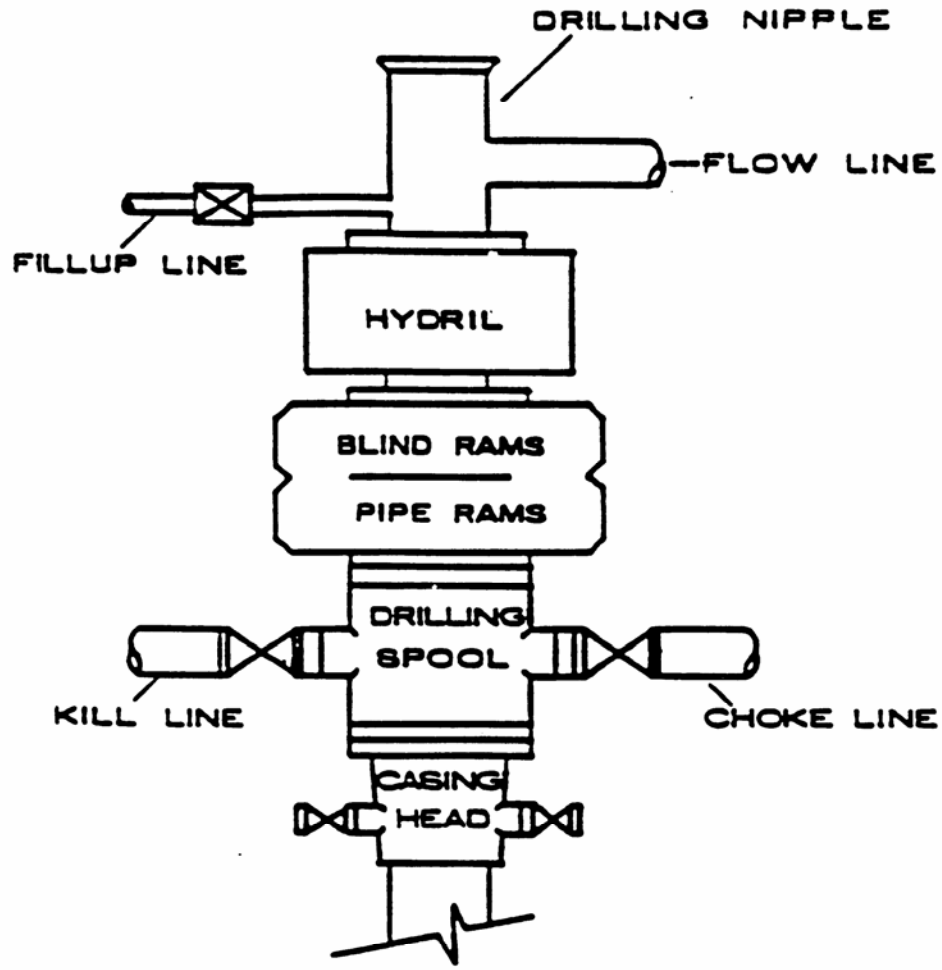
"Sundry Notice and Report on Wells" (form 3160-5) will be filed for approval for all changes of plans and other operations in accordance with 43 CFR 3162.3-2.

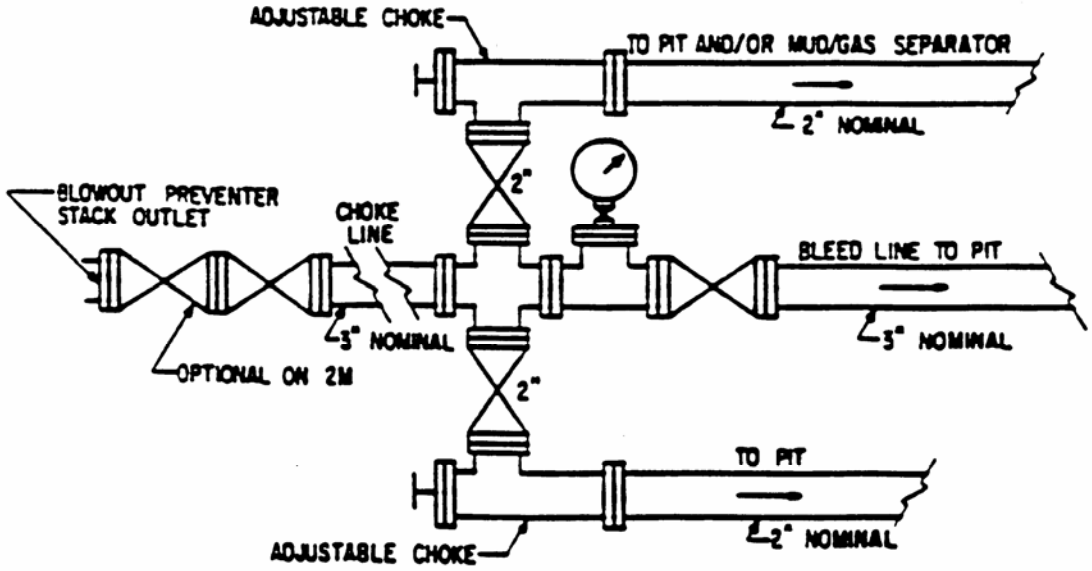
Section 102(b)(3) of the Federal Oil and Gas Royalty Management Act of 1982, as implemented by the applicable provisions of the operating regulations at Title 43 CFR 3162.4-1(c), requires that "not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, resumes production in the case of a well which has been off production for more than 90 days, the operator shall notify the Authorized Officer by letter or sundry notice, Form 3160-5, or orally to be followed by a letter or sundry notice, of the date on which such production has begun or resumed."

The APD approval is valid for a period of one year from the signature date. An extension period may be granted by the AO, if requested, prior to the expiration of the original approval period.

In the event after-hours approval or notification is necessary, one of the following individuals will be contacted:

EXHIBIT A
SCHEMATIC DIAGRAM OF 2,000 PSI BOP STACK





QUESTAR EXPLORATION & PRODUCTION (QEP)
FOR GREEN RIVER FORMATION WELLS LOCATED IN RED WASH, WONSITS VALLEY, GYPSUM HILLS, WHITE RIVER, GLEN BENCH, AND UNDESIGNATED FIELDS IN TOWNSHIPS 07 AND 08 SOUTH, RANGES 21 TO 24 EAST

Uintah County, Utah

STANDARD OPERATING PRACTICES

MULTI-POINT SURFACE USE & OPERATIONS PLAN

1. Existing Roads:

The siting of a particular well location will be shown on maps and described in the site-specific Application for Permit to Drill (APD).

Improvements requested to existing access roads will be noted in the site specific APD.

All existing roads will be maintained and kept in good repair during all drilling, completion, and production operations associated with this well.

2. Planned Access Roads:

Descriptions of the access road will be included in the site-specific APD. All proposed roads will be center-line flagged during the staking process and prior to conducting the on-site.

Access roads on BLM administered surface shall be approved under an APD, Sundry Notice, or Right-Of-Way (ROW) by the BLM/VFO Authorized Officer (AO). Authorizations for access roads will be attached to the APD.

New access roads on BLM surface will be crowned (2 to 3%), ditched, and constructed with a running surface of 18 feet and a maximum disturbed width of 30 feet. Graveling or capping the roadbed will be performed as necessary to provide a well constructed, safe road. Prior to construction or upgrading, the proposed road shall be cleared of any snow and allowed to dry completely.

The disturbed width needed may be wider than 30 feet to accommodate larger equipment where deep cuts are required for road construction; intersections or where sharp curves occur. These situations will be discussed and a decision made at the on-site. Site-specific proposals will be included in the APD. Surface disturbance and vehicular will be limited to the approved location and access route or, as proposed by the Operator. Approval will be required by the BLM/VFO AO.

Access roads and surface disturbing activities will conform to standards outlined in the BLM and Forest Service publication: Surface Operating Standards for Oil and gas Exploration and Development, 1989.

The road surface and shoulders will be kept in a safe and usable condition and will be maintained in accordance with the original construction standards. All drainage ditches and culverts will be kept clear and free-flowing and will be maintained according to original construction standards. The access road disturbed area will be kept free of trash during operations. All traffic will be confined to the approved road running surface. Road drainage

crossings shall be of the typical dry creek drainage crossing type. Crossings shall be designed so they will not cause excess siltation or accumulation of debris in the drainage nor shall the drainage be blocked by the roadbed. If culverts are needed, the location and size of the culverts will be proposed during the on-site. The operator will clean and maintain approved culverts as needed. Erosion of drainage ditches by runoff water shall be prevented by diverting water off at frequent intervals by means of cutouts. Should mud holes develop, the holes shall be filled in and detours around the holes avoided. When snow is removed from the road during the winter months, the snow should be pushed outside of the borrow ditches, and the turnouts kept clear so that snowmelt will be channeled away from the road.

3. Location of Existing Wells Within a 1-Mile Radius:

A map will be provided with the site-specific APD showing the location of existing wells within a one mile radius.

4. Location of Existing and Proposed Facilities:

The following guidelines will apply if the well is productive.

- A containment dike will be constructed completely around those production facilities which contain fluids (i.e., production tanks, produced water tanks). These dikes will be constructed of compacted impervious subsoil; hold 110% of the capacity of the largest tank; and, be independent of the back cut. If a Spill Prevention, Control, and Countermeasure (SPCC) Plan is required by the Environmental Protection Agency, the containment dike may be expanded to meet SPCC requirements with approval by the BLM/VFO AO. The specific APD will address additional capacity if such is needed due to environmental concerns. **The use of topsoil for the construction of dikes will not be allowed.**

- All loading lines will be placed inside the berm surrounding tank battery.

- All permanent (on site six months or longer) above the ground structures constructed or installed, including pumping units, will be painted a flat, non-reflective, earthtone color as approved by the BLM/VFO AO.

- All facilities will be painted within six months of installation. Facilities required to comply with the Occupational Safety and Health Act (OSHA) will be excluded. The required color is Desert Tan (174/FEB 141) unless the BLM/VFO AO determines that another color shall be used.

Surface pipelines will be constructed in accordance with the following guidance. A description of the proposed pipeline will be included as part of the site-specific APD.

- Gas: The pipeline will be unpainted steel, 3" inside diameter, Zap-lock, schedule #20 or greater, unless noted in the APD. The pipeline will be zap-locked together on location and pulled into place. The pipeline will laid within 20 feet of existing roads, pipelines, or existing route authorizations as much as possible. Pipeline route alternatives will be discussed at the on-site and the resulting proposal will be described in the APD. Road crossings will have a casing installed over the pipeline and ramped so the pipeline will not be buried. Pipeline Route Authorizations will be 20` wide and the location noted on maps accompanying the APD. No grading will be allowed unless it is proposed in the APD.

- Oil: The pipeline will be steel, Zap-lock, schedule #40 or greater, and consist of one (1) 2" inside diameter oil line and two (2) 1" inside diameter trace lines. The pipelines

will be zap-locked together on location and pulled separately into place. The lines will be banded together in one (1) bundle, insulated, and covered with tin painted Desert Tan. The pipeline will laid within 20 feet of existing roads, pipelines, or existing route authorizations as much as possible. Pipeline route alternatives will be discussed at the on-site and the resulting proposal will be described in the APD. Road crossings will have a casing installed over the pipeline and ramped so the pipeline will not be buried. Pipeline Route Authorizations will be 20` wide and the location noted on maps accompanying the APD. No grading will be allowed unless it is proposed in the APD.

- Fuel Gas: The pipeline will be a 2" inside diameter, poly pipe with a rating of 160 psi or greater. The line will be laid adjacent to the oil or gas lines following the lines to the location. Pipeline route alternatives will be discussed at the on-site and the resulting proposal will be described in the APD.

Buried water injection pipelines will be constructed in accordance with the following guidance. A description of the proposed pipeline will be included as part of the site-specific APD.

- Water Injection: The pipeline will be 2" inside diameter, externally coated Zap-lock, schedule #80, unless noted in the APD. A trench 48" deep will be constructed; the pipeline will be zap-locked in place; and lowered into the trench with a side boom. The pipeline will laid within 20 feet of existing roads as much as possible. The roads will be used as a work surface wherever possible. Pipeline route alternatives will be discussed at the on-site and the resulting proposal will be described in the APD. Pipeline Route Authorizations will be 20` wide and the location noted on maps accompanying the APD. Topsoil will be stockpiled in order to be respread over surface disturbance. The disturbed area will be seeded and drilled as soon as the work is completed. The seed mixture will be included as part of the site-specific APD.

5. Location and Type of Water Supply:

Water will be hauled to the location over roads as marked on maps included with the site-specific APD. Unless otherwise specified in the site-specific APD, fresh water for drilling purposes will be obtained from Wonsits Valley Water Right #36125, or Red Wash Water Right #49-2153.

Where possible, a water line (poly pipe) will be laid adjacent to the access road to each location to supply water for drilling purposes.

6. Source of Construction Materials:

Surface and subsoil materials in the immediate area will be utilized.

Any gravel will be obtained from a commercial source.

The use of materials under BLM jurisdiction will conform with 43 CFR 3610.2-3.

7. Methods of Handling Waste Materials:

Drill cuttings will be contained and buried in the reserve pit.

Drilling fluids, including salts and chemicals, will be contained in the reserve pit. Upon termination of drilling and completion operations, the liquid contents of the reserve pit will be used at the next drill site or will be removed and disposed of at an approved waste disposal facility within 120 days after drilling is terminated. Immediately upon well completion, any hydrocarbons in the pit shall be removed in accordance with 43 CFR 3162.7-1.

Unless specified in the site specific APD, the reserve pit will be constructed on the location and will not be located within natural drainages, where a flood hazard exists or surface runoff will destroy or damage the pit walls. The reserve pit will be constructed so that it will not leak, break, or allow discharge of liquids.

If it is determined at the on-site inspection that a pit liner is necessary, the reserve pit will be lined with a synthetic reinforced liner, a minimum of 12 millimeters thick, with sufficient bedding used to cover any rocks. The liner will overlap the pit walls and be covered with dirt and/or rocks to hold it in place. No trash or scrap will be disposed of in the pit.

Reserve pit leaks are considered an undesirable event and will be orally reported to the AO.

After first production, produced wastewater will be confined to the approved pit or storage tank for a period not to exceed 90 days. During the 90 day period, in accordance with Onshore Order # 7, all produced water will be contained in tanks on location and then hauled to Wonsits Valley location in SWNW Section 12, T8S, R21E; or, Red Wash Disposal Well located in NESW, Section 28, T7S, R22E; or, Red Wash Central Battery Disposal located in SWSE, Section 27, T7S, R23E.

Pit reclamation will be accomplished using the following procedures:

- Unlined pits: Free liquids will be removed to the extent as reasonably possible, either by hauling to sites as described above and/or through natural evaporation. To promote additional drying, the unlined pit area will be mixed with dry soil and left standing for a period of time prior to covering and compacting the pit area.

- Lined pits: Free liquids will be removed to the extent as reasonably possible, either by hauling to sites as described above and/or through natural evaporation. Liners will be ruptured when emptied to allow the remaining liquid to be adequately mixed and to promote additional drying of the pit area.

- For lined and unlined pits, mixing of pit sediments will be allowed to speed the drying process. No disturbance will be allowed outside of the pit area.

Produced water, oil, and other byproducts will not be applied to roads or well pads for control of dust or weeds. The dumping of produced fluids on roads, well sites, or other areas will not be allowed.

Any spills of oil, gas, salt water, or other noxious fluids will be immediately cleaned up and removed to an approved disposal site. The spills will be reported to the AO and other authorities as appropriate.

A chemical porta-toilet will be furnished with the drilling rig. The chemical porta-toilet wastes will be hauled to Ashley Valley Sewer and Water System for disposal.

Garbage, trash, and other waste materials will be collected in a portable, self-contained, fully enclosed trash cage during operations. Trash will not be burned on location. All debris and other waste material not contained in the trash cage will be cleaned up and removed from the location immediately after removal of the drilling rig. All trash and waste material will be hauled to the Uintah County Landfill.

No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds will be used, produced, stored, transported, or disposed of annually in association with the drilling, testing, or completing of wells within the Red Wash Unit, Wonsits Valley Unit, or areas outside these units which are in the Red Wash Field or

Wonsits Valley Field. Furthermore, extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, will not be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completing of wells within these areas. Specific APDs shall address any modifications from this policy.

8. Ancillary Facilities:

None anticipated.

9. Well Site Layout:

A Location Layout Diagram describing drill pad cross-sections, cuts and fills, and locations of mud tanks, reserve pits, flare pit, pipe racks, trailer parking, spoil dirt stockpile(s), and the surface material stockpile(s) will be included with the site specific APD.

The diagram will describe rig orientation, parking areas, and access roads, as well as the location of the following:

- The reserve pit.
- The stockpiled topsoil (first six inches), will not be used for facility berms. All brush removed from the well pad during construction will be stockpiled with the topsoil.
- The flare pit, which will be located downwind from the prevailing wind direction.
- Any drainage that crosses the well location will be diverted around the location by using: ditches, water diversion drains or berms. If deemed necessary at the on-site, erosion drains may be installed to contain sediments that could be produced from access roads and well locations.

10. Fencing Requirements:

Each existing fence to be crossed by an access road shall be braced and tied off before cutting the wire. The braces will be at a minimum of 2 7/8" outside diameter "od" steel pipe, in order to reduce the need for maintenance and to increase the life of the fence. The braces would consist of three posts and two top rail-braces. The brace posts would be cemented in the ground at a minimum of least 3 feet deep, and welded with a 27/8" top rail, with any open ends capped. The height of the brace posts would be at 42" from the ground to the top of the brace. A 16' steel powder-river type gate would be welded to the fence brace post adjacent to the cattleguard. The steel gate increases the likelihood of the gate being closed after someone goes through it due to the ease of opening and closing the steel gate as opposed to the wire type gates. A cattleguard would be installed on concrete bases. The fencing, braces, gate, cattleguard & bases will follow the provided BLM Standards." QEP will assume the maintenance of all such cattleguards and gates.

Any open pits will be fenced during the operations. The fencing will be maintained until such time as the pits are backfilled.

All pits will be fenced according to the following minimum standards:

- 39 inch net wire will be used with at least one strand of barbed wire on top of the net wire. Barbed wire is not necessary if pipe or some type of reinforcement rod is attached to the top of the entire fence.

- The net wire shall be no more than two inches above the ground. The barbed wire shall be three inches over the net wire. Total height of the fence shall be at least 42 inches.

- Corner posts shall be cemented and/or braced in such a manner to keep the fence tight at all times.

- Standard steel, wood, or pipe posts shall be used between the corner braces. Maximum distance between any 2 fence posts shall be no greater than 16 feet.

- All wire shall be stretched using a stretching device before it is attached to corner posts.

- The reserve pit will be fenced on three (3) sides during drilling operations. The fourth side will be put in place when the rig moves off location. The pit will be fenced and maintained until it is backfilled. If the drilling does not move onto location within 3 days, the fourth side of the fence will be installed. If fluids are placed in the reserve pit prior to drilling, the fourth side of the pit will be fenced until the rig is moved onto location.

11. Plans for Reclamation of the Surface:

Producing Location:

- Topsoil shall be stripped and salvaged to provide for sufficient quantities to be respread to a depth of at least four (4) to six (6) inches (or more if readily available on-site) over the disturbed areas to be reclaimed. Topsoil shall be stockpiled separately from subsoil materials. Topsoil salvaged from the reserve pit shall be stockpiled separately near the reserve pit. Topsoil to be stored for more than one year:

- Shall be windrowed, where possible, to a depth of three (3) to four (4) feet at the specified location determined at the on-site.

- Immediately after windrowing the topsoil, the approved seed mixture as determined by the AO (Attachment 2), will be broadcast seeded. After seeding, the stockpile will be "walked" with a dozer to cover the seed.

If straw or hay mulch is used, the straw and hay must be certified to be weed-free and the documentation submitted to the AO prior to usage.

- Immediately upon well completion, the location and surrounding area will be cleared of all unused tubing, materials, trash, and debris not required for production.

- If a synthetic, nylon reinforced liner is used, the excess liner will be cut off and removed and the remaining liner will be torn and perforated while backfilling the reserve pit. Alternatively, the pit will be pumped dry, the liner folded into the pit, and the pit backfilled.

- Before any dirt work associated with location restoration takes place, the reserve pit shall be as dry as possible. Any debris in it will be removed. Other waste and spoil materials will be disposed of immediately upon completion of operations.

- The reserve pit and that portion of the location not needed for production facilities / operations will be recontoured to approximate natural contours. The reserve pit will be reclaimed within 120 days from the date of well completion, weather permitting.

This will be completed by backfilling and crowning the pit to prevent water from standing. The seed mixture as determined by the AO (Attachment 2), will be drilled immediately after the pit is reclaimed. If the seed mixture is broadcasted, the area seeded will be "walked" with a dozer; dragged with a harrow; or, other implement to cover the seed.

Dry Hole/Abandoned Location:

- On lands administered by the BLM, abandoned well sites, roads, and other disturbed areas will be restored as near as practical to their original condition. Where applicable, these conditions may include the reestablishment of irrigation systems; reestablishment of appropriate soil conditions; and, the reestablishment of vegetation as specified.

  All disturbed surfaces will be recontoured to approximate natural contours, with reclamation of the well pad and access road to be performed as soon as practical after final abandonment. Reseeding operations will be performed after completion of other reclamation operations.

  The Authorized Officer of the appropriate surface management agency shall be contacted for the required seed mixture (Attachment 2). The seed will be drilled on the contour to an appropriate depth. The seeding may also be done by broadcasting the seed over the reclaimed area and "walking" the site with a dozer; dragging the site with a harrow; or, other implement to cover the seed.

- At final abandonment, all casing shall be cut off at the base of the cellar or 3 feet below final restored ground level, whichever is deeper, and the casing capped with a metal plate a minimum of 0.25 inch thick. The plate will be welded in place and the well location and identity will be permanently inscribed on the plate. The plate also will be constructed with a weep hole.

- The reclamation site would not be considered a success, unless the vegetation planted, is determined to be established during the 2nd growing season after initial planting. The company would be afforded two attempts to establish desired vegetation before the site would be considered un-reclaimable and then the site would be abandoned

12. Surface Ownership:

The ownership of the access roads and well pad will be specified on the site specific APD.

13. Other Information:

Powerlines: Unless otherwise agreed to by the AO in writing, powerlines shall be constructed in accordance with the standards outlined in Suggested Practices for Raptor Protection on Powerlines, (Raptor Research Foundation, Inc., 1981). QEP will construct the powerline in accordance with these standards or will assume the burden and expense of proving pole designs not shown in the above referenced publication are "raptor safe". A raptor expert acceptable to the AO shall provide such proof. The AO reserves the right to require modifications or additions to all powerline structures on applied for route authorizations, should they be necessary to ensure the safety of large perching birds. QEP Energy will make such modifications and/or additions without liability or expense to the Federal Government.

All wells submitted after April, 2000, will be in compliance with all applicable laws and regulations of this amended Standard Operating Practices.

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 is fully responsible for the actions of his subcontractors. A copy of these conditions will be furnished to the field representative to ensure compliance.

The Operator will control noxious weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. Any noxious weed outbreaks attributed to the activities of the lessee will be the responsibility of the lessee to control. A list of noxious weeds may be obtained from the BLM or the appropriate County Extension Office. On BLM administered land, it is required that a Pesticide Use Proposal be submitted and approved prior to the application of herbicides or other pesticides or possibly hazardous chemicals.

Drilling rigs and/or equipment used during drilling operations will not be stacked or stored on Federal lands on BLM administered lands after the conclusion of drilling operations or at any other time without authorization by the BLM/VFO Authorized Officer. If BLM authorization is obtained, such storage is only a temporary measure. Storage at the Red Wash office/yard will be allowed.

Unless previously conducted, a Class III archeological survey will be conducted on all Federal and/or Tribal lands. All personnel will refrain from collecting artifacts and from disturbing any significant cultural resources in the area. The Operator is responsible for informing all persons in the area who are associated with this project that they may be subject to prosecution for knowingly disturbing historic or archaeological sites or for collecting artifacts. All vehicular traffic, personnel movement, construction, and restoration activities shall be confined to the areas examined, as referenced in the archaeological report, and to the existing roadways and/or evaluated access routes. If historic or archaeological materials are uncovered during construction, the Operator is to immediately stop work that might further disturb such materials and contact the Authorized Officer and/or the Ute Tribe Energy and Mineral Department.

Within five working days, the AO will inform the Operator as to:

- Whether the materials appear eligible for the National Historic Register of Historic Places;
- The mitigation measures the Operator 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 to confirm, through the State Historic Preservation Officer, that the findings of the Authorized Officer are correct and that mitigation is appropriate.

If the Operator wishes, at any time, to relocate activities to avoid the expense of mitigation and/or the delays associated with this process, the Authorized Officer will assume responsibility for whatever recordation and stabilization of the exposed materials may be required. Otherwise the Operator 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 required mitigation has been completed, The Operator will then be allowed to resume construction.

On surface administered by the BIA, all Surface Use Conditions of Approval associated with the BIA Concurrence letter and Environmental Analysis Mitigation Stipulations will be adhered to, including:

- All contractors used by QEP, when applicable, will have acquired a Tribal Business License and have access permits prior to construction.

- If the surface rights are owned by the Ute Indian Tribe and mineral rights are owned by another entity, an approved right-of-way will be obtained from the BIA before the Operator begins any construction activities. The BIA right-of-way application will be delivered under separate cover. If the surface is owned by another entity and the mineral rights are owned by the Ute Indian Tribe, a right-of-way will be obtained from the other entity.

- Upon completion of the APD and right-of-way construction, the Ute Tribe Energy and Mineral Department will be notified so that a Tribal Technician can verify an Affidavit of Completion.

- Operator's employees, including subcontractors, will not gather firewood along roads constructed by the Operator. If wood cutting is required, a permit will be obtained from the Forestry Department of the BIA pursuant to 25 CFR 169.13 "Assessed Damages Incident to Right-of Way Authorization." The Operator, subcontractors, vendors and their employees or agents may not disturb saleable timber (including firewood) without a duly granted wood permit from the BIA Forester.

- All roads constructed by the Operator on Northern Ute Tribal Lands will have appropriate signage. Signs will be neat and of sound construction. The will state: (a) that the land is owned by the Northern Ute Indian Tribe, (b) the name of the Operator, (c) that firearms are prohibited to all non-Ute Tribal members, (d) that permits must be obtained from the BIA before cutting firewood or other timber products, and (e) only authorized personnel permitted.

- All well site locations on Northern Ute Tribal Lands will have appropriate signage indicating the name of the Operator, the lease serial number, the well name and number, the survey description of the well (either footages or the quarter/quarter section, the section, township, and range).

14. Lessee's or Operator's Representative and Certification:

Red Wash Operations Representative
Questar Exploration & Production
11002 East 17500 South
Vernal UT 84078
(435)781-4341

Certification: 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 representative(s) to ensure compliance and shall be on location during all construction and drilling operations.

Site specific certification will be submitted with the site specific APD.

ATTACHMENT 1
EPA's LIST OF NONEXEMPT EXPLORATION AND PRODUCTION WASTES

While the following wastes are nonexempt, they are not necessarily hazardous.

- Unused fracturing fluids or acids
- Gas plant cooling tower cleaning wastes
- Painting wastes
- Oil and gas service company wastes, such as empty drums, drum rinsate, vacuum truck rinsate, sandblast media, painting wastes, spend solvents, spilled chemicals, and waste acids
- Vacuum truck and drum rinsate from trucks and drums, transporting or containing nonexempt waste
- Refinery wastes
- Liquid and solid wastes generated by crude oil and tank bottom reclaimers
- Used equipment lubrication oils
- Waste compressor oil, filters, and blowdown
- Used hydraulic fluids
- Waste solvents
- Waste in transportation pipeline-related pits
- Caustic or acid cleaners
- Boiler cleaning wastes
- Boiler refractory bricks
- Incinerator ash
- Laboratory wastes
- Sanitary wastes
- Pesticide wastes
- Radioactive tracer wastes
- Drums, insulation and miscellaneous solids

ATTACHMENT 2

STANDARD SEED MIXES

#1.	Fourwing Saltbush Needle and Threadgrass Indian Ricegrass crested wheatgrass	*Atriplex canescens* *Stipa comata* *Oryzopsis hymenoides*	4 lbs. / acre 4 lbs. / acre 4 lbs. / acre 1lbs. / acre
#2.	Fourwing Saltbush Needle and Threadgrass Western Wheatgrass crested wheatgrass	*Atriplex canescens* *Stipa comata* *Agropyron smithii*	4 lbs. / acre 4 lbs. / acre 4 lbs. / acre 1lbs. / acre
#3.	Black Sagebrush Western Wheatgrass Galleta Grass crested wheatgrass	*Artemesia arbuscula nova* *Agropyron smithii* *Hilaria jamesii*	1 1b. / acre 6 lbs. / acre 5 lbs. / acre 1lbs. / acre
#4.	Fourwing Saltbush Indian Ricegrass Globe Mallow (scarlet or munro) crested wheatgrass	*Atriplex canescens* *Oryzopsis hymenoides* *Sphaeralcea coccinea* or *Sphaeralcea munroana*	4 lbs. / acre 4 lbs. / acre 4 lbs. / acre 1lbs. / acre
#5.	Gardner Saltbush Shadscale	*Atriplex gardneri* *Atriplex confertifolia*	6 lbs. / acre 6 lbs. / acre

APPENDIX 3-5-1

SUMMARY OF POTENTIAL OCCURRENCE OF SPECIAL STATUS PLANT SPECIES FOR THE GDBR FIELD DEVELOPMENT

Species	Status	Habitat	Potential for and/or Occurrence within GDBR[1]
Arabis vivariensis park rock cress	Sensitive	Webber Formation sandstone and limestone outcrops in mixed desert shrub and pinyon-juniper communities. 5000-6000ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Astragalus equisolensis horseshoe milkvetch	Candidate	Duchesne River Formation soils in sagebrush, shadscale, horsebrush and mixed desert shrub communities.4790-5185ft.	Plants occur within the proposed field development. Additional habitat is possible.
Astragalus hamiltonii Hamilton milkvetch	Sensitive	Lapoint and Dry Gulch members of the Duchesne River Formation , Mowery shale, Dakota and Wasatch Formation soils in pinyon-juniper and desert shrub communities. 5240-5800ft	None – Brennan Member of Duchesne River formation. No suitable habitat. Landforms and associated soils do not occur in analysis area..
Cirsium ownbeyi Ownbey thistle	Sensitive	East flank Uinta Mountains. In mesic sites within canyons of mixed sagebrush, juniper and riparian communities. 5500-6200ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Hymenoxys lapidicola Rock hymenoxis	Sensitive	Sandy soils on ledges and soil filled crevices in the Weber Formation associated with Blue Mountain. (5700-8100 feet).	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Penstemon acaulis stemless penstemon	Sensitive	Daggett County. Semi-barren substrates in pinyon-juniper and sagebrush-grass communities. 5840-7285 ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Penstemon flowersii Flowers penstemon	Sensitive	Clay badlands from Myton to Roosevelt and Randlett, in shadscale and desert communities. 5000-5400ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Penstemon gibbensii Gibbens penstemon	Sensitive	Brown's Park in Daggett County. Sandy and shaley (Green River Shale) bluffs and slopes with juniper, thistle, Eriogonum, Elymus, serviceberry, rabbit brush & Thermopsis 5500-6400 ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Penstemon goodrichii Goodrich penstemon	Sensitive	Lapoint-Tridell-Whiterocks area. Duchesne River Formation on blue gray to reddish bands of clay badlands. Elevations 5590 to 6215 ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Penstemon grahamii Graham beardtongue	Candidate	East Duchesne and Uintah Counties. Evacuation Creek and Lower Parachute Member of the Green River Formation. Shaley knolls in sparsely vegetated desert shrub and pinyon-juniper communities.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.

Species	Status	Habitat	Potential for and/or Occurrence within GDBR[1]
		4600-6700 ft	
Penstemon scariosus var. *albifluvis* White River penstemon	Candidate	Evacuation Creek and Lower Parachute Creek Member of the Green River Formation on sparsely vegetated shale slopes in mixed desert shrub and pinyon-juniper communities. 5000-6000ft	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Schoencrambe argillacea Clay thelopody	Threatened	Bookcliffs On the contact zone between the upper Uinta and lower Green River shale formations in mixed desert shrub of Indian ricegrass and pygmy sagebrush.5000-5650 ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Schoencrambe suffrutescens Shrubby reed-mustard	Endangered	Evacuation Creek and lower Parachute Creek Members of the Green River Formation on calcareous shales in pygmy sagebrush, mountain mahogany, juniper and mixed desert shrub communities. 5400-6000ft.	None - No suitable habitat. Formations and associated soils do not occur in the analysis area.
Sclerocactus glaucus (*Sclerocactus brevispinus*) Uinta Basin hookless cactus	Threatened	Gravelly hills and terraces on Quaternary and tertiary alluvium soils in cold desert shrub communities. 4700-6000ft.	Potential habitat within the Uintah Geological formation.
Spiranthes diluvialis Ute lady's tresses	Threatened	Streams, bogs and open seepages in cottonwood, salt cedar, willow and pinyon-juniper communities on the south and east slope of the Uintah Range and it's tributaries, and the Green River from Browns Park to Split mountain. Potentially in the Upper reaches of streams in the Book Cliffs. 4400-6810ft.	None - No suitable habitat. Green River corridor has been surveyed for potential habitat within the project area. None was found due to vegetation, texture, lack of consistent water table, and soils. Drainages into the Green River do not have suitable habitat due to high alkalinity and salinity.

APPENDIX 3.5.2

USFWS T&E Species

FWS 2004

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE

2369 WEST ORTON CIRCLE, SUITE 50

WEST VALLEY CITY, UTAH 84119

In Reply Refer To
FWS/R6
ES/UT
04-0426

February 3, 2004

Memorandum

To: Field Manager, Vernal Field Office, Bureau of Land Management, Vernal, Utah

From: Utah Field Supervisor, Ecological Services, U.S. Fish and Wildlife Service, Salt Lake City, Utah

Subject: 1792 UT-080; Questar Exploration and Production Company's Greater Deadman Bench Environmental Impact Statement, Scoping Notice

The U.S. Fish and Wildlife Service (Service) has reviewed your letter of January 8, 2004 announcing your intent to prepare an environmental document on the Questar Exploration and Production (QEP) Company's Greater Deadman Bench oil and gas production region project in Uintah County, Utah. The purpose of the project is to drill up to 1,239 new wells over a 10-year period, or until the resource base is fully developed on the leases. QEP estimates over 9 million barrels of oil and 750 billion cubic feet of natural gas will be produced over the next 40 years. The project area involves 99,000 acres in the Greater Deadman Bench oil and gas production region, located about 20 miles south of Vernal, Utah.

Of the proposed 1,239 wells, 769 well pads would be drilled on new locations and 470 would be "twins" drilled from existing locations. The proposed wells would be drilled on a 40-acre spacing pattern. Well site construction would consist of the following surface disturbance activities:

- Leveling a rectangular pad to 300' x 350', approx 2.5 acres
- Reserve pit for drilling mud and water storage of 150' x 70' x 12' deep adjacent to pad, approx 0.24 surface acres
- Stockpiles for topsoil and subsoil adjacent to pad, approx 0.5 acres
- Access road connecting the pad to the nearest established road of 1,000' x 30', approx 0.5 acres
- Right-of-Way for Green River Formation in the Green River Formation for production flow lines or water injection lines of 1,000' x 30', approx 0.5 acres
- Right-of-Way for Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation gas wells for surface gathering lines of 1,000' x 30', approx 0.5 acres

stent with NEPA regulation 40 CFR § 1503.1(a)(1) that the action agency shall obtain the ments of any Federal agency which has jurisdiction by law or special expertise with respect any environmental impact involved, we are responding to your request for concerns and omments on this EIS. In Section 1 of this letter we convey our concerns that should be addressed in the EIS for this project. Section 2 of this letter addresses your responsibilities under section 7 of the Endangered Species Act (ESA) of 1973, 16 U.S.C. § 1536.

Section 1.

The project area includes portions of the Upper Green River, which supports four federally endangered Colorado River fishes: Colorado pikeminnnow, humpback chub, bonytail, and razorback sucker. Sensitive species found within this river include roundtail chub, flannelmouth sucker, and bluehead sucker. The project area contains designated critical habitat for the endangered Colorado River fishes including those portions of the 100-year floodplain that contain constituent elements. The constituent elements are those physical and biological features that the Service considers essential for the conservation of the species and include, but are not limited to, the following items: (1) Space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally (5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of the species. Project activities should not lead to the detriment of this critical habitat.

White-tailed prairie dog colonies and habitat exist within this project area. White-tailed prairie dogs have been petitioned for listing under the Endangered Species Act. They are also included on the Utah Division of Wildlife Resources Sensitive Species List. The EIS should describe impacts to the species and habitat. Modifications of project activities should be designed and implemented as necessary to protect the white-tailed prairie dog and/or habitat from surface disturbing activities. A Range-wide Conservation Assessment is being developed, and could result in specific conservation recommendation for the species that may be applicable to this project.

Black-footed ferret habitat exists within the project area (personal communication, Miles Hanberg UDWR, January 28, 2004). We recommend implementing the *Surface Disturbance Management Guidelines* in Appendix E of the *Cooperative Plan for the Reintroduction and Management of Black-Footed Ferrets* (UDWR 1996). Planned resource extraction should be designed to avoid adverse impacts on prairie dog and black-footed ferret habitat. In the event of adverse impacts, activities should be designed to influence the smallest area feasible (UDWR 1996) and compensatory mitigation should be required. Buffers around existing colonies of 500 meters should be implemented to alleviate potential disturbances (personal communication, Amy Seglund, UDWR 2003). In addition, implementation of a long-term monitoring program to evaluate effects of development on prairie dogs and ferrets should be instituted. Evaluation of prairie dog populations before and after resource projects is recommended. Monitoring of populations should incorporate the methodology developed by Biggins et al. 1993.

The project area contains important wintering and brooding habitat for Greater sage grouse. There are two active sage grouse leks in the project area (personal communication, Miles Hanberg, UDWR, January 28, 2004). Any surface occupancy within historical or presently

occupied habitat should be avoided; grouse may utilize different lek sites due to weather variations or population increases. Development near strutting grounds or leks should be avoided as they are considered the focal point of year-around activities for sage grouse populations (Braun et al. 1977). The EIS should discuss the direct and indirect impacts to sage grouse leks; habitat surrounding the breeding grounds; nesting; and brood-rearing areas. Fragmentation is identified as one of the factors contributing to sage-grouse population declines (Braun 1998). To minimize the impacts of resource developments in sage-grouse habitats, we recommend avoiding developments that may fragment contiguous sage-grouse habitat or connectivity between seasonal habitats (breeding, nesting, early or late brood-rearing habitats). Areas that dually provide lekking/nesting habitats and wintering habitats should not be considered for natural resource development because these areas provide yearlong grouse use. If breeding, nesting, brood-rearing, and/or wintering habitats are unknown, monitoring to identify these habitats is essential, prior to resource development. Guidelines to minimize impacts to sage grouse, including seasonal and spatial buffers and habitat restoration recommendations, can be found in: the Utah Division of Wildlife Resources' *Strategic Plan for Management of Sage Grouse, 2002*, Publication No. 02-20 and in *Guidelines to Manage Sage Grouse Populations and Their Habitats* (Connelly et al. 2000).

Activities should avoid, to the extent possible, sensitive wildlife periods and areas (breeding season, calving season, migration corridors). Impacts to migratory bird habitat should be evaluated and minimized, focusing on the sagebrush obligate and sagebrush associated species on the Service's 2002 List of Birds of Conservation Concern and the Partners in Flight Priority Bird Species. To help meet responsibilities under Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), we recommend you conduct activities outside critical breeding seasons for migratory birds, minimize temporary and long-term habitat losses, and fully mitigate unavoidable habitat losses. If habitat disturbances occur in the spring or summer, we recommend surveys for migratory birds to assist in efforts to comply with the Migratory Bird Treaty Act (16 U.S.C. 703-712) and E.O. 13186.

Ferruginous hawks are known to occur in the Greater Deadman Bench Study Area. We recommend use of the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Romin and Muck, 2002) which were developed in part to provide consistent application of raptor protection measures statewide and provide full compliance with environmental laws regarding raptor protection. Raptor surveys and mitigation measures are provided in the Raptor Guidelines as recommendations to ensure that proposed projects will avoid adverse impacts to raptors. Locations of existing raptor nests should be identified prior to the initiation of project activities. Direct loss of nesting sites or territories should be avoided. Appropriate spatial buffer zones of inactivity should be established during crucial breeding and nesting periods relative to raptor nest sites or territories. Arrival at nesting sites can occur as early as December for certain raptor species. Nesting and fledging continues through August. Generally we recommend spatial buffers of 1.0 mile for threatened or endangered raptors, 0.5 mile for other diurnal raptors, and 0.25 mile for nocturnal raptor nests.

The 1997 Mexican spotted owl model identifies habitat within the project area. Although the 2000 model suggests nesting habitat may not exist within the project area, field reviews should be conducted to ensure model accuracy (letter from our office to BLM State Director, November 21, 2002). Small-scale habitat features, such as crevices or alcoves that may provide suitable owl

microclimates may be missed by the 2000 model. In addition, the 2000 model does not necessarily identify all owl habitat, such as foraging, dispersal, and wintering habitats. The EIS should discuss potential impacts and measures to minimize effects to the Mexican spotted owl.

Horseshoe Milkvetch occurs directly north of the study area and the Uinta Basin hookless cactus occurs in the project area (personal communication, Lenora Sullivan, UNHP, January 30, 2004). Impacts to these species should be minimized and the EIS should describe measures to protect these species.

The proposal may increase access and disturbance to previously isolated areas with high wildlife value. Therefore, the potential effects of dispersed recreation or enhanced access (camping, hiking, off-road vehicles) on wildlife habitat (disturbance of migration corridors, loss of vegetation) should be considered in project plans. Measures should be taken to prevent increased access to sensitive wildlife areas. In addition, the project activities will lead towards fragmenting the landscape and habitat. The EIS should discuss these impacts and well as describe the measures that will be taken to limit them.

The EIS should also identify the amount, location, and timeframe of temporary disturbance that could result from the proposed action. Displacement of wildlife across a large area during critical times, such as breeding, could prove a significant impact. If wildlife are displaced, it is likely that the area to which they are displaced is inhabited by other wildlife or disturbed by other ongoing activities. Depending on the season and species, displacement could lead to nest abandonment, inter- and intra-specific competition, reproductive failure, and possible mortality. In addition, the cumulative effects of other projects in the area may limit the availability of alternative sites for displaced wildlife.

Cumulative effects of other projects and activities to wildlife and wildlife habitat should be taken into account in project plans. The compounded effects this project will have with relation to the sagebrush die-off should be discussed. Approximately 50% of the sagebrush within the project area has died; remaining stands are typically older, decadent sagebrush with a cheatgrass understory (personal communication, Miles Hanberg, UDWR, January 28, 2004). As cheatgrass is known to increase fire occurrence, the cumulative effects of the EIS should also discuss how fire and the suppression activities will impact the proposed project activities as well as the remaining vegetation.

As with all projects that will create surface disturbance, there is potential for introduction and spread of invasive species. All possible measures should be taken to prevent the introduction or further proliferation of noxious species. Monitoring and control efforts should be implemented following construction. Seed mixes should, to the extent practicable, contain native plants or non-natives that will not naturalize, and plants that can successfully compete with noxious weeds.

Impacts associated with this project may lead to heightened erosion and degradation of fish and wildlife resources. We recommend you discuss the potential for erosion as well as any measures that will be taken to minimize the effects.

All mitigation efforts should be monitored using established thresholds to indicate the need for remedial action. Success criteria should be applied that address sensitive periods, species of concern, and desired vegetation communities.

Section 2.

Federal agencies have specific additional responsibilities under Section 7 of the ESA. To help you fulfill these responsibilities, we are providing an updated list of threatened (T) and endangered (E) species that may occur within the area of influence of your proposed action.

Common Name	Scientific Name	Status
Horseshoe Milkvetch	*Astragalus equisolensis*	C
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	T
Bonytail[1, 2]	*Gila elegans*	E
Colorado Pikeminnow[1, 2]	*Ptychocheilus lucius*	E
Humpback Chub[1, 2]	*Gila cypha*	E
Razorback Sucker[1, 2]	*Xyrauchen texanus*	E
Bald Eagle[3]	*Haliaeetus leucocephalus*	T
Mexican Spotted Owl	*Strix occidentalis lucida*	T
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	C
Black-footed Ferret[4]	*Mustela nigripes*	E

[1] Critical habitat designated in this county.
[2] Water depletions from *any* portion of the occupied drainage basin are considered to adversely affect or adversely modify the critical habitat of the endangered fish species, and must be evaluated with regard to the criteria described in the pertinent fish recovery programs.
[3] Wintering populations (only four known nesting pairs in Utah).
[4] Historical range.

The proposed action should be reviewed and a determination made if the action will affect any listed species or their critical habitat. If it is determined by the Federal agency, with the written concurrence of the Service, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is complete, and no further action is necessary.

Formal consultation (50 CFR 402.14) is required if the Federal agency determines that an action is "likely to adversely affect" a listed species or will result in jeopardy or adverse modification of critical habitat (50 CFR 402.02). Federal agencies should also confer with the Service on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10). A written request for formal consultation or conference should be submitted to the Service with a completed biological assessment and any other relevant information (50 CFR 402.12).

Candidate species have no legal protection under the Endangered Species Act (ESA). Candidate species are those species for which we have on file sufficient information to support issuance of a proposed rule to list under the ESA. Identification of candidate species can assist environmental planning efforts by providing advance notice of potential listings, allowing resource managers to alleviate threats and, thereby, possibly remove the need to list species as endangered or threatened. Even if we subsequently list this candidate species, the early notice provided here

could result in fewer restrictions on activities by prompting candidate conservation measures to alleviate threats to this species.

Only a Federal agency can enter into formal Endangered Species Act (ESA) section 7 consultation with the Service. A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such a designation. The ultimate responsibility for compliance with ESA section 7, however, remains with the Federal agency.

Your attention is also directed to section 7(d) of the ESA, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

Thank you for your interest in conserving endangered species. If we can be of further assistance, please contact Bekee Megown at 801-975-3330, ext. 146.

cc: BLM State Office – Attn: Ron Bolander
UDWR – SLC and Vernal
Buys & Associates, Inc., Attn: S. Kirby Carroll, Senior Ecologist, 300 E. Mineral Ave., Suite 10, Littleton, CO 80122-2631

Literature Cited

Biggins, D., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Creete and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pp. 73-88 *in* J.L. Oldemeyer, D.E. Biggins, B.J. Miller, and R. Crete, eds. Proceedings of the Symposium on the management of prairie dog complexes for the reintroduction of the black-footed ferret. Biological Report 13. July 1993. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 96 pp.

Braun, C. E., T. Britt, and R. O. Wallestad. 1977. Guidelines for maintenance of sage grouse habitats. Wildlife Society Bulletin 5:99-106.

Braun, C. E. 1998. Sage-grouse in Western North America: What are the problems? Proceedings of Western Association of Fish and Wildlife Agencies 78:139-156.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

Hanberg, Miles. January 28, 2004. Habitat Coordinator, Northern Region, UDWR Vernal, UT.

Romin, L.A., and J.A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildl. Serv., UT Field Office, Salt Lake City, UT.

Seglund, Amy. 2003. Pers. Comm. Sensitive Species Biologist, South Eastern Region, UDWR Price, UT.

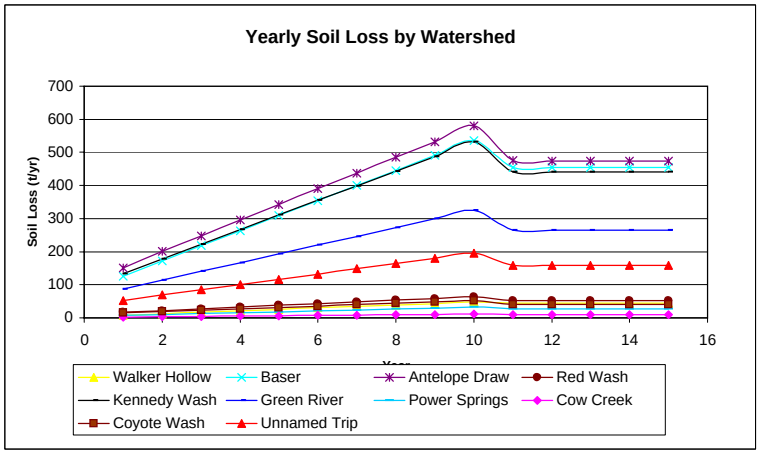
APPENDIX 4-1, 4-2

SOIL LOSS CALCULATIONS

REVISED UNIVERSAL SOIL LOSS EQUATION (RUSLE)

Watershed	Year of Operation														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Walker Hollow	7.66	12.13	16.59	21.06	25.53	29.99	34.46	38.93	43.39	47.86	44.67	44.67	44.67	44.67	44.67
Baser	125.77	172.63	218.02	263.41	308.80	354.20	399.59	444.98	490.37	535.76	455.38	453.91	453.91	453.91	453.91
Antelope Draw	151.75	200.26	247.65	295.05	342.44	389.84	437.23	484.63	532.03	579.42	475.06	473.96	473.96	473.96	473.96
Red Wash	17.00	22.18	27.37	32.56	37.74	42.93	48.11	53.30	58.49	63.67	51.86	51.86	51.86	51.86	51.86
Kennedy Wash	134.11	178.86	222.91	266.96	311.01	355.06	399.11	443.16	487.21	531.26	441.20	440.51	440.51	440.51	440.51
Green River	87.23	114.35	140.76	167.17	193.57	219.98	246.39	272.79	299.20	325.61	264.79	264.07	264.07	264.07	264.07
Power Springs	7.31	10.16	12.90	15.63	18.37	21.10	23.84	26.57	29.31	32.04	27.47	27.35	27.35	27.35	27.35
Cow Creek	2.82	3.74	4.66	5.58	6.50	7.42	8.34	9.25	10.17	11.09	9.19	9.19	9.19	9.19	9.19
Coyote Wash	14.96	19.11	23.26	27.41	31.56	35.71	39.86	44.01	48.16	52.31	41.50	41.50	41.50	41.50	41.50
Unnamed Trip	52.99	68.86	84.73	100.60	116.47	132.34	148.21	164.08	179.95	195.82	158.70	158.70	158.70	158.70	158.70
Total	601.60	802.28	998.85	1195.43	1392.00	1588.57	1785.14	1981.71	2178.28	2374.85	1969.82	1965.71	1965.71	1965.71	1965.71

Watershed	% Disturbed	SOIL LOSS (tons/yr)					% Natural for Max Rate
		MAX	MIN	AVERAGE	TOTAL	Natural	
Walker Hollow	1.56%	48	8	33	501	14407	0.33%
Baser	3.96%	536	126	372	5585	21536	2.49%
Antelope Draw	6.54%	579	152	402	6031	15909	3.64%
Red Wash	1.53%	64	17	44	663	8685	0.73%
Kennedy Wash	4.71%	531	134	369	5533	17894	2.97%
Green River	4.32%	326	87	226	3388	10766	3.02%
Power Springs	4.49%	32	7	22	334	944	3.39%
Cow Creek	3.92%	11	3	8	116	477	2.33%
Coyote Wash	2.91%	52	15	36	544	2766	1.89%
Unnamed Trip	3.93%	196	53	136	2038	6390	3.06%
Total		2375	602	1649	24731	99774	2.38%



WALKER HOLLOW WATERSHED ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	6508
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	101.74 1.56% of the watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare (MP-1)
2nd - 3rd Year	Blade, seed, no mulch (MP-3)
4th - 15 th Year	Range grass after disturbance (MP-4)
Reclaimed Areas (acres)	19.8
1st Year	Kill/remove vegetation, blade cut, smooth, bare (MP-1)
2nd - 15th Year	Smooth bare cut (MP-2)
ROADS AND PIPELINES	
Slope*	5.30%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines have slopes no greater that 50% of the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHED

Walker Hollow	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	18	3.15	0.69	0.69	4.53	81.54	0.9	16.2	3.03	54.54
New Oil Wells	4	3.15	0.69	1.21	5.05	20.2	0.9	3.6	3.55	14.2
Gas Wells on Existing Pads	0	0	0	0.69	0.69	0	0	0	0.69	0
Oil Wells on Existing Pads	0	0	0	1.21	1.21	0	0	0	1.21	0
Central Tank Facility	0	0	0	0	3.53	0	0	0	3.53	0
Compressor Stations	0	0	0	0	1	0	0	0	1	0
Total	22	6.3	1.38	3.8	16.01	101.74	1.8	19.8	13.01	68.74

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTICE

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	418	6.42%	0.71	0.05	0.17	0.01	0.11	0.01	0.13	0.01	1.20	0.08	1.10	0.07	2.4	0.15	1003
Loam	0	0.00%													4.2	0.00	0
Sandy-loam	2089	32.10%	0.84	0.27	0.19	0.06	0.13	0.04	0.10	0.03	1.60	0.51	1.50	0.48	3.1	1.00	6477
Silty clay-loam	487	7.48%	0.76	0.06	0.17	0.01	0.14	0.01	0.15	0.01	1.60	0.12	1.50	0.11	3.4	0.25	1656
Silty clay	3513	53.99%	0.41	0.22	0.10	0.05	0.06	0.03	0.07	0.04	0.71	0.38	0.67	0.36	1.5	0.81	5270
Sand and gravel	0	0.00%															
Total	6507	100.00%		0.59		0.14		0.09		0.09		1.09		1.03		2.21	14407

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAR

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	4.11	0.00	0.00	1.66	1.36	0.53	7.66
Year 2		0.18	0.95	1.56	1.27	0.50	4.47
Year 3		0.18	0.95	1.56	1.27	0.50	4.47
Year 4		0.18	0.95	1.56	1.27	0.50	4.47
Year 5		0.18	0.95	1.56	1.27	0.50	4.47
Year 6		0.18	0.95	1.56	1.27	0.50	4.47
Year 7		0.18	0.95	1.56	1.27	0.50	4.47
Year 8		0.18	0.95	1.56	1.27	0.50	4.47
Year 9		0.18	0.95	1.56	1.27	0.50	4.47
Year 10		0.18	0.95	1.56	1.27	0.50	4.47
Year 11		0.18	0.95	1.56	1.27	0.50	4.47
Year 12		0.18	0.95	1.56	1.27	0.50	4.47
Year 13		0.18	0.95	1.56	1.27	0.50	4.47
Year 14		0.18	0.95	1.56	1.27	0.50	4.47
Year 15		0.18	0.95	1.56	1.27	0.50	4.47

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEAR

OPERATIONAL YR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	7.66															7.66
Year 2	7.66	4.47														12.13
Year 3	7.66	4.47	4.47													16.59
Year 4	7.66	4.47	4.47	4.47												21.06
Year 5	7.66	4.47	4.47	4.47	4.47											25.53
Year 6	7.66	4.47	4.47	4.47	4.47	4.47										29.99
Year 7	7.66	4.47	4.47	4.47	4.47	4.47	4.47									34.46
Year 8	7.66	4.47	4.47	4.47	4.47	4.47	4.47	4.47								38.93
Year 9	7.66	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47							43.39
Year 10	7.66	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47						47.86
Year 11		4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47					44.67
Year 12			4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47				44.67
Year 13				4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47			44.67
Year 14					4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47		44.67
Year 15						4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	4.47	44.67

UNNAMED TRIPBUTARY TO THE GREEN RIVER ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	9237
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres	362.96 3.93% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acr	70.2
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	0.00%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHED

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	66	3.15	0.69	0.69	4.53	298.98	0.9	59.4	3.03	199.98
New Oil Wells	12	3.15	0.69	1.21	5.05	60.6	0.9	10.8	3.55	42.6
Gas Wells on Existing Pad	2	0	0	0.69	0.69	1.38	0	0	0.69	1.38
Oil Wells on Existing Pads	0	0	0	1.21	1.21	0	0	0	1.21	0
Central Tank Facility	0	0	0	0	3.53	0	0	0	3.53	0
Compressor Stations	2	0	0	0	1	2	0	0	1	2
Total	82	6.3	1.38	3.8	16.01	362.96	1.8	70.2	13.01	245.96

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTICE

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	0	0.00%	0.71	0.00	0.17	0.00	0.11	0.00	0.13	0.00	0.76	0.00	0.72	0.00	0.56	0.00	0
Loam	675	7.31%	1.2	0.09	0.26	0.02	0.18	0.01	0.20	0.01	1.30	0.10	1.20	0.09	0.92	0.07	621
Sandy-loam	8176	88.52%	0.84	0.74	0.19	0.17	0.13	0.12	0.10	0.09	0.95	0.84	0.90	0.80	0.69	0.61	5642
Silty clay-loam	0	0.00%	0.76	0.00	0.17	0.00	0.14	0.00	0.15	0.00	0.98	0.00	0.92	0.00	0.71	0.00	0
Silty clay	385	4.17%	0.41	0.02	0.10	0.00	0.06	0.00	0.07	0.00	0.44	0.02	0.42	0.02	0.33	0.01	127
Sand and gravel	0	0.00%															
Total	9236	100.00%		0.85		0.19		0.13		0.11		0.95		0.90		0.69	6390

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAR

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	20.84	0.00	21.01	5.14	4.48	1.52	52.99
Year 2		0.92	4.68	4.85	4.11	1.31	15.87
Year 3		0.92	4.68	4.85	4.11	1.31	15.87
Year 4		0.92	4.68	4.85	4.11	1.31	15.87
Year 5		0.92	4.68	4.85	4.11	1.31	15.87
Year 6		0.92	4.68	4.85	4.11	1.31	15.87
Year 7		0.92	4.68	4.85	4.11	1.31	15.87
Year 8		0.92	4.68	4.85	4.11	1.31	15.87
Year 9		0.92	4.68	4.85	4.11	1.31	15.87
Year 10		0.92	4.68	4.85	4.11	1.31	15.87
Year 11		0.92	4.68	4.85	4.11	1.31	15.87
Year 12		0.92	4.68	4.85	4.11	1.31	15.87
Year 13		0.92	4.68	4.85	4.11	1.31	15.87
Year 14		0.92	4.68	4.85	4.11	1.31	15.87
Year 15		0.92	4.68	4.85	4.11	1.31	15.87

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEAR

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	52.99															52.99
Year 2	52.99	15.87														68.86
Year 3	52.99	15.87	15.87													84.73
Year 4	52.99	15.87	15.87	15.87												100.60
Year 5	52.99	15.87	15.87	15.87	15.87											116.47
Year 6	52.99	15.87	15.87	15.87	15.87	15.87										132.34
Year 7	52.99	15.87	15.87	15.87	15.87	15.87	15.87									148.21
Year 8	52.99	15.87	15.87	15.87	15.87	15.87	15.87	15.87								164.08
Year 9	52.99	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87							179.95
Year 10	52.99	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87						195.82
Year 11		15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87					158.70
Year 12			15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87				158.70
Year 13				15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87			158.70
Year 14					15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87		158.70
Year 15						15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	158.70

RED WASH ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	6480
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	99.19 1.53% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	18
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	5.80%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHED

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	20	3.15	0.69	0.69	4.53	90.6	0.9	18	3.03	60.6
New Oil Wells	0	3.15	0.69	1.21	5.05	0	0.9	0	3.55	0
Gas Wells on Existing Pads	11	0	0	0.69	0.69	7.59	0	0	0.69	7.59
Oil Wells on Existing Pads	0	0	0	1.21	1.21	0	0	0	1.21	0
Central Tank Facility	0	0	0	0	3.53	0	0	0	3.53	0
Compressor Stations	1	0	0	0	1	1	0	0	1	1
Total	32	6.3	1.38	3.8	16.01	99.19	1.8	18	13.01	69.19

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTICE

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	129	1.99%	0.71	0.01	0.17	0.00	0.11	0.00	0.13	0.00	1.40	0.03	1.30	0.03	0.99	0.02	128
Loam	1108	17.10%	1.2	0.21	0.26	0.04	0.18	0.03	0.20	0.03	2.40	0.41	2.20	0.38	1.7	0.29	1884
Sandy-loam	730	11.27%	0.84	0.09	0.19	0.02	0.13	0.01	0.10	0.01	1.80	0.20	1.70	0.19	1.2	0.14	876
Silty clay-loam	4417	68.16%	0.76	0.52	0.17	0.12	0.14	0.10	0.15	0.10	1.20	0.82	1.10	0.75	1.3	0.89	5742
Silty clay	96	1.48%	0.41	0.01	0.10	0.00	0.06	0.00	0.07	0.00	1.80	0.03	1.70	0.03	0.58	0.01	56
Sand and gravel	0	0.00%															
Total	6480	100.00%		0.84		0.19		0.14		0.15		1.49		1.37		1.34	8685

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAR

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	5.28	0.00	5.36	2.05	3.18	1.13	17.00
Year 2		0.26	1.15	1.89	1.89	0.00	5.19
Year 3		0.26	1.15	1.89	1.89	0.00	5.19
Year 4		0.26	1.15	1.89	1.89	0.00	5.19
Year 5		0.26	1.15	1.89	1.89	0.00	5.19
Year 6		0.26	1.15	1.89	1.89	0.00	5.19
Year 7		0.26	1.15	1.89	1.89	0.00	5.19
Year 8		0.26	1.15	1.89	1.89	0.00	5.19
Year 9		0.26	1.15	1.89	1.89	0.00	5.19
Year 10		0.26	1.15	1.89	1.89	0.00	5.19
Year 11		0.26	1.15	1.89	1.89	0.00	5.19
Year 12		0.26	1.15	1.89	1.89	0.00	5.19
Year 13		0.26	1.15	1.89	1.89	0.00	5.19
Year 14		0.26	1.15	1.89	1.89	0.00	5.19
Year 15		0.26	1.15	1.89	1.89	0.00	5.19

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEAR

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	17.00															17.00
Year 2	17.00	5.19														22.18
Year 3	17.00	5.19	5.19													27.37
Year 4	17.00	5.19	5.19	5.19												32.56
Year 5	17.00	5.19	5.19	5.19	5.19											37.74
Year 6	17.00	5.19	5.19	5.19	5.19	5.19										42.93
Year 7	17.00	5.19	5.19	5.19	5.19	5.19	5.19									48.11
Year 8	17.00	5.19	5.19	5.19	5.19	5.19	5.19	5.19								53.30
Year 9	17.00	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19							58.49
Year 10	17.00	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19						63.67
Year 11		5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19					51.86
Year 12			5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19				51.86
Year 13				5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19			51.86
Year 14					5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19		51.86
Year 15						5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	51.86

POWDER SPRINGS ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	1229
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	55.24 4.49% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	9
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	0.00%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHED

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	0	3.15	0.69	0.69	4.53	0	0.9	0	3.03	0
New Oil Wells	10	3.15	0.69	1.21	5.05	50.5	0.9	9	3.55	35.5
Gas Wells on Existing Pads	0	0	0	0.69	0.69	0	0	0	0.69	0
Oil Wells on Existing Pads	1	0	0	1.21	1.21	1.21	0	0	1.21	1.21
Central Tank Facility	1	0	0	0	3.53	3.53	0	0	3.53	3.53
Compressor Stations	0	0	0	0	1	0	0	0	1	0
Total	12	6.3	1.38	3.8	16.01	55.24	1.8	9	13.01	40.24

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTICE

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	0	0.00%	0.71	0.00	0.17	0.00	0.11	0.00	0.13	0.00	0.80	0.00	0.76	0.00	0.59	0.00	0
Loam	102	8.30%	1.2	0.10	0.26	0.02	0.18	0.01	0.20	0.02	1.40	0.12	1.30	0.11	0.99	0.08	101
Sandy-loam	102	8.30%	0.84	0.07	0.19	0.02	0.13	0.01	0.10	0.01	1.00	0.08	0.95	0.08	0.73	0.06	74
Silty clay-loam	1025	83.40%	0.76	0.63	0.17	0.14	0.14	0.12	0.15	0.13	1.00	0.83	0.98	0.82	0.75	0.63	769
Silty clay	0	0.00%	0.41	0.00	0.10	0.00	0.06	0.00	0.07	0.00	0.47	0.00	0.44	0.00	0.34	0.00	0
Sand and gravel	0	0.00%															
Total	1229	100.00%		0.80		0.18		0.14		0.15		1.03		1.00		0.77	944

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAR

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	2.53	0.00	2.81	0.71	0.00	1.25	7.31
Year 2		0.13	0.70	0.69	0.00	1.34	2.86
Year 3		0.13	0.70	0.69	0.00	1.21	2.74
Year 4		0.13	0.70	0.69	0.00	1.21	2.74
Year 5		0.13	0.70	0.69	0.00	1.21	2.74
Year 6		0.13	0.70	0.69	0.00	1.21	2.74
Year 7		0.13	0.70	0.69	0.00	1.21	2.74
Year 8		0.13	0.70	0.69	0.00	1.21	2.74
Year 9		0.13	0.70	0.69	0.00	1.21	2.74
Year 10		0.13	0.70	0.69	0.00	1.21	2.74
Year 11		0.13	0.70	0.69	0.00	1.21	2.74
Year 12		0.13	0.70	0.69	0.00	1.21	2.74
Year 13		0.13	0.70	0.69	0.00	1.21	2.74
Year 14		0.13	0.70	0.69	0.00	1.21	2.74
Year 15		0.13	0.70	0.69	0.00	1.21	2.74

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEAR

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	7.31															7.31
Year 2	7.31	2.86														10.16
Year 3	7.31	2.86	2.74													12.90
Year 4	7.31	2.86	2.74	2.74												15.63
Year 5	7.31	2.86	2.74	2.74	2.74											18.37
Year 6	7.31	2.86	2.74	2.74	2.74	2.74										21.10
Year 7	7.31	2.86	2.74	2.74	2.74	2.74	2.74									23.84
Year 8	7.31	2.86	2.74	2.74	2.74	2.74	2.74	2.74								26.57
Year 9	7.31	2.86	2.74	2.74	2.74	2.74	2.74	2.74	2.74							29.31
Year 10	7.31	2.86	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74						32.04
Year 11		2.86	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74					27.47
Year 12			2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74				27.35
Year 13				2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74			27.35
Year 14					2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74		27.35
Year 15						2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	27.35

KENNEDY WASH ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	21324
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	1004.34 4.71% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	189
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	4.60%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHEI

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	155	3.15	0.69	0.69	4.53	702.15	0.9	139.5	3.03	469.65
New Oil Wells	55	3.15	0.69	1.21	5.05	277.75	0.9	49.5	3.55	195.25
Gas Wells on Existing Pads	22	0	0	0.69	0.69	15.18	0	0	0.69	15.18
Oil Wells on Existing Pads	6	0	0	1.21	1.21	7.26	0	0	1.21	7.26
Central Tank Facility	0	0	0	0	3.53	0	0	0	3.53	0
Compressor Stations	2	0	0	0	1	2	0	0	1	2
Total	240	6.3	1.38	3.8	16.01	1004.34	1.8	189	13.01	689.34

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTIC

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	0	0.00%	0.71	0.00	0.17	0.00	0.11	0.00	0.13	0.00	1.00	0.00	0.96	0.00	0.75	0.00	0
Loam	1228	5.76%	1.2	0.07	0.26	0.01	0.18	0.01	0.20	0.01	1.70	0.10	1.60	0.09	1.2	0.07	1474
Sandy-loam	8497	39.85%	0.84	0.33	0.19	0.08	0.13	0.05	0.10	0.04	1.30	0.52	1.20	0.48	0.92	0.37	7817
Silty clay-loam	6954	32.61%	0.76	0.25	0.17	0.06	0.14	0.05	0.15	0.05	0.87	0.28	0.82	0.27	0.95	0.31	6606
Silty clay	4646	21.79%	0.41	0.09	0.10	0.02	0.06	0.01	0.07	0.02	0.60	0.13	0.56	0.12	0.43	0.09	1998
Sand and gravel	0	0.00%															
Total	21325	100.00%		0.74		0.17		0.12		0.12		1.03		0.96		0.84	17894

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAF

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	49.01	0.00	49.16	14.93	12.58	8.42	134.11
Year 2		2.30	11.20	13.91	10.26	7.08	44.75
Year 3		2.30	11.20	13.91	10.26	6.39	44.05
Year 4		2.30	11.20	13.91	10.26	6.39	44.05
Year 5		2.30	11.20	13.91	10.26	6.39	44.05
Year 6		2.30	11.20	13.91	10.26	6.39	44.05
Year 7		2.30	11.20	13.91	10.26	6.39	44.05
Year 8		2.30	11.20	13.91	10.26	6.39	44.05
Year 9		2.30	11.20	13.91	10.26	6.39	44.05
Year 10		2.30	11.20	13.91	10.26	6.39	44.05
Year 11		2.30	11.20	13.91	10.26	6.39	44.05
Year 12		2.30	11.20	13.91	10.26	6.39	44.05
Year 13		2.30	11.20	13.91	10.26	6.39	44.05
Year 14		2.30	11.20	13.91	10.26	6.39	44.05
Year 15		2.30	11.20	13.91	10.26	6.39	44.05

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEA

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	134.11															134.11
Year 2	134.11	44.75														178.86
Year 3	134.11	44.75	44.05													222.91
Year 4	134.11	44.75	44.05	44.05												266.96
Year 5	134.11	44.75	44.05	44.05	44.05											311.01
Year 6	134.11	44.75	44.05	44.05	44.05	44.05										355.06
Year 7	134.11	44.75	44.05	44.05	44.05	44.05	44.05									399.11
Year 8	134.11	44.75	44.05	44.05	44.05	44.05	44.05	44.05								443.16
Year 9	134.11	44.75	44.05	44.05	44.05	44.05	44.05	44.05	44.05							487.21
Year 10	134.11	44.75	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05						531.26
Year 11		44.75	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05					441.20
Year 12			44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05				440.51
Year 13				44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05			440.51
Year 14					44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05		440.51
Year 15						44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	440.51

DIRECT SEDIMENTION INTO GREEN RIVER ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	15944
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	688.07 4.32% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	129.6
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	0.00%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHEI

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	129	3.15	0.69	0.69	4.53	584.37	0.9	116.1	3.03	390.87
New Oil Wells	15	3.15	0.69	1.21	5.05	75.75	0.9	13.5	3.55	53.25
Gas Wells on Existing Pads	18	0	0	0.69	0.69	12.42	0	0	0.69	12.42
Oil Wells on Existing Pads	7	0	0	1.21	1.21	8.47	0	0	1.21	8.47
Central Tank Facility	2	0	0	0	3.53	7.06	0	0	3.53	7.06
Compressor Stations	0	0	0	0	1	0	0	0	1	0
Total	171	6.3	1.38	3.8	16.01	688.07	1.8	129.6	13.01	472.07

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTIC

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	146	0.92%	0.71	0.01	0.17	0.00	0.11	0.00	0.13	0.00	0.88	0.01	0.83	0.01	0.65	0.01	95
Loam	2756	17.30%	1.2	0.21	0.26	0.04	0.18	0.03	0.20	0.03	1.50	0.26	1.40	0.24	1.1	0.19	3034
Sandy-loam	6451	40.50%	0.84	0.34	0.19	0.08	0.13	0.05	0.10	0.04	1.10	0.45	1.00	0.40	0.8	0.32	5165
Silty clay-loam	72	0.45%	0.76	0.00	0.17	0.00	0.14	0.00	0.15	0.00	1.10	0.00	1.10	0.00	0.82	0.00	59
Silty clay	6343	39.82%	0.41	0.16	0.10	0.04	0.06	0.03	0.07	0.03	0.51	0.20	0.48	0.19	0.38	0.15	2412
Sand and gravel	162	1.02%															
Total	15930	100.00%		0.72		0.16		0.11		0.10		0.92		0.85		0.68	10766

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAF

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	32.70	0.00	33.21	9.15	9.34	2.82	87.23
Year 2		1.43	7.40	8.45	7.57	2.27	27.13
Year 3		1.43	7.40	8.45	7.57	1.54	26.41
Year 4		1.43	7.40	8.45	7.57	1.54	26.41
Year 5		1.43	7.40	8.45	7.57	1.54	26.41
Year 6		1.43	7.40	8.45	7.57	1.54	26.41
Year 7		1.43	7.40	8.45	7.57	1.54	26.41
Year 8		1.43	7.40	8.45	7.57	1.54	26.41
Year 9		1.43	7.40	8.45	7.57	1.54	26.41
Year 10		1.43	7.40	8.45	7.57	1.54	26.41
Year 11		1.43	7.40	8.45	7.57	1.54	26.41
Year 12		1.43	7.40	8.45	7.57	1.54	26.41
Year 13		1.43	7.40	8.45	7.57	1.54	26.41
Year 14		1.43	7.40	8.45	7.57	1.54	26.41
Year 15		1.43	7.40	8.45	7.57	1.54	26.41

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEA

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	87.23															87.23
Year 2	87.23	27.13														114.35
Year 3	87.23	27.13	26.41													140.76
Year 4	87.23	27.13	26.41	26.41												167.17
Year 5	87.23	27.13	26.41	26.41	26.41											193.57
Year 6	87.23	27.13	26.41	26.41	26.41	26.41										219.98
Year 7	87.23	27.13	26.41	26.41	26.41	26.41	26.41									246.39
Year 8	87.23	27.13	26.41	26.41	26.41	26.41	26.41	26.41								272.79
Year 9	87.23	27.13	26.41	26.41	26.41	26.41	26.41	26.41	26.41							299.20
Year 10	87.23	27.13	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41						325.61
Year 11		27.13	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41					264.79
Year 12			26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41				264.07
Year 13				26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41			264.07
Year 14					26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41		264.07
Year 15						26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	26.41	264.07

COYOTE WASH ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	3755
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	109.32 2.91% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	19.8
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	0.00%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHED

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	22	3.15	0.69	0.69	4.53	99.66	0.9	19.8	3.03	66.66
New Oil Wells	0	3.15	0.69	1.21	5.05	0	0.9	0	3.55	0
Gas Wells on Existing Pads	14	0	0	0.69	0.69	9.66	0	0	0.69	9.66
Oil Wells on Existing Pads	0	0	0	1.21	1.21	0	0	0	1.21	0
Central Tank Facility	0	0	0	0	3.53	0	0	0	3.53	0
Compressor Stations	0	0	0	0	1	0	0	0	1	0
Total	36	6.3	1.38	3.8	16.01	109.32	1.8	19.8	13.01	76.32

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTICE

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	0	0.00%	0.71	0.00	0.17	0.00	0.11	0.00	0.13	0.00	0.96	0.00	0.91	0.00	0.71	0.00	0
Loam	47	1.25%	1.2	0.02	0.26	0.00	0.18	0.00	0.20	0.00	1.60	0.02	1.50	0.02	1.2	0.02	56
Sandy-loam	2585	68.86%	0.84	0.58	0.19	0.13	0.13	0.09	0.10	0.07	1.20	0.83	1.10	0.76	0.87	0.60	2250
Silty clay-loam	0	0.00%	0.76	0.00	0.17	0.00	0.14	0.00	0.15	0.00	0.82	0.00	0.77	0.00	0.89	0.00	0
Silty clay	1122	29.89%	0.41	0.12	0.10	0.03	0.06	0.02	0.07	0.02	0.56	0.17	0.53	0.16	0.41	0.12	460
Sand and gravel	0	0.00%															
Total	3754	100.00%		0.72		0.16		0.11		0.09		1.01		0.93		0.74	2766

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAR

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	4.96	0.00	4.96	1.54	2.52	0.98	14.96
Year 2		0.22	1.09	1.42	1.42	0.00	4.15
Year 3		0.22	1.09	1.42	1.42	0.00	4.15
Year 4		0.22	1.09	1.42	1.42	0.00	4.15
Year 5		0.22	1.09	1.42	1.42	0.00	4.15
Year 6		0.22	1.09	1.42	1.42	0.00	4.15
Year 7		0.22	1.09	1.42	1.42	0.00	4.15
Year 8		0.22	1.09	1.42	1.42	0.00	4.15
Year 9		0.22	1.09	1.42	1.42	0.00	4.15
Year 10		0.22	1.09	1.42	1.42	0.00	4.15
Year 11		0.22	1.09	1.42	1.42	0.00	4.15
Year 12		0.22	1.09	1.42	1.42	0.00	4.15
Year 13		0.22	1.09	1.42	1.42	0.00	4.15
Year 14		0.22	1.09	1.42	1.42	0.00	4.15
Year 15		0.22	1.09	1.42	1.42	0.00	4.15

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEAR

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	14.96															14.96
Year 2	14.96	4.15														19.11
Year 3	14.96	4.15	4.15													23.26
Year 4	14.96	4.15	4.15	4.15												27.41
Year 5	14.96	4.15	4.15	4.15	4.15											31.56
Year 6	14.96	4.15	4.15	4.15	4.15	4.15										35.71
Year 7	14.96	4.15	4.15	4.15	4.15	4.15	4.15									39.86
Year 8	14.96	4.15	4.15	4.15	4.15	4.15	4.15	4.15								44.01
Year 9	14.96	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15							48.16
Year 10	14.96	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15						52.31
Year 11		4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15					41.50
Year 12			4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15				41.50
Year 13				4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15			41.50
Year 14					4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15		41.50
Year 15						4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	41.50

COW CREEK ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	605
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	23.73 3.92% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	3.6
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	0.00%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHED

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	0	3.15	0.69	0.69	4.53	0	0.9	0	3.03	0
New Oil Wells	4	3.15	0.69	1.21	5.05	20.2	0.9	3.6	3.55	14.2
Gas Wells on Existing Pads	0	0	0	0.69	0.69	0	0	0	0.69	0
Oil Wells on Existing Pads	0	0	0	1.21	1.21	0	0	0	1.21	0
Central Tank Facility	1	0	0	0	3.53	3.53	0	0	3.53	3.53
Compressor Stations	0	0	0	0	1	0	0	0	1	0
Total	5	6.3	1.38	3.8	16.01	23.73	1.8	3.6	13.01	17.73

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTICE

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	0	0.00%	0.71	0.00	0.17	0.00	0.11	0.00	0.13	0.00	0.86	0.00	0.81	0.00	0.64	0.00	0
Loam	0	0.00%	1.2	0.00	0.26	0.00	0.18	0.00	0.20	0.00	1.50	0.00	1.40	0.00	1.1	0.00	0
Sandy-loam	97	16.06%	0.84	0.13	0.19	0.03	0.13	0.02	0.10	0.02	1.10	0.18	1.00	0.16	0.78	0.13	76
Silty clay-loam	507	83.94%	0.76	0.64	0.17	0.14	0.14	0.12	0.15	0.13	0.73	0.61	0.69	0.58	0.79	0.66	401
Silty clay	0	0.00%	0.41	0.00	0.10	0.00	0.06	0.00	0.07	0.00	0.50	0.00	0.47	0.00	0.37	0.00	0
Sand and gravel	0	0.00%															
Total	604	100.00%		0.77		0.17		0.14		0.14		0.79		0.74		0.79	477

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAR

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	0.97	0.00	1.25	0.22	0.00	0.38	2.82
Year 2		0.05	0.31	0.20	0.00	0.36	0.92
Year 3		0.05	0.31	0.20	0.00	0.36	0.92
Year 4		0.05	0.31	0.20	0.00	0.36	0.92
Year 5		0.05	0.31	0.20	0.00	0.36	0.92
Year 6		0.05	0.31	0.20	0.00	0.36	0.92
Year 7		0.05	0.31	0.20	0.00	0.36	0.92
Year 8		0.05	0.31	0.20	0.00	0.36	0.92
Year 9		0.05	0.31	0.20	0.00	0.36	0.92
Year 10		0.05	0.31	0.20	0.00	0.36	0.92
Year 11		0.05	0.31	0.20	0.00	0.36	0.92
Year 12		0.05	0.31	0.20	0.00	0.36	0.92
Year 13		0.05	0.31	0.20	0.00	0.36	0.92
Year 14		0.05	0.31	0.20	0.00	0.36	0.92
Year 15		0.05	0.31	0.20	0.00	0.36	0.92

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEAR

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	2.82															2.82
Year 2	2.82	0.92														3.74
Year 3	2.82	0.92	0.92													4.66
Year 4	2.82	0.92	0.92	0.92												5.58
Year 5	2.82	0.92	0.92	0.92	0.92											6.50
Year 6	2.82	0.92	0.92	0.92	0.92	0.92										7.42
Year 7	2.82	0.92	0.92	0.92	0.92	0.92	0.92									8.34
Year 8	2.82	0.92	0.92	0.92	0.92	0.92	0.92	0.92								9.25
Year 9	2.82	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92							10.17
Year 10	2.82	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92						11.09
Year 11		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92					9.19
Year 12			0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92				9.19
Year 13				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			9.19
Year 14					0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		9.19
Year 15						0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	9.19

ANTELOPE DRAW ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA	17885
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	1169.22 6.54% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	194.4
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	6.10%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHE

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	176	3.15	0.69	0.69	4.53	797.28	0.9	158.4	3.03	533.28
New Oil Wells	40	3.15	0.69	1.21	5.05	202	0.9	36	3.55	142
Gas Wells on Existing Pads	206	0	0	0.69	0.69	142.14	0	0	0.69	142.14
Oil Wells on Existing Pads	8	0	0	1.21	1.21	9.68	0	0	1.21	9.68
Central Tank Facility	4	0	0	0	3.53	14.12	0	0	3.53	14.12
Compressor Stations	4	0	0	0	1	4	0	0	1	4
Total	438	6.3	1.38	3.8	16.01	1169.22	1.8	194.4	13.01	845.22

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTIC

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	197	1.10%	0.71	0.01	0.17	0.00	0.11	0.00	0.13	0.00	1.50	0.02	1.40	0.02	1.1	0.01	217
Loam	640	3.59%	1.2	0.04	0.26	0.01	0.18	0.01	0.20	0.01	2.50	0.09	2.40	0.09	1.8	0.06	1155
Sandy-loam	4312	24.16%	0.84	0.20	0.19	0.05	0.13	0.03	0.10	0.02	1.90	0.46	1.80	0.43	1.3	0.31	5618
Silty clay-loam	1318	7.39%	0.76	0.06	0.17	0.01	0.14	0.01	0.15	0.01	1.30	0.10	1.20	0.09	1.4	0.10	1849
Silty clay	11378	63.76%	0.41	0.26	0.10	0.06	0.06	0.04	0.07	0.05	0.86	0.55	0.81	0.52	0.62	0.40	7070
Sand and gravel	0	0.00%															
Total	17845	100.00%		0.57		0.13		0.09		0.09		1.21		1.14		0.89	15909

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAF

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	38.88	0.00	39.91	18.03	31.88	23.05	151.75
Year 2		1.74	9.25	17.01	13.86	6.63	48.50
Year 3		1.74	9.25	17.01	13.86	5.53	47.40
Year 4		1.74	9.25	17.01	13.86	5.53	47.40
Year 5		1.74	9.25	17.01	13.86	5.53	47.40
Year 6		1.74	9.25	17.01	13.86	5.53	47.40
Year 7		1.74	9.25	17.01	13.86	5.53	47.40
Year 8		1.74	9.25	17.01	13.86	5.53	47.40
Year 9		1.74	9.25	17.01	13.86	5.53	47.40
Year 10		1.74	9.25	17.01	13.86	5.53	47.40
Year 11		1.74	9.25	17.01	13.86	5.53	47.40
Year 12		1.74	9.25	17.01	13.86	5.53	47.40
Year 13		1.74	9.25	17.01	13.86	5.53	47.40
Year 14		1.74	9.25	17.01	13.86	5.53	47.40
Year 15		1.74	9.25	17.01	13.86	5.53	47.40

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEA

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	151.75															151.75
Year 2	151.75	48.50														200.26
Year 3	151.75	48.50	47.40													247.65
Year 4	151.75	48.50	47.40	47.40												295.05
Year 5	151.75	48.50	47.40	47.40	47.40											342.44
Year 6	151.75	48.50	47.40	47.40	47.40	47.40										389.84
Year 7	151.75	48.50	47.40	47.40	47.40	47.40	47.40									437.23
Year 8	151.75	48.50	47.40	47.40	47.40	47.40	47.40	47.40								484.63
Year 9	151.75	48.50	47.40	47.40	47.40	47.40	47.40	47.40	47.40							532.03
Year 10	151.75	48.50	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40						579.42
Year 11		48.50	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40					475.06
Year 12			47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40				473.96
Year 13				47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40			473.96
Year 14					47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40		473.96
Year 15						47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	47.40	473.96

BASER ASSUMPTIONS	
CATEGORY	**ASSUMPTION**
WATERSHED AREA (acres)	18812
PADS/FACILITIES	
Slope	
1st Year	4% (Assumes 20% of pad area has slopes of 20%)
2nd Year	0 - 1 %
Management Practices	
Disturbed Areas (acres)	744.38 3.96% of total watershed
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 3rd Year	Blade fill, seed short prairie grass, no mulch
4th - 15 th Year	Range grass after disturbance
Reclaimed Areas (acres)	136.8
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance
ROADS AND PIPELINES	
Slope*	5.60%
Management Practices	
1st Year	Kill/remove vegetation, blade cut, smooth, bare
2nd - 15th Year	Smooth, bare after disturbance

* Roads and pipelines follow the natural slope

ESTIMATED DISTURBANCE DUE TO DRILLING AND CONSTRUCTION ACTIVITIES IN THE WATERSHED

Baser	No. of Wells	ST DISTURBANCE					RECLAIMED AREA (acres)		LT DISTURBANCE	
		Pad (acres)	Roads (acres)	Pipelines (acres)	Dist/Well (acres)	Total (acres)	Rec/Well (acres)	Total (acres)	Acreage	Total (acres)
New Gas Wells	119	3.15	0.69	0.69	4.53	539.07	0.9	107.1	3.03	360.57
New Oil Wells	33	3.15	0.69	1.21	5.05	166.65	0.9	29.7	3.55	117.15
Gas Wells on Existing Pads	42	0	0	0.69	0.69	28.98	0	0	0.69	28.98
Oil Wells on Existing Pads	8	0	0	1.21	1.21	9.68	0	0	1.21	9.68
Central Tank Facility	5	0	0	0	0	0	0	0	3.53	17.65
Compressor Stations	6	0	0	0	0	0	0	0	1	6
Total	213	6.3	1.38	3.8	11.48	744.38	1.8	136.8	13.01	540.03

ESTIMATED SOIL LOSS DUE TO WELLS/ROADS/PIPELINES/FACILITIES BY SOIL TYPE AND MANAGEMENT PRACTICE

SOIL TYPE	AREA (acres)	AREA (%)	SOIL LOSS														
			PADS/FACILITIES								ROADS/PIPELINES				UNDISTURBED LANDS		
			MP1 1YR		MP 2 2YR-15YR		MP3 2YR-3YR		MP4 4YR-15YR		MP1 1YR		MP 2 2YR-15YR				
			Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss Rate (t/ac/yr)	Soil Loss (t/ac/yr)	Soil Loss (t/yr)
Clay-loam	664	3.53%	0.71	0.03	0.17	0.01	0.11	0.00	0.13	0.00	1.30	0.05	1.20	0.04	0.95	0.03	631
Loam	2467	13.11%	1.2	0.16	0.26	0.03	0.18	0.02	0.20	0.03	2.20	0.29	2.10	0.28	1.6	0.21	3947
Sandy-loam	12130	64.48%	0.84	0.54	0.19	0.12	0.13	0.08	0.10	0.06	1.70	1.10	1.60	1.03	1.2	0.77	14557
Silty clay-loam	690	3.67%	0.76	0.03	0.17	0.01	0.14	0.01	0.15	0.01	1.70	0.06	1.60	0.06	1.2	0.04	828
Silty clay	2860	15.20%	0.41	0.06	0.10	0.02	0.06	0.01	0.07	0.01	0.77	0.12	0.72	0.11	0.55	0.08	1573
Sand and gravel	0	0.00%															
Total	18811	100.00%		0.81		0.18		0.13		0.11		1.61		1.52		1.14	21536

ESTIMATED SOIL LOSS FOR 10% OF WELLS/FACILITIES PER YEAR

	Pads (tons)			Roads (tons)	Gas Pipelines (tons)	Oil Pipelines (tons)	Total
	ST Disturbance	Reclaimed Disturbance	LT Disturbance				
Year 1	38.99	0.00	40.92	16.89	17.89	11.09	125.77
Year 2		1.72	9.23	15.92	12.46	7.53	46.86
Year 3		1.72	9.23	15.92	12.46	6.06	45.39
Year 4		1.72	9.23	15.92	12.46	6.06	45.39
Year 5		1.72	9.23	15.92	12.46	6.06	45.39
Year 6		1.72	9.23	15.92	12.46	6.06	45.39
Year 7		1.72	9.23	15.92	12.46	6.06	45.39
Year 8		1.72	9.23	15.92	12.46	6.06	45.39
Year 9		1.72	9.23	15.92	12.46	6.06	45.39
Year 10		1.72	9.23	15.92	12.46	6.06	45.39
Year 11		1.72	9.23	15.92	12.46	6.06	45.39
Year 12		1.72	9.23	15.92	12.46	6.06	45.39
Year 13		1.72	9.23	15.92	12.46	6.06	45.39
Year 14		1.72	9.23	15.92	12.46	6.06	45.39
Year 15		1.72	9.23	15.92	12.46	6.06	45.39

ESTIMATED SOIL LOSS BASED OF THE INSTALLATION OF WELLS AND FACILITIES AT A RATE OF 10% PER YEAR

OPERATIONAL YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Year 1	125.77															125.77
Year 2	125.77	46.86														172.63
Year 3	125.77	46.86	45.39													218.02
Year 4	125.77	46.86	45.39	45.39												263.41
Year 5	125.77	46.86	45.39	45.39	45.39											308.80
Year 6	125.77	46.86	45.39	45.39	45.39	45.39										354.20
Year 7	125.77	46.86	45.39	45.39	45.39	45.39	45.39									399.59
Year 8	125.77	46.86	45.39	45.39	45.39	45.39	45.39	45.39								444.98
Year 9	125.77	46.86	45.39	45.39	45.39	45.39	45.39	45.39	45.39							490.37
Year 10	125.77	46.86	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39						535.76
Year 11		46.86	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39					455.38
Year 12			45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39				453.91
Year 13				45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39			453.91
Year 14					45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39		453.91
Year 15						45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	45.39	453.91

APPENDIX 6-1

COMMENTS LETTERS

ON THE GREATER DEADMAN BENCH

DRAFT ENVIRONMENTAL IMPACT STATEMENT

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE

2369 WEST ORTON CIRCLE, SUITE 50

WEST VALLEY CITY, UTAH 84119

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In Reply Refer To
FWS/R6
ES/UT
FA-0264

March 24, 2006

Memorandum

To: Greater Deadman Bench Project Manager, Bureau of Land Management, 170 South 500 East, Vernal, Utah 84078

From: Utah Field Supervisor, Ecological Services, U.S. Fish and Wildlife Service, West Valley City, Utah

Subject: Draft Environmental Impact Statement on the Proposed Greater Deadman Bench Region Oil and Gas Field Development; 1792 UT080-P

The Fish and Wildlife Service (Service) has reviewed your January 2006 letter regarding Questar Exploration and Production Company's (QEP) proposed oil and gas field development project within the Greater Deadman Bench Region. The proposed action would include constructing 1,020 natural gas wells, 219 oil/water injection wells, 169 miles of access roads, 193 miles of pipelines, 41 miles of oil flowlines, 15 compressor stations, and 22 central tank facilities. Long term surface disturbance throughout the project area over the life of the project is estimated at 4,561 acres. The maximum water use during the 10-year development phase would be 2,408 acre-feet per year. The project area is approximately 98,785 acres within Townships 6 to 8 South and Ranges 21 to 25 East, Uintah County, Utah.

Your letter requested comments regarding the draft EIS. The Service provides recommendations for protective measures for threatened and endangered species in accordance with the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et. seq.*). Protective measures for migratory birds are provided in accordance with the Migratory Bird Treaty Act of 1918 (MBTA), as amended (16 U.S.C. 703 *et. seq.*) and the Bald and Golden Eagle Protection Act of 1940 (BGEPA), as amended (16 U.S.C. 668 *et. seq.*). Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, 48 Stat. 401, as amended (16 U.S.C. 661 *et. seq.*).

General Comments

The abstract for the proposed field development states 1,010 new gas wells will be drilled but tables S-1 page S-11 and 2.3 page 2-15 show 1,020. Also, table S-1 shows 891 new well pads will be constructed under the proposed action while table 2.3 lists 893 new well pads. Please verify numbers and any acreage calculations throughout.

On page 2-3, the last paragraph states that the requirement for lining the reserve pit would be site-specific. We recommend following the Guidance for Determining Pit Lining Requirements found within the Utah Division of Oil, Gas and Mining's *Environmental Handbook: Environmental Regulations for the Oil & Gas Exploration and Production Industry* (http://ogm.utah.gov/oilgas/PUBLICATIONS/Handbooks/envbook.htm). Soil type is only one factor to consider when determining whether a liner is needed. Other factors such as distance to groundwater, distance to wells, distance to surface water, fluid type, etc. are taken into consideration when evaluating the need for a liner. Absent site-specific evaluations, we recommend all pits be lined.

Best Management Practices

We commend QEP for being proactive and planning the field development using best Management Practices (BMPs). We appreciate your inclusion of standards for power line construction as outlined in the Suggested Practices for Raptor Protection on Power Lines (Edison Electrical Institute 1996) (Section 2.3.4 page 2-25).

QEP commits to monitoring and controlling noxious and invasive weeds (Section 2.3.5 page 2-25). We recommend that success criteria, frequency of control, and monitoring protocols be incorporated into the Pesticide Use Proposal.

Bald Eagle

Section 3.6.8.3, page 3-71, states there are four nesting sites within Utah. Currently, there are eight nesting pairs within Utah (http://mountain-prairie.fws.gov/endspp/CountyLists/UTAH.htm).

The determination on page 4-36 states that the proposed action "may affect is not likely to adversely affect" the bald eagle. Because mortality could potentially occur, the determination should be "may affect, likely to adversely affect". In addition to the applicant committed BMPs described in chapter 2 and the mitigation measures outlined in 4.6.2, we recommend incorporating the following measures to minimize the impacts to bald eagle:

1. Temporary activities within 0.5 miles of winter roost areas, e.g., cottonwood galleries, will not occur during the winter roost season of November 1 to March 31, unless the area has been surveyed according to protocol and determined to be unoccupied.
2. No permanent infrastructure will be placed within 0.5 miles of winter roost areas.
3. Avoid loss or disturbance to large cottonwood gallery riparian habitats.
4. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in suitable habitat Utilize directional drilling to avoid direct impacts to large cottonwood gallery riparian habitats. Ensure that such directional drilling does not intercept or degrade alluvial aquifers.
5. All areas of surface disturbance within riparian areas and/or adjacent uplands should be re-vegetated with native species.

Raptors

To help meet responsibilities under the Migratory Bird Treaty Act (16 U.S.C. 703-712), Executive Order 13186, and the Bald and Golden Eagle Protection Act of 1940 (BGEPA), as amended (16 U.S.C. 668 *et. seq.*), we recommend implementing the guidelines for avoiding and minimizing impacts to raptor species as described in the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Romin and Muck, 2002). The guidelines state that "long term land use activities and human use activities should not occur within the species-specific spatial buffer zone of occupied nests." Furthermore, long-term land use activities should not occur proximally to unoccupied nests unless it is determined that mitigation is appropriate and can be accomplished prior to initiation of the long-term disturbance.

Horseshoe Milkvetch

In the second paragraph of the horseshoe milkvetch section on page 4-21, the milkvetch is referred to as a cactus, please correct.

QEP commits to surveying potential habitat prior to any surface disturbance. We request that all survey results, whether or not plants are found, are provided to this office.

In the fourth paragraph of this section, it is unclear as to what mitigation would be used within horseshoe milkvetch habitat against weed invasion. In order to provide protection to this candidate species, we do not recommend mechanical or herbicide treatments in areas that will impact occupied habitat.

Effects to Federally Listed Fish Species

The EIS states the water depletion fee is $16.30 per acre-foot (page 4-39). The current water depletion fee is $16.67 and this fee changes annually. It appears from Figures 2-1 and 3.2-1 that there are proposed wells located within or impacting the designated critical habitat for the endangered Colorado River fish species. The analysis presented in 4.6.1.1 for the Endangered Colorado River Fish does not analyze the effects of the proposed action (drilling within the floodplain of the Green River) to the fish or its designated critical habitat. Absent this analysis and the full disclosure of effects, we recommend that well pads, roads, and pipelines should not be placed within designated critical habitat. Impacts to endangered fish or their habitats should be fully assessed through section 7 consultation with our office. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in the designated critical habitat.

Floodplains

We recommend no well pads be placed within the 100-Year floodplain. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in the 100-Year floodplain.

Seed Mixes

We recommend removing crested wheatgrass from the seed mixes listed in Attachment 2 as this introduced species has not been shown as occurring in the area (section 34.5.2 Vegetation Communities).

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have further questions regarding our comments or if we can be of further assistance, please contact Bekee Megown at (801) 975-3330 extension 146.

cc: BLM State Office

Literature Cited

Edison Electric Institute. 1996. Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996. Avian Power Line Interaction Committee, the Edison Electric Institute, and the Raptor Research Foundation, Washington, D.C., 1996.

Romin, L.A., and J.A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildl. Serv., UT Field Office, Salt Lake City, UT.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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MAR 27 2006

Ref: EPR-N

Stephanie Howard, Project Manager
Bureau of Land Management
Vernal Field Office
170 South 500 East
Vernal, UT 84078

Re: Draft Environmental Impact Statement (EIS) for Questar Exploration and Production Company – Greater Deadman Bench Oil and Gas Producing Region
CEQ # 20060038

Dear Ms. Howard:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency Region 8 (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) on the Greater Deadman Bench Oil and Gas Producing Region (GDBR) as proposed by Questar Exploration and Production Company (QEP). EPA appreciates the opportunity to review the Proposed Action and offers the following comments for your consideration.

The GDBR project area is located in eastern Uintah County approximately 20 miles south of Vernal, Utah. Questar E&P (QEP) proposes to exercise their valid oil and gas mineral leases in the GDBR and fully develop the oil and gas resources. The project includes the drilling and development of a total of 1,020 natural gas wells and 219 oil/water injection wells for a total of 1,239 wells. Of the total number of wells for this project, 891 wells are proposed in new locations with the remaining 348 wells "twinned" to an existing well pad. Additionally, there will be 170 miles of new access roads, 235 miles of new pipelines/flowlines, and a total of 37 new ancillary facilities constructed. The 98,785-acre project area is located entirely within the exterior boundaries of the Uintah and Ouray Indian Reservation. The surface and mineral estate ownership is approximately 85% Federal lands administered by BLM and 12% owned by the State of Utah, with the remaining 3% of the project area privately owned. QEP holds leases on 79% of the federal, state, and private lands. The anticipated life of the project is 40 years, with the construction phase occurring in the first ten years or until full development of the resource.

Current land use in the GDBR is primarily oil and gas development, rangeland for cattle and sheep operations, utility corridors, and wildlife habitat. The area also includes limited

opportunities for recreational activities such as fishing, big game hunting, hiking, and off-highway vehicles. We understand that this project has the potential to significantly impact soils with 85% of the project area classified as severe to moderate erosion potential. There are also concerns related to project impacts on vegetation and wildlife. Potentially present within the vicinity of the GDBR are about eighteen special status species (2 plants, 2 mammals, 7 birds, and 7 fish), including ten species listed as threatened, endangered, proposed, or candidates under the federal Endangered Species Act (ESA) and the others found on the BLM Sensitive Species List.

Alternatives considered: The GDBR Draft EIS analyzed two alternatives, the Proposed Action and the No Action Alternative. Alternative A, the Proposed Action, is the only alternative considered in detail that meets the purpose and need. While Alternative B, the No Action Alternative, was analyzed in detail, this alternative does not meet the purpose of the proposed action to fully recover oil and natural gas on these previously leased lands.

Range of Alternatives: The DEIS fails to compare the proposed action to any alternative that meets the purpose of QEP utilizing its valid existing rights on these previously leased lands to develop oil and natural gas. "The range of alternatives considered in an EIS is important because the decision maker can only choose from alternatives or combinations of specific parts of an alternative that have been analyzed" (see *Reasonably Foreseeable Development Scenarios and Cumulative Effects Analysis for Oil and Gas Activities on Federal Lands*, Rocky Mountain Federal Leadership Forum, August 30, 2002, page 38). In addition, CEQ regulations, which require analysis of all reasonable alternatives, clearly contemplate that an EIS should evaluate reasonable alternatives in addition to the proposed action. The alternatives analysis "should present the environmental impacts *of the proposal and the alternatives* in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public", 40 CFR 1502.14 (emphasis provided). Only by providing a broad range of alternatives to consider in the EIS process can the decision maker have latitude in managing the development of the resource and its resulting environmental impacts. The GDBR Draft EIS lacks this basic requirement of an EIS. Therefore, a Supplemental Draft EIS or the Final EIS must consider reasonable alternatives, in addition to the proposed action, in order for reviewers to evaluate their comparative merits.

EPA recommends that a Supplemental Draft EIS or the Final EIS analyze a range of alternatives that will meet the purpose and need to provide for oil and gas drilling and development while assuring adherence to appropriate and necessary environmental protections. An appropriate range of alternatives may be selected by reassessing one or more of the alternatives considered but not evaluated in detail (see the DEIS pages 2-27 to 2-32). We suggest that a range of alternatives and an "environmentally preferred" alternative could be developed from the following four examples with features that include: 1) phased development; 2) site-specific directional drilling to reduce surface disturbance; 3) assuring all well locations meet environmental setback requirements; and 4) protecting the Green River floodplain though well-setbacks and other measures.

1. Phased Development: An alternative to delay access to certain leases for an extended period of time was considered in the DEIS (Section 2.4.2 Suspension of Operations) but rejected

from further analysis because it was determined to "merely put off environmental effects for the period of the suspension of lease access" (see page 2-28). However, this alternative should be given further consideration, as a phased development process could be designed to lessen impacts as drilling and production occurs sequentially across the Greater Deadman Bench area. Phased development could decrease the distances between each new rig setup, address issues of unitization and gas capture, and reduce field-related vehicular traffic. Phasing development also allows time for additional technological advancements, such as improving directional drilling methods, which could result in increased oil and gas production with fewer environmental impacts. Experience and knowledge gained from each development phase can be used to better plan and implement the subsequent phases.

2. Directional Drilling Alternative: A full-field directional drilling alternative (Section 2.4.4) was considered and rejected from further analysis in the DEIS. The DEIS recognizes that "consideration of directional drilling as an option for a site-specific situation may be appropriate," such as to avoid surface disturbance near prairie dog towns or floodplains in the GDBR (see page 2-28). According to the Draft EIS, full-field directional drilling would be an infeasible means of achieving the purpose of the proposed action. However, QEP has already successfully completed several directionally-drilled oil wells in GDBR from a single well pad at 40-acre down hole spacing. Directional drilling was performed in that case because the steep topography made it impractical to construct an individual pad and access for each well (see DEIS page 2-30). Based on the economic analysis provided in the Draft EIS, it appears that directional drilling would be economically feasible for the portion of the field where there are low risks such as the infill locations and are also within the exceptional recovery area. We suggest that the final EIS reconsider the alternative of directional drilling in all portions of the field with these characteristics.

3. Minimum Setback Distances Alternative: An alternative that assures adherence to all minimum setback distances from riparian zones, floodplains, springs, or sensitive wildlife, geologic, and cultural resource areas could be used to highlight where such conflicts may occur. BLM's Vernal Resources Management Plan (RMP) established that wells should be located outside of the 100-year floodplain or up to 200 meters (660 feet) from the river. Since the alternative of not allowing well development near these sensitive areas appears to substantially meet the stated purpose of the project, it should be fully evaluated in the Final EIS. EPA recommends consideration of an alternative that includes setback distances for specific locations to analyze the difference in environmental effects compared to the proposed action and other alternatives.

4. Green River Protection Alternative: An alternative that has no well pad development within the Green River floodplain could be fully developed in the Supplemental Draft EIS or the Final EIS. EPA has concerns with the impacts of the proposed wells within the riparian corridor along the Green River. There are proposed wells within the Green River floodplain located on BLM administered and private lands. As stated previously, BLM has a policy to require wells to be located 200 meters from the river or outside of the 100-year floodplain. While such locations are subject to approval at the APD stage, it is unclear whether the proposed action would approve these setback distances or grant waivers. Since the alternative of not allowing well development

in the Green River corridor and floodplain appears to substantially meet the stated purpose of the project, it should be fully evaluated in a Supplemental DEIS or the Final EIS. This alternative may still be considered for wells proposed on private lands since CEQ's guidance to lead agencies acknowledges that an alternative outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable (see 40 CFR 1502.14(c) and CEQ's 40 Questions and Answers about NEPA, Question 2b).

EPA Rating

Thank you for the opportunity to review the Draft EIS on the QEP Greater Deadman Bench Oil and Gas Producing Region. EPA rates this DEIS in Category EC-2, meaning we have Environmental Concerns with the proposed action regarding impacts to riparian areas and wildlife habitat. The "2" rating means that additional information is needed. Specifically, a Supplemental Draft EIS or the Final EIS should analyze an adequate range of alternatives to the proposed action in order to comply with the provisions of NEPA. A description of EPA's EIS rating system is enclosed.

If you have any questions or would like to discuss our comments, please contact Jennifer Slavick of our staff at 303/312-6807 or me at 303/312-6004.

Sincerely,

Larry Svoboda
Director, NEPA Program
Office of Ecosystems Protection
and Remediation

Enclosure

Detailed Comments by the Environmental Protection Agency
Draft Environmental Impact Statement (EIS) for Questar E&P Company Greater Deadman Bench Oil and Gas Producing Region
Bureau of Land Management, Vernal, Utah

General concerns:

1) EPA direct implementation in Indian County: As you are aware the project area is located on Indian country lands within the exterior boundaries of the Uintah and Ouray Indian Reservation. Therefore, EPA directly implements our federal environmental protection programs with regard to activities associated with the proposed project. This includes permitting authority for the proposed water injection wells for enhanced recovery and any produced water disposal wells pursuant to the Underground Injection Control (UIC) program as authorized by the Safe Drinking Water Act. Please contact Tracy Eagle, EPA Region 8 UIC Program Director at 303/312-6373 for further information on EPA's implementation of the UIC permitting program for this project.

2) Pilot Office Coordination: We understand that the BLM Office in Vernal, Utah was designated as a pilot project office under Section 365 of the Energy Policy Act to "improve the efficiency of processing oil and gas use authorizations on public lands." A key goal of this effort is to maintain or enhance environmental protection through an effective oil and gas enforcement program for operations on Federal lands. (For further information, see MOU on implementing Section 365 signed by representatives of the EPA, Interior, Forest Service and the Department of the Army, October 19, 2005.)

3) Pilot Office Enforcement: It may be possible to improve the frequency of field inspections regarding environmental compliance based on the additional staffing provided to the Pilot Offices. We request that the Final EIS specify the number of staff and percentage of time allocated to enforcement inspection. It would be appropriate for members of the public and the Tribal members to be able to receive quarterly or semi-annual reports of field compliance with all environmental stipulations or any waivers to such stipulations.

4) Management, Mitigation, and Monitoring: Throughout the DEIS, there are many activities described that require management, mitigation, and monitoring of construction and operational project impacts, as well as reclamation status and effectiveness. BMPs must be implemented during construction and operation, water quality is monitored, road access control methods and devices are utilized and monitored, weeding and seeding operations are performed and monitored, drill pad and facility maintenance and decommissioning activities occur, and other activities important to environmental protection are implemented. Details will be required for accomplishing these activities in each annual work plan. It is important to specifically designate which entity (BLM, the Operators, resource organizations, or some combination) will be in charge of what activity, and who will have specific enforceable accountability. All management, mitigation, and monitoring should be verifiable, and an agency/entity needs to be held accountable for performance oversight, both throughout the project life and after the project has been decommissioned. Please provide additional detail in the Final EIS on the issues discussed above. We also recommend that BLM provide public disclosure of these performance

oversight activities.

5) Revegetation Concerns: In Section 4.4, it is stated that the project area would be difficult to re-vegetate due to high erosion potentials and poor topsoil and soils with the potential for severe water erosion in about 45% of the GDBR. Although there are a number of mitigation measures proposed, reports indicate that reclaimed areas have not shown much success to date and many disturbed areas currently show increased erosion, weed infestations, and low native vegetation cover. Studies also show that new roads can become a pathway for the spread of invasive plants. We suggest that the Final EIS address the control of such intrusions via new roads during the initial review and planning stages and document the implementation of proper management and mitigation measures.

Detailed comments by page:

Page 1-11: Table 1-1 presents the issuing agency for major permits, approvals, and authorizing actions required for QEP's Deadman Bench Oil and Gas Development Project. The entire 98,785-acre project area lies within the exterior boundaries of the Uintah and Ouray Indian Reservation and therefore the authority to approve and issue Underground Injection Control (UIC) permits for the produced water disposal wells is the Region 8 Office of the EPA. In other words, regardless if these disposal wells are proposed on Tribally-owned surface, State-owned surface, or public lands under BLM's management, the GDBR is entirely within Indian Country where EPA is the permitting authority for these activities under the Safe Drinking Water Act. EPA also has jurisdiction over the National Pollutant Discharge Elimination System (NPDES), NPDES General Permit for Storm Water Discharges, and New Source Review (NSR) Permit, Prevention of Significant Deterioration (PSD), which are listed under the Utah Department of Transportation in Table 1.1 of the DEIS. The Final EIS should list those permits under EPA authority, as appropriate.

Page 2-30: The economic rationale used to reject the full-field directional drilling alternative is unclear. The DEIS acknowledges that for the proposed deep gas wells, "completion times and cost are not appreciably impacted by directional drilling" (see page 2-29). For the deep oil wells, the analysis indicates that a directional well would cost about 19% more, or approximately $140,000 more, than a conventional vertical well. Despite such increased drilling costs, the economic analysis provided in the Draft EIS indicates that "unrisked" directional wells in the exceptional recovery area would have a favorable return on investment exceeding 20% based on a gas price of $4.84 per thousand cubic feet. Current limitations regarding the technical and economical aspects of directional drilling should be updated from the information provided by a 2004 QEP report because the advances in directional drilling technologies are very rapid.

Page 3-33: Although table 3.3-3 lists air quality standards, the Affected Environment section lacks a similar table to summarize background concentrations of air pollutants. Footnotes to tables 4.3-4 and 4.3-5 cite some background concentrations, but not their sources or other details. In the Final EIS, please include a table that lists background concentrations, including the sources of the data and the statistics selected (for example, a 24-hr PM_{10} concentration as either the highest or the second highest monitored value, an eight-hour CO concentration as the second-

highest non-overlapping average, and a one-hour CO concentration, a 24-hour SO_2 concentration, and a three-hour SO_2 concentration as the second-highest averages in their reporting periods).

Page 4-6: According to section 4.3.1.1, an Air Quality Technical Support Document is available from the Vernal Field Office. Please send a copy of the document to EPA Region 8. We also ask that, in the future, the VFO send copies of air quality technical support documents for our review concurrent with Draft EISs, consistent with existing guidelines from the Federal Leadership Forum.

Page 4-8: A paragraph in the section on near-field impacts at the bottom of page 4-8 refers to potential concentrations of air pollutants "after all construction would be complete," referring to the near-field analysis of operational emissions. However, the percentages of air quality standards mentioned in this paragraph do not match the direct project impacts or the project impacts combined with background listed in table 4.3-5. Please clarify this section and its accompanying table. The last paragraph of the subsection on far-field impacts (page 4-11) discusses the potential maximum visibility impact at the Ouray National Wildlife Refuge, which has a Class II designation. Potentially, up to four days having a visibility change greater than 1.0 deciview (Δdv) could occur, with the maximum impact being 1.51 Δdv. The context suggests this would be a direct impact of project emissions and not a cumulative impact; please clarify whether this is the case.

Page 4-11: Section 4.3.2 on mitigation begins with a reference to the permitting authority of the Utah Department of Environmental Quality, Division of Air Quality. As stated above, EPA has authority for air permits in Indian Country on the Uintah and Ouray Reservation. Please revise this statement.

Page 4-12: There is no Figure 3.4-2 that illustrates the erosion potential.

Page 4-18: Regarding the direct and indirect impacts to vegetation communities, the Utah BLM has a state-wide policy (UT-93-93) that protects riparian habitat on BLM lands. This policy "requires that riparian areas be maintained and/or improved to Proper Functioning Condition".

Page 5-9: The list of proposed oil and gas NEPA projects in the Vernal Field Office should also include a similar list for the oil and gas NEPA projects being developed from the Bureau of Indian Affairs area office in Ft. Duchesne, Utah. A number of these projects, including Brundage Canyon, West Brundage Canyon, Tabby Canyon and Antelope Creek projects are mentioned on page 5-11. These projects were the subject of past Environmental Assessments and Findings of No Significant Impact by the BIA. In addition, this list should include Ute/FNR's gas development project on the former Naval Oil Shale Reserve #2 (NOSR#2) with the notation that federal action is not required for oil and gas development on these lands. NOSR#2 was transferred to the Ute Tribe under the Strom Thurmond National Defense Authorization Act, as amended by the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001. In 2004, Congress enacted the Native American Technical Corrections Act which provides that the NOSR#2 lands conveyed to the Tribe "no exploration, development,

or other agreement relating to the land that is authorized by resolution by the governing body of the Tribe, shall require approval by the Secretary of the Interior or any other Federal official."

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements

Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections: The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns: The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections: The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory: The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - - Adequate: EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information: The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate: EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

Office of the Governor
PUBLIC LANDS POLICY COORDINATION

LYNN H. STEVENS
Public Lands Policy Coordinator

RESOURCE DEVELOPMENT COORDINATING COMMITEE
Public Lands Section

RECEIVED
MAR 21 2006
BLM VERNAL, UTAH

March 15, 2006

Stephanie Howard, Project Manager
Bureau of Land Management
Vernal Field Office
170 South 500 East
Vernal, Utah 84078

SUBJECT: Greater Deadman Bench Region
Project No. 06-6221

Dear Ms. Howard:

The Resource Development Coordinating Committee (RDCC) has reviewed this proposal. The Department of Environmental Quality/Division of Water Quality comments:

Wells should be drilled and managed to prevent degradation of water quality through measures to limit erosion, limit stormwater runoff, and limit pollutant loading to stormwater runoff.

1. Wellpad placement or expansion disturbs soils. Vegetative and/or structural measures to control erosion should be implemented within 60 days of initial soil disturbance to prevent erosion leaving the site from exceeding the tolerable rate as determined by the local office of USDA/NRCS.

2. If vegetation surrounding the wellpad does not provide at least 60% ground cover within 60 days of creating the wellpad, engineering practices should be implemented within those 60 days to control erosion. Such engineering measures may include mulching, use of fiber mats, cross slope trenching, contour furrows, rock dams, terracing or such other erosion control practices as are required to prevent erosion from exceeding the tolerable rate as defined by the USDA Natural Resource Conservation Service.

3. No disturbance or degradation, to or of surrounding or nearby soils, native or beneficial vegetation or riparian areas should be permitted beyond the defined wellpad or permitted roads.

4. In addition, no spills nor runoff of chemicals including hydrocarbons, lubricants, salt water, antifreeze, or other potentially damaging materials should be permitted.

5. Before wellpad use is discontinued, permit holder should restore the site to prevent stormwater runoff from exceeding water quality standards. Erosion from the site should not exceed the tolerable rate as established by the local office of USDA/ RCS while the wellpad site is in use, or when it is no longer in active use. No petrochemicals, salt, pesticides, or other introduced potential pollutants should be left such that they might be eroded, dissolved, blown,

or otherwise carried away to become potential pollutant loads.

6. Any roads created should be limited in duration to not extend beyond the life of mineral rights lease. Access road and pipeline easements should include restrictions and requirements to prohibit erosion rates from exceeding the tolerable rate as established by USDA/NRCS. For pipelines, this may require seeding and establishment of vegetation following pipeline placement, or it may require other measures of stabilization, infiltration enhancement, and/or retention of runoff waters. Requirements could be developed for preventing or reducing such potential erosion which might include standards for:

a, Revegetation to ground cover level > or = to conditions prior to pipeline.

b. Structural BMPS to infiltrate runoff from slopes in pipeline excavation > 5 % for > 10 ft.

c. Maintaining the erosion rate on the pipeline below the standard NRCS acceptable level.

d. Structural BMPS to capture sediment and suspended solids in runoff before it would enter intermittent or perennial streams, or washes, or gullies.

7. It would be prudent to consult with USDA/NRCS to consider appropriate standards of erosion control to adopt into such requirements.

8. It would be beneficial to require implementation of road standards for the road easements similar to what are currently required for roadways on the Price District of BLM lands. The Price, Utah Field Office, US Bureau of Land Management has developed Hydrologic Modification Standards for Roads which have been required for several years. Leasors have found that while meeting the requirements requires a slightly higher initial expense in road construction, costs to maintain the roadways are significantly reduced. And leasors find that compared with other roads, roads constructed to these standards remain much more accessible and useful through unfavorable weather conditions and seasons. With this experience, some leasers now implement the standards even where they are not required. To protect the natural resources of Utah, to protect water quality, reduce erosion, improve accessibility and longevity of roadways, and to reduce long term costs for road maintenance, our office recommends and strongly advises that provisions similar to the Price Field Office Hydrologic Modification Standards for Roads (copied below) be included in all future mineral leases offered through Trust Land Administration.

The Committee appreciates the opportunity to review this proposal. Please direct any other written questions regarding this correspondence to the Resource Development Coordinating Committee, Public Lands Section, at the above address or call Jonathan Jemming at (801) 537-9023 or Carolyn Wright at (801) 537-9230.

Sincerely,

John Harja
Director
Resource Development Coordinating Committee
Public Lands Section

/attachment

Price Field Office –
Hydrologic Modification Standards for Roads
K. Flood – Hydrologist
Updated October 14, 2003

I. Surface Water Channel Crossing Criteria:

(1) Crossings which require a CWA-404 or GP-40 channel alteration permit, as determined by the Utah Division of Water Rights, are to be engineered if they are part of a federal Right of Way permit application.

(2) Channel crossings requiring culverts with individual or cumulative diameters of 30 inches or greater are to be engineered, and sized to the 25 year, 6 hour event at a minimum.

A. The commonly used sizing equations for culverts or other flow conveyances might not be reliable if there are no local precipitation stations from which to obtain accurate values. Isohyets are generated from available data. Often, the isohyet values given for remote areas have large errors associated with them. In such cases, run-off and stream flows should be obtained from hydrographs if available, measured directly if possible, or estimated based on channel dimension measurements.

(3) Wherever possible, roads should be aligned perpendicular to channels at crossings.

(4) Crossings on perennial channels which require structures or channel modification, including bank disturbance, are to be engineered. Crossings on intermittent and ephemeral channels may require engineering on a case by case basis.

(5) Culverts should connect a channel at existing points on both sides of the road. Realignment of channels is strongly discouraged. If realignment is the only option, engineering shall be done to ensure channel parameters are preserved as described in I. (6) A, B, and C.

(6) Engineered designs will ensure that crossings do not cause changes to the existing channel parameters as follows:

A. Cross Sectional Dimensions: Changes to the cross sectional dimensions of a channel destabilize streams. An altered channel often undergoes a series of undesirable changes before restabilizing. Significant widening and downcutting can occur, followed by the formation of a new channel within the widened area. This process results in significant soil loss, degrading water quality. Local ground water levels are often lowered, which can cause changes in vegetation.

1. width, as measured at bankfull level: Factors which influence width are:

a. flow velocity: Velocity of flow exiting the crossing must equal velocity of flow entering the crossing. Where culverts are used, a 'V' shaped flow guide (i.e., wing walls) should be installed

at the inlet. At the outlet, a 'U' shaped guide should be used to return flow to the original width, depth, and velocity. Also see criteria I. (6) A. 1. d. and I. (6) A. 2. b.

b. flow magnitude: Avoid changes in flow magnitude within the channel. Where a flood plain is present, flows from the flood plain must not be converged with channel flow. Each flood plain must be reestablished at the crossing outlet, with flow discharged at the same velocity, width, and depth as found immediately upstream of the inlet. Where culverts are used, the flood plains should have individually sized culverts, and each must be properly placed. Combination culvert/low-water crossings may be used, allowing flood level flows to go over the road. The same principles apply, differences in flow velocity on the flood plains must be considered in crossing designs. See I. (6) A. 2. a. and I. (6) A. 2. b.

c. size and type of transported sediment: Avoid creating changes in sediment load via use of erosion controls during construction and by replacing vegetation as soon after construction as possible.

d. bed and bank materials: Introduced bed and/or bank materials should have a friction coefficient similar to that of the natural channel, except where specifically designed to adjust flow velocity, and must be installed so as to withstand high flows and floods without dislodging.

2. depth, as measured from thalwag to bankfull level: The practice of installing culverts at a slope less than the natural channel bed slope to adjust flow velocity should be discontinued if changes to channel depth are to be avoided. This would also serve to reduce head at the inlet which can occur from the flow velocity change caused by the difference in culvert slope and bed slope.

a. Culverts should generally be installed with approximately ten percent of the diameter below the channel bed, provided rock or concrete aprons are included at the inlet and outlet, each flush with the original bed surface. Unless the bed is armored, both the inlet and the outlet must be installed at the existing bed level. Exceptions to this may be prescribed to reverse a preexisting downcutting problem without incurring additional costs.

b. Adjust flow velocity using an energy dissipating rock apron at the outlet.

B. Stream Channel Patterns:

1. radius of curvature: The following equation gives a relationship for the radius of curvature of meander bends to meander length and sinuosity.

$$R = L_m K^{-1.5} \div 13(K-1)^{0.5}$$

where: R = radius of curvature
L_m = meander length
K = sinuosity

and: $K = L_c \div L_v$; which may be approximated by $m_v \div m_c$

where: L_c = channel length
L_v = valley length
m_v = valley slope
m_c = channel slope
This relationship shows that parameters of a realignment can be made to mimic natural pattern geometry by adjusting channel slope and length within the realignment reach. It is necessary to design channel pattern changes (realignments) using the correct radius of curvature to avoid causing repercussions to the cross sectional dimensions. However, realignments should be made only if there are no alternatives. See I. (6) C. 1.

a. In cases where a channel must be realigned, the radius of curvature of the new alignment must equal the radius of curvature of the natural meander of the channel.

2. width/variable width, as a function of depth:

a. Width at bankfull of the new reach must equal width at bankfull of the original reach.

b. Banks must be contoured with the same slope as the original banks.

C. Stream Channel Profile:

1. slope of the channel bed: The bed slope is the single most sensitive physical parameter of a channel. When the bed slope changes, most or all other parameters of the pattern and cross sectional dimensions will change.

a. If possible, choose a crossing location low on the watershed, where the ground is relatively flat. See criteria I. (6) A. 2. a. and I. (6) A. 2. b.

2. pool-riffle ratio: At higher elevations in a watershed, the bed slope is generally greater and the channel is usually straighter (lower sinuosity). To compensate for low sinuosity, step pools and riffles develop at more frequent intervals. Pools occur where the bed slope is flatter, and riffles occur where the slope increases. Also, water seeps into the ground at pools, and discharges from the ground into the channel at riffles. If structures are built on riffles, water seepage could cause extensive damage and present potential safety risks.

a. Cross channels at pools, not at riffles.
b. Where roads must cross at riffles, in-seepage of water must be addressed in the design.

UINTAH COUNTY

STATE OF UTAH

COMMISSIONERS:
David J. Hadden
Jim Abegglen
Michael J. Mecker
ASSESSOR - Gayla Casper
ATTORNEY - JoAnn Stoughton
CLERK-AUDITOR - Michael W. Wilkins
RECORDER - Randy J. Simmons
TREASURER - Donna Richens
SHERIFF - Rick Hawkins
SURVEYOR - Robert Kay

March 17, 2006

RECEIVED
MAR 21 2006
BLM VERNAL UTAH

Greater Deadman Bench Project Manager
Bureau of Land Management
170 South 500 East
Vernal, Utah 84078

RE: Greater Deadman Bench Oil and Gas Producing Region

Dear Project Manager,

Thank you for the opportunity to comment on the Greater Deadman Bench Oil and Gas Producing Region. We submit the following comments for your consideration:

Page 4-26 4.5.2 - Mitigation
Here, and in some of the other chapter 4 mitigation sections, soft wording is used. The word "could" is used to describe implementation of mitigation. Such wording begs the question "will, or will not", mitigation be used to address such impacts?

Page 4-82 4.17.2 - Irritereavable Effects
This section should be re-visited. The loss of vegetation, until reclamation, does not appear to be an irretrievable effect. The act of reclamation makes it retrievable as most of the losses reported here are to be mitigated or would be prevented through proper reclamation. It does not appear that they are irretrievable.

Page 2-34 2.4.6 - Best Management Practices
Anywhere this document addresses best management practices (BMP's), such BMP's must be adopted for local conditions. We object to the utilization of national BMP's until they have been analyzed and adjusted to be compatible with local conditions, both environmental and type of development.

COUNTY BUILDING - 152 EAST 100 NORTH - VERNAL, UTAH 84078

Page 234 1st paragraph
Here it states that the Vernal Field Office operators in the Uintah Basin and Uintah County officials are cooperatively developing a comprehensive list of improved standard operating practices and additional BMPs. To our knowledge this process has come to a halt and thus, this statement should be struck.

Thank you for your review and consideration. We have no further comments at this time, however, we reserve the right to comment at a later date.

Sincerely,

UINTAH COUNTY COMMISSION

Michael J. McKee, Chairman

David J. Haslem

Jim Abegglen

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Reston, VA 20192

Division AFMS	Initial	Assigned
Field Manager		
Planner		
NEPA		
Ranger		
Bus. Practices		
Renewables		
Operations		

BUREAU OF LAND MGMT, VERNAL, UTAH

MAR 23 '06

MINERALS	
RRE	
EMPLOYEES	

In Reply Refer To:
Mail Stop 423

MAR 2 0 2006

Greater Deadman Bench Project Manager
Bureau of Land Management
170 South 500 East
Vernal, UT 84078

Subject: Draft Environmental Impact Statement on the Greater Deadman Bench Oil and Gas Producing Region

As requested by the Bureau of Land Management in correspondence dated January 27, 2006, the U.S. Geological Survey (USGS) has reviewed the subject draft environmental impact statement (DEIS) and offers the following comments.

GENERAL COMMENT

More information would be useful in evaluating the potential impacts of this project on water resources. It is estimated that oil field water flooding operations will require about 2,300 acre-feet per year of produced water and ground water (pages 2-12 through 2-14). However, the potential hydrologic effects of the proposed water usage are not described in the chapter on potential environmental consequences. Further assessment could address possible changes to the potentiometric surface of affected freshwater aquifers and the direction of ground-water flow, effects on spring or seep flow in the area, and potential effects of pumping water from deep production wells located within 100 yards of the Green River on streamflow. If changes in streamflow are predicted, associated effects on aquatic habitat could be assessed.

SPECIFIC COMMENTS

Pages 3-12 through 3-17, Section 3.2.3.1 Surface Water Flow

The USGS streamflow gaging station number 09307000 is Green River near Ouray, UT, which was discontinued in 1966. The gaging station near Jensen, UT is number 09261000. The peak flow information cited for this station is misleading. The lowest "annual" peak during the period 1992 to 2003 was 7,570 cubic feet per second (cfs) on May 23, 2002, as can be seen on the USGS website for peak flows for this site at:

http://nwis.waterdata.usgs.gov/nwis/peak?site_no=09261000&agency_cd=USGS&format=html

If the intent is to compare the overall range of flow conditions at this site, a discussion of the monthly mean or daily streamflow data may be more appropriate. Monthly mean data can be found at:

http://nwis.waterdata.usgs.gov/nwis/monthly/?site_no=09261000&agency_cd=USGS

Monthly mean streamflows of less than 1,000 cfs were measured during the summer of 2002, with some daily streamflows below 850 cfs.

http://nwis.waterdata.usgs.gov/nwis/discharge/?site_no=09261000&agency_cd=USGS

Similarly, the description of streamflow conditions for the White River near Watson at gaging station number 09306500 is misleading. Streamflow information (annual peak, monthly mean, and daily data) for this station can be obtained by substituting this station number for 09261000 in the preceding three websites.

A peak streamflow of 852 cfs was measured on October 5, 1981 for Coyote Wash near Ouray (gaging station number 09306878), which is larger than the "up to 600 cfs" reported on page 3-16. Instantaneous peak flow information for this station can be found at:

http://nwis.waterdata.usgs.gov/nwis/peak?site_no=09306878&agency_cd=USGS&format=html

Thank you for the opportunity to review and comment on this DEIS. If you have any questions concerning our comments, please contact Lloyd Woosley, Chief of the USGS Environmental Affairs Program, at (703) 648-5028 or at lwoosley@usgs.gov.

Sincerely,

James F. Devine
Senior Advisor for Science Applications

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
Uintah and Ouray Agency
P.O. Box 130, 988 South 7500 East
Fort Duchesne, Utah 84026-0130
(435) 722-4300

MAR 2 2 2006

IN REPLY REFER TO:
MS – 420 Real Estate Services
Greater Deadman Bench Oil and Gas Producing Region EIS

March 21, 2006

Greater Deadman Bench Project Manager
Bureau of Land Management
170 South 500 East
Vernal, Utah 84078

Subject: Comments on UTU-080-2003-0396V

Dear Ms. Howard;

I am providing comments regarding the Questar Exploration and Production Company's (QEP) Greater Deadman Bench Oil and Gas Producing Region (UTU-080-2003-0396V) Draft Environmental Impact Statement (DEIS) as it impacts Tribal resources of the Uintah and Ouray Indian Reservation.

Cooperating Agency

The Bureau of Indian Affairs, Uintah and Ouray Agency (BIA) wishes to be a cooperating agency on this project. I apologize for any inconvenience this causes at this late date. Please update all areas of the document to reflect BIA cooperating agency status. Comments are being prepared through the Uintah and Ouray Agency. BIA's Record of Decision (ROD), however, will be issued through the Western Regional Office. If the BLM and BIA need to do separate consultation with U.S. Fish and Wildlife Service, please advise us of such.

Proposed Action Comments

Tribal and Allotted lands should be included as part of the Proposed Action. QEP's existing NEPA is limited in extent and the mineral estate is primarily Federal. Please include lands within Township 8 South, Range 21 East, Sections 1, 10-16, and 19-23; Township 8 South, Range 22 East, Sections 3, 5-8, 16-19, 27 and 30; and Township 8 South, Range 20 East, Section 34 (approximately 17,280 acres) in your analysis. This includes existing and future wells in the Glen Bench, Gypsum Hills, Wonsits Valley and any other of QEP's wells in the Greater Deadman Bench Area on Indian lands.

Please extend the estimates for surface damage for well pads, access roads, and pipelines and number of wells, and associated analysis/effects (air quality, surface and subsurface hydrologic issues, water depletion issues, erosion, wildlife, socio-economics, and AUM reduction, etc.) to the Proposed Action.

Summary Comments

Page S-5 State how this document conforms to the new RMP.

Page S-11 Update Proposed Action if it has changed since scoping occurred in 2003-2004.

Page S-11 List additional compressors on Indian land in the project area.

Page S-12 Update No Action well numbers.

Page S-13 Include Tribal/Allotted Ownership.

Page S-13 Address reduction in AUMs.

Page S-14 Avoid giving specifics on cultural sites.

Impacts Comparison Table-

- Special status wildlife-List number of active nests for Proposed Action. List current number of leks for No Action.
- Cultural resources-Surveys will identify possible impacts.
- Effects to land use -List number of AUMs lost.
- Rangeland Management-Forward adjusted AUMs to the range program for implementation.

Chapter 1

1.4 Western Regional Director of the BIA will also issue a ROD. Individual site-specific NEPA documents will be prepared and approved by Agency Superintendent.

1.4.1 Company will work with Ute Indian Tribe and/or BIA to lay out locations on Indian lands.

1.5.2 State how this document conforms to the new RMP.

1.7 Document does not address: Native American Religious Concerns or Environmental Justice. There are approximately 17,280 acres held in Trust for QEP's development.

Table 1.1 Add Ute Indian Tribe's and BIA's authorizations.

Chapter 2

2.1 Verify current well spacing APDs on Tribal land. It seems that increased density wells on Tribal may be being permitted.

2.1.1.1 Access may be on Tribal roads. All reserve pits on Tribal land need to be lined with an impervious material.

2.1.3/2.1.4.1/2.1.4.2/2.1.6 Include table with all water requirements; specify duration of water use. Verify Section 7 Consultation with USFWS covers all water usage.

2.1.8 Reclamation will occur per surface management agency (SMA) specifications.

Page 2-23 Assumption regarding compressor stations conflicts with that listed on page S-11.

2.3.1 SMA would be notified immediately if cultural resources were found.

2.3.3 SMA would prescribe mitigation measures to protect special status species.

2.3.12 QEP will work with SMA to monitor success of reclamation.

2.3.13 Ute Indian Tribe needs to be included in road usage monitoring.

2.4.6 Include BMPs that are to be applied in all cases directly to Proposed Action.

Add Depletion to Table.

Chapter 3

3.2.3.1 Add newer hydrograph and water quality data where available.

3.6.8.2 No black-footed ferrets exist on Tribal land in the project area.

3.6.8.4 Yellow-billed cuckoo may have suitable habitat on Allotted/Tribal land near the Green River.

3.6.8.5 Golden eagles often winter roost on Tribal/Allotted land near the Green River.

3.6.8.6 Ferruginous hawks are known to use artificial nest structures in the project area.

3.6.8.9 Suitable habitat near the Green and White Rivers may exist for common yellowthroat.

3.9 Update acreage of project area and number of wells to reflect Tribal lands. Also include Tribal/BIA rights-of-way.

3.11 List any Indian grazing allotments.

3.12 Cross country travel is not permitted on Tribal lands.

3.13 Visual classifications have not been assigned to Indian lands; however development will use matching earth-toned mat-finish on all structures to minimize visual impact.

3.14.1 Include population centers of Fort Duchesne and Roosevelt in demographic analysis.

3.14.4.2 Surface use agreements and other surface payments provide revenues to Ute Indian Tribe and to Allottees in the project area.

Chapter 4

Increase all environmental consequences where Indian lands will be affected.

Special status species on Indian land will be surveyed and appropriately avoided.

Chapter 5

No comments.

Chapter 6

Include BIA as a consulted agency.

Chapter 7

Update reviewers and preparers.

The BIA appreciates the opportunity to comment on this DEIS and your consideration of our comments and requests. We look forward to receiving a Final version of this document in the future. If you have any questions please contact Niccole Mortenson, Environmental Protection Specialist, at 435-722-4322.

Sincerely,

Chester D. Mills
Superintendent

cc: Branch and chrono files
Amy Hueslein, WRO EQS
Allen Anspach, Regional Director, WRO

CENTER FOR NATIVE ECOSYSTEMS

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www.nativeecosystems.org

Stephanie Howard
Vernal Field Office
Bureau of Land Management
170 South 500 East
Vernal, UT 84078

25 March 2006

Dear Stephanie,

Center for Native Ecosystems provides these comments on the January 2006 Draft Environmental Impact Statement for the Greater Deadman Bench Oil and Gas Producing Region.

Here are our main concerns:

Lack of a reasonable range of alternatives

The BLM presents only the preferred alternative and a No Action alternative, both of which involve drilling in sensitive habitats. Many other alternatives could have been considered which conserve irreplaceable resources and meet the stated purpose and need: "to extract and transport oil and natural gas, at a profit, from the portions of the GDBR leased by its companies" (p. 1-1). Therefore, the FEIS must consider additional alternatives, including delaying approval until the RMP revision is complete and prohibiting surface disturbance in habitat for special status species, floodplains, and in other sensitive areas - these can all be accomodated with QEP still making a profit.

Horseshoe milkvetch

Horseshoe milkvetch is only found in one site, which includes part of the planning area. Figure 3.1-4 suggests that all of its habitat is found within the Horseshoe Bend oil and gas field. We are currently evaluating whether an emergency listing petition is warranted for this species, and this project's proposed disturbance of over 1000 acres of potential habitat argues for the need for immediate protection. The DEIS claims that there will be no direct impacts, but page 3-54 acknowledges that the actual extent of the occupied habitat in the project area is not known. The DEIS provides no information on how how the potential habitat in this project area compares to the total potential habitat believed to be available. There is no discussion of cumulative impacts from other oil and gas drilling, including wells approved outside of field development projects. I think this is the fourth time we've argued this in the past week - the BLM must disclose not just

the estimated extent of the potential impacts in the project area; it must also give the public some context as to what this means for the species as a whole, or at the very least, within the Field Office.

How does the BLM arrive at the conclusion that there is a 4% chance of taking horseshoe milkvetch (p. S-16), especially if the potential habitat has not been surveyed for the plant? This is a Candidate species found in a single site. Allowing surface disturbance in potential habitat shows that the BLM lacks the regulatory mechanisms necessary to recover the species, and that the agency is contributing to the need to list this wildflower under the Endangered Species Act. Instead, the BLM should not approve any surface disturbance in potential (or occupied) habitat and should immediately begin working on a comprehensive conservation plan for horseshoe milkvetch. We are participating with the BLM in the Uinta Basin Rare Plant Forum, and strongly encourage the agency not to allow this surface disturbance which will further imperil one of the most at-risk plants in the basin.

Raptors

The Vernal Field Office's track record on raptors is apalling. Page 3-62 indicates that only 17 of 232 nests in the project area (plus one-mile buffer) are presently active - about 7%. None of the 15 Artificial Nest Structures in the project area showed signs of use. Yet page 4-42 states that "appropriate measures to avoid disturbing active nest sites and to protect the viability of all nest sites for potential future nesting" may include "the construction of Artificial Nest Structures in appropriate locations". NEPA requires that mitigations be effective, and the existing ANSes in the project area itself are demonstrably ineffective. The DEIS tries to downplay the effects of additional disturbance on raptors because "overall abundance of nests should result in small overall effect" (p. S-16). Well, not if one of the 17 active nests is impacted, not if most of the 232 nests have already been impacted by other drilling, and not if the limiting factor isn't availability of nests but rather of undisturbed nests. The BLM must do a better job of analyzing the real impacts of approving this action. The DEIS states on page 2-36 that "43 new wells and associted access roads would be constructed within raptor guideline buffers." The BLM must not violate the MBTA, or its special status species Manual obligations.

Major projects authorized during plan revision

This is just one of a flurry of projects that are being approved during plan revision, which makes the planning process essentially irrelevant. The project area includes white-tailed prairie dog ACECs that the RMP process may designate - this is just one of the potential improvements in oil and gas management that waiting until after revision could provide. Field Managers have discretion to delay decisions while under plan revision, and Vernal should take advantage of that opportunity. Staff already are overwhelmed with processing and monitoring all the already-permitted projects.

Air quality

The BLM must carefully consider impacts to air quality, and obtain the proper state permits.

Interim reclamation

This DEIS analyzes impacts assuming that interim reclamation will occur. However, the Chapita Wells DEIS that we commented on recently acknowledges that interim reclamation has been ineffective, and that impacts should be considered long-term. This view is borne out by other portions of the Greater Deadman Bench DEIS that discuss the near impossibility of preventing weed infestation once soils have been disturbed. The BLM must revise this section to be in keeping with the more honest Chapita Wells analysis; doing otherwise would clearly be arbitrary and capricious and thus violate the APA.

White-tailed prairie dog management

The DEIS suggests that white-tailed prairie dogs will thrive if their forage is removed and they are left with bare ground to make a living on. Again, the BLM takes the inconsistent view that these areas will be successfully reclaimed, rather than becoming dominated by cheatgras: "when these disturbed areas are reclaimed, the regrowth of native vegetation provides ideal forage for the prairie dog" (p. 4-35). That would be nice, but the real story in the basin involves massive dieoff of native sagebrush and noxious weed proliferation, not recolonization of disturbed areas by natives.

Conclusion

Drilling in this project area will last for 40 years according to the DEIS. There should be no rush to approve this now. Instead, the BLM should wait until plan revision and the development of effective mitigations and reclamation methods are complete. If impacts to special status species cannot be effectively mitigated (as the major wildlife declines in the basin confirm) and/or effective reclamation cannot be achieved, these areas should not be developed. Allowing drilling in horseshoe milkvetch habitat is one of the most egregious aspects of this project, which must be remedied in the FEIS.

Sincerely,

Erin Robertson
Staff Biologist

QUESTAR

Questar Exploration and Production Company
Independence Plaza
1060 17th Street, Suite 500
Denver, CO 80265
Tel 303 672 6900 • Fax 303 294 9632

Rocky Mountain Region

March 27, 2006

Ms. Stephanie Howard
Greater Deadman Bench Project Manager
Bureau of Land Management
170 South 500 East
Vernal, UT 84078

Re: Greater Deadman Bench Oil and Gas Producing Region
Draft Environmental Impact Statement – January 2006

Dear Ms. Howard:

Questar Exploration and Production Company (QEP) appreciates the opportunity to review and submit comments on the Greater Deadman Bench Oil and Gas Producing Region (GDBR) Draft Environmental Impact Statement (EIS). QEP agrees with the BLM's preferred alternative, the Proposed Action. QEP submits the following specific comments to be considered in the final EIS and Record of Decision (ROD):

1. Abstract, paragraph 2: The abstract states, "In addition to QEP's commitment to voluntarily apply Best Management Practices, mitigation has been disclosed to lessen the environmental effects." This leads the reader to believe that QEP will apply *all* Best Management Practices and that the mitigation disclosed *will* be carried out. This should be rewritten for clarification: "In addition to QEP's commitment to voluntarily apply *selected* Best Management Practices, mitigation has been disclosed, *that if applied, could* lessen the environmental effects."

2. Page 2-33, Section 2.4.6 Best Management Practices: Paragraph 1 defines Best Management Practices as "innovative, dynamic, and economically feasible mitigation measures applied on a site-specific basis..." QEP feels it is necessary, to reiterate that Best Management Practices (BMPs) must be *economically* feasible and that they should also be *technically* feasible. BLM Instruction Memorandum No. 2004-194 refers to BMPs that field offices and operators are encouraged to **consider** and provides the following criterion before listing examples of typical case-by-case BMPs: "Other BMPs are more suitable for Field Office consideration on a case-by-case basis depending on their effectiveness, **the balancing of increased operating costs vs. the benefit to the public and resource values,** the availability of less restrictive mitigation alternatives, and other site specific factors.

3. Page 3-21, Section 3.2.6 Groundwater, 4th paragraph: The text inaccurately states that the Birds Nest aquifer **may** be present beneath the GDBR, leading the reader

to question its existence below the project area. The Birds Nest *is* present beneath the GDBR and provides important technical rationale for not being able to directionally drill. The text should be changed to: "The Birds Nest Aquifer, which *is* present beneath the GDBR..."

4. Page 3-72, Section 3.6.8.8 Greater Sage-grouse *(Centrocercus urophasianus),* 1st paragraph, last sentence: This section claims, "Since 1967, the abundance of male grouse attending breeding grounds in Utah has declined by approximately 50 percent." Please cite the source for this statement or remove the statement if not supported by scientific data.

5. Page 3-72, Section 3.6.8.8 Greater Sage-grouse *(Centrocercus urophasianus),* 2nd paragraph: "UDWR records indicate that 14 leks exist within 5 miles of the GDBR, half of which occur within its boundary (Figure 3.6.4)." Figure 3.6.4 depicts White Tailed Prairie Dog Habitat. Please include the correct map. Regarding the 14 leks that exist within 5 miles of the GDBR, please indicate which leks are active and which are inactive. Appendix 3.5.2, USFWS T&E Species Consultation letter states on page 2, last paragraph: "There are two active sage grouse leks in the project area."

6. Page 4-5, Section 4.2.2 Mitigation [Water Resources]: The text states, "Roads crossing floodplains would be constructed at the narrowest part of the floodplain as designated by the Authorized Officer." While attempts to follow this guidance will be made, it should be recognized that site-specific conditions would dictate the road construction location. The text should be changed to read, "Roads crossing floodplains would be constructed at the narrowest part of the floodplain and perpendicular to the floodplain, *where feasible*."

7. Page 4-26, Section 4.5.2 Mitigation [Vegetation], paragraph 2: The text states, "All construction equipment and vehicles could be power-washed prior to the start of construction. Any construction or operational vehicles traveling between the GDBR and outside areas should be power-washed on a weekly basis". This mitigation measure should be removed from the final EIS. QEP employees typically wash their vehicles once per week but QEP cannot control whether and how often contractors wash their vehicles. QEP will encourage its contractors and vendors to comply with this guideline; however this requirement is unenforceable either by QEP or the BLM.

8. Page 4-27, Section 4.6.1, Direct and Indirect Effects [Wildlife]: There are several statements that imply certain consequences "would" take place. It should not be assumed that indefinite consequences such as mortality or displacement "would" take place; indefinite consequences "could" take place. The first sentence should be changed to read, "Direct impacts from the Proposed Action and alternative *could* include...." The 4th sentence should be changed to read, "Indirect impacts

from the proposed action *could* include...." The same comment applies to all indefinite consequences in this section found in pages 4-27 through 4-48.

9. Page 4-49, Section 4.6.2.1 Wildlife [Mitigation]:

    a. Bullet #3: "Avoid placing well pads within 0.5 to 1 mile of raptor nests, depending on the species." This mitigation measure should clarify active vs. inactive nests and should be rephrased: "Avoid placing well pads within 0.5 to 1 mile of *active* raptor nests, depending on the species."

    b. Bullet #6: "Conduct annual raptor nest activity and winter roosting inventories of their project area plus a one-mile radius during the seven-year drilling and construction phase." This mitigation measure does not state who will pay for this survey although it is implied that QEP would bear the expense. Annual surveys would impose an unnecessary expense because raptor nest and winter roosting inventories are already performed with every on-site inspection by a BLM wildlife biologist. This mitigation measure should be removed from the final EIS.

    c. Bullet #12: "Where such actions would not endanger human safety, require field personnel to remove animal carcasses along lease roads within the project area and place them at least 100 feet from the road." Questar suggests that this sentence be rewritten to say that Questar will notify the Department of Wildlife or other responsible wildlife agency of animal carcasses found on lease roads. Removing carcasses could potentially endanger human safety and health or violate state or federal wildlife laws and removal should remain the responsibility of wildlife agencies.

10. Page 4-50, Section 4.6.2.2 Special Status Wildlife:

    a. Bullet #1: "Remove dead animals from roads and ROWs to prevent mortality to the raptors." Questar suggests that responsibility for removing dead animals remain with the wildlife agencies as noted in comments to Bullet #12 above.

11. Page 4-50, Section 4.6.3.1 Wildlife and Section 4.6.3.2 Special Status Species [Unavoidable Adverse Impacts]: Again, it should not be assumed that indefinite consequences "would" take place; indefinite consequences "could" take place. The first sentence in each section should be rephrased: "Unavoidable adverse impacts to wildlife species from the Proposed Action or No Action Alternative *could* include:"

12. Page 4-60, Section 4.10.2 Mitigation [Transportation]: "QEP should implement and enforce speed limits for their employees and contractors while driving on roads within the GDBR." While efforts are made by all to maintain proper speed limits, QEP does not have the authority to implement and enforce speed limits.

13. Page 5-19, Section 5.4.6 Visual Resources [Cumulative Impacts Associated with the Proposed Action]: The first paragraph states, "...the Uintah Basin Best Management Practices that are currently being developed *would* be applied...." and "Such measures *would* include:" These sentences should be restated as "*could* be applied" and "*could* include". Use of the word "would" implies that these considerations are mandatory when in fact, they are examples given for consideration, are voluntary, and acceptable only when technically and economically feasible.

Thank you for the opportunity to comment on this draft EIS document. We look forward to working with the BLM to finalize a mutually acceptable and legally defensible EIS and ROD. If you have any questions or require additional information, please contact Ms. Stephanie Tomkinson in our Vernal office at 435-781-4308.

Respectfully submitted,

J. Paul Matheny
Vice President

JPM/slt

APPENDIX 6-2

CONSULTATION LETTERS

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Vernal Field Office
170 South 500 East
Vernal, UT 84078
(435) 781-4400 Fax: (435) 781-4410

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1792
UT-080

January 8, 2004

Memorandum

To: Utah Field Supervisor, Utah Field Office, Fish & Wildlife Service, Salt Lake City, Utah

From: Acting Field Manager, Vernal Field Office, Bureau of Land Management

Subject: Initiation of Consultation and Request for List of Species - Questar Exploration and Production Company's Greater Deadman Bench Environmental Impact Statement

The Questar Exploration and Production Company's Uintah Basin Division has notified this Office of its proposal to drill up to 1, 239 new wells over a 10-year period, or until the resource base is fully developed on their leases. The project area would involve about 99,000 acres in the Greater Deadman Bench oil and gas production region, located about 20 miles south of Vernal, Utah. The project area would involve about 85% BLM-administered public lands, 12% State of Utah-administered lands; and 3% patented land.

The BLM is initiating an environmental impact analysis (EIS) to consider the proposal and reasonable alternatives. We have enclosed a Scoping Notice for your information which provides additional information on the proposed plan, preliminary resource issues and concerns, as well as general maps covering the project area.

In accordance with the provisions of the Endangered Species Act, BLM is initiating consultation and requesting a list of species specific to the project area that would be addressed in the EIS. Also, in accordance with NEPA and CEQ guidelines, BLM is conducting a formal scoping period seeking issues, concerns and/or data that should to be factored into to the EIS. We request that any concerns and/or information your office may have relative to this project be provided to us by on or before the close of the formal scoping period of February 4, 2004.

Should you have any questions on the NEPA aspects of this project, please contact Jean Nitschke-Sinclear (435-781-4437); relative to the consulting/conferring aspects, please

contact either Tim Faircloth (435-781-4465, wildlife) or Robert Specht (435-781-4436, plants).

Thank you for your assistance.

/s/ Howard B. Clearwater III /jns

Enclosure – Scoping Notice

Cc: State Director, U-933
Central Files
Reading
QEP – Adm. Record
JNit-Sin:jns:1/08/04\NEPA.QEP.Scoping.FWS

BUREAU OF LAND MANAGEMENT
VERNAL FIELD OFFICE
VERNAL, UTAH

SCOPING NOTICE

QUESTAR EXPLORATION AND PRODUCTION COMPANY'S GREATER DEADMAN BENCH ENVIRONMENTAL IMPACT STATEMENT

EIS NO. UTU-080-2004-0369V

1.0 INTRODUCTION

Questar Exploration & Production Company (QEP) has notified the Bureau of Land Management (BLM) Vernal Field Office that it proposes to fully develop hydrocarbon resources underlying oil and gas mineral leases within the Greater Deadman Bench oil and gas-producing region (GDBR) (project area).

The project area consists of about 146 sections (approximately 99,000 acres) in an existing oil and gas producing region located in all or portions of T6 to 8S, R21 to 25E, Uintah County, Utah (Figure 1-1). The project area is on BLM-administered lands (83,864 acres); lands administered by the State of Utah (11,448 acres), and a small area of private lands (3,473 acres). QEP operates the majority of the mineral lease rights (79.2 percent) underlying the public, State and private lands in the project area.

QEP proposes to drill up to 1,239 wells at the rate of 100 to 120 wells per year over 10 years, or until the resource base is fully developed. This would include approximately 16 Uinta Formation gas wells, 219 Green River Formation oil wells, 148 Green River Formation gas wells, 451 Wasatch Formation gas wells, 68 Mesaverde Formation gas wells, 311 Blackhawk/Mancos Formation gas wells, and 26 Frontier/Dakota Formation deep gas wells. Of these, 769 well pads would be drilled on new locations and 470 would be "twins" drilled from existing locations (representing 38% of the total new wells that would be drilled).

1.1 Purpose and Need

The purpose of the proposed project is to further develop hydrocarbon resources underlying the GDBR. QEP estimates that the proposed project could yield over 9 million barrels of oil and 750 billion cubic feet (bcf) of natural gas gross production over the next 40 years with a certain amount of risk associated with the success of the different horizons considered in the analysis. QEP believes that the public interest need for the project is to maintain and enhance responsibly developed domestic crude oil production which would result in less dependence on foreign sources of crude oil. On a regional scale, additional oil production would yield tax revenues as well as significant royalty revenues to both the United States and Utah State governments. On a local level, the development activity would provide employment opportunities that further enhance the local economy and tax base.

1.2 Relationship of the Project to Controlling Land Use Plans

The management of BLM public lands and resources encompassed by the project area are directed and guided by the BLM's Book Cliffs Resource Area (BCRA) Resource Management Plan Environmental Impact Statement and Record of Decision (BLM 1985). The proposed project lies within an area that has been partially developed for oil and gas production and is designated by BLM as "Category 1" and "Category 2" for oil and gas leasing by the BLM.

2.0 PROPOSED ACTION

QEP proposes to drill at a maximum rate of 100 to 120 wells per year until the resource base is fully developed (Table 2-1). The monthly rate of drilling would range from 0 to 12 wells per month. The total number of wells drilled would depend largely on factors out of the QEP's control such as geologic success, economic factors, and lease restrictions. The reasonably foreseeable full development model in the EIS analysis area ranges from 1,000 to 1,239 new wells. At the maximum drilling pace, development drilling is expected to occur over a span of 10 years.

TABLE 2-1 QEP GREATER DEADMAN BENCH PROPOSED 2004 - 2014 WELL DEVELOPMENT

FORMATION	RESOURCE	DRILLING RATE (WELLS/MONTH)	PROPOSED NEW WELLS
Uinta	Gas	0-1	16
Green River	Oil	0-3	219
Green River	Gas	0-3	148
Wasatch	Gas	0-6	451
Mesaverde	Gas	0-1	68
Blackhawk/Mancos	Gas	0-3	311
Frontier/Dakota	Gas	0-1	26
	Mixed	**0-12**	**1239**

The proposed wells would be drilled on a 40-acre spacing pattern in order to efficiently recover oil and gas reserves from the Green River Formation at depths of 3,500 to 5,500 feet; from the Wasatch Formation at depths of 5,500 to 8,000 feet; from the Mesaverde Formation at depths of 6,500 to 10,000 feet; and from the Blackhawk/Mancos Formation at depths of 10,500 to 14,000 feet. Deep drilling to the Frontier/Dakota would exceed 16,000 feet.

2.1 Location Construction and Land Requirements

Well site construction would consist of leveling a rectangular pad to 300 feet x 350 feet, occupying approximately 2.5 acres. Well pads would be constructed from the native sand/soil/rock materials present and leveled by balancing cut and fill areas.

A reserve pit (150 feet x 70 feet x 12 feet deep, approximately 0.24 surface acres) for drilling mud and water storage would be excavated adjacent to the pad. Stockpiles for both topsoil and subsoil would be established adjacent to the well pad and maintained for future use in backfilling the reserve pit and rehabilitating the location upon abandonment. Depending on the amount of cut and fill required to level each site, these stockpiles would occupy approximately 0.5 acres.

An access road connecting the pad to the nearest established road also would be

constructed. The existing road network within the EIS analysis area would provide the primary access routes to the new well sites. Over 600 miles of existing roads would be used, thereby minimizing additional surface impact. Based on the average well, each well site road would be approximately 1,000-feet long by 30-feet wide and cause approximately 0.5 acre of additional surface disturbance. For Green River Formation wells, a Right-of-Way (ROW) (approximately 1,000-feet long by 30-feet wide; running to a central tank facility) would be required for production flow lines or water injection lines causing approximately 0.5 acre of additional surface disturbance. For Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation gas wells, a ROW (approximately 1,000-feet long by 30-feet wide) would be required for surface gathering lines, causing approximately 0.5 acres of additional surface disturbance per well.

Each well pad and access road would typically take 2 to 4 days to construct. The combined surface disturbance for the average new producing well would be approximately 3.75 acres, or 9.4 percent of the available surface area in each 40-acre tract. Thus, approximately 2,625 to 3,250 total acres would be disturbed for construction of the 700 to 800 maximum proposed well sites, access roads, and pipelines. Additional disturbance would be required for central tank batteries, compressor stations, and utility lines necessary for production operations.

Following the drilling and initial completion operations, a portion of each well pad plus the reserve pit would no longer be needed. These areas would be promptly rehabilitated and returned to natural conditions reducing long-term surface disturbance to approximately 3 acres per 40-acre tract, or 7.5 percent of total surface area. Of the 2,625 to 3,250 total acres disturbed during construction for well sites, access roads, and pipelines, approximately 600 acres would be reclaimed immediately after construction is complete.

Dry holes would be Plugged & Abandoned (P&A) as per applicable regulations, and the entire well location and its access road would be promptly rehabilitated and returned to natural conditions.

2.2 Drilling Operations

Drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, all State of Utah Division of Oil, Gas, and Mining rules and regulations, and all applicable local rules and regulations.

2.3 Completion Operations

Once production casing has been cemented in place, the drilling rig would be released and a completion rig would be moved in. The typical completion operation for Green River, Wasatch and Mesaverde wells typically takes 4 to 6 days to perform. Deeper

completions, such as in the Blackhawk /Mancos and/or Dakota wells, are performed in a similar manner but longer periods of time are needed for well bore cleanup and production testing which generally occurs between each stage of the completion. Completion of the initial Blackhawk /Mancos and/or Dakota wells would take 4 to 6 weeks. Eventually, that time period would be compressed to under 2 weeks.

2.4 Applicant-Committed Environmental Protection Measures

Several procedures are described below that would be implemented, at the sole expense of the interest owners, to reduce the potential environmental impacts of the proposed development activity. In addition, the BLM on-site inspection for each new well site may identify specific resources that may be affected on a particular location. The on-site inspection would be used in conjunction with the measures described below to develop site-specific mitigating measures for sensitive resources.

2.4.1 Cultural Resources

A Class III cultural resources survey, conducted by a qualified archaeologist, would be conducted over all areas proposed for surface disturbance. Class III cultural resource block surveys have been conducted in portions of the proposed development area and would be utilized where applicable. If these surveys identify areas with a high probability of encountering potentially significant subsurface archaeological sites, a qualified archaeologist would monitor surface disturbance. QEP and their contractors would inform their employees about relevant federal regulations intended to protect cultural resources. Equipment operators would be informed that if a site is uncovered during construction, activities in the vicinity would immediately cease and the BLM's Authorized Officer (AO) would be notified. Historic properties considered eligible for the National Register of Historic Places (NRHP) would be avoided or mitigated through an approved data recovery plan.

2.4.2 Paleontological Resources

Based on site-specific recommendations from the BLM's AO, surveys for paleontological resources would be conducted on areas with sandstone outcrops and where bedrock excavation into sensitive formations is necessary. The survey would be conducted by a qualified paleontologist funded by QEP and would determine fossil localities and the sensitivity of the area for fossil resources. These actions would determine the necessity of having a qualified paleontologist on-site during construction. If paleontological resources were uncovered during ground disturbing activities, QEP would suspend all operation that would further disturb such materials and would immediately contact BLM's AO, who would arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan.

2.4.3 Wildlife and Vegetation (including Federally listed, Candidate and Proposed Species)

QEP would comply with Endangered Species Act regulations in order to prevent adverse impacts to Federally listed, Candidate and Proposed wildlife and plant species. QEP would also implement appropriate protective measures (e.g., timing and spatial stipulations) discussed in the Book Cliffs RMP in order to prevent adverse impacts on non-listed wildlife species and habitats.

2.4.4 Power Lines

Unless otherwise agreed to by the AO in writing, power lines shall be constructed in accordance with the standards outlined in *Suggested Practices for Raptor Protection on Power Lines*, (Raptor Research Foundation, Inc. 1981). QEP would construct power lines in accordance with these standards or will assume the burden and expense of proving pole designs not shown in the referenced publication are "raptor safe". A raptor expert acceptable to the AO shall provide such proof. The AO reserves the right to require modification or additions to all power line structures on applied for route authorizations, should they be necessary to ensure the safety of large perching birds. QEP would make such modifications and/or additions without liability or expense to the Federal Government.

2.4.5 Noxious and Invasive Weeds

QEP would monitor and control noxious and invasive weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. On BLM administered land, a Pesticide Use Proposal would be submitted and approved prior to the application of herbicides, pesticides or other hazardous chemicals.

2.4.6 Soils

All existing roads will be maintained and kept in good repair during all drilling, completion, and production operations associated with wells. Planned access roads and surface disturbing activities will conform to standards outlined in the BLM and Forest Service publication: *Surface Operating Standards for Oil and Gas Exploration and Development, 1989.*

2.4.7 Visual Resources

Based on site-specific recommendations from the BLM's AO, surface equipment would be painted to blend in with the surroundings.

2.4.8 Existing Facilities and Rights-of-Way

Cattle guards would be used for fence crossings whenever practicable. If a fence must be cut, H-braces would be installed to support the existing fence and a cattle guard installed to prevent livestock movement.

2.4.9 Hazardous and Solid Waste/Trash Disposal

All solid waste or trash would be transported for disposal to an approved solid waste disposal facility.

3.0 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COMPLIANCE

The BLM has determined that permitting this Proposed Action constitutes a federal action that may affect the quality of the human environment. Pursuant to NEPA and the Council on Environmental Quality (CEQ) regulations on implementing NEPA, the BLM will prepare a NEPA-compliant Environmental Impact Statement (EIS) that will describe and evaluate the potential impacts of QEP's Proposed Action and alternatives. The purpose of the EIS will be to provide the public and decision-makers with sufficient information to understand the environmental consequences of the Proposed Action and alternatives, and to identify and develop appropriate mitigation measures to minimize environmental impacts. NEPA requires that a No Action alternative and any reasonable action alternative(s) be evaluated during the analysis process. In part, this scoping statement has been prepared to enable government agencies, the general publics, and other interested parties to participate in and contribute to the alternative selection process.

4.0 PRELIMINARY RESOURCE ISSUES FOR NEPA ANALYSIS

Based on the BLM's preliminary review of QEP's Proposed Action, the following resource issues have been identified as requiring a full analysis in the EIS:

- Air Quality
- Cultural Resources
- Federally listed and BLM Sensitive Plants, Wildlife, and Fish Species
- Existing Land Use and Status
- Noxious and Invasive Weeds
- Paleontological Resources
- Range and Rangeland Management
- Recreation Resources
- Socioeconomics
- Soils
- Hydrology and Watershed Resources
- Wildlife and Fisheries
- Vegetation and Wetlands
- Visual Resources and Noise

In addition to the above-listed resources, the EIS will address all of the Critical Elements of the Human Environment as described in the BLM's Instruction Memorandum Number ID-2003-075 9 (dated July 11, 2003). Additional issues or resource concerns are likely to be determined during the public scoping process.

5.0 PUBLIC PARTICIPATION

A critical element of the NEPA process is public scoping. Scoping activities are initiated early in the process to:

- Identify reasonable alternatives to be evaluated in the NEPA document,
- Identify issues of concern related to the Proposed Action, and
- Determine the depth of the analysis for issues addressed in the NEPA document.

The public is encouraged to participate during the scoping process to help identify the scope of the analysis needed, alternatives to the Proposed Action, other issues or concerns that should be analyzed, mitigation opportunities, and any other comments or ideas to help ensure the completeness of the analysis process. **Your written comments will be accepted on or before February 4, 2004.** Please submit your written comments to:

Ms. Jean Nitschke-Sinclear, AFM NEPA, Planning and Special Projects
Bureau of Land Management, Vernal Field Office
170 South 500 East
Vernal, UT 84078
jean_nitschke-sinclear@blm.gov
Telephone: (435) 781-4400
Fax: (435) 781-4410

A public meeting to discuss the proposed project is scheduled for the following date and location:

Wednesday, January 14, 2003
7:00-9:00pm
South Conference Room, Uintah County Bldg., 147 East Main Street, Vernal Utah

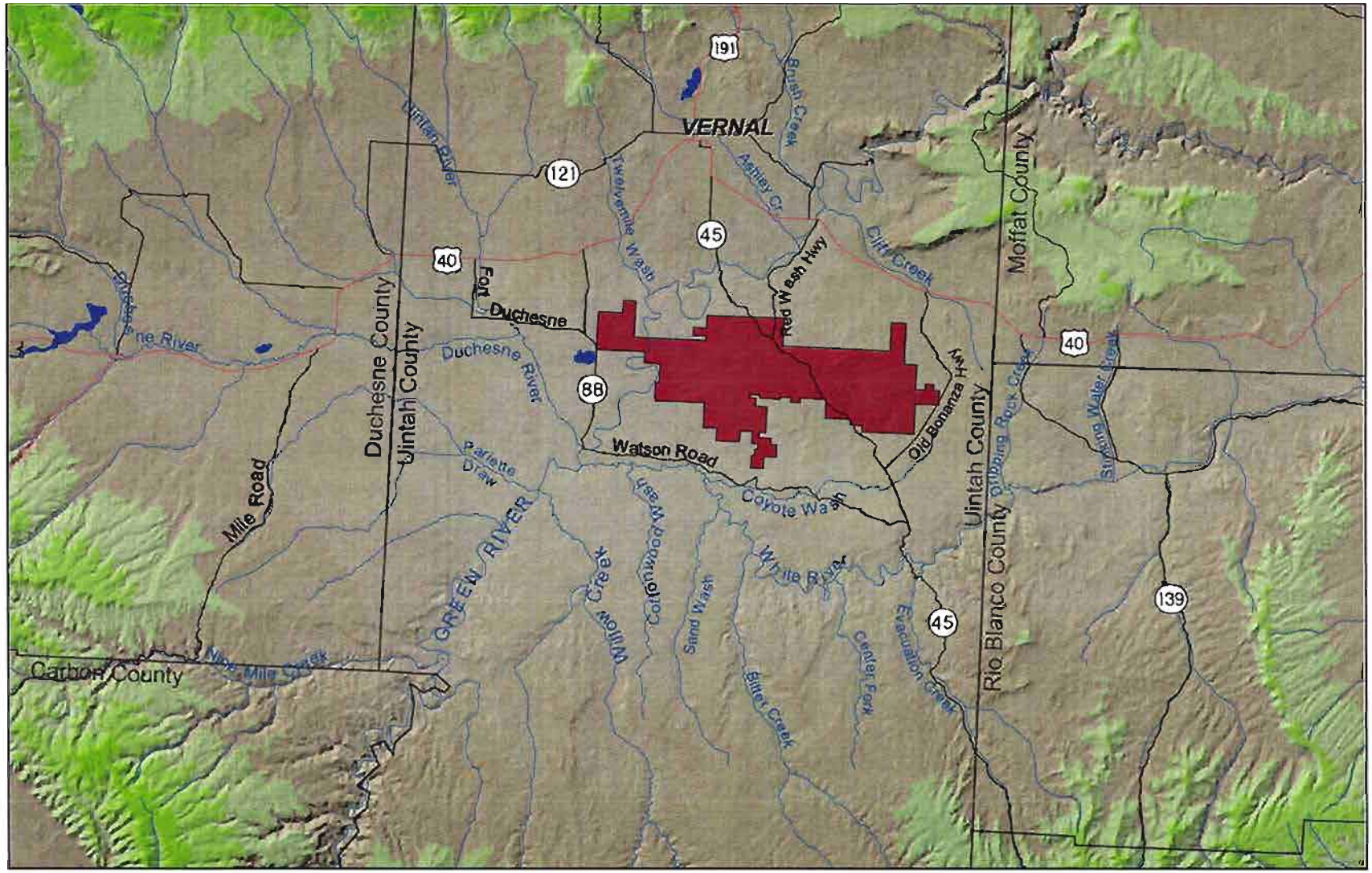

Figure 1-1. Location Map of the Greater Deadman Bench Project Area, Uintah County, Utah.

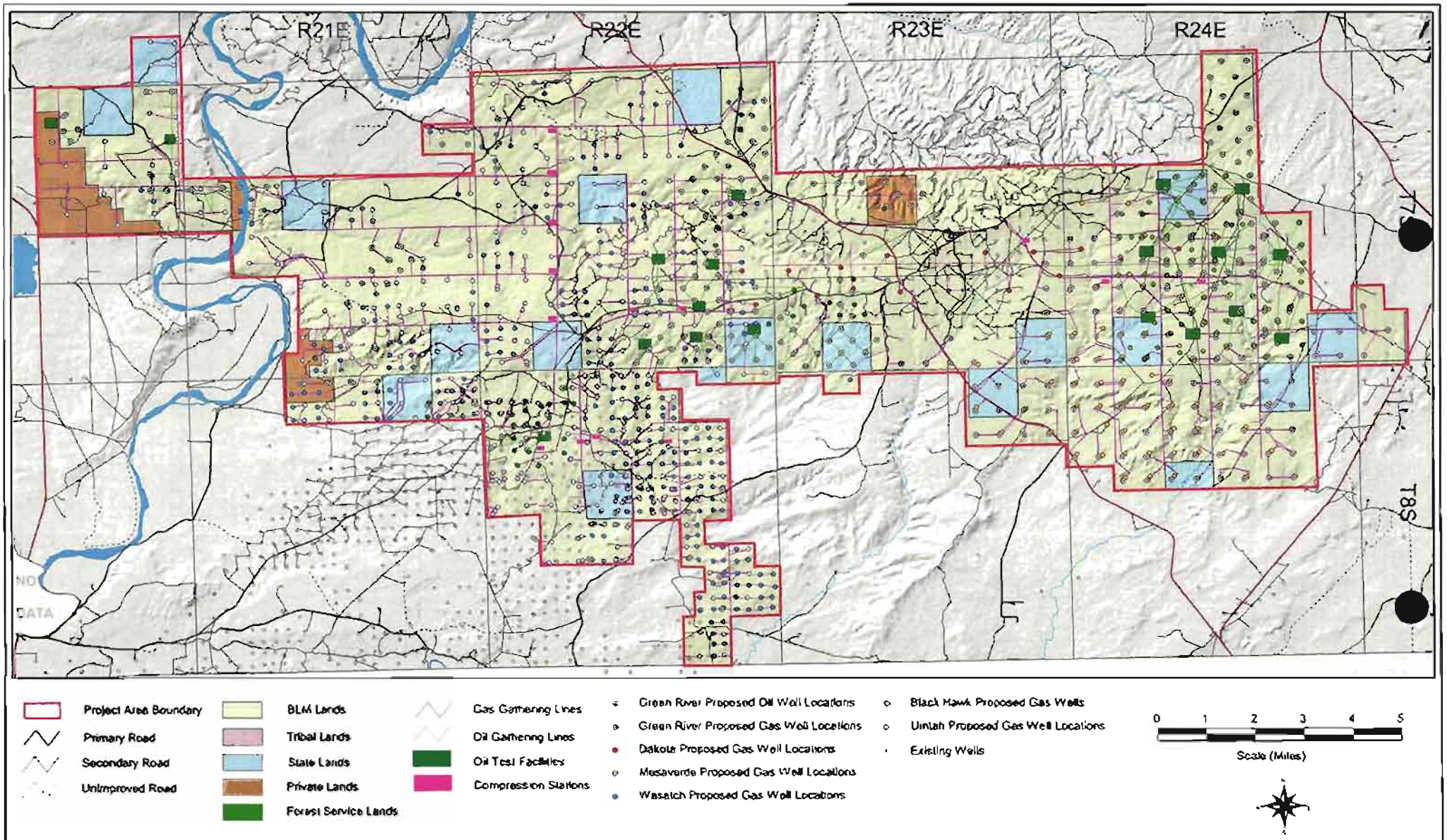

Figure 1-2. Existing Roads, Pipelines, Wells, and Proposed Wells and Pipelines within the Greater Deadman Bench Study Area

(8)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UTAH 84119

RECEIVED
FEB 06 2004
BLM VERNAL, UTAH

In Reply Refer To
FWS/R6
ES/UT
04-0426

February 3, 2004

Memorandum

To: Field Manager, Vernal Field Office, Bureau of Land Management, Vernal, Utah

From: Utah Field Supervisor, Ecological Services, U.S. Fish and Wildlife Service, Salt Lake City, Utah

Subject: 1792 UT-080; Questar Exploration and Production Company's Greater Deadman Bench Environmental Impact Statement, Scoping Notice

The U.S. Fish and Wildlife Service (Service) has reviewed your letter of January 8, 2004 announcing your intent to prepare an environmental document on the Questar Exploration and Production (QEP) Company's Greater Deadman Bench oil and gas production region project in Uintah County, Utah. The purpose of the project is to drill up to 1,239 new wells over a 10-year period, or until the resource base is fully developed on the leases. QEP estimates over 9 million barrels of oil and 750 billion cubic feet of natural gas will be produced over the next 40 years. The project area involves 99,000 acres in the Greater Deadman Bench oil and gas production region, located about 20 miles south of Vernal, Utah.

Of the proposed 1,239 wells, 769 well pads would be drilled on new locations and 470 would be "twins" drilled from existing locations. The proposed wells would be drilled on a 40-acre spacing pattern. Well site construction would consist of the following surface disturbance activities:

- Leveling a rectangular pad to 300' x 350', approx 2.5 acres
- Reserve pit for drilling mud and water storage of 150' x 70' x 12' deep adjacent to pad, approx 0.24 surface acres
- Stockpiles for topsoil and subsoil adjacent to pad, approx 0.5 acres
- Access road connecting the pad to the nearest established road of 1,000' x 30', approx 0.5 acres
- Right-of-Way for Green River Formation in the Green River Formation for production flow lines or water injection lines of 1,000' x 30', approx 0.5 acres
- Right-of-Way for Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation gas wells for surface gathering lines of 1,000' x 30', approx 0.5 acres

Consistent with NEPA regulation 40 CFR § 1503.1(a)(1) that the action agency shall obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved, we are responding to your request for concerns and comments on this EIS. In Section 1 of this letter we convey our concerns that should be addressed in the EIS for this project. Section 2 of this letter addresses your responsibilities under section 7 of the Endangered Species Act (ESA) of 1973, 16 U.S.C. § 1536.

Section 1.

The project area includes portions of the Upper Green River, which supports four federally endangered Colorado River fishes: Colorado pikeminnnow, humpback chub, bonytail, and razorback sucker. Sensitive species found within this river include roundtail chub, flannelmouth sucker, and bluehead sucker. The project area contains designated critical habitat for the endangered Colorado River fishes including those portions of the 100-year floodplain that contain constituent elements. The constituent elements are those physical and biological features that the Service considers essential for the conservation of the species and include, but are not limited to, the following items: (1) Space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally (5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of the species. Project activities should not lead to the detriment of this critical habitat.

White-tailed prairie dog colonies and habitat exist within this project area. White-tailed prairie dogs have been petitioned for listing under the Endangered Species Act. They are also included on the Utah Division of Wildlife Resources Sensitive Species List. The EIS should describe impacts to the species and habitat. Modifications of project activities should be designed and implemented as necessary to protect the white-tailed prairie dog and/or habitat from surface disturbing activities. A Range-wide Conservation Assessment is being developed, and could result in specific conservation recommendation for the species that may be applicable to this project.

Black-footed ferret habitat exists within the project area (personal communication, Miles Hanberg UDWR, January 28, 2004). We recommend implementing the *Surface Disturbance Management Guidelines* in Appendix E of the *Cooperative Plan for the Reintroduction and Management of Black-Footed Ferrets* (UDWR 1996). Planned resource extraction should be designed to avoid adverse impacts on prairie dog and black-footed ferret habitat. In the event of adverse impacts, activities should be designed to influence the smallest area feasible (UDWR 1996) and compensatory mitigation should be required. Buffers around existing colonies of 500 meters should be implemented to alleviate potential disturbances (personal communication, Amy Seglund, UDWR 2003). In addition, implementation of a long-term monitoring program to evaluate effects of development on prairie dogs and ferrets should be instituted. Evaluation of prairie dog populations before and after resource projects is recommended. Monitoring of populations should incorporate the methodology developed by Biggins et al. 1993.

The project area contains important wintering and brooding habitat for Greater sage grouse. There are two active sage grouse leks in the project area (personal communication, Miles Hanberg, UDWR, January 28, 2004). Any surface occupancy within historical or presently

occupied habitat should be avoided; grouse may utilize different lek sites due to weather variations or population increases. Development near strutting grounds or leks should be avoided as they are considered the focal point of year-around activities for sage grouse populations (Braun et al. 1977). The EIS should discuss the direct and indirect impacts to sage grouse leks; habitat surrounding the breeding grounds; nesting; and brood-rearing areas. Fragmentation is identified as one of the factors contributing to sage-grouse population declines (Braun 1998). To minimize the impacts of resource developments in sage-grouse habitats, we recommend avoiding developments that may fragment contiguous sage-grouse habitat or connectivity between seasonal habitats (breeding, nesting, early or late brood-rearing habitats). Areas that dually provide lekking/nesting habitats and wintering habitats should not be considered for natural resource development because these areas provide yearlong grouse use. If breeding, nesting, brood-rearing, and/or wintering habitats are unknown, monitoring to identify these habitats is essential, prior to resource development. Guidelines to minimize impacts to sage grouse, including seasonal and spatial buffers and habitat restoration recommendations, can be found in: the Utah Division of Wildlife Resources' *Strategic Plan for Management of Sage Grouse, 2002*, Publication No. 02-20 and in *Guidelines to Manage Sage Grouse Populations and Their Habitats* (Connelly et al. 2000).

Activities should avoid, to the extent possible, sensitive wildlife periods and areas (breeding season, calving season, migration corridors). Impacts to migratory bird habitat should be evaluated and minimized, focusing on the sagebrush obligate and sagebrush associated species on the Service's 2002 List of Birds of Conservation Concern and the Partners in Flight Priority Bird Species. To help meet responsibilities under Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), we recommend you conduct activities outside critical breeding seasons for migratory birds, minimize temporary and long-term habitat losses, and fully mitigate unavoidable habitat losses. If habitat disturbances occur in the spring or summer, we recommend surveys for migratory birds to assist in efforts to comply with the Migratory Bird Treaty Act (16 U.S.C. 703-712) and E.O. 13186.

Ferruginous hawks are known to occur in the Greater Deadman Bench Study Area. We recommend use of the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Romin and Muck, 2002) which were developed in part to provide consistent application of raptor protection measures statewide and provide full compliance with environmental laws regarding raptor protection. Raptor surveys and mitigation measures are provided in the Raptor Guidelines as recommendations to ensure that proposed projects will avoid adverse impacts to raptors. Locations of existing raptor nests should be identified prior to the initiation of project activities. Direct loss of nesting sites or territories should be avoided. Appropriate spatial buffer zones of inactivity should be established during crucial breeding and nesting periods relative to raptor nest sites or territories. Arrival at nesting sites can occur as early as December for certain raptor species. Nesting and fledging continues through August. Generally we recommend spatial buffers of 1.0 mile for threatened or endangered raptors, 0.5 mile for other diurnal raptors, and 0.25 mile for nocturnal raptor nests.

The 1997 Mexican spotted owl model identifies habitat within the project area. Although the 2000 model suggests nesting habitat may not exist within the project area, field reviews should be conducted to ensure model accuracy (letter from our office to BLM State Director, November 21, 2002). Small-scale habitat features, such as crevices or alcoves that may provide suitable owl

microclimates may be missed by the 2000 model. In addition, the 2000 model does not necessarily identify all owl habitat, such as foraging, dispersal, and wintering habitats. The EIS should discuss potential impacts and measures to minimize effects to the Mexican spotted owl.

Horseshoe Milkvetch occurs directly north of the study area and the Uinta Basin hookless cactus occurs in the project area (personal communication, Lenora Sullivan, UNHP, January 30, 2004). Impacts to these species should be minimized and the EIS should describe measures to protect these species.

The proposal may increase access and disturbance to previously isolated areas with high wildlife value. Therefore, the potential effects of dispersed recreation or enhanced access (camping, hiking, off-road vehicles) on wildlife habitat (disturbance of migration corridors, loss of vegetation) should be considered in project plans. Measures should be taken to prevent increased access to sensitive wildlife areas. In addition, the project activities will lead towards fragmenting the landscape and habitat. The EIS should discuss these impacts and well as describe the measures that will be taken to limit them.

The EIS should also identify the amount, location, and timeframe of temporary disturbance that could result from the proposed action. Displacement of wildlife across a large area during critical times, such as breeding, could prove a significant impact. If wildlife are displaced, it is likely that the area to which they are displaced is inhabited by other wildlife or disturbed by other ongoing activities. Depending on the season and species, displacement could lead to nest abandonment, inter- and intra-specific competition, reproductive failure, and possible mortality. In addition, the cumulative effects of other projects in the area may limit the availability of alternative sites for displaced wildlife.

Cumulative effects of other projects and activities to wildlife and wildlife habitat should be taken into account in project plans. The compounded effects this project will have with relation to the sagebrush die-off should be discussed. Approximately 50% of the sagebrush within the project area has died; remaining stands are typically older, decadent sagebrush with a cheatgrass understory (personal communication, Miles Hanberg, UDWR, January 28, 2004). As cheatgrass is known to increase fire occurrence, the cumulative effects of the EIS should also discuss how fire and the suppression activities will impact the proposed project activities as well as the remaining vegetation.

As with all projects that will create surface disturbance, there is potential for introduction and spread of invasive species. All possible measures should be taken to prevent the introduction or further proliferation of noxious species. Monitoring and control efforts should be implemented following construction. Seed mixes should, to the extent practicable, contain native plants or non-natives that will not naturalize, and plants that can successfully compete with noxious weeds.

Impacts associated with this project may lead to heightened erosion and degradation of fish and wildlife resources. We recommend you discuss the potential for erosion as well as any measures that will be taken to minimize the effects.

· All mitigation efforts should be monitored using established thresholds to indicate the need for remedial action. Success criteria should be applied that address sensitive periods, species of concern, and desired vegetation communities.

Section 2.

Federal agencies have specific additional responsibilities under Section 7 of the ESA. To help you fulfill these responsibilities, we are providing an updated list of threatened (T) and endangered (E) species that may occur within the area of influence of your proposed action.

Common Name	Scientific Name	Status
Horseshoe Milkvetch	*Astragalus equisolensis*	C
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	T
Bonytail[1, 2]	*Gila elegans*	E
Colorado Pikeminnow[1, 2]	*Ptychocheilus lucius*	E
Humpback Chub[1, 2]	*Gila cypha*	E
Razorback Sucker[1, 2]	*Xyrauchen texanus*	E
Bald Eagle[3]	*Haliaeetus leucocephalus*	T
Mexican Spotted Owl	*Strix occidentalis lucida*	T
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	C
Black-footed Ferret[4]	*Mustela nigripes*	E

[1] Critical habitat designated in this county.
[2] Water depletions from *any* portion of the occupied drainage basin are considered to adversely affect or adversely modify the critical habitat of the endangered fish species, and must be evaluated with regard to the criteria described in the pertinent fish recovery programs.
[3] Wintering populations (only four known nesting pairs in Utah).
[4] Historical range.

The proposed action should be reviewed and a determination made if the action will affect any listed species or their critical habitat. If it is determined by the Federal agency, with the written concurrence of the Service, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is complete, and no further action is necessary.

Formal consultation (50 CFR 402.14) is required if the Federal agency determines that an action is "likely to adversely affect" a listed species or will result in jeopardy or adverse modification of critical habitat (50 CFR 402.02). Federal agencies should also confer with the Service on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10). A written request for formal consultation or conference should be submitted to the Service with a completed biological assessment and any other relevant information (50 CFR 402.12).

Candidate species have no legal protection under the Endangered Species Act (ESA). Candidate species are those species for which we have on file sufficient information to support issuance of a proposed rule to list under the ESA. Identification of candidate species can assist environmental planning efforts by providing advance notice of potential listings, allowing resource managers to alleviate threats and, thereby, possibly remove the need to list species as endangered or threatened. Even if we subsequently list this candidate species, the early notice provided here

could result in fewer restrictions on activities by prompting candidate conservation measures to alleviate threats to this species.

Only a Federal agency can enter into formal Endangered Species Act (ESA) section 7 consultation with the Service. A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such a designation. The ultimate responsibility for compliance with ESA section 7, however, remains with the Federal agency.

Your attention is also directed to section 7(d) of the ESA, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

Thank you for your interest in conserving endangered species. If we can be of further assistance, please contact Bekee Megown at 801-975-3330, ext. 146.

cc: BLM State Office – Attn: Ron Bolander
UDWR – SLC and Vernal
Buys & Associates, Inc., Attn: S. Kirby Carroll, Senior Ecologist, 300 E. Mineral Ave., Suite 10, Littleton, CO 80122-2631

Literature Cited

Biggins, D., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Creete and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pp. 73-88 *in* J.L. Oldemeyer, D.E. Biggins, B.J. Miller, and R. Crete, eds. Proceedings of the Symposium on the management of prairie dog complexes for the reintroduction of the black-footed ferret. Biological Report 13. July 1993. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 96 pp.

Braun, C. E., T. Britt, and R. O. Wallestad. 1977. Guidelines for maintenance of sage grouse habitats. Wildlife Society Bulletin 5:99-106.

Braun, C. E. 1998. Sage-grouse in Western North America: What are the problems? Proceedings of Western Association of Fish and Wildlife Agencies 78:139-156.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

Hanberg, Miles. January 28, 2004. Habitat Coordinator, Northern Region, UDWR Vernal, UT.

Romin, L.A., and J.A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildl. Serv., UT Field Office, Salt Lake City, UT.

Seglund, Amy. 2003. Pers. Comm. Sensitive Species Biologist, South Eastern Region, UDWR Price, UT.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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WEST VALLEY CITY, UTAH 84119

MAR

In Reply Refer To
FWS/R6
ES/UT
FA-0264

March 24, 2006

Memorandum

To: Greater Deadman Bench Project Manager, Bureau of Land Management, 170 South 500 East, Vernal, Utah 84078

From: Utah Field Supervisor, Ecological Services, U.S. Fish and Wildlife Service, West Valley City, Utah

Subject: Draft Environmental Impact Statement on the Proposed Greater Deadman Bench Region Oil and Gas Field Development; 1792 UT080-P

The Fish and Wildlife Service (Service) has reviewed your January 2006 letter regarding Questar Exploration and Production Company's (QEP) proposed oil and gas field development project within the Greater Deadman Bench Region. The proposed action would include constructing 1,020 natural gas wells, 219 oil/water injection wells, 169 miles of access roads, 193 miles of pipelines, 41 miles of oil flowlines, 15 compressor stations, and 22 central tank facilities. Long term surface disturbance throughout the project area over the life of the project is estimated at 4,561 acres. The maximum water use during the 10-year development phase would be 2,408 acre-feet per year. The project area is approximately 98,785 acres within Townships 6 to 8 South and Ranges 21 to 25 East, Uintah County, Utah.

Your letter requested comments regarding the draft EIS. The Service provides recommendations for protective measures for threatened and endangered species in accordance with the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et. seq.*). Protective measures for migratory birds are provided in accordance with the Migratory Bird Treaty Act of 1918 (MBTA), as amended (16 U.S.C. 703 *et. seq.*) and the Bald and Golden Eagle Protection Act of 1940 (BGEPA), as amended (16 U.S.C. 668 *et. seq.*). Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, 48 Stat. 401, as amended (16 U.S.C. 661 *et. seq.*).

General Comments

The abstract for the proposed field development states 1,010 new gas wells will be drilled but tables S-1 page S-11 and 2.3 page 2-15 show 1,020. Also, table S-1 shows 891 new well pads will be constructed under the proposed action while table 2.3 lists 893 new well pads. Please verify numbers and any acreage calculations throughout.

On page 2-3, the last paragraph states that the requirement for lining the reserve pit would be site-specific. We recommend following the Guidance for Determining Pit Lining Requirements found within the Utah Division of Oil, Gas and Mining's *Environmental Handbook: Environmental Regulations for the Oil & Gas Exploration and Production Industry* (http://ogm.utah.gov/oilgas/PUBLICATIONS/Handbooks/envbook.htm). Soil type is only one factor to consider when determining whether a liner is needed. Other factors such as distance to groundwater, distance to wells, distance to surface water, fluid type, etc. are taken into consideration when evaluating the need for a liner. Absent site-specific evaluations, we recommend all pits be lined.

Best Management Practices

We commend QEP for being proactive and planning the field development using best Management Practices (BMPs). We appreciate your inclusion of standards for power line construction as outlined in the Suggested Practices for Raptor Protection on Power Lines (Edison Electrical Institute 1996) (Section 2.3.4 page 2-25).

QEP commits to monitoring and controlling noxious and invasive weeds (Section 2.3.5 page 2-25). We recommend that success criteria, frequency of control, and monitoring protocols be incorporated into the Pesticide Use Proposal.

Bald Eagle

Section 3.6.8.3, page 3-71, states there are four nesting sites within Utah. Currently, there are eight nesting pairs within Utah (http://mountain-prairie.fws.gov/endspp/CountyLists/UTAH.htm).

The determination on page 4-36 states that the proposed action "may affect is not likely to adversely affect" the bald eagle. Because mortality could potentially occur, the determination should be "may affect, likely to adversely affect". In addition to the applicant committed BMPs described in chapter 2 and the mitigation measures outlined in 4.6.2, we recommend incorporating the following measures to minimize the impacts to bald eagle:

1. Temporary activities within 0.5 miles of winter roost areas, e.g., cottonwood galleries, will not occur during the winter roost season of November 1 to March 31, unless the area has been surveyed according to protocol and determined to be unoccupied.
2. No permanent infrastructure will be placed within 0.5 miles of winter roost areas.
3. Avoid loss or disturbance to large cottonwood gallery riparian habitats.
4. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in suitable habitat Utilize directional drilling to avoid direct impacts to large cottonwood gallery riparian habitats. Ensure that such directional drilling does not intercept or degrade alluvial aquifers.
5. All areas of surface disturbance within riparian areas and/or adjacent uplands should be re-vegetated with native species.

Raptors

To help meet responsibilities under the Migratory Bird Treaty Act (16 U.S.C. 703-712), Executive Order 13186, and the Bald and Golden Eagle Protection Act of 1940 (BGEPA), as amended (16 U.S.C. 668 *et. seq.*), we recommend implementing the guidelines for avoiding and minimizing impacts to raptor species as described in the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Romin and Muck, 2002). The guidelines state that "long term land use activities and human use activities should not occur within the species-specific spatial buffer zone of occupied nests." Furthermore, long-term land use activities should not occur proximally to unoccupied nests unless it is determined that mitigation is appropriate and can be accomplished prior to initiation of the long-term disturbance.

Horseshoe Milkvetch

In the second paragraph of the horseshoe milkvetch section on page 4-21, the milkvetch is referred to as a cactus, please correct.

QEP commits to surveying potential habitat prior to any surface disturbance. We request that all survey results, whether or not plants are found, are provided to this office.

In the fourth paragraph of this section, it is unclear as to what mitigation would be used within horseshoe milkvetch habitat against weed invasion. In order to provide protection to this candidate species, we do not recommend mechanical or herbicide treatments in areas that will impact occupied habitat.

Effects to Federally Listed Fish Species

The EIS states the water depletion fee is $16.30 per acre-foot (page 4-39). The current water depletion fee is $16.67 and this fee changes annually. It appears from Figures 2-1 and 3.2-1 that there are proposed wells located within or impacting the designated critical habitat for the endangered Colorado River fish species. The analysis presented in 4.6.1.1 for the Endangered Colorado River Fish does not analyze the effects of the proposed action (drilling within the floodplain of the Green River) to the fish or its designated critical habitat. Absent this analysis and the full disclosure of effects, we recommend that well pads, roads, and pipelines should not be placed within designated critical habitat. Impacts to endangered fish or their habitats should be fully assessed through section 7 consultation with our office. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in the designated critical habitat.

Floodplains

We recommend no well pads be placed within the 100-Year floodplain. Where technically and economically feasible, use directional drilling or multiple wells from the same pad to reduce surface disturbance and eliminate drilling in the 100-Year floodplain.

Seed Mixes

We recommend removing crested wheatgrass from the seed mixes listed in Attachment 2 as this introduced species has not been shown as occurring in the area (section 34.5.2 Vegetation Communities).

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have further questions regarding our comments or if we can be of further assistance, please contact Bekee Megown at (801) 975-3330 extension 146.

cc: BLM State Office

Literature Cited

Edison Electric Institute. 1996. Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996. Avian Power Line Interaction Committee, the Edison Electric Institute, and the Raptor Research Foundation, Washington, D.C., 1996.

Romin, L.A., and J.A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildl. Serv., UT Field Office, Salt Lake City, UT.

United States Department of the Interior

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IN REPLY REFER TO:
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(UT-0322)

January 23, 2007

MEMORANDUM

To: Utah Field Supervisor, Ecological Services, U.S. Fish & Wildlife Service, Salt Lake City Utah

From: Field Manager

Subject: Initiation of Formal Consultation on the Final Environmental Impact Statement (FEIS) and Biological Assessment (BA) for Questar Exploration & Production Company's (QEP), Greater Deadman Bench Oil and Gas Producing Region.

The Draft EIS/BA for the Greater Deadman Bench Oil and Gas Producing Region (GDBR) was published on February 10, 2006 with a 45-day public comment period. Informal consultation, through phone calls and meetings, has been conducted between this office and the Service both prior and during the comment period for this FEIS/BA.

Attached is the FEIS/BA for the GDBR project. Pursuant to Section 7 of the Endangered Species Act of 1973, and in conformance with 50 CFR 402.12, the Vernal Field Office is requesting concurrence with the determinations made for the threatened, endangered and candidate species evaluated in the FEIS/BA and conclude formal consultation for this project.

Please refer to the attached FEIS/BA.

Project Overview

QEP proposes to develop oil and gas resources within the 98.785-acre GDBR area located about 20 miles south of Vernal, Utah. The GDBR is partially developed with 278 existing oil and water-injection wells, 300 gas wells, and approximately 57 miles of primary roads and 314 miles of secondary roads. The Proposed Action would include the following: 1,020 natural gas wells, 219 oil/water injection wells, 169 miles of access roads, 193 miles of pipelines, 42 miles of oil flowlines, 15 2,000-horsepower compressor stations, and 22 central tank facilities. Construction would begin after the issuance of the Environmental Impact Statement Record of Decision, approval of individual Applications for Permit to Drill, and

Opinions specify that the Recovery Implementation Program Recovery Action Plan, initiated in 1988 (FWS 1988) had made sufficient progress to be the reasonable and prudent alternative to avoid the likelihood of jeopardy to these endangered fish species from new depletions of less than 3,000 acre-feet. The FWS determined that water depletion fees for projects annually depleting less than 100 acre-feet of water were no longer necessary (FWS 1994c). Since the Proposed Action would result in an annual water depletion of a maximum of 2,300 acre-feet, a payment of a fee of $16.30 per acre-foot for water depletion above 100 acre-feet would be required.

Indirect impacts on the species could occur from decreased water quality due to increased erosion and sediment yield resulting from surface disturbance. However, the predicted increase would only be 0.03%, a negligible increase. Therefore, no impacts would occur to fish species from increased sedimentation.

Based on the removal of water from the Green River (i.e., water depletion) for construction and drilling operations, the Proposed Action "***may affect, is likely to adversely affect***" the endangered Colorado pikeminnow, humpback chub, bonytail, and razorback sucker.

Black-footed Ferret (*Mustela nigripes*)–E–10(j), Experimental Population in Uintah County

The black-footed ferret is a federally listed endangered species, which utilizes prairie dog colonies for shelter and feeds on the prairie dogs. The BLM records indicate that approximately 1,827 acres of white-tailed prairie dog habitat are present within the GDBR in Section 3, T7S, R24E; Sections 1 and 12, T8S, R23E; Section 2, 5-11, and 14-17, T8S, R24E) (see Figure 3.6-1).

If black-footed ferrets are present in the GDBR, the Proposed Action could result in direct and indirect impacts to this species. The direct impacts would include mortality from construction activities that resulted in destruction of the white-tailed prairie dog colonies. Indirect impacts would include loss of prairie dog colonies and disturbance due to noise from construction and human activities. Increased traffic and construction of well pads, pipelines and roads associated with the Proposed Action may cause an increase in prairie dog mortality, habitat fragmentation and loss, and colony abandonment, thereby decreasing the viability of the habitat to support black-footed ferrets. Fragmentation of habitat is of particular concern, since black-footed ferrets would need a minimum density of 8 prairie dog burrows/acre (20 burrows/ha) for the ferret population to survive (USFWS 1989).

Populations of black-footed ferrets have been introduced into the wild in Coyote Basin, south of the GDBR and are characterized as "non-essential experimental" populations. According to the FWS and the UDWR, management activities within the Coyote Basin PMZ should be conducted with the objective of maintaining a minimum of 10,000 acres of prairie dog colonies (EA No. UT-080-1999-02). Prairie dog colonies located in the PMZ and in the GDBR create a complex of approximately 16,000 acres. Approximately 1,830 acres of active prairie dog colonies exist in this area of the PMZ. It is estimated that well pad, pipeline and road construction would result in disturbance up to 73.2 acres within these sections of the GDBR. Therefore, the Proposed Action would be consistent with habitat management objectives (i.e., maintaining a minimum of 10,000 acres of prairie dog colonies) for the Coyote Basin PMZ. Based on the potential for prairie dog mortality and disturbance to the

Unavoidable Adverse Impacts to Wildlife

Unavoidable adverse impacts to wildlife species from the Proposed Action or No Action Alternatives would include:

• Disturbance to raptor breeding, nesting, and foraging habitat from construction of well pads, roads, pipelines, and ancillary facilities. Approximately 43 new well pads under the Proposed Action would need to be moved or constructed outside of timing limitations to mitigate these potential adverse impacts. Only 4 well pads would need mitigation under the No Action.

• Fragmentation of wildlife habitat from construction of well pads, roads, pipelines, and ancillary facilities. Approximately five times more roads would occur under the Proposed Action than the No Action.

• Displacement of wildlife species habitat from construction of well pads, roads, pipelines, and ancillary facilities. Total displacement would result from disturbance of 4,651 acres under the Proposed Action and 880 under the No Action.

• Increased disturbance from noise and human activities from construction of well pads, roads, pipelines, and ancillary facilities. Total noise effect would result from disturbance of 4,651 acres under the Proposed Action and 880 under the No Action.

• Well pad and road and pipeline construction could result in long-term disturbance to white-tailed prairie dog colonies, which would result in loss of prey, breeding habitat and shelter for the black-footed ferret.
• Drilling, completion and dust suppression activities would result in water depletion from the Green River and result in adverse impacts to the endangered Colorado River fish species.

Special Status Plant Species

Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7 (a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action "*may affect, is likely to adversely affect*" a federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate and BLM sensitive species are also managed to prevent a future listing as threatened or endangered. The sections below describe the special status plant species that may be affected by the No Action Alternative. Effects of the No Action Alternative on special status plant species are also addressed in the FEIS/BA.

The special status plant species that potentially occur in the GDBR include the Uinta Basin hookless cactus (*Sclerocactus glaucus*) and the horseshoe milkvetch (*Astragalus equisolensis*). The following analyses assume that applicant-committed BMPs would be implemented.

natural sedimentation impacts on the Uinta Basin hookless cactus indicates that human induced sedimentation can have an even more detrimental effect on the species. Because of these potential impacts, sedimentation potentially resulting from surface disturbance under the proposed action is a concern. However, several applicant-committed BMPs have been incorporated into the proposed action in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on Uinta Basin hookless cactus habitats.

Based on these potential impacts, and the anticipated effectiveness of the mitigating measures BLM finds that the proposed action "***may affect, is not likely to adversely affect***" the Uinta Basin hookless cactus.

Mitigation Measures

The following mitigation measures would be applied to minimize the impact of the Proposed Action and No Action Alternative to the vegetation communities.

Power-washing of all construction and drilling equipment would occur prior to the equipment entering the GDBR project area from outside the Vernal Field Office area.

Over the construction, drilling and completion season, QEP could implement an intensive interim reclamation program beginning the first growing season after each segment of project completion. As applicant-committed BMPs, QEP would reseed all portions of well pads and ROWs not utilized for the operational phase of the project, as well as any sites within the GDBR determined necessary by the appropriate SMA. Reseeding would be accomplished using SMA specified plant species. Post-construction seeding applications would continue as determined necessary by the SMA.

Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer of the appropriate SMA. Weed monitoring would occur on an annual basis (or as frequently as the SMA determines) throughout the life of the project. QEP would avoid placement of roads, pipelines, well pads, and ancillary facilities within 100 meters of riparian habitats. If avoidance is not feasible, then impacts to riparian habitats would be minimized, where possible.

During the APD process, BLM should consider moving facilities up to 200 meters away from water courses, livestock corrals, BLM rain gauges, and long-term established vegetation studies. If these range facilities could not be avoided, the operators could be required to replace them.

The following mitigation has been developed by BLM and the USFWS to mitigate potential impacts to the hookless cactus:

Surveys

• Pre-project habitat assessments will be completed across 100 percent of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable Uinta Basin hookless cactus habitat is present.

• Oil, water, or condensate tanks in centralized locations will be placed away from occupied habitat, and,

▪ Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

Monitoring

▪ Occupied Uinta Basin hookless cactus habitats within 100' of the edge of the surface pipeline rights-of-way, 100 feet of the edge of the roads' right-of-ways, and 100 feet from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

• Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

Should you have questions, or require additional information, please contact Amy Torres, Wildlife Biologist, at 435-781-4481

Attachment: Questar Exploration & Production Company's (QEP), Greater Deadman Bench Oil and Gas Producing Region FEIS/BA (CD)

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January 23, 2007

MEMORANDUM

To: Utah Field Supervisor, Ecological Services, U.S. Fish & Wildlife Service, Salt Lake City Utah

From: Field Manager

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• Use directional drilling where technically and economically feasible to reduce disturbance and drilling in suitable roosting habitat. All areas of disturbance within riparian areas and/or adjacent uplands should be revegetated with native species.

Unavoidable Adverse Impacts to Wildlife

Unavoidable adverse impacts to wildlife species from the Proposed Action or No Action Alternatives would include:

• Disturbance to raptor breeding, nesting, and foraging habitat from construction of well pads, roads, pipelines, and ancillary facilities. Approximately 43 new well pads under the Proposed Action would need to be moved or constructed outside of timing limitations to mitigate these potential adverse impacts. Only 4 well pads would need mitigation under the No Action.

• Fragmentation of wildlife habitat from construction of well pads, roads, pipelines, and ancillary facilities. Approximately five times more roads would occur under the Proposed Action than the No Action.

• Displacement of wildlife species habitat from construction of well pads, roads, pipelines, and ancillary facilities. Total displacement would result from disturbance of 4,651 acres under the Proposed Action and 880 under the No Action.

• Increased disturbance from noise and human activities from construction of well pads, roads, pipelines, and ancillary facilities. Total noise effect would result from disturbance of 4,651 acres under the Proposed Action and 880 under the No Action.

• Well pad and road and pipeline construction could result in long-term disturbance to white-tailed prairie dog colonies, which would result in loss of prey, breeding habitat and shelter for the black-footed ferret.
• Drilling, completion and dust suppression activities would result in water depletion from the Green River and result in adverse impacts to the endangered Colorado River fish species.

Special Status Plant Species

Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7 (a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action "*may affect, is likely to adversely affect*" a federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate and BLM sensitive species are also managed to prevent a future listing as threatened or endangered. The sections below describe the special status plant species that may be affected by the No Action Alternative. Effects of the No Action Alternative on special status plant species are also addressed in the FEIS/BA.

sedimentation. The BLM has documented incidences where natural sediment deposition (i.e., sedimentation not caused by oil and gas development or other human activities) caused the loss of cacti or modified suitable habitat for the Uinta Basin hookless cactus. This example of natural sedimentation impacts on the Uinta Basin hookless cactus indicates that human induced sedimentation can have an even more detrimental effect on the species. Because of these potential impacts, sedimentation potentially resulting from surface disturbance under the proposed action is a concern. However, several applicant-committed BMPs have been incorporated into the proposed action in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on Uinta Basin hookless cactus habitats.

Based on these potential impacts, and the anticipated effectiveness of the mitigating measures BLM finds that the proposed action "***may affect, is not likely to adversely affect***" the Uinta Basin hookless cactus.

Mitigation Measures

The following mitigation measures would be applied to minimize the impact of the Proposed Action and No Action Alternative to the vegetation communities.

Power-washing of all construction and drilling equipment would occur prior to the equipment entering the GDBR project area from outside the Vernal Field Office area.

Over the construction, drilling and completion season, QEP could implement an intensive interim reclamation program beginning the first growing season after each segment of project completion. As applicant-committed BMPs, QEP would reseed all portions of well pads and ROWs not utilized for the operational phase of the project, as well as any sites within the GDBR determined necessary by the appropriate SMA. Reseeding would be accomplished using SMA specified plant species. Post-construction seeding applications would continue as determined necessary by the SMA.

Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer of the appropriate SMA. Weed monitoring would occur on an annual basis (or as frequently as the SMA determines) throughout the life of the project. QEP would avoid placement of roads, pipelines, well pads, and ancillary facilities within 100 meters of riparian habitats. If avoidance is not feasible, then impacts to riparian habitats would be minimized, where possible.

During the APD process, BLM should consider moving facilities up to 200 meters away from water courses, livestock corrals, BLM rain gauges, and long-term established vegetation studies. If these range facilities could not be avoided, the operators could be required to replace them.

The following mitigation has been developed by BLM and the USFWS to mitigate potential impacts to the hookless cactus:

Surveys

• Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,

• Designs will avoid concentrating water flows or sediments into occupied habitat,

• Oil, water, or condensate tanks in centralized locations will be placed away from occupied habitat, and,

• Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

Monitoring

• Occupied Uinta Basin hookless cactus habitats within 100' of the edge of the surface pipeline rights-of-way, 100 feet of the edge of the roads' right-of-ways, and 100 feet from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.

• Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

Should you have questions, or require additional information, please contact Amy Torres, Wildlife Biologist, at 435-781-4481

Attachment. Questar Exploration & Production Company's (QEP), Greater Deadman Bench Oil and Gas Producing Region FEIS/BA (CD)

Bcc: Reading File
Central File
Project File: QEP's Greater Deadman Bench Oil & Gas Producing Region FEIS/BA

United States Department of the Interior
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March 27, 2007

MEMORANDUM

To: Utah Field Supervisor, Ecological Services, U.S. Fish & Wildlife Service, Salt Lake City Utah

From: Field Manager

Subject: Supplemental Information regarding the Formal Consultation on the Final Environmental Impact Statement (FEIS) and Biological Assessment (BA) for Questar Exploration & Production Company's (QEP), Greater Deadman Bench Oil and Gas Producing Region.

The Draft EIS/BA for the Greater Deadman Bench Oil and Gas Producing Region (GDBR) was published on February 10, 2006 with a 45-day public comment period. Informal consultation, through phone calls and meetings, has been conducted between this office and the Service both prior and during the comment period for this FEIS/BA.

Consultation was initiated on January 23, 2007. Attached is the revised FEIS/BA for the GDBR project. Pursuant to Section 7 of the Endangered Species Act of 1973, and in conformance with 50 CFR 402.12, the Vernal Field Office is requesting concurrence with the determinations made for the threatened, endangered and candidate species evaluated in the FEIS/BA and conclude formal consultation for this project.

Please refer to the attached FEIS/BA.

Project Overview

QEP proposes to develop oil and gas resources within the 98,785-acre GDBR area located about 20 miles south of Vernal, Utah. The GDBR is partially developed with 278 existing oil and water-injection wells, 300 gas wells, and approximately 57 miles of primary roads and 314 miles of secondary roads. The Proposed Action would include the following: 1,020 natural gas wells, 219 oil/water injection wells, 169 miles of access roads, 193 miles of pipelines, 42 miles of oil flowlines, 15 2,000-horsepower compressor

(BLM 1999). The GDBR is not within the ferret release location, but the southeast portion (i.e., T8S, R24E, Sections 2-11 and 14-17) is directly within the Coyote Basin Black-Footed Ferret Primary Management Zone (PMZ). Ferret reintroduction in the Coyote Basin PMZ was authorized by the USFWS, in cooperation with the BLM, the Colorado Division of Wildlife and the Utah Division of Wildlife Resources. Section 10j of the ESA classifies reintroduced populations such as those ferrets in the Coyote Basin as "nonessential-experimental", and these species are treated as a candidate species.

The BLM, USFWS, and UDWR are monitoring the released population closely and have noted that the ferrets are expanding into surrounding areas. Although ferrets have not been documented within the specific GDBR, it is possible that the species could eventually migrate into the GDBR as released populations grow and expand into other suitable habitats.

Impacts:
The black-footed ferret is a federally listed endangered species, which utilizes prairie dog colonies for shelter and feeds on the prairie dogs. The BLM records indicate that approximately 1,827 acres of white-tailed prairie dog habitat are present within the GDBR in Section 3, T7S, R24E; Sections 1 and 12, T8S, R23E; Section 2, 5-11, and 14-17, T8S, R24E) (see Figure 3.6-1).

If black-footed ferrets are present in the GDBR, the Proposed Action could result in direct and indirect impacts to this species. The direct impacts would include mortality from construction activities that resulted in destruction of the white-tailed prairie dog colonies. Indirect impacts would include loss of prairie dog colonies and disturbance due to noise from construction and human activities. Increased traffic and construction of well pads, pipelines and roads associated with the Proposed Action may cause an increase in prairie dog mortality, habitat fragmentation and loss, and colony abandonment, thereby decreasing the viability of the habitat to support black-footed ferrets. Fragmentation of habitat is of particular concern, since black-footed ferrets would need a minimum density of 8 prairie dog burrows/acre (20 burrows/ha) for the ferret population to survive (USFWS 1989).

Populations of black-footed ferrets have been introduced into the wild in Coyote Basin, south of the GDBR and are characterized as "non-essential experimental" populations. The Coyote Basin black-footed ferret Primary Management Area encompasses approximately 46,000 acres of which 10,250 acres are in the GDBR. According to the FWS and the UDWR, management activities within the Coyote Basin PMZ should be conducted with the objective of maintaining a minimum of 10,000 acres of prairie dog colonies (EA No. UT-080-1999-02). Prairie dog colonies located in the PMZ and in the GDBR create a complex of approximately 16,000 acres. Approximately 1,830 acres of active prairie dog colonies exist in this area of the PMZ. It is estimated that well pad, pipeline and road construction would result in disturbance up to 151 acres, or 1.5 percent of the PMZ. Therefore, the Proposed Action would be consistent with habitat management objectives (i.e., maintaining a minimum of 10,000 acres of prairie dog colonies) for the Coyote Basin PMZ.

avoidance and minimization measures identified in Section 4.6.2, the potential effects of the Proposed Action would be reduced.

Based on the potential loss of prey species and loss of habitat, the Proposed Action "*may affect is not likely to adversely affect*" the bald eagle.

Colorado Pikeminnow (*Ptychocheilus lucius*)

The Colorado pikeminnow, also known as the Colorado squawfish, is federally listed as endangered by the USFWS. The Colorado pikeminnow thrives in swift flowing muddy rivers with quiet, warm backwaters. Colorado pikeminnow are primarily piscivorous (fish-eaters), but smaller individuals also eat insects and other invertebrates. The species spawns during the spring and summer over riffle areas with gravel or cobble substrate. Eggs are randomly splayed onto the bottom, and usually hatch in less than one week (Sigler and Sigler 1996).

The Colorado pikeminnow were historically found in the mainstream Colorado River and its tributaries from Wyoming to the Gulf of California. Currently, wild populations of pikeminnow persist only in the upper basin. The White River currently supports some of the highest densities of Colorado pikeminnow in the Green River sub-basin. The White River is used for year round residence and also as a migration corridor to other connected habitats in the Green and Yampa rivers. Adult Colorado pikeminnow are present in the White River upstream to the Taylor Draw Dam. Portions of the White River and its 100-year floodplain, about five miles south of the Project Area, are officially designated as critical habitat for the Colorado pikeminnow. Portions of the Green River and its 100-year floodplain in the Project Area are also officially designated as critical habitat for the Colorado pikeminnow (USFWS 2003).

Humpback Chub (*Gila cypha*)

The humpback chub is a federally endangered minnow found in the Upper Colorado River Basin. The humpback prefers deep, fast-moving, turbid waters often associated with large boulders and steep cliffs. Humpback chubs feed predominately on small aquatic insects, diatoms and filamentous algae. Spawning occurs between April and July during high flows from snowmelt (Sigler and Sigler 1996).

Historically, the humpback chub inhabited canyons of the Colorado River and four of its tributaries: the Green, Yampa, White and Little Colorado rivers. Today, populations currently exist near the Colorado/Utah border in Westwater Canyon in Utah and at Black Rocks, in Colorado. Smaller numbers have been found in the Yampa and Green Rivers in Dinosaur National Monument, Desolation and Gray canyons on the Green River in Utah, Cataract Canyon on the Colorado River in Utah and the Colorado River in Arizona. The largest known population is in the Little Colorado River in the Grand Canyon, where there may be up to 10,000 fish. There are no population estimates available for the rest of the upper Colorado River basin (USFWS 2003).

degrade the flow of downstream waters into the Colorado River (U.S. Fish and Wildlife Service 1990a, b).

Implementation of the Proposed Action in or near designated critical habitats of the endangered Colorado River fish could impact the Colorado River Endangered Fish species by: 1) altering the substrate characteristics of the floodplain, thereby reducing the quality of habitat available to fish populations 2) changing the floodplain vegetation which provides allochthonous input into the river 3) potentially exposing fish species to contaminants from accidental spills/leaks of pipelines or productions facilities, and 4) resulting in a depletion of the Upper Colorado River Basin.

Increased vehicle traffic associated with oil and gas activities has the potential to introduce exotic species to floodplain areas. The spread of exotic plants can alter river channels. Channel width reductions increase water velocities in the main channel and decrease the number of low velocity backwaters. However, the operator has committed to control weeds that become established on their well pads and road and pipeline use authorizations, and rights of ways.

The Green River is a large river with high dilution factors. However, if a spill/leak were to enter this river, contaminants would likely to accumulate in backwater/depressional areas with reduced dilution and less flushing capacity (Woodward et al. 1985). The endangered Colorado River fish use these sites which provide cover and a food source. Water quality is defined by parameters such as temperature, dissolved oxygen, environmental contaminants, nutrients, turbidity, and is considered a primary constituent element of designated critical habitat for the Colorado River fishes. Research is limited regarding threats posed by environmental contaminants to the endangered Colorado River fishes (Woodward et al. 1985; Krahn et al. 1986; Mayer and Ellerieck 1986). However, these studies have shown that contaminants, including petroleum hydrocarbons released via spills/leaks, can affect behavioral functions which have been shown to impair feeding behavior (Woodward et al. 1987). Early life stages of all fish are generally more sensitive to environmental contaminants than juveniles or adults (Mayer and Ellersieck), and disruption of behavioral functions can result in population declines or changes in year-class strength if enough individuals are affected (Little et al. 1993). To minimize these impacts, the operator has committed to install secondary containment (berms, etc) around chemical storage facilities. They have also committed to line the pit as directed by the Surface Management Agency.

Depletion or the removal of water from the Upper Colorado River Basin reduce the ability of the river to create and maintain the physical habitat (areas inhabited or potentially habitable to special status fish for use of spawning, development of fish larvae, feeding, or serving as corridors between these areas) and the biological environment. Water depletions can also contribute to alterations in flow regimes that favor nonnative fish.

In order to address depletion (and other) impacts on the Colorado River Endangered Fish species, a Recovery Implementation Program for Endangered Fish Species in the Upper

- Activities within ½ mile of winter roost areas, e.g., cottonwood galleries, will not occur during the winter roost season from November 1 to March 31.
- No permanent facilities will be placed within 0.5 miles of winter roost areas.
- Avoid loss or disturbance to large cottonwood gallery riparian habitats.
- Use directional drilling where technically and economically feasible to reduce disturbance and drilling in suitable roosting habitat. All areas of disturbance within riparian areas and/or adjacent uplands should be revegetated with native species.

Unavoidable Adverse Impacts to T&E Wildlife Species

Unavoidable impacts resulting from the Proposed Action or No Action Alternative would include the following:

- Well pad and road and pipeline construction could result in long-term disturbance to white-tailed prairie dog colonies, which would result in loss of prey, breeding habitat and shelter for the black-footed ferret.
- Drilling, completion and dust suppression activities would result in water depletion from the Green River and result in adverse impacts to the endangered Colorado River fish species.

Special Status Plant Species

Uinta Basin Hookless Cactus (Sclerocactus glaucus)

The Uinta Basin hookless cactus' (federally threatened) unhooked large central spine differentiates it from other members of the *Sclerocactus* genus, which have either a hooked large central spine or none (USFWS 1990). However, at least a few individuals in most Uinta Basin hookless cactus populations possess moderately to strongly hooked spines (Goodrich and Neese 1986).

Habitat for the Uinta Basin hookless cactus generally consists of gravelly or rocky surfaces on river terrace deposits and lower mesa slopes (USFWS 1990), as well as gravel littered draws (Goodrich and Neese 1986), that are underlain by clay or silty clay. This species does not grow in sandy soils. The species occurs on varying exposures, but is more abundant on south-facing exposures, slopes to about 30 percent grade, and where terrace deposits break from level tops to steeper side slopes. The Uinta Basin hookless cactus is found at elevations from 4,500 to 5,900 feet amsl within the desert shrub vegetation community (USFWS 1990). No populations of Uinta Basin hookless cactus currently occur in the GDBR but potential habitat for the species occurs in the southern and west portions of the GDBR in the Uinta Geological formation. Populations are found adjacent to the GDBR in the west near Pelican Lake and to the southeast near the Bonanza Power Plant.

cactus is not tolerant of heavy sedimentation. The BLM has documented incidences where natural sediment deposition (i.e., sedimentation not caused by oil and gas development or other human activities) caused the loss of cacti or modified suitable habitat for the Uinta Basin hookless cactus. This example of natural sedimentation impacts on the Uinta Basin hookless cactus suggests that human-induced sedimentation can have an even more detrimental effect on the species. Because of these potential impacts, sedimentation potentially resulting from surface disturbance under the No Action Alternative is a concern. However, several applicant-committed BMPs have been incorporated into the No Action Alternative in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on Uinta Basin hookless cactus habitats.

Based on the potential for modification or loss of potential habitat and increased access to potential or occupied habitats, the No Action Alternative "*may affect, is not likely to adversely affect*" the Uinta Basin hookless cactus.

Mitigation Measures for T&E Plant Species:

The following mitigation measures would be applied to minimize the impact of the Proposed Action and No Action Alternative to the vegetation communities.

Power-washing of all construction and drilling equipment would occur prior to the equipment entering the GDBR project area from outside the Vernal Field Office area.

Over the construction, drilling and completion season, QEP could implement an intensive interim reclamation program beginning the first growing season after each segment of project completion. As applicant-committed BMPs, QEP would reseed all portions of well pads and ROWs not utilized for the operational phase of the project, as well as any sites within the GDBR determined necessary by the appropriate SMA. Reseeding would be accomplished using SMA specified plant species. Post-construction seeding applications would continue as determined necessary by the SMA.

Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer of the appropriate SMA. Weed monitoring would occur on an annual basis (or as frequently as the SMA determines) throughout the life of the project.

QEP would avoid placement of roads, pipelines, well pads, and ancillary facilities within 100 meters of riparian habitats. If avoidance is not feasible, then impacts to riparian habitats would be minimized, where possible.

During the APD process, BLM would consider moving facilities up to 200 meters away from water courses, livestock corrals, BLM rain gauges, and long-term established vegetation studies. If these range facilities could not be avoided, the operators could be required to replace them.

- Surface pipelines will be laid such that a 100 foot buffer exists between the edge of the right of way and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population,
- Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,
- Designs will avoid concentrating water flows or sediments into occupied habitat,
- Oil, water, or condensate tanks in centralized locations will be placed away from occupied habitat, and
- Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

Monitoring

- Occupied Uinta Basin hookless cactus habitats within 100' of the edge of the surface pipeline rights-of-way, 100 feet of the edge of the roads' right-of-ways, and 100 feet from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.
- Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

Should you have questions, or require additional information, please contact Amy Torres, Wildlife Biologist, at 435-781-4481.

Attachment: Questar Exploration & Production Company's (QEP), Greater Deadman Bench Oil and Gas Producing Region FEIS/BA (CD)

United States Department of the Interior

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March 27, 2007

MEMORANDUM

/s/ William Stringer

To: Utah Field Supervisor, Ecological Services, U.S. Fish & Wildlife Service, Salt Lake City Utah

From: Field Manager

Subject: Supplemental Information regarding the Formal Consultation on the Final Environmental Impact Statement (FEIS) and Biological Assessment (BA) for Questar Exploration & Production Company's (QEP), Greater Deadman Bench Oil and Gas Producing Region.

The Draft EIS/BA for the Greater Deadman Bench Oil and Gas Producing Region (GDBR) was published on February 10, 2006 with a 45-day public comment period. Informal consultation, through phone calls and meetings, has been conducted between this office and the Service both prior and during the comment period for this FEIS/BA.

Consultation was initiated on January 23, 2007. Attached is the revised FEIS/BA for the GDBR project. Pursuant to Section 7 of the Endangered Species Act of 1973, and in conformance with 50 CFR 402.12, the Vernal Field Office is requesting concurrence with the determinations made for the threatened, endangered and candidate species evaluated in the FEIS/BA and conclude formal consultation for this project.

Please refer to the attached FEIS/BA.

Project Overview

QEP proposes to develop oil and gas resources within the 98,785-acre GDBR area located about 20 miles south of Vernal, Utah. The GDBR is partially developed with 278 existing oil and water-injection wells, 300 gas wells, and approximately 57 miles of primary roads and 314 miles of secondary roads. The Proposed Action would include the following: 1,020 natural gas wells, 219 oil/water injection wells, 169 miles of access

In 1999, black-footed ferrets were released in Coyote Basin, an area approximately 32 miles southeast of Vernal, Utah and 5 miles from the southeastern end of the GDBR (BLM 1999). The GDBR is not within the ferret release location, but the southeast portion (i.e., T8S, R24E, Sections 2-11 and 14-17) is directly within the Coyote Basin Black-Footed Ferret Primary Management Zone (PMZ). Ferret reintroduction in the Coyote Basin PMZ was authorized by the USFWS, in cooperation with the BLM, the Colorado Division of Wildlife and the Utah Division of Wildlife Resources. Section 10j of the ESA classifies reintroduced populations such as those ferrets in the Coyote Basin as "nonessential-experimental", and these species are treated as a candidate species.

The BLM, USFWS, and UDWR are monitoring the released population closely and have noted that the ferrets are expanding into surrounding areas. Although ferrets have not been documented within the specific GDBR, it is possible that the species could eventually migrate into the GDBR as released populations grow and expand into other suitable habitats.

Impacts:
The black-footed ferret is a federally listed endangered species, which utilizes prairie dog colonies for shelter and feeds on the prairie dogs. The BLM records indicate that approximately 1,827 acres of white-tailed prairie dog habitat are present within the GDBR in Section 3, T7S, R24E; Sections 1 and 12, T8S, R23E; Section 2, 5-11, and 14-17, T8S, R24E) (see Figure 3.6-1).

If black-footed ferrets are present in the GDBR, the Proposed Action could result in direct and indirect impacts to this species. The direct impacts would include mortality from construction activities that resulted in destruction of the white-tailed prairie dog colonies. Indirect impacts would include loss of prairie dog colonies and disturbance due to noise from construction and human activities. Increased traffic and construction of well pads, pipelines and roads associated with the Proposed Action may cause an increase in prairie dog mortality, habitat fragmentation and loss, and colony abandonment, thereby decreasing the viability of the habitat to support black-footed ferrets. Fragmentation of habitat is of particular concern, since black-footed ferrets would need a minimum density of 8 prairie dog burrows/acre (20 burrows/ha) for the ferret population to survive (USFWS 1989).

Populations of black-footed ferrets have been introduced into the wild in Coyote Basin, south of the GDBR and are characterized as "non-essential experimental" populations. The Coyote Basin black-footed ferret Primary Management Area encompasses approximately 46,000 acres of which 10,250 acres are in the GDBR. According to the FWS and the UDWR, management activities within the Coyote Basin PMZ should be conducted with the objective of maintaining a minimum of 10,000 acres of prairie dog colonies (EA No. UT-080-1999-02). Prairie dog colonies located in the PMZ and in the GDBR create a complex of approximately 16,000 acres. Approximately 1,830 acres of active prairie dog colonies exist in this area of the PMZ. It is estimated that well pad, pipeline and road construction would result in disturbance up to 151 acres, or 1.5 percent of the PMZ. Therefore, the Proposed Action would be consistent with habitat

species (e.g., prairie dogs, rabbits, mice, small birds). This loss of some prey species may limit foraging opportunities for individual eagles. However, with the implementation of avoidance and minimization measures identified in Section 4.6.2, the potential effects of the Proposed Action would be reduced.

Based on the potential loss of prey species and loss of habitat, the Proposed Action "*may affect is not likely to adversely affect*" the bald eagle.

Colorado Pikeminnow (*Ptychocheilus lucius*)

The Colorado pikeminnow, also known as the Colorado squawfish, is federally listed as endangered by the USFWS. The Colorado pikeminnow thrives in swift flowing muddy rivers with quiet, warm backwaters. Colorado pikeminnow are primarily piscivorous (fish-eaters), but smaller individuals also eat insects and other invertebrates. The species spawns during the spring and summer over riffle areas with gravel or cobble substrate. Eggs are randomly splayed onto the bottom, and usually hatch in less than one week (Sigler and Sigler 1996).

The Colorado pikeminnow were historically found in the mainstream Colorado River and its tributaries from Wyoming to the Gulf of California. Currently, wild populations of pikeminnow persist only in the upper basin. The White River currently supports some of the highest densities of Colorado pikeminnow in the Green River sub-basin. The White River is used for year round residence and also as a migration corridor to other connected habitats in the Green and Yampa rivers. Adult Colorado pikeminnow are present in the White River upstream to the Taylor Draw Dam. Portions of the White River and its 100-year floodplain, about five miles south of the Project Area, are officially designated as critical habitat for the Colorado pikeminnow. Portions of the Green River and its 100-year floodplain in the Project Area are also officially designated as critical habitat for the Colorado pikeminnow (USFWS 2003).

Humpback Chub (*Gila cypha*)

The humpback chub is a federally endangered minnow found in the Upper Colorado River Basin. The humpback prefers deep, fast-moving, turbid waters often associated with large boulders and steep cliffs. Humpback chubs feed predominately on small aquatic insects, diatoms and filamentous algae. Spawning occurs between April and July during high flows from snowmelt (Sigler and Sigler 1996).

Historically, the humpback chub inhabited canyons of the Colorado River and four of its tributaries: the Green, Yampa, White and Little Colorado rivers. Today, populations currently exist near the Colorado/Utah border in Westwater Canyon in Utah and at Black Rocks, in Colorado. Smaller numbers have been found in the Yampa and Green Rivers in Dinosaur National Monument, Desolation and Gray canyons on the Green River in Utah, Cataract Canyon on the Colorado River in Utah and the Colorado River in Arizona. The largest known population is in the Little Colorado River in the Grand Canyon, where

cypha), and bonytail (*Gila elegans*). These species have experienced severe population declines throughout their range as a result of the dams constructed along much of the Colorado River system. They continue to be impacted by activities that deplete or degrade the flow of downstream waters into the Colorado River (U.S. Fish and Wildlife Service 1990a, b).

Implementation of the Proposed Action in or near designated critical habitats of the endangered Colorado River fish could impact the Colorado River Endangered Fish species by: 1) altering the substrate characteristics of the floodplain, thereby reducing the quality of habitat available to fish populations 2) changing the floodplain vegetation which provides allochthonous input into the river 3) potentially exposing fish species to contaminants from accidental spills/leaks of pipelines or productions facilities, and 4) resulting in a depletion of the Upper Colorado River Basin.

Increased vehicle traffic associated with oil and gas activities has the potential to introduce exotic species to floodplain areas. The spread of exotic plants can alter river channels. Channel width reductions increase water velocities in the main channel and decrease the number of low velocity backwaters. However, the operator has committed to control weeds that become established on their well pads and road and pipeline use authorizations, and rights of ways.

The Green River is a large river with high dilution factors. However, if a spill/leak were to enter this river, contaminants would likely to accumulate in backwater/depressional areas with reduced dilution and less flushing capacity (Woodward et al. 1985). The endangered Colorado River fish use these sites which provide cover and a food source. Water quality is defined by parameters such as temperature, dissolved oxygen, environmental contaminants, nutrients, turbidity, and is considered a primary constituent element of designated critical habitat for the Colorado River fishes. Research is limited regarding threats posed by environmental contaminants to the endangered Colorado River fishes (Woodward et al. 1985; Krahn et al. 1986; Mayer and Ellerieck 1986). However, these studies have shown that contaminants, including petroleum hydrocarbons released via spills/leaks, can affect behavioral functions which have been shown to impair feeding behavior (Woodward et al. 1987). Early life stages of all fish are generally more sensitive to environmental contaminants than juveniles or adults (Mayer and Ellersieck), and disruption of behavioral functions can result in population declines or changes in year-class strength if enough individuals are affected (Little et al. 1993). To minimize these impacts, the operator has committed to install secondary containment (berms, etc) around chemical storage facilities. They have also committed to line the pit as directed by the Surface Management Agency.

Depletion or the removal of water from the Upper Colorado River Basin reduce the ability of the river to create and maintain the physical habitat (areas inhabited or potentially habitable to special status fish for use of spawning, development of fish larvae, feeding, or serving as corridors between these areas) and the biological environment. Water depletions can also contribute to alterations in flow regimes that favor nonnative fish.

The following measures were recommended by the USFWS to ensure the protection of the bald eagle:

- Activities within ½ mile of winter roost areas, e.g., cottonwood galleries, will not occur during the winter roost season from November 1 to March 31.
- No permanent facilities will be placed within 0.5 miles of winter roost areas.
- Avoid loss or disturbance to large cottonwood gallery riparian habitats.
- Use directional drilling where technically and economically feasible to reduce disturbance and drilling in suitable roosting habitat. All areas of disturbance within riparian areas and/or adjacent uplands should be revegetated with native species.

Unavoidable Adverse Impacts to T&E Wildlife Species

Unavoidable impacts resulting from the Proposed Action or No Action Alternative would include the following:

- Well pad and road and pipeline construction could result in long-term disturbance to white-tailed prairie dog colonies, which would result in loss of prey, breeding habitat and shelter for the black-footed ferret.
- Drilling, completion and dust suppression activities would result in water depletion from the Green River and result in adverse impacts to the endangered Colorado River fish species.

Special Status Plant Species

Uinta Basin Hookless Cactus (Sclerocactus glaucus)

The Uinta Basin hookless cactus' (federally threatened) unhooked large central spine differentiates it from other members of the *Sclerocactus* genus, which have either a hooked large central spine or none (USFWS 1990). However, at least a few individuals in most Uinta Basin hookless cactus populations possess moderately to strongly hooked spines (Goodrich and Neese 1986).

Habitat for the Uinta Basin hookless cactus generally consists of gravelly or rocky surfaces on river terrace deposits and lower mesa slopes (USFWS 1990), as well as gravel littered draws (Goodrich and Neese 1986), that are underlain by clay or silty clay. This species does not grow in sandy soils. The species occurs on varying exposures, but is more abundant on south-facing exposures, slopes to about 30 percent grade, and where terrace deposits break from level tops to steeper side slopes. The Uinta Basin hookless cactus is found at elevations from 4,500 to 5,900 feet amsl within the desert shrub vegetation community (USFWS 1990). No populations of Uinta Basin hookless cactus currently occur in the GDBR but potential habitat for the species occurs in the southern and west portions of the GDBR in the Uinta Geological formation. Populations are found

where stormwater flows across slopes. Surface disturbance associated with the construction of well pads, access roads, pipelines, etc., can lead to increased soil erosion, and stormwater runoff with heavy concentrations of sediment. The Uinta Basin hookless cactus is not tolerant of heavy sedimentation. The BLM has documented incidences where natural sediment deposition (i.e., sedimentation not caused by oil and gas development or other human activities) caused the loss of cacti or modified suitable habitat for the Uinta Basin hookless cactus. This example of natural sedimentation impacts on the Uinta Basin hookless cactus suggests that human-induced sedimentation can have an even more detrimental effect on the species. Because of these potential impacts, sedimentation potentially resulting from surface disturbance under the No Action Alternative is a concern. However, several applicant-committed BMPs have been incorporated into the No Action Alternative in order to reduce erosion and subsequent sediment yield. These measures would serve to reduce the potential effects of sedimentation on Uinta Basin hookless cactus habitats.

Based on the potential for modification or loss of potential habitat and increased access to potential or occupied habitats, the No Action Alternative "*may affect, is not likely to adversely affect*" the Uinta Basin hookless cactus.

Mitigation Measures for T&E Plant Species:

The following mitigation measures would be applied to minimize the impact of the Proposed Action and No Action Alternative to the vegetation communities.

Power-washing of all construction and drilling equipment would occur prior to the equipment entering the GDBR project area from outside the Vernal Field Office area.

Over the construction, drilling and completion season, QEP could implement an intensive interim reclamation program beginning the first growing season after each segment of project completion. As applicant-committed BMPs, QEP would reseed all portions of well pads and ROWs not utilized for the operational phase of the project, as well as any sites within the GDBR determined necessary by the appropriate SMA. Reseeding would be accomplished using SMA specified plant species. Post-construction seeding applications would continue as determined necessary by the SMA.

Weed control would be conducted through an Approved Pesticide Use and Weed Control Plan from the Authorized Officer of the appropriate SMA. Weed monitoring would occur on an annual basis (or as frequently as the SMA determines) throughout the life of the project.

QEP would avoid placement of roads, pipelines, well pads, and ancillary facilities within 100 meters of riparian habitats. If avoidance is not feasible, then impacts to riparian habitats would be minimized, where possible.

During the APD process, BLM would consider moving facilities up to 200 meters away from water courses, livestock corrals, BLM rain gauges, and long-term established

- A buffers of at least 100 feet will be established between the edge of the right of way (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated.
- Surface pipelines will be laid such that a 100 foot buffer exists between the edge of the right of way and the plants, use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines don't move towards the population,
- Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.,
- Designs will avoid concentrating water flows or sediments into occupied habitat,
- Oil, water, or condensate tanks in centralized locations will be placed away from occupied habitat, and
- Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

Monitoring

- Occupied Uinta Basin hookless cactus habitats within 100' of the edge of the surface pipeline rights-of-way, 100 feet of the edge of the roads' right-of-ways, and 100 feet from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and the Service. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the Service.
- Reinitiation of section 7 consultation with the Service will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

Should you have questions, or require additional information, please contact Amy Torres, Wildlife Biologist, at 435-781-4481.

Attachment. Questar Exploration & Production Company's (QEP), Greater Deadman Bench Oil and Gas Producing Region FEIS/BA (CD)

Bcc. Reading File
Central File
Project File: QEP's Greater Deadman Bench Oil & Gas Producing Region FEIS/BA

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Vernal Field Office
170 South 500 East
Vernal, UT 84078
(435) 781-4400 Fax: (435) 781-4410

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1792
UT-080

January 8, 2004

Mr. James L. Dykmann
Compliance Archaeologist
Utah Division of State History
300 Rio Grande Avenue
Salt Lake City, UT 84101-1182

Dear Mr. Dykmann:

RE: Initiation of Consultation - QEP's Greater Deadman Bench
Oil & Gas Field Development Strategy

The Questar Exploration and Production Company's Uintah Basin Division has notified this Office of its proposed plan to drill up to 1, 239 new wells over a 10-year period, or until the resource base is fully developed on their leases. The project area would involve about 99,000 acres in the Greater Deadman Bench oil and gas production region, located about 20 miles south of Vernal, Utah. The project area would involve about 85% BLM-administered public lands, 12% State of Utah-administered lands; and 3% patented land.

The BLM is initiating an environmental impact analysis (EIS) to consider the proposal and reasonable alternatives. We have enclosed a Scoping Notice for your information which provides additional information on the proposed plan, preliminary resource issues and concerns, as well as general maps covering the project area.

We recognize that decisions involving BLM-administered public lands may have ramifications for State of Utah lands adjoining and within the project area. As such we would like to initiate consultation with your office and encourage and invite your participation on this project. At this time BLM is seeking issues, concerns and/or data that the SHPO may have which should be factored into to the EIS. We request that any concerns and/or information your office may have relative to this project be provided to us by close of business February 4, 2004.

Please provide written comments to: Field Manager
ATTN: QEP Field Development Project
Bureau of Land Management
170 South 500 East
Vernal, UT 84078

The SHPO is currently included on our mailing list to receive copies of the draft and final EIS documents. Should you not wish to receive copies of these documents, please let us know. Should you have questions or require additional information on this project, please contact Jean Nitschke-Sinclear at 435-781-4437.

Thank you for your continuing interest in public land management.

Sincerely,

/s/ Jean Nitschke-Sinclear

for Howard B. Cleavinger, II
Acting Field Manager

Enclosure – Scoping Notice

Cc: State Director, U-934
Central Files
Reading
QEP – Adm. Rec.

JNit-Sin:jns 1/08/04\NEPA.QEP.Scoping.SHPO

Jan. 2004
Cultural Program
QEP

BUREAU OF LAND MANAGEMENT
VERNAL FIELD OFFICE
VERNAL, UTAH

SCOPING NOTICE

QUESTAR EXPLORATION AND PRODUCTION COMPANY'S GREATER DEADMAN BENCH ENVIRONMENTAL IMPACT STATEMENT

EIS NO. UTU-080-2004-0369V

1.0 INTRODUCTION

Questar Exploration & Production Company (QEP) has notified the Bureau of Land Management (BLM) Vernal Field Office that it proposes to fully develop hydrocarbon resources underlying oil and gas mineral leases within the Greater Deadman Bench oil and gas-producing region (GDBR) (project area).

The project area consists of about 146 sections (approximately 99,000 acres) in an existing oil and gas producing region located in all or portions of T6 to 8S, R21 to 25E, Uintah County, Utah (Figure 1-1). The project area is on BLM-administered lands (83,864 acres); lands administered by the State of Utah (11,448 acres), and a small area of private lands (3,473 acres). QEP operates the majority of the mineral lease rights (79.2 percent) underlying the public, State and private lands in the project area.

QEP proposes to drill up to 1,239 wells at the rate of 100 to 120 wells per year over 10 years, or until the resource base is fully developed. This would include approximately 16 Uinta Formation gas wells, 219 Green River Formation oil wells, 148 Green River Formation gas wells, 451 Wasatch Formation gas wells, 68 Mesaverde Formation gas wells, 311 Blackhawk/Mancos Formation gas wells, and 26 Frontier/Dakota Formation deep gas wells. Of these, 769 well pads would be drilled on new locations and 470 would be "twins" drilled from existing locations (representing 38% of the total new wells that would be drilled). Would these pads need to be expanded in size?

1.1 Purpose and Need

The purpose of the proposed project is to further develop hydrocarbon resources underlying the GDBR. QEP estimates that the proposed project could yield over 9 million barrels of oil and 750 billion cubic feet (bcf) of natural gas gross production over the next 40 years with a certain amount of risk associated with the success of the different horizons considered in the analysis. QEP believes that the public interest need for the project is to maintain and enhance responsibly developed domestic crude oil production which would result in less dependence on foreign sources of crude oil. On a regional scale, additional oil production would yield tax revenues as well as significant royalty revenues to both the United States and Utah State governments. On a local level, the development activity would provide employment opportunities that further enhance the local economy and tax base. Given imports & U.S. production, does the US really needs these products now? How does the above mentioned statements correlate to market trends & predictions?

1.2 Relationship of the Project to Controlling Land Use Plans

The management of BLM public lands and resources encompassed by the project area are directed and guided by the BLM's Book Cliffs Resource Area (BCRA) Resource Management Plan Environmental Impact Statement and Record of Decision (BLM 1985). The proposed project lies within an area that has been partially developed for oil and gas production and is designated by BLM as "Category 1" and "Category 2" for oil and gas leasing by the BLM. Will these categories stay the same in the L.U.P? How will this S.I.S. fit into the L.U.P?

2.0 PROPOSED ACTION

QEP proposes to drill at a maximum rate of 100 to 120 wells per year until the resource base is fully developed (Table 2-1). The monthly rate of drilling would range from 0 to 12 wells per month. The total number of wells drilled would depend largely on factors out of the QEP's control such as geologic success, economic factors, and lease restrictions. The reasonably foreseeable full development model in the EIS analysis area ranges from 1,000 to 1,239 new wells. At the maximum drilling pace, development drilling is expected to occur over a span of 10 years.

TABLE 2-1 QEP GREATER DEADMAN BENCH PROPOSED 2004 - 2014 WELL DEVELOPMENT How is This Table's data derived?

FORMATION	RESOURCE	DRILLING RATE (WELLS/MONTH)	PROPOSED NEW WELLS
Uinta	Gas	0-1	16
Green River	Oil	0-3	219
Green River	Gas	0-3	148
Wasatch	Gas	0-6	451
Mesaverde	Gas	0-1	68
Blackhawk/Mancos	Gas	0-3	311
Frontier/Dakota	Gas	0-1	26
	Mixed	**0-12**	**1239**

The proposed wells would be drilled on a 40-acre spacing pattern in order to efficiently recover oil and gas reserves from the Green River Formation at depths of 3,500 to 5,500 feet; from the Wasatch Formation at depths of 5,500 to 8,000 feet; from the Mesaverde Formation at depths of 6,500 to 10,000 feet; and from the Blackhawk/Mancos Formation at depths of 10,500 to 14,000 feet. Deep drilling to the Frontier/Dakota would exceed 16,000 feet.

1239 x 2.5 = 3097.5 acres

2.1 Location Construction and Land Requirements

Well site construction would consist of leveling a rectangular pad to 300 feet x 350 feet, occupying approximately 2.5 acres. Well pads would be constructed from the native sand/soil/rock materials present and leveled by balancing cut and fill areas. Is This an average for all depths of drilling?

A reserve pit (150 feet x 70 feet x 12 feet deep, approximately 0.24 surface acres) for drilling mud and water storage would be excavated adjacent to the pad. Stockpiles for both topsoil and subsoil would be established adjacent to the well pad and maintained for future use in backfilling the reserve pit and rehabilitating the location upon abandonment. Depending on the amount of cut and fill required to level each site, these stockpiles would occupy approximately 0.5 acres. x 1239 = 619.5 + 3097.5 = 3717 acres. / 5.8 Miles²

An access road connecting the pad to the nearest established road also would be

+619.5 acres To 3717 acres 619.5 acres +619.5 acres +3717 acres 4956 acres Total

constructed. The existing road network within the EIS analysis area would provide the primary access routes to the new well sites. Over 600 miles of existing roads would be used, thereby minimizing additional surface impact. Based on the average well, each well site road would be approximately 1,000-feet long by 30-feet wide and cause approximately 0.5 acre of additional surface disturbance. For Green River Formation wells, a Right-of-Way (ROW) (approximately 1,000-feet long by 30-feet wide; running to a central tank facility) would be required for production flow lines or water injection lines causing approximately 0.5 acre of additional surface disturbance. For Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation gas wells, a ROW (approximately 1,000-feet long by 30-feet wide) would be required for surface gathering lines, causing approximately 0.5 acres of additional surface disturbance per well. ?

Each well pad and access road would typically take 2 to 4 days to construct. The combined surface disturbance for the average new producing well would be approximately 3.75 acres, or 9.4 percent of the available surface area in each 40-acre tract. Thus, approximately 2,625 to 3,250 total acres would be disturbed for construction of the 700 to 800 maximum proposed well sites, access roads, and pipelines. Additional disturbance would be required for central tank batteries, compressor stations, and utility lines necessary for production operations.

Following the drilling and initial completion operations, a portion of each well pad plus the reserve pit would no longer be needed. These areas would be promptly rehabilitated and returned to natural conditions reducing long-term surface disturbance to approximately 3 acres per 40-acre tract, or 7.5 percent of total surface area. Of the 2,625 to ~~3,250 total~~ 4956 Total acres acres disturbed during construction for well sites, access roads, and pipelines, approximately 600 acres would be reclaimed immediately after construction is complete.

Dry holes would be Plugged & Abandoned (P&A) as per applicable regulations, and the entire well location and its access road would be promptly rehabilitated and returned to natural conditions.

2.2 Drilling Operations

Drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, all State of Utah Division of Oil, Gas, and Mining rules and regulations, and all applicable local rules and regulations.

2.3 Completion Operations

Once production casing has been cemented in place, the drilling rig would be released and a completion rig would be moved in. The typical completion operation for Green River, Wasatch and Mesaverde wells typically takes 4 to 6 days to perform. Deeper

completions, such as in the Blackhawk /Mancos and/or Dakota wells, are performed in a similar manner but longer periods of time are needed for well bore cleanup and production testing which generally occurs between each stage of the completion. Completion of the initial Blackhawk /Mancos and/or Dakota wells would take 4 to 6 weeks. Eventually, that time period would be compressed to under 2 weeks.

2.4 Applicant-Committed Environmental Protection Measures

Several procedures are described below that would be implemented, at the sole expense of the interest owners, to reduce the potential environmental impacts of the proposed development activity. In addition, the BLM on-site inspection for each new well site may identify specific resources that may be affected on a particular location. The on-site inspection would be used in conjunction with the measures described below to develop site-specific mitigating measures for sensitive resources.

2.4.1 Cultural Resources

A Class III cultural resources survey, conducted by a qualified archaeologist, would be conducted over all areas proposed for surface disturbance. Class III cultural resource block surveys have been conducted in portions of the proposed development area and would be utilized where applicable. If these surveys identify areas with a high probability of encountering potentially significant ~~subsurface~~ archaeological sites, ~~a qualified archaeologist would monitor surface disturbance~~. QEP and their contractors would inform their employees about relevant federal regulations intended to protect cultural resources. Equipment operators would be informed that if a site is uncovered during construction, activities in the vicinity would immediately cease and the BLM's Authorized Officer (AO) would be notified. Historic properties considered eligible for the National Register of Historic Places (NRHP) would be avoided or mitigated through an approved data recovery plan. (Provisions for cultural in the l.u.p needs to be added.

Local consultation would occur and Tribal consultation as well.

what would be the cumulative effects if the maximum development occurs?

2.4.2 Paleontological Resources

Noise, visual impacts to sites, this is an effect considered in 36 CFR part 800.4-5.

Based on site-specific recommendations from the BLM's AO, surveys for paleontological resources would be conducted on areas with sandstone outcrops and where bedrock excavation into sensitive formations is necessary. The survey would be conducted by a qualified paleontologist funded by QEP and would determine fossil localities and the sensitivity of the area for fossil resources. These actions would determine the necessity of having a qualified paleontologist on-site during construction. If paleontological resources were uncovered during ground disturbing activities, QEP would suspend all operation that would further disturb such materials and would immediately contact BLM's AO, who would arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan.

P.A. for this E.I.S or covered by the P.A(?) ~~for~~ in the l.u.p?

USHPO consultation

Advisory Council on Historic Places consultation

Historic Trust consultation

Tribes?

2.4.3 Wildlife and Vegetation (including Federally listed, Candidate and Proposed Species)

QEP would comply with Endangered Species Act regulations in order to prevent adverse impacts to Federally listed, Candidate and Proposed wildlife and plant species. QEP would also implement appropriate protective measures (e.g., timing and spatial stipulations) discussed in the Book Cliffs RMP in order to prevent adverse impacts on non-listed wildlife species and habitats.

2.4.4 Power Lines

Unless otherwise agreed to by the AO in writing, power lines shall be constructed in accordance with the standards outlined in *Suggested Practices for Raptor Protection on Power Lines*, (Raptor Research Foundation, Inc. 1981). QEP would construct power lines in accordance with these standards or will assume the burden and expense of proving pole designs not shown in the referenced publication are "raptor safe". A raptor expert acceptable to the AO shall provide such proof. The AO reserves the right to require modification or additions to all power line structures on applied for route authorizations, should they be necessary to ensure the safety of large perching birds. QEP would make such modifications and/or additions without liability or expense to the Federal Government.

2.4.5 Noxious and Invasive Weeds

QEP would monitor and control noxious and invasive weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. On BLM administered land, a Pesticide Use Proposal would be submitted and approved prior to the application of herbicides, pesticides or other hazardous chemicals.

2.4.6 Soils

All existing roads will be maintained and kept in good repair during all drilling, completion, and production operations associated with wells. Planned access roads and surface disturbing activities will conform to standards outlined in the BLM and Forest Service publication: *Surface Operating Standards for Oil and Gas Exploration and Development, 1989.*

2.4.7 Visual Resources

Based on site-specific recommendations from the BLM's AO, surface equipment would be painted to blend in with the surroundings.

2.4.8 Existing Facilities and Rights-of-Way

Cattle guards would be used for fence crossings whenever practicable. If a fence must be cut, H-braces would be installed to support the existing fence and a cattle guard installed to prevent livestock movement.

2.4.9 Hazardous and Solid Waste/Trash Disposal

All solid waste or trash would be transported for disposal to an approved solid waste disposal facility.

3.0 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COMPLIANCE

The BLM has determined that permitting this Proposed Action constitutes a federal action that may affect the quality of the human environment. Pursuant to NEPA and the Council on Environmental Quality (CEQ) regulations on implementing NEPA, the BLM will prepare a NEPA-compliant Environmental Impact Statement (EIS) that will describe and evaluate the potential impacts of QEP's Proposed Action and alternatives. The purpose of the EIS will be to provide the public and decision-makers with sufficient information to understand the environmental consequences of the Proposed Action and alternatives, and to identify and develop appropriate mitigation measures to minimize environmental impacts. NEPA requires that a No Action alternative and any reasonable action alternative(s) be evaluated during the analysis process. In part, this scoping statement has been prepared to enable government agencies, the general publics, and other interested parties to participate in and contribute to the alternative selection process.

4.0 PRELIMINARY RESOURCE ISSUES FOR NEPA ANALYSIS

Based on the BLM's preliminary review of QEP's Proposed Action, the following resource issues have been identified as requiring a full analysis in the EIS:

- Air Quality
- Cultural Resources
- Federally listed and BLM Sensitive Plants, Wildlife, and Fish Species
- Existing Land Use and Status
- Noxious and Invasive Weeds
- Paleontological Resources
- Range and Rangeland Management
- Recreation Resources
- Socioeconomics
- Soils
- Hydrology and Watershed Resources
- Wildlife and Fisheries
- Vegetation and Wetlands
- Visual Resources and Noise

In addition to the above-listed resources, the EIS will address all of the Critical Elements of the Human Environment as described in the BLM's Instruction Memorandum Number ID-2003-075 9 (dated July 11, 2003). Additional issues or resource concerns are likely to be determined during the public scoping process.

5.0 PUBLIC PARTICIPATION

A critical element of the NEPA process is public scoping. Scoping activities are initiated early in the process to:

- Identify reasonable alternatives to be evaluated in the NEPA document,
- Identify issues of concern related to the Proposed Action, and
- Determine the depth of the analysis for issues addressed in the NEPA document.

The public is encouraged to participate during the scoping process to help identify the scope of the analysis needed, alternatives to the Proposed Action, other issues or concerns that should be analyzed, mitigation opportunities, and any other comments or ideas to help ensure the completeness of the analysis process. **Your written comments will be accepted on or before February 4, 2004.** Please submit your written comments to:

Ms. Jean Nitschke-Sinclear, AFM NEPA, Planning and Special Projects
Bureau of Land Management, Vernal Field Office
170 South 500 East
Vernal, UT 84078
jean_nitschke-sinclear@blm.gov
Telephone: (435) 781-4400
Fax: (435) 781-4410

A public meeting to discuss the proposed project is scheduled for the following date and location:

Wednesday, January 14, 2003
7:00-9:00pm
South Conference Room, Uintah County Bldg., 147 East Main Street, Vernal Utah

1792

QEP.

FILE COPY

State of Utah

OLENE S. WALKER
Governor

GAYLE F. McKEACHNIE
Lieutenant Governor

Department of Community and Economic Development
DAVID HARMER
Executive Director

Division of State History / Utah State Historical Society
PHILIP F. NOTARIANNI
Division Director

January 26, 2004

Field Manager
ATTN: QEP Field Development Project
Bureau of Land Management
170 South 500 East
Vernal UT 84078

RE: Initiation of Consultation - QEP's Greater Deadman Bench Oil & Gas Field Development Strategy

In Reply Please Refer to Case No. 04-0002

The Utah State Historic Preservation Office received the referenced information on January 13, 2004. After consideration of the consultation request in behalf of the Bureau of Land Management, the Utah Preservation Office provides the following comments per §36CFR800.

Consultation Section 106; the statements outlined in section 2.4.1 are accurate, and USHPO will consult concerning the undertaking as the undertaking is developed.

This information is provided to assist with Section 106 responsibilities as per §36CFR800. My email address is: jdykman@utah.gov

As ever,

James L. Dykmann
Deputy State Historic
Preservation Officer - Archaeology

JLD:04-0002 BLM/EIS

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Matthew T. Seddon
Deputy State Historic Preservation
Officer-Archaeology
Utah Division of State History
300 Rio Grande Avenue
Salt Lake City, Utah 84101-1182

COMPLETE THIS SECTION ON DELIVERY

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X [illegible] ☐ Agent ☐ Addressee

B. Received by (Printed Name) [illegible] C. Date of Delivery 2-14

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
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☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service) 7005 1820 0002 6515 6488

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City, State, ZIP+4 Salt Lake City, Utah 84101-1182

PS Form 3800, June 2002 See Reverse for Instructions

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Vernal Field Office
170 South 500 East
Vernal, Utah 84078
(435) 781-4400 Fax: (435) 781-4410
http://www.ut.blm.gov/utah/vernal

IN REPLY REFER TO:
8141
UT-082

February 13, 2005

Matthew T. Seddon Ph.D.
Deputy State Historic Preservation Officer-Archaeology
Utah Division of State History
300 Rio Grande Ave.
Salt Lake City, Utah 84101-1182

Dear Dr. Seddon:

RE: Section 106 Consultation: Greater Deadman Bench Draft Environmental Impact Statement (DEIS).

Attached for Section 106 consultation, comment and coordination is a copy of Questar Exploration and Production Companys "Greater Deadman Bench Oil and Gas Producing Region Draft Environmental Impact Statement. (GDBR) EIS number: UTU-080-2003-0369V. This document is dated January, 2006. The Vernal Field Office requests written comments between February 10, 2006 through March 27, 2006..

Please refer to Page S-1 for a summary of the existing situation and proposed action. The GDBR has about 278 Oil and water-injection wells, 300 gas wells, and about 57 miles of primary roads and 314 miles of secondary roads. The proposed action includes 1020 natural gas wells, 219 oil wells, 170 miles of new roads, 235 miles of new pipelines, 22 new central tank facilities, and 15 new compressor stations. Of the total proposed locations, 891wells would require new construction and 348 wells would be "twinned" from existing well pads. A ten year project life is anticipated at this time. It is further anticipated that 100 to 120 wells would be drilled yearly.

In Section 2.3, applicant-committed best management practices, subsection 2.3.1, Page 2-24 through 2-29 describes the actions which would be taken prior to surface disturbance. This section includes class III (100%) inventories of the wells pads, access roads, pipelines and other ancillary facilities as needed. Project specific Section 106 will be done for each project which is the current practice.

Chapter three, Affected Environment describes the known cultural resources within the DEIS area; See Section 3.7, Cultural Pages 3-76 -77.

Chapter four, Environmental Consequences" describes impacts and affects on cultural resources for the proposed action and the "No Action Alternative."

If the applicant committed measures are followed the Vernal Field Office recommends a No Adverse Effect determination for the DEIS area and actions as proposed.

If there are questions, concerns or problems please contact this office at your earliest possible convenience. Please contact Blaine Phillips at 435-781-4438.

Sincerely,

Tim Faircloth
Assistant Field Manager for Renewable Resources

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Vernal Field Office
170 South 500 East
Vernal, UT 84078
(435) 781-4400 Fax: (435) 781-4410

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1792
UT-080

January 8, 2004

Dear Sir/Madam :

RE: Initiation of Consultation - QEP's Greater Deadman Bench
Oil & Gas Field Development Strategy

The Questar Exploration and Production Company's Uintah Basin Division has notified this Office of its proposed plan to drill up to 1, 239 new wells over a 10-year period, or until the resource base is fully developed on their leases. The project area would involve about 99,000 acres in the Greater Deadman Bench oil and gas production region, located about 20 miles south of Vernal, Utah. The project area would involve about 85% BLM-administered public lands, 12% State of Utah-administered lands; and 3% patented land.

The BLM is initiating an environmental impact analysis (EIS) to consider the proposal and reasonable alternatives. We have enclosed a Scoping Notice for your information which provides additional information on the proposed plan, preliminary resource issues and concerns, as well as general maps covering the project area.

We recognize that decisions involving BLM-administered public lands near reservations and in areas traditionally occupied or used by Tribes may have ramifications for future use of these lands by Tribes and Tribal members. As such we would like to initiate consultation with your Tribe and encourage and invite your participation on this project. At this time BLM is seeking issues, concerns and/or data that the Tribe may have which should to be factored into to the EIS. We request that any concerns and/or information the Tribe may have relative to this project be provided to this office by close of business February 4, 2004.

Please provide written comments to: Field Manager
ATTN: QEP Field Development Project
Bureau of Land Management
170 South 500 East
Vernal, UT 84078

The Tribe is currently included on our mailing list to receive copies of the draft and final EIS documents. Should you not wish to receive copies of these documents, please let us know. Should you have questions or require additional information on this project, please contact Jean Nitschke-Sinclear at 435-781-4437.

Thank you for your continuing interest in public land management.

Sincerely,

Jean Nitschke-Sinclear

for Howard B. Cleavinger, II
Acting Field Manager

Enclosure – Scoping Notice

Cc: State Director, U-934
Central Files
Reading
QEP – Adm. Record

JNit-Sin:jns:1/08/04\NEPA.QEP.Scoping.Tribes

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NEIL B. CLOUD
NAGPRA COORDINATOR
SOUTHERN UTE TRIBE
P.O. BOX 737 #12
IGNACIO CO 81137

TERRY KNIGHT
CULTURAL REPRESENTATIVE
UTE MOUNTAIN TRIBE
P.O. BOX 248
TOWAOC CO 83334

ALLAN DOWNER, DIRECTOR
HISTORIC PRESERVATION DEPARTMENT
NAVAJO NATION
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LEIGH KUWANWISWMA
CULTURAL PRESERVATION OFFICER
THE HOPI TRIBE
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DOREEN MARTINEAU
CULTURAL RESOURCES OFFICER
PAIUTE INDIAN TRIBE OF UTAH
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DIRECTOR, NATURAL RESOURCES
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PUEBLO OF ZUNI
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ZUNI NM 87327

BLAINE EDMO, CHAIRMAN
FT HALL BUXINESS COUNCIL
SHOSHONE-BANNOCK TRIBES
P.O. BOX 306
FORT HALL ID 83202-0306

BUREAU OF INDIAN AFFAIRS
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BUREAU OF LAND MANAGEMENT
VERNAL FIELD OFFICE
VERNAL, UTAH

SCOPING NOTICE

QUESTAR EXPLORATION AND PRODUCTION COMPANY'S GREATER DEADMAN BENCH ENVIRONMENTAL IMPACT STATEMENT

EIS NO. UTU-080-2004-0369V

1.0 INTRODUCTION

Questar Exploration & Production Company (QEP) has notified the Bureau of Land Management (BLM) Vernal Field Office that it proposes to fully develop hydrocarbon resources underlying oil and gas mineral leases within the Greater Deadman Bench oil and gas-producing region (GDBR) (project area).

The project area consists of about 146 sections (approximately 99,000 acres) in an existing oil and gas producing region located in all or portions of T6 to 8S, R21 to 25E, Uintah County, Utah (Figure 1-1). The project area is on BLM-administered lands (83,864 acres); lands administered by the State of Utah (11,448 acres), and a small area of private lands (3,473 acres). QEP operates the majority of the mineral lease rights (79.2 percent) underlying the public, State and private lands in the project area.

QEP proposes to drill up to 1,239 wells at the rate of 100 to 120 wells per year over 10 years, or until the resource base is fully developed. This would include approximately 16 Uinta Formation gas wells, 219 Green River Formation oil wells, 148 Green River Formation gas wells, 451 Wasatch Formation gas wells, 68 Mesaverde Formation gas wells, 311 Blackhawk/Mancos Formation gas wells, and 26 Frontier/Dakota Formation deep gas wells. Of these, 769 well pads would be drilled on new locations and 470 would be "twins" drilled from existing locations (representing 38% of the total new wells that would be drilled).

1.1 Purpose and Need

The purpose of the proposed project is to further develop hydrocarbon resources underlying the GDBR. QEP estimates that the proposed project could yield over 9 million barrels of oil and 750 billion cubic feet (bcf) of natural gas gross production over the next 40 years with a certain amount of risk associated with the success of the different horizons considered in the analysis. QEP believes that the public interest need for the project is to maintain and enhance responsibly developed domestic crude oil production which would result in less dependence on foreign sources of crude oil. On a regional scale, additional oil production would yield tax revenues as well as significant royalty revenues to both the United States and Utah State governments. On a local level, the development activity would provide employment opportunities that further enhance the local economy and tax base.

1.2 Relationship of the Project to Controlling Land Use Plans

The management of BLM public lands and resources encompassed by the project area are directed and guided by the BLM's Book Cliffs Resource Area (BCRA) Resource Management Plan Environmental Impact Statement and Record of Decision (BLM 1985). The proposed project lies within an area that has been partially developed for oil and gas production and is designated by BLM as "Category 1" and "Category 2" for oil and gas leasing by the BLM.

2.0 PROPOSED ACTION

QEP proposes to drill at a maximum rate of 100 to 120 wells per year until the resource base is fully developed (Table 2-1). The monthly rate of drilling would range from 0 to 12 wells per month. The total number of wells drilled would depend largely on factors out of the QEP's control such as geologic success, economic factors, and lease restrictions. The reasonably foreseeable full development model in the EIS analysis area ranges from 1,000 to 1,239 new wells. At the maximum drilling pace, development drilling is expected to occur over a span of 10 years.

TABLE 2-1 QEP GREATER DEADMAN BENCH PROPOSED 2004 - 2014 WELL DEVELOPMENT

FORMATION	RESOURCE	DRILLING RATE (WELLS/MONTH)	PROPOSED NEW WELLS
Uinta	Gas	0-1	16
Green River	Oil	0-3	219
Green River	Gas	0-3	148
Wasatch	Gas	0-6	451
Mesaverde	Gas	0-1	68
Blackhawk/Mancos	Gas	0-3	311
Frontier/Dakota	Gas	0-1	26
	Mixed	**0-12**	**1239**

The proposed wells would be drilled on a 40-acre spacing pattern in order to efficiently recover oil and gas reserves from the Green River Formation at depths of 3,500 to 5,500 feet; from the Wasatch Formation at depths of 5,500 to 8,000 feet; from the Mesaverde Formation at depths of 6,500 to 10,000 feet; and from the Blackhawk/Mancos Formation at depths of 10,500 to 14,000 feet. Deep drilling to the Frontier/Dakota would exceed 16,000 feet.

2.1 Location Construction and Land Requirements

Well site construction would consist of leveling a rectangular pad to 300 feet x 350 feet, occupying approximately 2.5 acres. Well pads would be constructed from the native sand/soil/rock materials present and leveled by balancing cut and fill areas.

A reserve pit (150 feet x 70 feet x 12 feet deep, approximately 0.24 surface acres) for drilling mud and water storage would be excavated adjacent to the pad. Stockpiles for both topsoil and subsoil would be established adjacent to the well pad and maintained for future use in backfilling the reserve pit and rehabilitating the location upon abandonment. Depending on the amount of cut and fill required to level each site, these stockpiles would occupy approximately 0.5 acres.

An access road connecting the pad to the nearest established road also would be

constructed. The existing road network within the EIS analysis area would provide the primary access routes to the new well sites. Over 600 miles of existing roads would be used, thereby minimizing additional surface impact. Based on the average well, each well site road would be approximately 1,000-feet long by 30-feet wide and cause approximately 0.5 acre of additional surface disturbance. For Green River Formation wells, a Right-of-Way (ROW) (approximately 1,000-feet long by 30-feet wide; running to a central tank facility) would be required for production flow lines or water injection lines causing approximately 0.5 acre of additional surface disturbance. For Wasatch, Mesaverde, Blackhawk/Mancos, and Frontier/Dakota Formation gas wells, a ROW (approximately 1,000-feet long by 30-feet wide) would be required for surface gathering lines, causing approximately 0.5 acres of additional surface disturbance per well.

Each well pad and access road would typically take 2 to 4 days to construct. The combined surface disturbance for the average new producing well would be approximately 3.75 acres, or 9.4 percent of the available surface area in each 40-acre tract. Thus, approximately 2,625 to 3,250 total acres would be disturbed for construction of the 700 to 800 maximum proposed well sites, access roads, and pipelines. Additional disturbance would be required for central tank batteries, compressor stations, and utility lines necessary for production operations.

Following the drilling and initial completion operations, a portion of each well pad plus the reserve pit would no longer be needed. These areas would be promptly rehabilitated and returned to natural conditions reducing long-term surface disturbance to approximately 3 acres per 40-acre tract, or 7.5 percent of total surface area. Of the 2,625 to 3,250 total acres disturbed during construction for well sites, access roads, and pipelines, approximately 600 acres would be reclaimed immediately after construction is complete.

Dry holes would be Plugged & Abandoned (P&A) as per applicable regulations, and the entire well location and its access road would be promptly rehabilitated and returned to natural conditions.

2.2 Drilling Operations

Drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, all State of Utah Division of Oil, Gas, and Mining rules and regulations, and all applicable local rules and regulations.

2.3 Completion Operations

Once production casing has been cemented in place, the drilling rig would be released and a completion rig would be moved in. The typical completion operation for Green River, Wasatch and Mesaverde wells typically takes 4 to 6 days to perform. Deeper

completions, such as in the Blackhawk /Mancos and/or Dakota wells, are performed in a similar manner but longer periods of time are needed for well bore cleanup and production testing which generally occurs between each stage of the completion. Completion of the initial Blackhawk /Mancos and/or Dakota wells would take 4 to 6 weeks. Eventually, that time period would be compressed to under 2 weeks.

2.4 Applicant-Committed Environmental Protection Measures

Several procedures are described below that would be implemented, at the sole expense of the interest owners, to reduce the potential environmental impacts of the proposed development activity. In addition, the BLM on-site inspection for each new well site may identify specific resources that may be affected on a particular location. The on-site inspection would be used in conjunction with the measures described below to develop site-specific mitigating measures for sensitive resources.

2.4.1 Cultural Resources

A Class III cultural resources survey, conducted by a qualified archaeologist, would be conducted over all areas proposed for surface disturbance. Class III cultural resource block surveys have been conducted in portions of the proposed development area and would be utilized where applicable. If these surveys identify areas with a high probability of encountering potentially significant subsurface archaeological sites, a qualified archaeologist would monitor surface disturbance. QEP and their contractors would inform their employees about relevant federal regulations intended to protect cultural resources. Equipment operators would be informed that if a site is uncovered during construction, activities in the vicinity would immediately cease and the BLM's Authorized Officer (AO) would be notified. Historic properties considered eligible for the National Register of Historic Places (NRHP) would be avoided or mitigated through an approved data recovery plan.

2.4.2 Paleontological Resources

Based on site-specific recommendations from the BLM's AO, surveys for paleontological resources would be conducted on areas with sandstone outcrops and where bedrock excavation into sensitive formations is necessary. The survey would be conducted by a qualified paleontologist funded by QEP and would determine fossil localities and the sensitivity of the area for fossil resources. These actions would determine the necessity of having a qualified paleontologist on-site during construction. If paleontological resources were uncovered during ground disturbing activities, QEP would suspend all operation that would further disturb such materials and would immediately contact BLM's AO, who would arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan.

2.4.3 Wildlife and Vegetation (including Federally listed, Candidate and Proposed Species)

QEP would comply with Endangered Species Act regulations in order to prevent adverse impacts to Federally listed, Candidate and Proposed wildlife and plant species. QEP would also implement appropriate protective measures (e.g., timing and spatial stipulations) discussed in the Book Cliffs RMP in order to prevent adverse impacts on non-listed wildlife species and habitats.

2.4.4 Power Lines

Unless otherwise agreed to by the AO in writing, power lines shall be constructed in accordance with the standards outlined in *Suggested Practices for Raptor Protection on Power Lines*, (Raptor Research Foundation, Inc. 1981). QEP would construct power lines in accordance with these standards or will assume the burden and expense of proving pole designs not shown in the referenced publication are "raptor safe". A raptor expert acceptable to the AO shall provide such proof. The AO reserves the right to require modification or additions to all power line structures on applied for route authorizations, should they be necessary to ensure the safety of large perching birds. QEP would make such modifications and/or additions without liability or expense to the Federal Government.

2.4.5 Noxious and Invasive Weeds

QEP would monitor and control noxious and invasive weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. On BLM administered land, a Pesticide Use Proposal would be submitted and approved prior to the application of herbicides, pesticides or other hazardous chemicals.

2.4.6 Soils

All existing roads will be maintained and kept in good repair during all drilling, completion, and production operations associated with wells. Planned access roads and surface disturbing activities will conform to standards outlined in the BLM and Forest Service publication: *Surface Operating Standards for Oil and Gas Exploration and Development, 1989.*

2.4.7 Visual Resources

Based on site-specific recommendations from the BLM's AO, surface equipment would be painted to blend in with the surroundings.

2.4.8 Existing Facilities and Rights-of-Way

Cattle guards would be used for fence crossings whenever practicable. If a fence must be cut, H-braces would be installed to support the existing fence and a cattle guard installed to prevent livestock movement.

2.4.9 Hazardous and Solid Waste/Trash Disposal

All solid waste or trash would be transported for disposal to an approved solid waste disposal facility.

3.0 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COMPLIANCE

The BLM has determined that permitting this Proposed Action constitutes a federal action that may affect the quality of the human environment. Pursuant to NEPA and the Council on Environmental Quality (CEQ) regulations on implementing NEPA, the BLM will prepare a NEPA-compliant Environmental Impact Statement (EIS) that will describe and evaluate the potential impacts of QEP's Proposed Action and alternatives. The purpose of the EIS will be to provide the public and decision-makers with sufficient information to understand the environmental consequences of the Proposed Action and alternatives, and to identify and develop appropriate mitigation measures to minimize environmental impacts. NEPA requires that a No Action alternative and any reasonable action alternative(s) be evaluated during the analysis process. In part, this scoping statement has been prepared to enable government agencies, the general publics, and other interested parties to participate in and contribute to the alternative selection process.

4.0 PRELIMINARY RESOURCE ISSUES FOR NEPA ANALYSIS

Based on the BLM's preliminary review of QEP's Proposed Action, the following resource issues have been identified as requiring a full analysis in the EIS:

- Air Quality
- Cultural Resources
- Federally listed and BLM Sensitive Plants, Wildlife, and Fish Species
- Existing Land Use and Status
- Noxious and Invasive Weeds
- Paleontological Resources
- Range and Rangeland Management
- Recreation Resources
- Socioeconomics
- Soils
- Hydrology and Watershed Resources
- Wildlife and Fisheries
- Vegetation and Wetlands
- Visual Resources and Noise

In addition to the above-listed resources, the EIS will address all of the Critical Elements of the Human Environment as described in the BLM's Instruction Memorandum Number ID-2003-075 9 (dated July 11, 2003). Additional issues or resource concerns are likely to be determined during the public scoping process.

5.0 PUBLIC PARTICIPATION

A critical element of the NEPA process is public scoping. Scoping activities are initiated early in the process to:

- Identify reasonable alternatives to be evaluated in the NEPA document,
- Identify issues of concern related to the Proposed Action, and
- Determine the depth of the analysis for issues addressed in the NEPA document.

The public is encouraged to participate during the scoping process to help identify the scope of the analysis needed, alternatives to the Proposed Action, other issues or concerns that should be analyzed, mitigation opportunities, and any other comments or ideas to help ensure the completeness of the analysis process. **Your written comments will be accepted on or before February 4, 2004.** Please submit your written comments to:

Ms. Jean Nitschke-Sinclear, AFM NEPA, Planning and Special Projects
Bureau of Land Management, Vernal Field Office
170 South 500 East
Vernal, UT 84078
jean_nitschke-sinclear@blm.gov
Telephone: (435) 781-4400
Fax: (435) 781-4410

A public meeting to discuss the proposed project is scheduled for the following date and location:

Wednesday, January 14, 2003
7:00-9:00pm
South Conference Room, Uintah County Bldg., 147 East Main Street, Vernal Utah

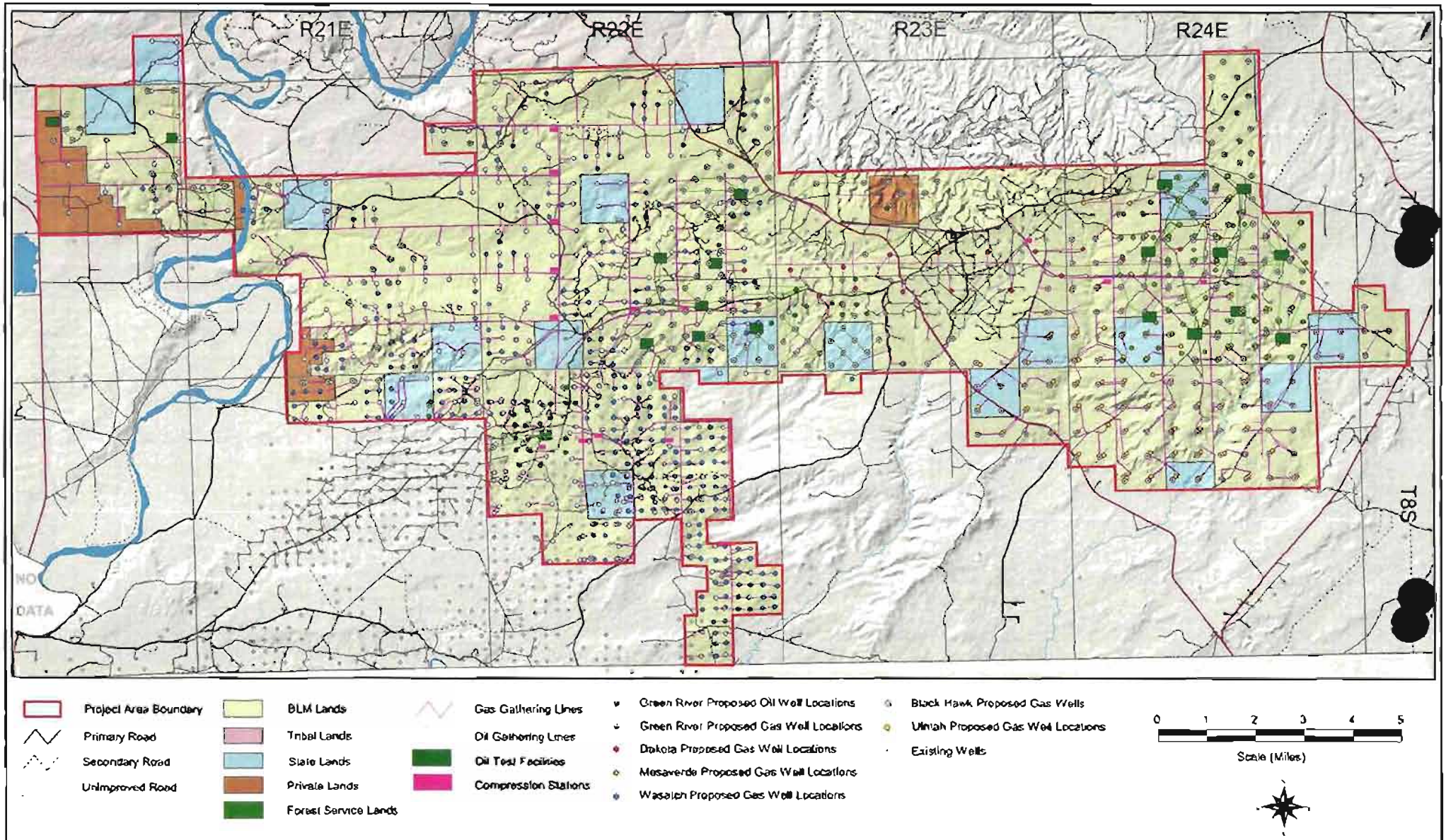

Figure 1-2. Existing Roads, Pipelines, Wells, and Proposed Wells and Pipelines within the Greater Deadman Bench Study Area.

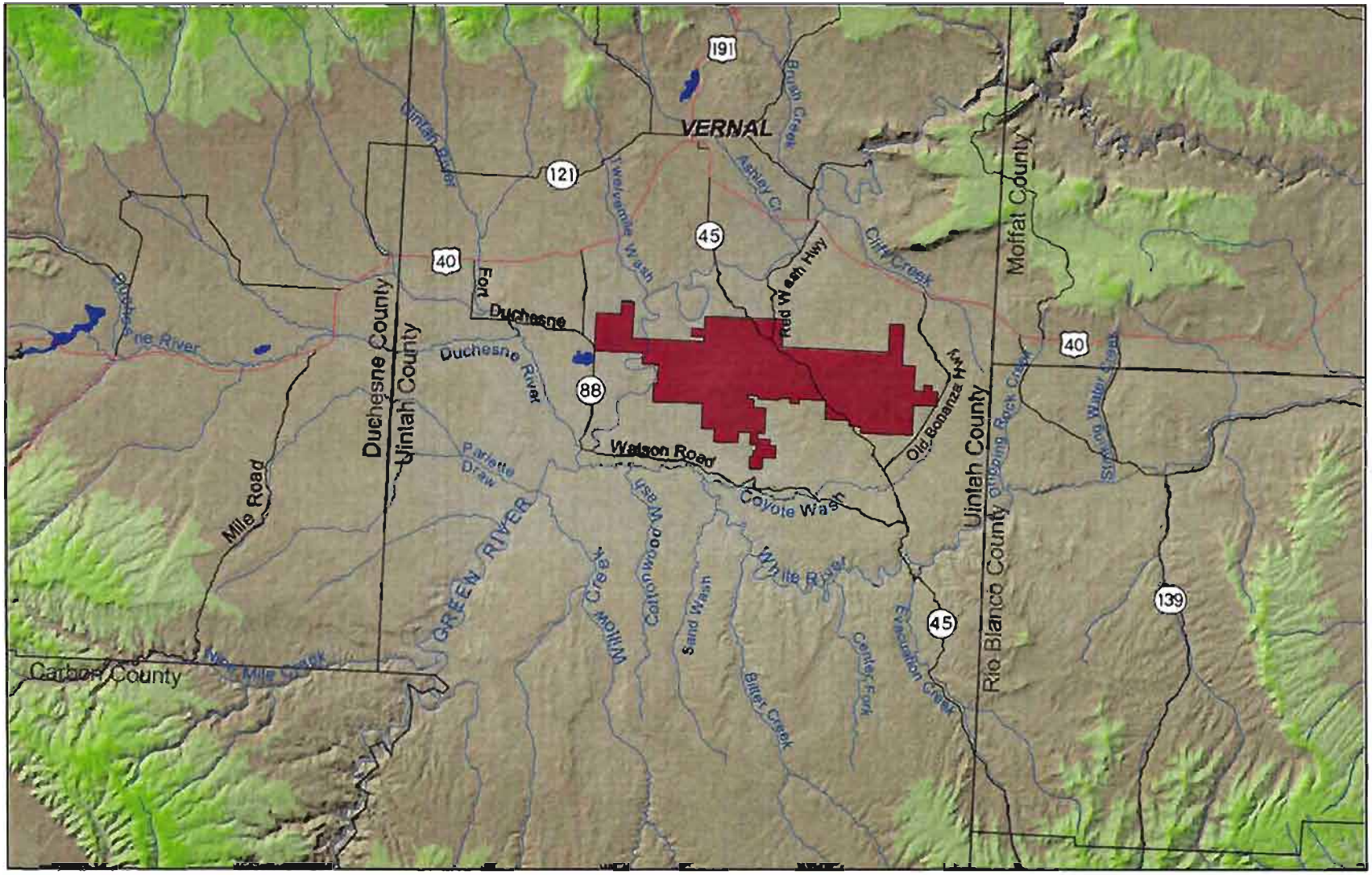

Figure 1-1. Location Map of the Greater Deadman Bench Project Area, Uintah County, Utah.

THE HOPI TRIBE

RECEIVED
JAN 20 2004
BLM VERNAL, UTAH

Wayne Taylor, Jr.
CHAIRMAN

Caleb Johnson
VICE-CHAIRMAN

January 13, 2004

Howard B. Cleavinger, II, Acting Field Manager
Attention: Jean Nitschke-Sinclear, AFM NEPA, Planning and Special Projects
Bureau of Land Management, Vernal Field Office
170 South 500 East
Vernal, Utah 84078-2799

Dear Acing Field Manager Cleavinger,

This letter is in response to your correspondence dated January 8, 2004, and the enclosed Scoping Notice EIS NO. UTU-080-2004-0369V, regarding the Questar Exploration and Production Company's notification of its proposed plan to drill up to 1,239 new wells on a project area of about 99,000 acres in the Greater Deadman Bench oil and gas production region, located about 20 miles south of Vernal. The Hopi Tribe claims cultural affiliation to prehistoric cultural groups in Utah, and therefore we appreciate the Bureau of Land Management (BLM), Verbal Field Office's continuing solicitation of our input and your efforts to address our concerns.

The Hopi Tribe supports the identification and avoidance of prehistoric archaeological sites, and we oppose BLM Instruction Memoranda 98-131-2, which prohibit reburial of Native American human remains excavated from BLM land and subject to the Native American Graves Protection and Repatriation Act (NAGPRA) on BLM land. Therefore, we oppose all ground disturbing activities on BLM land with the potential to disturb the remains of our ancestors.

We understand the BLM is initiating an Environmental Impact Statement (EIS). The Scoping Report states that Class III cultural resources surveys would be conducted over all areas proposed for surface disturbance. Presumably, these Class III surveys would be conducted separately as proposed over the next ten years for 1,239 new wells and associated roads and developments.

Therefore, in the development of this EIS, how does the BLM propose to identify prehistoric archaeological sites and Traditional Cultural Properties over this 99,000 acre project area? And how does the BLM propose respectful reburial of Native American ancestors that may be disturbed as a result of this proposal, through subsequent Class III surveys, mitigation and approved data recovery plans?

Please provide us with a copy of the Class I cultural resources overview for this proposal for review and comment. Should you have any questions or need additional information, please contact Clay Hamilton or Terry Morgart at the Hopi Cultural Preservation Office. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: Utah State Historic Preservation Office
Sally Wisely, Garth Portillo, BLM Utah State Office
Clay Hamilton, HCPO

THE PAIUTE INDIAN TRIBE OF UTAH

440 North Paiute Drive · Cedar City, Utah 84720 · (435) 586-1112

RECEIVED

JAN 2 6 2004

BLM VERNAL, UTAH

January 15, 2004

Field Manager
ATTN: QEP Field Development Project
170 South 500 East
Vernal, Utah 84078

Dear Sir/Madam

SUBJECT: QEP's Greater Deadman Bench oil & Gas Field Development Strategy

The Paiute Indian Tribe of Utah is in receipt of your letter dated January 8, 2004 regarding the Initiation of Consultation - QEP's Greater Deadman Bench Oil & Gas Field Development Strategy. These particular areas that the proposed project is being considered for, is lands that are part of the aboriginal Southern Paiute home lands.

We are very much interested in consulting with you with regards to the above named project. Our interest is not limited to cultural resources but includes plants and animals as well as natural Springs or other places of cultural significance. At this time we are not aware of any archaeological resources in or near the proposed site, but would be very much interested in receiving copies of the documents in the future. Please notify the Paiute Tribe if there are any changes or updates to the project.

Sincerely

Dorena Martineau

Dorena Martineau
Cultural Resources
Paiute Indian Tribe of Utah

(9)

SOUTHERN UTE INDIAN TRIBE

BLM VERNAL, UTAH

January 28, 2004

Attn: QEP Field Development Project
BLM, Vernal Field Office
170 South 500 East
Vernal, UT 84078

Subject: QEP's Greater Deadman Bench Oil & Gas Field Development

Dear Project Manager:

I have reviewed your letter of January 8 2004, and, at this time, believe there are no known impacts to areas of Native American Cultural sites that are sensitive to this Tribe in regards to the proposed new wells being drilled over the next 10 years in the above named region. In the event of inadvertent discoveries of Native American sites, artifacts, of human remains, this Tribe would appreciate immediate notification of such findings.

Should you require additional comments or have any questions, feel free to contact me, at the number listed below, extension 2209.

Sincerely,

Neil B. Cloud

Neil B. Cloud
NAGPRA Coordinator

Cc: Howard D. Richards Sr., Chairman
Southern Ute Indian Tribe

P.O. Box 737 • Ignacio, CO 81137 • Phone: 970-563-0100

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Vernal Field Office
170 South 500 East
Vernal, Utah 84078
(435) 781-4400 Fax: (435) 781-4410
http://www.ut.blm.gov/utah/vernal

IN REPLY REFER TO:
8141
UT-082

February 14, 2006

Name
Address

Dear Dr. Seddon:

RE: Greater Deadman Bench Draft Environmental Impact Statement (DEIS) Consultation.

We are seeking your Tribe's comments, concerns or recommendations regarding the following federal action by the Department of the Interior, Bureau of Land Management (BLM).

The Purpose of this letter is to introduce you to the proposed action for the Greater Deadman Bench Oil and Gas action. A copy of Questar Exploration and Production Companys "Greater Deadman Bench Oil and Gas Producing Region Draft Environmental Impact Statement. (GDBR) EIS number: UTU-080-2003-0369V is provided for your review and comment. This document is dated January, 2006. The Vernal Field Office requests written comments between February 10, 2006 through March 27, 2006..

Please refer to Page S-1 for a summary of the existing situation and proposed action. The GDBR has about 278 Oil and water-injection wells, 300 gas wells, and about 57 miles of primary roads and 314 miles of secondary roads. The proposed action includes 1020 natural gas wells, 219 oil wells, 170 miles of new roads, 235 miles of new pipelines, 22 new central tank facilities, and 15 new compressor stations. Of the total proposed locations, 891wells would require new construction and 348 wells would be "twinned" from existing well pads. A ten year project life is anticipated at this time. It is ~~further~~ anticipated that 100 to 120 wells would be drilled yearly.

In Section 2.3, applicant-committed best management practices, subsection 2.3.1, Page 2-24 through 2-29 describes the actions which would be taken prior to surface disturbance. This section includes class III (100%) inventories of the wells pads, access roads, pipelines and other ancillary facilities as needed. Project specific Section 106 will be done for each project which is the current practice.

Chapter three, Affected Environment describes the known cultural resources within the DEIS area; See Section 3.7, Cultural Pages 3-76 -77.

Chapter four, Environmental Consequences" describes impacts and affects on cultural resources for the proposed action and the "No Action Alternative."

If the applicant committed measures are followed the Vernal Field Office recommends a No Adverse Effect determination for the DEIS area and actions as proposed.

In accordance with the National Environmental Policy Act, the National Historic Preservation Act of 1966 as amended, the Native American Graves Protection and Repatriation Act, American Indian Religious Freedoms Act, the Archaeological Resources Protection Act, Executive Order 13007, and the Federal land Policy and Management Act, the Vernal Field Office of the BLM respectfully inquires as to if there are any comments, special concerns that you and your Tribe may have about the protection of properties and places of traditional cultural or religious importance within the proposed project area. If you have any questions, comments or concerns about the proposed project we would be pleased to discuss them with you. Please advise us whether there are any individuals, such as traditional cultural leaders or religious practitioners, contacted in regard to these matters. We also would like to know if you have any other general comments or concerns regarding the proposed project as outlined in this letter.

The potential for inadvertently discovering human remains and/or funerary objects during the implementation of the project outlined in this letter is limited. Previous inventories and discussions with Northern Ute traditional leaders have indicated a low potential for human remains in the areas to be disturbed by energy development. However, if such a discovery is made we will notify you within three days of the discovery, as per the Native American Graves Protection and Repatriation Act.

The purpose of the proposed action is to facilitate further energy development in an environmentally sensitive manner in the Uinta Basin of North Eastern Utah for the benefit of the peoples of the United States.

If you are aware of any impacts this project may have on specific places of traditional cultural or religious importance to your Tribe and community, or have comments or concerns about the proposed project, please contact William Stringer, Field Office Manager at (435) 781-4400. If you are aware of places of Traditional cultural or religious importance that may be impacted by the proposed project, we would be pleased to discuss them with you in person. For any concerns regarding cultural resources please contact Archaeologist Blaine Phillips at (435) 781-4438. We would appreciate hearing from you within 30 days of receipt of this letter so any information, comments or concerns you may wish to bring to our attention can be addressed promptly. Please let me know if you require additional time so that we may adjust our schedules accordingly.

We look forward to working with you to assure your concerns about places of traditional or religious importance are identified, considered, and protected during project planning and implementation.

Sincerely,

Tim Faircloth
Acting Associate Field manager for
Renewable Resources

Enclosure – as stated

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1. Article Addressed to:

Governor
Santa Clara Pueblo
PO Box 580
Espanola, NM 87532

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A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) S Lon Gutierrez
C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
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☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

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City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

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- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Governor
Laguna Pueblo
PO Box 194
Laguna, NM 87026

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☒ Agent ☐ Addressee

B. Received by (Printed Name) Rebecca A Bautista
C. Date of Delivery 2-17-08

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ~~☒ Return Receipt for Merchandise~~
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Nur (Transfer fr 7005 1820 0002 6515 6532

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7005 1820 0002 6515 6570

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OFFICIAL USE

Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To: Navajo
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 — See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

President
Navajo Nation
PO Box 9000
Window Rock, AZ 86515

COMPLETE THIS SECTION ON DELIVERY

A. Signature — X — ☑ Agent ☐ Addressee

B. Received by (Printed Name) — C. Date of Delivery: 2/17/06

D. Is delivery address different from item 1? ☐ Yes ☐ No
If YES, enter delivery address below:

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label): 7005 1820 0002 6515 6570

PS Form 3811, February 2004 — Domestic Return Receipt — 102595-02-M-1540

7005 1820 0002 6515 6501

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Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To: Northwestern Shoshone
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 — See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

Chairperson
Northwestern Band of Shoshone Nation
862 South Main, Suite 6
Brigham City, UT 84302

COMPLETE THIS SECTION ON DELIVERY

A. Signature — X — ☐ Agent ☐ Addressee

B. Received by (Printed Name) — C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes ☐ No
If YES, enter delivery address below:

Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label): 7005 1820 0002 6515 6501

PS Form 3811, February 2004 — Domestic Return Receipt — 102595-02-M-1540

7005 1820 0002 6515 6549

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OFFICIAL USE

Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To Goshute
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chairperson
Confederated Tribes of the Goshute Reservation
PO Box 6104
Ibapah, UT 84034

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Phyllis Narang ☑ Agent ☐ Addressee

B. Received by (Printed Name) Phyllis Narang
C. Date of Delivery 2-17-06

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☑ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1820 0002 6515 6549

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7005 1820 0002 6515 6587

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OFFICIAL USE

Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To Ute Tribe
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chairperson
Ute Indian Tribe
PO Box 190
Ft. Duchesne, UT 84026

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Rod Cuch ☐ Agent ☐ Addressee

B. Received by (Printed Name) Rod Cuch
C. Date of Delivery 2-23-06

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1820 0002 6515 6587

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7005 1820 0002 6515 6686

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Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Total Postage & Fees $

Postmark Here

Sent To White Mesa
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Councilperson
White Mesa Ute Council
PO Box 7096
White Mesa, UT 84511

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Connie Rebbit ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

FEB 2005 USPS - 84511

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from s 7005 1820 0002 6515 6686

DM

PS Form 3811, February 2004 Domestic Return Receipt

7005 1820 0002 6515 6563

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OFFICIAL USE

Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Total Postage & Fees $

Postmark Here

Sent To Eastern Shoshone
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chairperson
Eastern Shoshone Business Council
PO Box 538
Ft. Washakie, WY 82514

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article N (Transfer 7005 1820 0002 6515 6563

DM

PS Form 3811, February 2004 Domestic Return Receipt

7005 1820 0002 6515 6556

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OFFICIAL USE

Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To: Southern Ute
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 — See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chairperson
Southern Ute Tribal Council
PO Box 737
Ignacio, CO 81137

COMPLETE THIS SECTION ON DELIVERY

A. Signature: X Delvert Waters — ☐ Agent ☐ Addressee

B. Received by (Printed Name) — C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1820 0002 6515 6556

PS Form 3811, February 2004 — Domestic Return Receipt — 102595-02-M-1540

7005 1820 0002 6515 6679

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OFFICIAL USE

Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To: Ute Mountain Ute
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 — See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chairperson
Ute Mountain Ute Tribe
PO Box 248
Towaoc, CO 81334

COMPLETE THIS SECTION ON DELIVERY

A. Signature: X Buddy Shaw — ☐ Agent ☐ Addressee

B. Received by (Printed Name): BUDDY C COOK — C. Date of Delivery: 2-23-06

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1820 0002 6515 6679

PS Form 3811, February 2004 — Domestic Return Receipt — 102595-02-M-1540

7005 1820 0002 6515 6493

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Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Total Postage & Fees $ 5.36

Postmark Here

Sent To Hopi
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chairman
Hopi Tribal Council
PO Box 123
Kykotsmovi, AZ 86039

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Tiffany Kayhayes ☐ Agent ☐ Addressee

B. Received by (Printed Name) TIFFANY KAYHAYES
C. Date of Delivery FEB 21 2006

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1820 0002 6515 6493

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7005 1820 0002 6515 6495

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Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Total Postage & Fees $

Postmark Here

Sent To Paiute
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chairperson
Paiute Indian Tribe of Utah
440 North Paiute Drive
Cedar City, UT 84720

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Candice Wall ☐ Agent ☐ Addressee

B. Received by (Printed Name) Candice Wall
C. Date of Delivery 2-17-06

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7005 1820 0002 6515 6495

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7005 1820 0002 6515 6518

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Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To Zia Pueblo

Street, Apt. No.; or PO Box No.

City, State, ZIP+4

PS Form 3800, June 2002 See Reverse for Instructions