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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