



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Kemmerer Field Office
312 Highway 189 North
Kemmerer, Wyoming 83101-9711



October 16, 2007

ENVIRONMENTAL ASSESSMENT
FOR THE
Bear Canyon #8-12 Exploratory Well (WYW-152773)
EA No. WY090-EA07-089

The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that take into account the long-term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness, and natural, scenic, scientific, and cultural values.

1.0	Introduction.....	1
1.1	Need for Proposed Action.....	1
1.2	Conformance with Land Use Plans.....	1
1.3	Relationship to Statutes, Regulations, or Other Plans	2
1.4	Issues.....	2
2.0	Proposed Action and Alternatives	3
2.1	Proposed Action.....	3
2.1.1	Access Road Construction	3
2.1.2	Well Pad Construction	4
2.1.3	Drilling Operations	5
2.1.4	Well Completion and Production.....	6
2.1.6	Water.....	7
2.1.7	Solid Waste Management and Sanitation	7
2.1.8	Spill Procedures	7
2.1.9	Hazardous Materials	7
2.1.10	Interim Well Pad Reclamation.....	8
2.1.11	Well Abandonment and Reclamation.....	8
2.1.12	Applicant-Committed Environmental Protection Measures.....	9
2.2	NO ACTION ALTERNATIVE.....	11
3.0	AFFECTED ENVIRONMENT	11
3.1	Rights-of-Way and Access	13
3.2	Air Quality/Noise.....	14
3.3	Geology/Minerals/Geologic Hazards.....	16
3.3.1	Geology.....	16
3.3.2	Minerals	16
3.3.3	Geologic Hazards.....	17
3.4	Cultural and Paleontology Resources.....	17
3.4.1	Survey Methodology.....	18
3.4.2	Summary of Inventory Results	18
3.4.3	Paleontology	19
3.5	Rangelands (Grazing Allotments).....	20
3.6	Wastes (Hazardous or Solid)	20
3.7	Vegetation.....	21
3.7.1	Vegetation Cover Types	21
3.7.2	Threatened, Endangered, and Other Special Status Plant Species.....	22
3.8	Soils.....	24
3.9	Hydrology	25
3.9.1	Surface Water.....	25
3.9.2	Groundwater	25
3.10	FISH AND Wildlife.....	25
3.10.1	Big Game Habitat Definitions	26
3.10.2	Raptors	29
3.10.3	Migratory Birds.....	29
3.10.4	Fisheries	30
3.10.5	Threatened, Endangered and Candidate Species	30
3.10.6	BLM Sensitive Species and Other Special Status Species	33

3.11	Visual Resources.....	39
3.12	Recreation	39
3.13	Socioeconomics	40
3.14	Fire	42
4.0	ENVIRONMENTAL CONSEQUENCES	44
4.1	Air Quality	44
4.2	Noise	46
4.3	Geology/Minerals	48
4.4	Paleontological Resources	48
4.5	Cultural Resources	49
4.6	Wastes Solid or Hazardous	49
4.7	Vegetation and Noxious Weeds.....	50
4.8	Soils.....	51
4.9	Hydrology	51
4.10	Fish and Wildlife.....	52
4.11	Visual Resources.....	58
4.12	Recreation	59
4.13	Socioeconomics	59
4.14	Hazardous Materials/ Health and Safety.....	61
4.14	Cumulative Effects.....	64
5.0	Description Of Proposed Mitigating Measures.....	67
5.1	Air Quality/Noise Effects	67
5.2	Cultural Resources.....	67
5.3	Paleontological Resources	67
5.4	Noxious Weeds	68
5.1.5	Vegetation.....	69
5.6	Soils.....	70
5.7	Wildlife	70
5.8	Visual Resources.....	70
6.0	References.....	71
	Appendix A – FIGURES	1
	Appendix B – CONDITIONS OF APPROVAL	1
	Appendix C – AIR QUALITY ANALYSIS.....	2
	Appendix D – VISUAL SIMULATIONS	1

1.0 INTRODUCTION

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. The EA is tiered to the Bureau of Land Management (BLM) Kemmerer Resource Management Plan/Draft Environmental Impact Statement (BLM 1985), and the associated environmental analyses and decision documents. Prior to authorizing oil exploration and well development on BLM-administered lands, the environmental and social effects of those actions must be evaluated on all federal and nonfederal lands within the potentially affected areas. The purpose of this EA is to disclose the direct, indirect, and cumulative effects and consequences of the Proposed Action and other alternatives. This EA would be used for evaluation of the alternatives and to make a determination of the need to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). The responsible BLM line officers would make decisions based on consideration of the purpose and need for the project, the significance of the effects of alternatives, and public concerns. If impacts are not significant, as defined in 40 Code of Federal Regulations (CFR) 1508.27, separate decision documents would be prepared by the appropriate agency officials (a Decision Record and FONSI). Decisions would be prepared and distributed along with this EA, and a legal notice would be published in the local newspaper. If impacts are determined to be significant, the EIS process would be initiated. For this project, the responsible official is:

BLM Field Manager, Mary Jo Rugwell

Kemmerer Field Office

312 Highway 189 N.

Kemmerer, WY 83101-9711

1.1 NEED FOR PROPOSED ACTION

Exploration and development of federal mineral resources by private entities is an integral part of the BLM's national energy policy. BLM is authorized to lease the federal lands for oil and gas development under the authority of the Mineral Leasing Act of 1920, as amended; the Mining and Minerals Policy Act of 1970; the Federal Land Policy and Management Act of 1976; the National Materials and Minerals Policy, Research and Development Act of 1980; and the Federal Onshore Oil and Gas Leasing Reform Act 1987.

The proposed action allows Fortuna (US) L.P. (Fortuna) to construct, drill, and develop the federally administered minerals located on lease number WYW-152773. Fortuna has filed a Notice of Staking (NOS) at the Kemmerer Field Office (KFO) in November, 2006 for an exploratory well in Section 12, Township 23 North, Range 118 West. The proposed Bear Canyon exploration well is needed to effectively evaluate hydrocarbon reserves underlying the Project Area to determine development potential of the oil and gas resources (Figure 1-1).

This EA is being completed in accordance with NEPA in order to evaluate the potential effects of the proposed action. In addition, the document will address if the proposal will comply with all statutory regulations prior to authorizing the Application for Permit to Drill (APD).

1.2 CONFORMANCE WITH LAND USE PLANS

This Proposed Action is subject to the 1985 Kemmerer Resource Area (KRA) RMP/DEIS. The KRA is now known as the KFO (Kemmerer Field Office). This plan has been reviewed to determine if the Proposed Action conforms with the land use plan terms and conditions as required by 43 CFR 1610.5.

The Proposed Action is in conformance with the applicable RMP/DEIS Record of Decision (ROD) because it is specifically provided for in the following decision:

All public lands within the resource area have been reviewed and have been determined to be suitable for oil and gas leasing and development subject to certain stipulations. (BLM 1986:10). However, in accordance with the “Interim Management Policy for Lands Under Wilderness Review,” no leases are currently being issued in the Raymond Mountain Wilderness Study Area.

1.3 RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS

This EA is prepared pursuant to the NEPA and subsequent regulations adopted by the Council on Environmental Quality (40 CFR 1500). The EA is intended to be a concise public document that analyzes the probable and known environmental impacts of the Proposed Action and alternatives upon the components of the human environment and reaches a conclusion as to its significance. The ultimate decision of this EA must ensure that the actions approved are not only in the best interest of the public, but would not result in a significant impact to the human environment (40 CFR 1508.13).

1.4 ISSUES

A Scoping Notice for the project was disseminated on December 3, 2006. The Scoping Notice described Fortuna’s Proposed Action. The Scoping Notice indicated the original plans for four well pads with three wells on each pad. Written comments on the Proposed Action were received until January 3, 2007. Twenty-three comments were received concerning the project. The majority of the people expressed concerns about oil development near the Sublette Cutoff of the Oregon Trail and near Immigrant Springs and the effects on the trails, gravesites and the tranquility of the experience visiting this historic trail site. However, Fortuna has withdrawn three of the proposed well pads and 11 of the proposed wells. Therefore, this EA is written to address the impacts associated with the Bear Canyon 8-12 well location. As a result, no activity is currently planned near the Cutoff or Immigrant Springs. Any future proposals would be based on the results of the exploratory well and would be evaluated separately under another NEPA procedure. Other comments from State and Federal agencies indicated concerns about water and wildlife issues. In addition, the BLM staff identified the following list of resources that may be affected by the Proposed Action:

- Soil types and areas of concerns such as erosion and mitigation;
- Air quality
- Geologic hazards;
- Reclamation procedures;
- Noxious weed management;
- Paleontology resources;
- Big game habitats;
- Sage grouse nesting/brood-rearing habitat;
- Recreational issues
- BLM sensitive species;
- Surface and ground water quality;
- Human Health and Safety issues;
- Threatened and Endangered species; and
- Cultural resources.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the alternatives that are being analyzed as part of the Bear Canyon Oil Exploratory Project (BCOEP) (i.e., the Proposed Action and No Action Alternative), as well as alternatives that were considered but eliminated from detailed analysis.

2.1 PROPOSED ACTION

Fortuna (US) LP (Fortuna) proposes an exploratory well to test the potential for crude oil production on Oil and Gas Lease number WYM 152773 (See Figure 1-1). The project is hereafter referred to as the Bear Canyon Oil Exploratory Project (BCOEP). The project includes the following:

- Construction of a well pad;
- Upgrade of an existing two-track road;
- Construction of a new short access road from the existing two-track to the proposed well pad;
- Minor upgrading (gravel application, grading in places as needed) of Dempsey Road
- Drilling and completion of the well;
- Installation of well pad facilities if the well is successful;
- Transporting oil and produced water off-site via trucks if the well is capable of producing economic quantities; and
- If it is a natural gas well, the well would be shut in until all permits, including a NEPA analysis, would be issued for pipelines to transport the natural gas to sales pipelines.

The BCOEP cumulative analysis area is within Township 23 North and Ranges 117 and 118 West. The southeast corner of the BCOEP is located approximately 15 miles northwest of Kemmerer, Wyoming, in the BLM Kemmerer Field Office. The BCOEP overlaps with federally and state-managed lands as well as private lands (Figure 1-1). However, the 8-12 well pad is on fee surface and will access federal minerals via directional drilling. Therefore, the proposed action is defined as a federal undertaking and federal requirements will be applied on the fee surface to insure protection of the environment. The BCOEP cumulative analysis area covers 73.53 square miles (47,058), 25,430 acres (54 percent) of which are administered by the BLM; 5,930 acres (12.6 percent) by the state of Wyoming; 14,123 acres (30 percent) that are privately owned; and 1,575 acres (3.4 percent) of open water. All acreage values within this EA are estimates calculated from GIS resources and are accurate within +/- 0.5 percent.

The Proposed Action analyzes the Bear Canyon 8-12 proposal and the related access roads with Conditions of Approval (COA's). The conditions of approval that would be listed in Appendix B are impact-mitigation measures that would be attached to the approval documents to minimize anticipated environmental impacts. Construction activities would follow guidelines described in the "Gold Book," *Surface Operating Standards for Oil and Gas Exploration and Development* (BLM and USFS 2005). The duration of pad and road construction, and well drilling and completion would be approximately three to four months.

2.1.1 Access Road Construction

Primary access to the 8-12 well is north from Kemmerer along Highway 223 and then the existing Dempsey Road would be utilized from the paved surface Highway 233 crossing BLM, State and Fee lands. Some blading & re-graveling with 2-3 inch crushed gravel may be required on Dempsey Road. Reconstruction of this road is not anticipated or planned.

The final access road to Bear Canyon 8-12 is mostly a two-track off Dempsey Road that would be slightly widened with the addition of gravel as needed, and then a 250-foot new access road would be constructed to the edge of the pad. The road would be built in accordance with the BLM resource road standard as found in Chapter 4 of the new Gold Book. The equipment for upgrading and building the short piece of new road would utilize a crawler tractor or track hoe to windrow the vegetation to one side, remove topsoil to the opposing side, and rough in the roadway. This would be followed with a grader or bulldozer to establish barrow ditches and crown the road surface. If culverts are required, a track hoe or backhoe would trench the road and install the culverts. Only minor equipment excavation and disturbance would be applied to the upgraded portion of the existing two-track trail.

The road would be constructed within a 30-foot wide ROW with a 14-foot width running surface. The length of the road, including the upgrade of the existing two-track, would be 2,000 feet. The surface would have a crown to facilitate drainage to borrow ditches on both sides designed to increase drainage and minimize erosion potential. Runoff and erosion control measures, such as water bars, berms, and interceptor ditches, would be installed as specified in Chapter 4 of the Gold Book and at the direction of the Authorized Officer.

2.1.2 Well Pad Construction

Construction of the well pad would use the following types and classes of heavy equipment: a D6 or larger crawler tractor; a Class 12 or larger motor grader; a Class 125 or larger track hoe; a mid-sized backhoe; a 10-yard dump truck; and possibly a Class 988 loader. Approximately 25 vehicle trips per day would be needed to move equipment to and from the site during the five-day construction period.

In order to clear surfaces for well pad construction, a crawler tractor would strip existing topsoil and brush, and would stockpile the soil along the uphill side of the well pad to prevent any possible contamination and soil loss. All cut and fill slopes needed for the well pad would be constructed so that stability would be maintained for the life of the project. Diversion ditches and berms would be constructed to achieve a zero runoff location, not only keeping runoff from entering well but also from drilling fluids and potential releases from leaving the location.

Best Management Practices for erosion control, soil viability, and maintenance would be followed during construction and drilling operations. The well pad would be surrounded by a berm to minimize erosion. The berm would also divert drainage from adjacent lands around areas of disturbance. Energy dissipaters such as straw bales and silt fences may be used in areas where the possibility of down-cutting exists. The well pad, spoil piles, areas between the pad and piles, and the access and egress road would initially disturb 10 acres. 3.66 acres. An additional 1.4 acres would be disturbed by the upgrading of the existing two-track. Therefore, total project disturbance would be 11.4 acres.

If the well would be productive, no interim reclamation would take place until an evaluation could be made regarding the potential to drill another well on the pad. If the well would be found to be incapable of producing economic quantities, reclamation of the well pad would begin during the fall. All facilities would be removed from the pad, the well would be plugged and abandoned, the pad would be recontoured and then the regraded areas would then be seeded with a BLM-approved seed mixture. Onshore Order 1 (May 2007) requires that all reclamation activities be completed within six months after drilling completion.

Construction of the well pad would use the following types and classes of heavy equipment:

- D6 or larger crawler tractor,
- Class 12 or larger motor grader,

- a Class 125 or larger track hoe,
- a mid-sized backhoe,
- a 10-yard dump truck, and
- a Class 988 loader.

This equipment would be on site about five days to complete the well pad and access road construction. Additionally, five pickup trucks would be driven to and from the site every day.

2.1.3 Drilling Operations

Once construction of the well pad is complete, drilling equipment would be moved to the drilling site. The surface well bore is located 1,661 feet from the northern line of Section 12 and 974 feet from the eastern line of Section 12. The well would be a directional well that would be drilled to a vertical depth to 14,092 feet at a location 1,836 feet south and 3,689.5 feet west from the surface location of the wellbore. Fortuna needs to use this directional drill method, as opposed to a vertical drilling method that would take a shorter time and cost less, because the topography over the proposed location of the bottom of the well is too steep to construct a well pad over the intended downhole location. A triple drill rig, approximately 2,500 to 4,000 horsepower would be powered by diesel engines. Diesel fuel would be delivered by tanker truck to a storage tank located on the well pad. The exact type and size of rig would be dependant upon rig availability at the time of project implementation and the depth of the proposed well.

The operator has indicated that they would utilize a close-loop drilling system in order to minimize the disturbance area. A closed-loop circulation system includes four 600-barrel tanks, a cuttings tank, and a flare pit during drilling operations would be used. In a closed-loop drilling fluid system, the reserve pit is replaced with a series of storage tanks that separate liquids and solids. As a result, a reserve pit would not be needed. Equipment to separate out solids (e.g., screen shakers, hydrocyclones, centrifuges) and collection equipment (e.g., vacuum trucks, shale barges) minimize the amount of drilling waste muds and cuttings that require disposal, and maximize the amount of drilling fluid recycled and reused in the drilling process. The wastes created are transferred off-site for disposal at injection wells or oilfield waste disposal facilities. Produced water would be confined to a 400-barrel tank for a period of 90 days after initial production. Tanks would be enclosed by either earthen berms or corrugated metal rings to contain potential hydrocarbon spills. A flare line would be directed to a flare pit so as to avoid environmental damage and as required by the BLM and State of Wyoming regulations.

The drilling activities would take approximately 90 to 120 days. All fresh water (less than 10,000 parts per million total dissolved solids) encountered during drilling would be isolated by both casing and cement (Personal Communications Matthew Warren 2007). All potentially productive hydrocarbon zones would be cemented and tested. Site-specific descriptions of drilling procedures and equipment are included in the APD and the associated Conditions of Approval for the well.

Hydrogen sulfide (H₂S) gas may be encountered during drilling and completion activities. Fortuna has developed an H₂S Contingency Plan in accordance with the requirements of National Onshore Oil and Gas Operating Order #6, H₂S Operations. The plan describes the safety procedures in the event of an accidental H₂S release. This plan is on file with the BLM Kemmerer Field Office.

Approximately 50 trips using large trucks would be required to move a drill rig and associated equipment to the site. An addition 50 vehicles would be needed to remove the equipment after the drilling would be finished. Once drilling begins, there would be two crew vehicles every 12 hours (four per day) traveling to and from the rig. A water truck would haul two to three loads per day for the first month then one per day

after that. The mud vehicle would make a trip to the site every second day. All other vehicles would be on an as needed basis and could be as high as one vehicle per day. Therefore, five to seven vehicles would enter and leave the location daily for the 90-day duration of drilling.

2.1.4 Well Completion and Production

Once the well is drilled and assuming indications of potential well productivity, completion operations would commence. Completion operations would involve setting casing to depth and perforating the casing in target production zones, followed by hydraulically fracturing (fracing) the formation under high pressure. The fracing material would likely contain sand or other proponent t to keep the fractures no longer under pressure from closing, thereby allowing hydrocarbons to escape the formation. The next phase would be to flow and test the well to determine rates of production. Approximately two to four weeks would be needed to complete the well depending on conditions at the well.

If the well is determined to be productive, facilities would be installed on the pad including a wellhead, separator with a 1 million British thermal unit (1 MMBtu) heater/boiler enclosed in a 24 feet x 12 feet x 12 feet high building, a 600 bbl oil tank (10 feet high x 20 feet diameter sitting inside a containment area 35' feet x 35 feet x 4 feet high, a 60 bbl water tank 6 feet high x 8.5 feet diameter in a containment area 13 feet x 13 feet x 13' feet high, and flare or an incinerator, which height would be determined by the H₂S concentrations. The separator located on the well pad would be powered by diesel fuel. The separator would separate the oil, water and waste gas in the stream. Natural gas and all waste gas would be initially sent to a flare or incinerator. These gases would include those from the wellhead through the separator and the flashing and “breathing” emissions from the oil tanks.

A containment dike constructed of compacted subsoil would be constructed around these facilities that would hold 110% of the capacity of the largest tank. The proposed pad design is shown on Figure 2-1. The use of topsoil for the construction of dikes would not be allowed. Since a Spill Prevention, Control, and Countermeasure (SPCC) Plan is required by the State of Wyoming, the containment dike may be expanded with the BLM Authorized Officer’s approval to meet SPCC requirements.

Oil tanks would be pumped periodically as needed, and all oil product would be transported to refineries most likely in the Salt Lake area, and produced water would be transported to an approved disposal facility. All applicable security guidelines identified in 43 Code of Federal Regulations (CFR) 3162.7-5 and Onshore Oil and Gas Order No. 3 would be followed.

Remote telemetry would be installed to monitor and control the well operations. Particularly, the operation of the flare or incinerator would be monitored to ensure working order. If the flare would fail for any reason, the well would be immediately shut down to prevent any gases, especially hydrogen sulfide, from venting to the atmosphere.

Periodically, a work-over or recompletion on the well may be required to ensure that efficient production is maintained. Work-overs can include repairs to the well bore equipment (casing, tubing, rods, or pump), the wellhead, or the production facilities. These repairs would usually be completed in several days per well, during daylight hours. The frequency for this type of work cannot be accurately projected because work-overs vary well by well; however, an average work time may be one work-over per well per year after five years following drilling and completion for a period of seven days. In the case of a recompletion, where casings are worked on or valves and fittings would be replaced to simulate production, a reserve pit may have to be constructed. This could have an effect on interim reclamation efforts.

Six vehicles would be needed to move the service rig to and from the site. During an anticipated 30-day completion period, one crew vehicle would be driven to the site every 12 hours. A service provider

vehicle would be drive to the site daily. Therefore, an average of three vehicles would enter and leave the site daily during completion operations.

2.1.5 Operations

The estimated initial production of about 200 barrels/day (bopd) of crude oil and 20 barrels of produced water per day (bpwd). Trucks with an approximate 200-barrel load capacity would make daily trips to the well to haul the oil and every three days to haul the produced water. However, Fortuna would install a 600-bbl oil tank and a 60-bbl water tank for the well in case weather or poor road conditions would prevent truck traffic to the site. If access to the site would be curtailed for more than three days, Fortuna would temporarily shut down the well through remote radio access.

2.1.6 Water

An estimated 3.0 acre-feet (ac-ft) (12,000 barrels) of water would be needed to drill the proposed well and apply water to roads as required. Water would be purchased from a private person who has the allocated water to sell. The water source is the Jo. O. Wright diversion on the Hams Fork River and located on private property in T22N R116W, Section 27, N1/2, Lincoln County, Wyoming. Therefore, a 3.0 ac-ft depletion from the Colorado River Basin is anticipated to occur as a result of drilling water requirements. Formal consultation with the U.S. Fish and Wildlife Service (USFWS) will be conducted prior to approval of this project and water use would be reported.

2.1.7 Solid Waste Management and Sanitation

Self-contained, chemical portable toilets would be provided for human waste disposal. Upon completion of operations, or as needed, the toilet holding tanks would be pumped and the contents thereof disposed of in the nearest, approved, sewage disposal facility.

Garbage, trash, and other waste materials would be collected in portable, self-contained, fully enclosed trash cages during operations. Accumulated trash would be disposed of at an authorized sanitary landfill. Trash would not be burned or buried on location.

All debris and other waste materials not contained in the trash cage would be cleaned up and removed from the location promptly after removal of the completion rig (weather permitting). Any open pits would be fenced during the operations. The fencing would be maintained with best efforts until such time as the pits are backfilled.

2.1.8 Spill Procedures

If any spills of oil, condensate, salt water, or other fluids occur during the construction, drilling, completion, operation, or abandonment phase of the proposed project, Fortuna or their contractors or sub-contractors would immediately contact the BLM and any other regulatory agencies (e.g., EPA National Response Center, State of Wyoming) as required by law or regulation. Strict cleanup efforts would be initiated immediately.

2.1.9 Hazardous Materials

Chemicals on the EPA's Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) that may be used or stored in quantities of over 10,000 pounds would be used in their entirety or disposed of annually. In the course of drilling, Fortuna and/or its contractors may store and use diesel fuel, sand (silica), hydrochloric acid, and carbon dioxide (gas), all described as hazardous substances in 40 CFR Part 302, Table 302.4, in quantities exceeding 10,000 pounds. During production operations, H₂S scavenger, paraffin solvent, natural gas

condensate and crude oil, described as hazardous substances in 40 CFR Part 302, Table 302.4, may be stored or used on site in quantities exceeding 10,000 pounds. During production operations, triethylene glycol, ethylene glycol mix (50 percent), and methanol, all described as hazardous substances in 40 CFR Part 302, Table 302.4, may be stored or used onsite in quantities less than 10,000 pounds. Small quantities of retail products (paint/spray paint, solvents [e.g., WD-40], and lubrication oil) containing non-reportable volumes of hazardous substances may be stored and used on site at any time. Any spills of oil, condensate, salt water or any other potentially contaminating substances would be cleaned up and immediately removed to an approved designated disposal site.

Produced oil would be stored in tanks surrounded by an impervious berm. The berm would be capable of containing, at a minimum, the contents of the largest single tank or treater in use, plus ten percent (10%) freeboard for precipitation. All loading lines and valves would be placed inside the berm surrounding the tank or would be surrounded with berms to contain spills. The tanks would be emptied as necessary, and the oil transported to market via trucks. If weather constraints or other unforeseen issues arise where access is restricted to the well the well would be shut-in until all issues have been addressed.

As required by Federal and State regulation, Fortuna would maintain and make available an emergency Spill Prevention, Control, and Countermeasure (SPCC) Plan that outlines the methodology to be used in the event of a spill. The SPCC Plan would describe how to contain a spill and how to facilitate rapid clean up of any hydrocarbon spill prior to its contamination of either surface or subsurface waters. The SPCC would be included as part of the SUPO. Also, Fortuna would maintain and make available a Hazardous Substance Management Plan.

2.1.10 Interim Well Pad Reclamation

Following drilling and completion operations, drilling equipment, supplies and trash would be removed from the well pad. If the well is successful, the pad would remain at its original size pending a decision to drill other wells on the pad. If the well is not determined successful and economic, the well pad would be recontoured and reclaimed with seed mixtures approved by the BLM.

The seedbed for reclamation would be prepared by disking or by using similar implement and a certified weed-free seed mixture, as recommended by BLM, would be used. For spring/summer construction and drilling, seeding would be performed in the fall following completion operations, after September 15 and before permanent snowfall. A surface mulch of certified weed-free straw would be applied to seeded areas where necessary. If monitoring shows that drilled-in or broad-cast seed has not germinated by July 15, re-seeding would be completed again after September 1 and before permanent snowfall. Broadcast seeding pounds per acre of seed would be higher. However, drilled-in seeding may have higher equipment costs.

Annual or noxious weeds would be treated as often as necessary on all disturbed areas as directed by the BLM. Weed treatment would be conducted using approved chemical and/or mechanical methods. Reclamation would be monitored for successful re-vegetation. Watering to establish vegetation may be required for successful reclamation as determined by monitoring. As previously stated, if the well were a dry hole or non-producer, the well pad would be reclaimed in its entirety.

2.1.11 Well Abandonment and Reclamation

Abandonment of the well facilities would be performed in compliance with all applicable regulations. At the time of final plugging and abandonment, all of the surface equipment would be removed and the surface disturbance associated with the well would be reclaimed according to BLM specifications and applicable COAs.

2.1.12 Applicant-Committed Environmental Protection Measures

The following list summarizes various applicant-committed practices that would be implemented by Fortuna to avoid or minimize negative effects on environmental resources for the Bear Canyon 8-12 well. Implementation of these measures would be contingent upon approval by the BLM.

2.1.12.1 Noise

- All vehicles and construction equipment would be appropriately muffled to minimize construction-related noise.

2.1.12.2 Erosion and Sedimentation Control

- No cross-country travel would be permitted; and all vehicles would be restricted to permitted roads and approved ROWs.
- Employees and contractors would be instructed to travel at appropriate speeds to limit disturbance to soils and vegetation, and to minimize the potential for vehicle-wildlife and vehicle-vehicle collisions.
- For construction, drilling and completion activities, Fortuna would apply dust suppressants, as needed, to utilized roads to reduce fugitive dust from vehicle traffic. At the end of the life of the project, all surface facilities would be removed and all disturbed areas would be recontoured and reseeded.
- The operator will prepare and submit a Storm Water Pollution Prevention Plan. A copy of the approved plan would be provided to be on file with the Kemmerer Field Office.

2.1.12.3 Air Quality

- Members of the construction and drilling crew would be encouraged to car pool to and from surrounding towns to minimize vehicle-related emissions.
- For construction, drilling and completion activities, Fortuna would apply dust suppressants, as needed, to utilized roads to reduce fugitive dust from vehicle traffic for an anticipated use of 1.5 ac-ft..
- Fortuna would comply with EPA and Wyoming Department of Environmental Quality standards for drill rig engines.

2.1.12.4 Vegetation Resources

- To reduce the spread/introduction of noxious and invasive weed species via project-related vehicles and equipment into the Project Area, project employees and contractors would not be allowed to drive off-road (unless on approved ROWs).

2.1.12.5 Wildlife Protection

- Fortuna would comply with all BLM directives concerning the restriction of construction and drilling activities during times when these activities would affect designated wildlife species.
- To reduce the potential for wildlife-vehicle collisions, Fortuna would require their employees and contractors to always drive at safe speeds.
- To protect wildlife from the possibility of harassment or depredation by loose dogs, no dogs are allowed on the well site.

- Employees and contractors are prohibited from harassing, shooting, maiming, or killing of wildlife in the project area.

2.1.12.6 Cultural/Paleontological Resources

- If cultural or paleontological resources were discovered during construction and drilling activities, all activity within the immediate area of impact would cease. Fortuna would immediately notify BLM of the find. The BLM and Wyoming State Historic Preservation Office representatives would then determine how to avoid impacting the site or artifact.

2.1.12.7 Fire Protection

- Vehicles with catalytic converters would be restricted to existing roads and trails; parking or idling would not be permitted in portions of roads or trails with taller vegetation.
- The following operational procedures would be followed:
 - 1) All brush build-up around mufflers, radiators, heater-treaters, and other engine parts would be avoided; periodic checks would be conducted to prevent this build-up.
 - 2) All personnel would be advised that smoking is only allowed in company vehicles and/or designated smoking areas; and that all cigarette butts should be placed in appropriate containers and not thrown on the ground or out windows of vehicles.
 - 3) All personnel would be advised that campfires or uncontained fires of any kind are prohibited.
 - 4) The crew contingency plan would include a fire communications protocol for contacting fire-fighting personnel.
 - 5) Water would be kept onsite for fire suppression purposes.

2.1.12.8 Public/Crew Safety

- Fortuna would take all necessary precautions for the protection and safety of the public during construction of the project. Warning signs would be posted along roads to inform the public of construction activity.
- To further facilitate coordination with local emergency services, Fortuna would provide mapped locations of the proposed drilling locations and times to the respective emergency services personnel, as applicable, in advance of any exploration drilling activities. In addition, Fortuna would have cell phones or radios onsite, as appropriate, to provide immediate communication to emergency services.
- Local emergency telephone numbers and GPS coordinates would be posted at drilling locations.
- Vehicle traffic would be limited to existing roads and trails and approved ROWs. Vehicles would travel at speeds within set speed limits of main access roads and at slower speeds appropriate for conditions on more remote roads and trails.
- At a minimum, all crew members would comply with the Occupational Safety and Health Administration (OSHA) rules and regulations.
- All pipelines would be flagged or marked before construction activities or post construction activities take place in the vicinity of the pipeline.

2.1.12.9 Geological Hazards

To protect the wellbore against the small potential of a large earthquake, Fortuna would include the following measures:

- Thicker casing
- Remote access to seal off well downhole
- Blind Rams on rig (shear the casing and drill stems resulting in total loss of access to well bore), and
- Emergency Shutdown Valves.

2.2 NO ACTION ALTERNATIVE

The *No Action Alternative* would require BLM to defer or deny future submissions of Applications. BLM's authority to implement the *No Action Alternative* is limited. The reason for this is that the operators have been issued a lease by the Bureau of Land Management. The lease gives the Operators the "right to drill, extract, remove and dispose of all oil and gas deposits..." in the leased lands subject to the terms and conditions of the lease. Because BLM has authority and responsibility to protect the environment within the Federal oil and gas leases, reasonable restrictions can be imposed on the lease terms to avoid significant adverse impacts as long as they are consistent with the lessee's rights; however, the BLM cannot deny development of the lease.

Although, the *No Action Alternative* could be selected by the BLM, selection must clearly demonstrate that the proposal and alternatives would cause significant adverse impacts resulting in unnecessary and undue degradation of the public lands and resources. If the impacts of the proposed action and alternatives are determined to be significant, it would require the completion of an environmental impact statement to fully disclose those impacts that are determined to be significant.

3.0 AFFECTED ENVIRONMENT

The BCOEP is part of a semi-arid ecosystem that supports primarily sagebrush shrubland-grassland habitats. The regional landscape is dominated by north/south-trending ridgelines with the two major drainages of the Hams Fork and North Fork of Twin Creek crossing the BCOEP. The Hams Fork Plateau bisects the BCOEP between these drainages.

The human presence is sparse. Primary land uses in the area including ranching, and varied forms of recreation associated primarily with public lands. The following sections describe in more detail the land uses and natural resources that may occur in the BCOEP. Table 3.1 lists the critical elements that were considered for analysis. A brief description of the resources not affected follows Table 3-1.

Table 3.1. Critical Elements Considered in the Analysis

Affected			Affected			Affected		
Critical Element	Y	N	Critical Element	Y	N	Resource Elements	Y	N
Air Quality/Noise	X		TES Species	X		Wildlife	X	
ACEC		X	Wetlands/Riparian Zones	X		Health & Safety	X	
Cultural/Historic	X		Waste (Solid/Hazardous)	X		Migratory Birds	X	
Wilderness		X	Vegetation	X		Grazing Allotments	X	
Farmland, Prime/Unique		X	Invasive/Non-Native Species	X		Visual Resources	X	
Native American Religious Concerns		X	Soils			Recreation	X	
Geology & Minerals		X	Water Quality – Surface, Drinking & Ground	X		Geology and Minerals	X	
Floodplains		X	Wild & Scenic Rivers		X	Paleontology	X	
Environmental Justice		X	Socioeconomic	X		Land Resources	X	
						Soils	X	
						Fire		X
						Forest Resources		X

Native American Religious Concerns

As outlined in the BLM 8100 Regulations, specifically Sections 8120 and H-8120-1 Tribal Consultation under Cultural Resource Authorities, the BLM has various coordination and consultation responsibilities with respect to Native American cultural and religious concerns that may be associated with the management of public lands and resources. Based on the initial records search of the BCOEP and the Class III cultural resource inventory completed specifically for this project, no areas were identified within the general BCOEP that are considered potentially sensitive to the traditional tribal values of the Native American tribes that have expressed an interest in development within the BLM KFO jurisdiction. For this reason, no further consultation with the interested tribes is considered necessary for this project.

Floodplains

Two significant drainages and their associated floodplains occur within the BCOEP. The Hams Fork River, which flows through the northwest corner of the area, maintains the largest of the floodplains in the BCOEP. The width of the Hams Fork floodplain varies from approximately 0.5 mile to 1 mile wide along its course within the BCOEP, with primary and secondary channels meandering throughout the center of the existing floodplain. Much of the Hams Fork floodplain is located within irrigated meadows currently utilized for hay production on private lands; however, there is a small reach of approximately 1,692 ft near the confluence with Meadow Creek that flows through BLM-administered land. Reaches of first-order perennial and intermittent streams that are tributaries to the Hams Fork and have associated floodplains

Bear Canyon Environmental Assessment 12

through the BCOEP, are Meadow Creek, a portion of Quakenasp Creek (BLM named) within the Quakenasp Canyon, Westfall Hollow, and Box. Since no construction or operation would occur near these floodplains, no further analysis is necessary (see Figure 3.9-1).

Wetlands and Riparian Areas

No new wetlands and/or riparian sites would be involved. Access to the Bear Canyon 8-12 well along Dempsey Road would cross Hams Fork drainage and pass near Emigrant Springs, but would not involve any new surface disturbance.

Environmental Justice

Pursuant to Executive Order 12898, it is part of the mission of federal agencies to achieve environmental justice by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects associated with their activities on minority and low-income populations. The population demographics for Lincoln County show a racial composition of 97.1 percent white, 2.2 percent Hispanic, and less than 1 percent other minorities (Federal Statistics 2006). No minority groups or low-income populations are concentrated within areas in or immediately adjacent to the BCOEP. The Proposed Action does not have the potential to result in human health risks to minority or low-income populations.

Sensitive Areas (ACECs, Wilderness Areas, Prime/Unique Farmland)

No Areas of Critical Environmental Concern (ACECs), designated or proposed Wilderness Areas, or prime farmlands exist within the BCOEP.

3.1 LAND RESOURCES

The multiple uses of BLM-administered public rangelands in the BCOEP include recreation such as fishing, hunting, off-road vehicle use, and cultural recreation, as well as livestock grazing. In addition, the BCOEP provides habitat for numerous wildlife species. The existing conditions of these various land uses are assessed in specific sections of Chapter 3.

Existing rights-of-way (ROW) within the BCOEP analysis area includes the existing Dempsey access road and three existing electricity transmission lines (345 to 540 Kv lines). There are no active wells within the BCOEP analysis area. However, there are two abandoned well sites, located in SWNE Section 12 T23N R118 and SESW Section 24 T 23N R 118W (Wyoming Oil and Gas Conservation Commission 2006) drilled by Exxon in the 1980s.

The BCOEP is accessed from Kemmerer to Route 233 to Dempsey Road. Route 233 is the one major highway that traverses the BCOEP. From the intersection of the project access road the north BCOEP boundary, Route 233 extends from 13.4 miles north-to-south across the eastern portion of the BCOEP. Portion of Highway 233, directly east of the Kemmerer Reservoir and Lake Viva Naughton, is a Designated Scenic Byway. (National Scenic Byways Program 2006. <http://www.byways.org/browse/byways/2466/travel.html>). Route 233 is a State road maintained by the State of Wyoming (Lincoln County Roads Department, 2007).

The project access road, Dempsey Road, is a two-lane unpaved road that extends 23 miles from the intersection of Route 233 and into the BCOEP. This access road is a part of the BLM transportation system and is maintained by the BLM (Lincoln County Roads Department 2007). The current project development will utilize the Dempsey Road in its current condition.

3.2 AIR QUALITY/NOISE

Wyoming Ambient Air Quality Standards (WAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. Pollutants for which standards have been set include sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), and particulate matter less than 10 or 2.5 microns in effective diameter (PM₁₀ and PM_{2.5}), and ozone.

Air quality conditions are likely to be good because of the limited number of air pollution emission sources in the airshed. Air quality monitoring has not been conducted within the proposed BCOEP because potential emission sources in the airshed are few and widely dispersed. The proposed project site is located in a rural, relatively undeveloped area containing no substantial emission sources. The nearest community, Kemmerer, is relatively small and does not provide major emission sources. However, the Wyoming Department of Environmental Quality (Pers. Comm. Kelly Bott) provided the existing air quality levels for southwest Wyoming (see Table 2). When compared to the WAAQS, these values show that the background air quality in the general area is good.

There are no special designation airsheds or non-attainment areas nearby. The closest federally designated Class I area, where the air is pristine and development near these area is very restricted, is the Bridger and Fitzpatrick Wilderness Areas, both managed by the U.S. Forest Service. The closest boundary of the Bridger Wilderness Area is 80 miles from the BCOEP.

The EPA established a noise level of 55 dBA as a guideline for acceptable environmental noise (EPA 1974). This established EPA environmental noise level is used for a basis of evaluating noise effects when no other local, county, or state standard has been established. The Federal Energy Regulatory Commission (FERC) adopted the 55 dBA noise level as criteria for the maximum noise that can be allowed from a new compressor station at established sensitive receptors (residences, schools, medical facilities, recreational areas). It is important to understand that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value of the public health and welfare. Furthermore, this noise level is directed at sensitive receptors where people would be exposed to an average noise level over a specific period of time. In this context, public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance as well as the absence of clinical symptoms such as hearing loss or demonstrable physiological injury. Therefore, a 55 dBA noise level should not be misconstrued as a regulatory goal. Rather, the 55 dBA noise level should be recognized as a level below which there is no reason to suspect that the public health and welfare of the general population would be at risk from any of the identified effects of noise. A noise level of 55 dBA can be compared to a common human experience. A noise level of 60 dBA is generated during the normal conversation of two people five feet apart. Therefore, a noise level of 55 dBA from a nearby source would barely be audible during normal conversation.

Table 2. Ambient Air Quality for BCOEP

Pollutant and Averaging Period	WAAQS (µg/m3)	Background Concentration (µg/m3)	Percentage of WAAQS (%)	Source
CO 1-hour	40,000	3,336	8.3%	A
CO 8-hour	10,000	1,381	13.8%	A
NO ₂ annual	100	3.4	3.4%	B
O ₃ 8-hour	160	147	91.9%	C
PM ₁₀ 24-hour	150	51	34.0%	D
PM ₁₀ annual	50	21	42.0%	D
PM _{2.5} 24-hour	65	30	46.2%	D
PM _{2.5} annual	15	8	53.3%	D
SO ₂ 3-hour	1,300	93	7.2%	E
SO ₂ 24-hour	260	32	12.3%	E
SO ₂ annual	60	4	6.7%	E

A Data collected by Amoco at Ryckman Creek for an 8 month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983)

B Data collected at Green River Basin Visibility Study site during the period January - December 2001 (ARS 2002)

C Data collected at Green River Basin Visibility Study site during the period June 10, 1998 - December 31, 2001 (ARS 2001). Data represents the top tenth percentile maximum 1-hour value.

D Data collected by WDEQ at Lander, WY, 2005 (Personal Communication with WDEQ, February 13, 2007).

E Data collected at Lost Cabin Gas Plant (preconstruction monitoring) Fremont County, WY 1986-1987/LaBarge Study Area at the Northwest Pipeline Craven Creek site, 1982-1983 (WDEQ)

All short-term data are second-maximum values unless otherwise specified. Annual data represent averages.

Primary sources of human-caused noise within the BCOEP are occasional jet aircraft traffic over-flights at high altitudes, and minimal local traffic on Dempsey Road and other sounds associated with normal human habitation on or near private lands. In addition to human-induced noise, the topography and natural landscape do not offer many breaks from the wind, which contributes to the background noise levels along with any water sources or wildlife that may be present. These noise sources currently create only modest sound disturbances within the area.

Loud noises can negatively impact wildlife populations in many ways, examples include: causing some wildlife species to avoid otherwise functional habitat; and reducing breeding success of some wildlife species that initiate courtship by using sounds.

Loud noise may reduce a person's opportunity to enjoy solitude. Noise disturbance can annoy people to differing degrees depending on their expectations, attitudes towards development activities, magnitude and duration of the noise, the activity they are pursuing, and the time of day. The BLM has compiled typical noise levels for familiar indoor and outdoor sources, measured in decibels (dBA) (Table 3.)

Table 3. Typical Sound Levels of Common Noise Sources

Sound Pressure Level (dBA)	Common Indoor Noise Levels	Common Outdoor Noise Levels
110	Rock band	--
105	--	Jet flyover at 1,000 ft
100	Inside New York subway train	--
95	--	Gas lawn mower at 3 ft
90	Food blender at 3 ft	--
80	Garbage disposal or shouting at 3 ft	Noisy urban daytime
70	Vacuum cleaner at 10 ft	Gas lawn mower at 100 ft
60	Normal speech at 5 ft	Commercial area, heavy traffic at 300 ft
60	Large business office	--
50	Dishwasher in next room	Quiet urban daytime
40	Small theater, large conference room	Quiet urban nighttime
35	--	Quiet suburban nighttime
33	Library	--
28	Bedroom at night	--
25	Concert hall (background)	Quiet rural nighttime
15	Broadcast and recording studio	--
5	Threshold of hearing	--

3.3 GEOLOGY/MINERALS/GEOLOGIC HAZARDS

3.3.1 Geology

The BCOEP is within the Fossil Basin and Overthrust Belt geographic provinces. Fossil Basin is characterized by faulted and folded Paleozoic and Mesozoic strata buried beneath relatively flat-lying beds contained in the upper portion of the Wasatch Formation (Eocene) and the Green River Formation (Eocene) (Oriol and Tracey Jr., 1970). The Tunp Range, located in the western portion of the BCOEP, is part of the overthrust belt and is bounded on the east by the Tunp thrust fault (Rubey et al., 1975). Quaternary alluvium is located within the BCOEP along Rock Creek, Fish Creek, Robinson Creek and the Hams Fork River (M'Gonigle and Dover, 1992).

3.3.2 Minerals

The BCOEP is part of the Overthrust Belt geologic province that is rich in minerals. The following mineral resources are potentially located within the BCOEP: oil and gas, phosphate, and salable minerals.

In 2003, the USGS conducted an assessment of the undiscovered oil and gas resources of the Wyoming Thrust Belt province. The USGS estimated 918 billion cubic feet of undiscovered natural gas, 39 million barrels of undiscovered oil and 57.3 million barrels of undiscovered natural gas fluids may exist within the province (USGS, 2003). According to the Wyoming Oil and Gas Commission website, production in Lincoln County for January through November, 2006, was 678,178 barrels of oil and 73,754,686 thousand cubic feet of gas.

Phosphate-bearing rock is located within the BCOEP; however, there are no Federal Phosphate Lease Areas located within the BCOEP (BLM, 1985).

Salable minerals include sand and gravel, building stone, pumice, cinders, clay and petrified wood. Sand and gravel are located along terraces and elevations along streams and rivers. Building stone and fill material are located on more resistant ridges within the Overthrust Belt (BLM, 1985).

3.3.3 Geologic Hazards

Potential geologic hazards within the BCOEP include landslides and seismic hazards (e.g. earthquakes). According to the BLM (1985), the majority of the BCOEP is located in a high landslide potential area. Within the BCOEP, areas containing the Green River–Wasatch Formation have the highest landslide potential (BLM, 1985). The line of contact between the Green River and Wasatch Formations is particularly susceptible to slumping, and the Wasatch Formation is prone to swelling and failures due to the presence of bentonite clay (Rubey et al., 1975).

One active fault (Rock Creek fault) is located within the BCOEP. Rock Creek fault is located to the west of the well pad. Directly beneath the well pad there is an unnamed, potentially active fault. According to the California Division of Mines and Geology website, an active fault is one that is defined as having movement or displacement within the last 11,000 years. A potentially active fault is one that there is evidence of movement within the last 1.6 million years before present (or the beginning of the Quaternary). According to Witkind (1975), Rock Creek fault has had movement within the last 100 years.

3.4 CULTURAL AND PALEONTOLOGY RESOURCES

A Class I and Class III cultural resource inventory was conducted for the Bear Canyon #8-12. The potential associated access roads were also inventoried. Approximately 50 acres in total were inventoried, all of which are administered by the BLM Kemmerer Field Office. The objectives of the inventory were to locate, document, and evaluate any cultural resources that may be affected by construction or operation of the well pad and facilities and, the access road. This information is used to predict possible impacts to historic and archaeological resources resulting from development of the area for oil and gas exploration.

The cultural resource inventory was conducted in compliance with Federal and State legislation including Section 106 of 36 CFR 800, the National Historic Preservation Act of 1966 (as amended) (NHPA), the National Environmental and Historic Preservation Act of 1969, the Archaeological and Historic Conservation Act of 1972, the Archaeological Resources Protection Act of 1979, and the American Indian Religious Freedom Act of 1978. The NHPA sets forth national policy and procedures regarding “historic properties”—that is, regions, sites, buildings, structures, and objects included in or eligible for the NRHP. Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on such properties, following regulations issued by the Advisory Council on Historic Preservation (ACHP) (36 CFR 800).

Criteria for evaluating the significance of resources for listing on the NRHP are outlined in 36 CFR 800.10, “National Register Criteria.” The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and,

- a) That are associated with events that have made a significant contribution to the broad patterns of our history.
- b) That are associated with the lives of persons significant in our past.
- c) That embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, and,

- d) That have yielded, or may be likely to yield, information important in prehistory or history.

The cultural-chronological sequence in BCOEP includes two prehistoric “cultural sequences” and the historic period. The prehistoric “cultural sequences” are the northern Great Plains sequence, often associated with large game hunting, and the Great Basin sequence, associated with the desert Hunter-Gatherer traditions (Ireland 1986:55). The Great Plains sequence is sub-divided into three prehistoric periods that include the Paleo-Indian Period (12,000 to 8,000 years before present (B.P.)), the Plains Archaic Period (7,400 to 1,400 B.P.), and the Late Plains Prehistoric – Early Plains Historic Period (1,400 to 200 B.P.). The Great Basin sequence is subdivided into four prehistoric periods that include the Paleo-Indian Period (12,000 to 8,000 B.P.), the Archaic Period (10,000 to 1,600 B.P.), the Fremont Period (1,550 to 600 B.P.), and the Numic Expansion (600 to 250 B.P.).

The historic period in the BCOEP has a long history, beginning with fur traders in the early 18th century. European claims on Wyoming land and the development and expansion of the fur trade spans between the years 1742 and 1840. This early exploration and westward migration created the well-traveled routes that are now recognized as important historic sites near the BCOEP. These are places where visitors can see original trail tracks and wagon ruts in a setting that is relatively unchanged from the time when early explorers and fur trappers first traveled through. These include the Sublette Cutoff, one of the first established Oregon Trail cutoffs established in Wyoming; Emigrant Springs, a historic emigrant campsite that is listed on the National Register of Historic Places (NRHP); the Hockaday Dempsey Trail; and the Overland Migration Trail. Following the decline of the fur trade, some trappers and mountaineers went back east, some led new groups into the west, and some settled along the immigrant trails. As settlement and exploration of the region continued, around 1910, an oil boom began in the State of Wyoming, and by the 1920s, the state ranked fourth in the nation in the production of crude oil (FWP 1981:93-95). It continues to be a leader in the national coal, oil, and natural gas industries.

3.4.1 Survey Methodology

An intensive, 100 percent coverage pedestrian survey was performed for the proposed well #8-12 and another originally proposed well. The survey consisted of two 20-acre parcels of land measuring 934 x 934 feet centered on the well pad and potential well pad and 3,000 feet of proposed access and pipeline corridors. The corridors and well pads were walked in parallel transects spaced no more than 100 feet apart. The corridors were walked in parallel transects to cover a corridor width of 150 feet. Ground visibility consisted of between 10-20 percent snow coverage on the well pads and access roads. Field methods and results were not altered due to weather conditions. The area surveyed during this project totaled 50.33 acres situated on lands administered by the BLM, Kemmerer Field Office.

3.4.2 Summary of Inventory Results

The cultural resource inventory of Fortuna’s proposed well location #8-12, and the associated access road determined that no eligible historic properties occur within the BCOEP. The Class I inventory identified one previously documented site, the Hams Fork Lithic Landscape (48LN3203), within the BCOEP, is not eligible for nomination to the NRHP. The Class III inventory resulted in the documentation of one new archaeological site (48LN4437). However, because the site lacks integrity and has no potential to yield information important in the prehistory or history of the area, it is recommended as not eligible for nomination to the NRHP.

One site was found within one mile of the #8-12 well, but there is no potential for this newly recorded site to yield information important in the prehistory or history of the area. There, the site is recommended as not eligible for an NRRP nomination. Within one mile of Dempsey Road, there are two historic sites that are recommended eligible for nomination to the NRHP. These include the Sublette Cutoff overland

migration trail and a historic burial. There are two additional important historic sites not included in the one mile radius of the file search yet still located in the vicinity of the BCOEP. These are Emigrant Springs, and the Hockaday Dempsey Trail.

3.4.3 Paleontology

BLM Handbook H-8270, *General Procedural Guidance for Paleontological Resource Management* (1998), guides paleontological research on BLM-administered lands. The handbook presents a classification system for ranking areas and geologic formations according to their potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. The conditions under the BLM classification system are as follows:

- Condition 1 - Areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.
- 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 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.

The proposed project facilities would be located on rocks known to produce fossils. These rock units include the Main Body, Tulp Member, and Bullpen Member of the Wasatch Formation, and the Angelo Member of the Green River Formation. No proposed facilities would be located on the Fossil Butte Member of the Green River Formation.

The Green River Formation has received much attention with vertebrate and invertebrate fossils having been discovered throughout the formation (Grande 1984). The well known Eocene fish fossils from ancient Fossil Lake are preserved within two layers of the Fossil Butte Member of the Green River Formation. Some 19 genera of Eocene fish come from the Green River Formation (fossilmall.com).

The Angelo Member of the Green River Formation underlies portions of the access roads and the entire drilling location. The Angelo Member has produced significant vertebrate fossils, including fish, feathers, and birds, as well as insects and leaves. Asineops, a relatively rare fish fossil, is also found in the Angelo Member (oral communication from Arvid Aase, paleontologist at Fossil Butte National Monument to Gary McNaughton, BLM geologist on 6/19/2007).

Fossil vertebrates have been recovered from three stratigraphic intervals within the Main Body of the Wasatch Formation to the south of the Project Area within Fossil Butte National Monument. The combined assemblages contained at least eight species of reptiles and as many as 34 species of mammals (Gunnell 2002).

The Wasatch and Green River Formations in the Project Area are ranked as “Condition 1” formations according to the BLM’s classification system.

3.5 RANGELANDS (GRAZING ALLOTMENTS)

Rangelands provide open space for wildlife use, air and water quality maintenance, human solitude, and scenic views, as well as multiple uses such as mineral exploration, recreation, and livestock grazing.

The Wyoming BLM manages rangeland following their updated Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management (BLM 2004b). These apply to all BLM-administered public rangelands and represent minimum acceptable health, productivity, and sustainability conditions on these lands.

Implementation of the Standards and Guidelines began in 1998 and includes assessing the health of grazing allotments and applying management action guidelines to those that do not meet all six standards. BLM management implementation is conducted by periodic review of grazing Allotment Management Plans (AMPs) and land condition. Land condition is classified based on six standards including soils, riparian and wetland vegetation, upland vegetation, native plant diversity, water quality, and air quality (BLM 2004). Habitat for federally listed threatened, endangered, or candidate and other special status (TES) species that occurs on allotments is also taken into account for review priority (BLM 1998). Once reviewed, allotments are classified into three land health priority categories: improvement, maintenance, or custodial (I, M, or C) to facilitate the standards review process.

Management actions recommended for allotments that do not meet standards may affect the BLM's, livestock permittee's, or lessee's practices to increase rangeland health by altering timing, duration and/or level of grazing, or range improvements such as water developments (BLM 2004). Changes are recommended to affect one of the following biotic conditions: vegetative and litter cover, riparian plant communities, stream channel morphology, soil organisms, plant reproductive or nutrient cycling success, water quality, TES and other native plant and animal species habitat, and upland desired plant communities.

The project would directly involve the Fish Creek grazing allotment (Figure 3.5-1). This allotment consists of about 18,840 total acres and is currently permitted to four grazing permittees for cattle during the summer months (May through September). BLM data also reveals the average annual cattle use of this allotment to be about 2,793 Animal Unit Months (AUMs, the forage sufficient for 1 cow and her nursing calf, or its equivalent, for one month). Using these figures, the average carrying capacity for the Fish Creek grazing allotment is about 6.8 or 7 acres per AUM.

The existing access route from Kemmerer to the BCOEP would cross the Quakenasp Canyon and Rock Creek grazing allotments. The route through these allotments is currently unfenced. BLM currently authorizes 15 grazing permittees to graze cattle, horses and sheep during the summer months on public lands within the Rock Creek allotment. The BLM also authorizes two grazing permittees to graze cattle and sheep yearlong on public lands within the Quakenasp Canyon allotment.

3.6 WASTES (HAZARDOUS OR SOLID)

Talisman has indicated in their APD that some hazardous materials would be used during drilling, completion, and production of their proposed well. The term hazardous materials as used here means: 1) any substance, pollutant, or contaminant (regardless of quantity) listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. 9601 et seq., and the regulations issued under CERCLA, 2) any hazardous waste as defined in the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, and 3) any nuclear or nuclear byproduct as defined by the Atomic Energy Act of 1954,

as amended, 42 U.S.C. 2011 et seq. 4) Subject to Reporting under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986.

BLM instruction Memoranda Numbers WO-93-344 and WY-94-059 require all NEPA documents to list and describe any hazardous materials that would be produced, used, stored, transported and disposed of as a result of the Proposed Action (Appendix X Hazardous Management Plan). Hazardous materials anticipated to be used or produced from the Proposed Action might come from fuels, drilling materials, bore plugging materials, geophysical survey materials, vehicle emissions, and other miscellaneous materials. Hazardous constituents potentially occurring in these products and materials include gasoline, diesel fuel, aviation fuel, blasting agents, and dynamite utilized for shot hole explosives.

BLM-administered public lands contaminated with hazardous materials would be secured, reported, and cleaned up according to all applicable federal and state regulations. Parties responsible for contamination on public lands would be held liable for resource damage and clean up costs as prescribed in federal and state regulations (BLM, 1994).

3.7 VEGETATION

The BCOEP would be associated with the Hams Fork Plateau in a foothills region between the Green River Basin and Wyoming Range mountains in southwest Wyoming. Due to the elevation range associated with the Plateau (7400-8000 feet) and the average annual precipitation of 12 inches, the BCOEP is characterized upland. Vegetation data would be very similar to that presented in the *PGD Onshore 2006 Absaroka Ridge 3-D Project* (BLM, 2006). EA No. WY-090-EA06-051, dated April 2006). The proposed Bear Canyon BCOEP overlaps the Absaroka Ridge 3-D project, as both projects involve the major access route between Kemmerer and Tunp Range, on the lower Hams Fork Plateau (T22N, Ranges 116 and 117 W.). This discussion focuses on the vegetation communities associated with the proposed well and its immediate access routes.

3.7.1 Vegetation Cover Types

The location for the proposed well would occur on Dempsey Ridge and the northern portion of Hams Fork Plateau, respectively. The proposed well location would be located within a mature mountain sagebrush community (*Artemisia tridentata* ssp. *vaseyana*) which dominates the deep, well-drained soils on the upper Plateau. Perennial bunchgrass species (including wheatgrass and needleandthread) and forbs dominate the understory. This community type provides the majority of the forage for grazing animals in the area. The vegetation distribution is shown on Figure 3.7-1.

The proposed well site would be located near stands of aspen (*Populus tremuloides*), fir (*Pseudotsuga Carr*) and spruce (*Picea A. Dietr.*). Within the BCOEP, the understory composition of the involved aspen stands is dominated by mesic woodland grasses and forbs. These stands provide cover and forage for domestic livestock and numerous wildlife species in the area.

Some surface areas within the project are may be covered with cryptogamic soil crusts, although no formal surveys have been conducted (BLM, 2006). Formed by living organisms and their by products, these organisms create a surface crust of soil particles bound together by organic materials. Crusts are predominately composed of cyanobacteria, green and brown algae, mosses, and lichens. Lichens of the genera *Collema* spp., and mosses from the genera *Tortula* spp are also common. Cryptogamic crusts primarily provide a less than half-inch cover on bare ground, protecting topsoil from wind and water erosion and contributing nutrients to plants that enhance seedling germination and plant growth. (U.S. Geological Service, 2003).

3.7.2 Threatened, Endangered, and Other Special Status Plant Species

In accordance with the Endangered Species Act, the BLM must ensure that any federal action to be authorized, funded, or implemented would not adversely affect a federally listed threatened or endangered species. It is BLM’s current policy (BLM Manual 6840 – Special Status Species Management) that USFWS candidate species, State species of special concern and BLM-designated sensitive species be managed to prevent future federal listing as threatened or endangered.

Of the federally listed, proposed for listing, or candidate plant species, only Ute ladies’ tresses (*Spiranthes diluvialis*), currently listed as threatened, has the potential to occur within the KFO area. This species has been documented primarily along the Front Range of Colorado and in southeastern Wyoming (Wyoming Rare Plant Technical Committee, 1994). The nearest known location of this plant to the BCOEP is in Daggett County, Utah, along the Green River. It has been determined that the Hams Fork drainage contains low potential habitat for this species (BLM, 1995).

Table 3.7-1 provides a list of the 15 plant species BLM currently considers sensitive and occurring in Lincoln County. Of these species only three have potential habitat within or near the BCOEP. These species are: Entire-leaved peppergrass, prostrate bladderpod and tufted twinpod.

Table 3.7-1. BLM Sensitive Plant Species Occurring in Lincoln County, Wyoming

Scientific Name	Common Name	Have Potential to Occur in BCOEP
<i>Astragalus racemosus</i> var. <i>treleasei</i>	Trelease’s milkvetch	NO
<i>Astragalus jejunus</i> var. <i>jejunus</i>	Starveling milkvetch	NO
<i>Astragalus paysonii</i>	Payson's astragalus	NO
<i>Draba borealis</i>	Boreal draba	NO
<i>Draba densifolia</i> var. <i>apiculata</i> [<i>D. apiculata</i> , <i>D. globosa</i>]	Rockcress draba	NO
<i>Lepidium integrifolium</i> var. <i>integrifolium</i>	Entire-leaved peppergrass	YES
<i>Lesquerella macrocarpa</i>	Large-fruited bladderpod	NO
<i>Lesquerella multiceps</i>	Western bladderpod	NO
<i>Lesquerella paysonii</i>	Payson's bladderpod	NO
<i>Lesquerella prostrate</i>	Prostrate bladderpod	YES
<i>Phlox opalensis</i> [<i>P. sp. nov.</i>]	Opal phlox	NO
<i>Phlox pungens</i>	Beaver Rim phlox	NO
<i>Physaria condensate</i>	Tufted twinpod	YES
<i>Physaria dornii</i>	Dorn's twinpod	NO
<i>Physaria integrifolia</i> var. <i>monticola</i>	Creeping twinpod	NO

Source: Adapted from BLM, updated September 14, 2004 (BLM 2004e).

Entire-leaved peppergrass is considered critically imperiled because of extreme rarity both in Wyoming and globally, and known from less than five occurrences (WYNDD 2006). It has been recorded in Lincoln and Uinta counties, including within Fossil Butte National Monument, adjacent to the BCOEP, where it is considered “the Monument’s rarest plant species” (Fertig 2000a). That report stated that the plant was only known within and just outside the Monument in Wyoming. The information on this plant’s occurrence within the BCOEP near U.S. Highway 30 was from 2005 data received from the BLM, so it is likely a newer discovery.

The tufted twinpod is known to occur only in three Wyoming counties (Lincoln, Sublette, and Uinta) inhabits sparsely vegetated calcareous or shale slopes and ridges between 6,500 and 7,000 ft (WRPTC 1994). This local endemic plant is considered globally and locally imperiled because of rarity or factors making it vulnerable to extinction (WYNDD 2006). As of 2002, the species was considered to be stable, as several known populations are currently protected, both in Fossil Buttes National Monument and on BLM managed lands (Fertig 2002b).

The prostrate bladderpod has been documented only in Lincoln and Uinta counties in Wyoming, but occurs in Idaho and Utah as well. It is considered imperiled in the state and rare globally (WYNDD 2006). This plant occurs on dry, sparsely vegetated desert slopes of limey clays and soft sandstones of the Green River, Wasatch, and Bridger formations (Fertig 2000c).

3.7.2.1 Noxious Weeds

The spread of non-native plants and noxious weeds is a concern in areas proposed for surface disturbance. Noxious weeds are plants that are designated by a Federal, State, or county government as injurious to public health, agriculture, recreation, wildlife, or property. A noxious weed is commonly accepted as a plant that grows out of place and is competitive, persistent, and pernicious. Many consider a plant invasive if it has been introduced into an environment where it did not evolve, and as a result do not have natural enemies (e.g., insects, other plants) to limit their reproduction. Both noxious and invasive species are introduced to an area primarily from vehicles, animals, or wind, and can dominate disturbed and newly revegetated sites. 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) increased fragmentation of wildlife habitats; and, 4) increased soil erosion.

Table 3.7-2 listed the following weed officially designated and published as noxious for the State of Wyoming, per the authority of the Wyoming Weed and Pest Control Act

Table 3.7-2. Designated Noxious Weed Species for the State of Wyoming

Scientific Name	Common Name	Have Potential to Occur in the BCOEP
<i>Agropyron repens</i>	Quackgrass	NO
<i>Arctium minus</i>	Common burdock	YES
<i>Avena fatua</i> ¹	Wild oat	NO
<i>Cardaria draba, C. pubescens</i>	Hoary cress, whitetop	YES
<i>Carduus acanthoides</i>	Plumeless thistle	NO
<i>Carduus nutans</i>	Musk thistle	YES
<i>Centaurea diffusa</i>	Diffuse knapweed	NO
<i>Centaurea macculosa</i>	Spotted knapweed	NO
<i>Centaurea repens</i>	Russian knapweed	NO
<i>Chrysanthemum leucanthemum</i>	Ox-eye daisy	NO
<i>Cirsium arvense</i>	Canada thistle	YES
<i>Convulvulus arvensis</i>	Field bindweed	NO
<i>Cynoglossum officinale</i>	Houndstongue	YES
<i>Euphorbia esula</i>	Leafy spurge	NO
<i>Fraseria discolor</i>	Skeletonleaf bursage	NO
<i>Hypericum perforatum</i>	Common St. Johnswort	NO

Scientific Name	Common Name	Have Potential to Occur in the BCOEP
<i>Isatis tintoria</i>	Dyers woad	NO
<i>Lepidium latifolium</i>	Perennial pepperweed	YES
<i>Linaria dalmatica</i>	Dalmatian toadflax	NO
<i>Linaria vulgaris</i>	Yellow toadflax	NO
<i>Lythrum salicaria</i>	Purple loosestrife	NO
<i>Onopordum acanthium</i>	Scotch thistle	NO
<i>Sonchus arvensis</i>	Perennial sowthistle	NO
<i>Tanacetum vulgare</i>	Common Tansy	NO
<i>Tamarix</i> spp	Saltcedar	NO

Source: Wyoming Weed & Pest Council. 2004. ¹Added in 2006

Russian thistle (*Salsola iberica*), halogeton (*Halogeton glomeratus*) and cheatgrass (*Bromus tectorum*) are the primary invasive annual species that dominate disturbed areas, including roadsides, throughout the Intermountain West. Cheatgrass is a strong competitor that is difficult to control once it becomes established. Russian thistle and halogeton are less aggressive and are generally out-competed by perennial native species. Halogeton is a weed of particular concern because it is highly poisonous to sheep, and is known to affect other livestock as well.

Black henbane (*Hyoscyamus niger*) has also been found within the BCOEP analysis area. While not a listed noxious weed for either Lincoln County or Wyoming, black henbane is poisonous to humans and can also be detrimental to livestock, and is therefore listed by the State of Wyoming as a species of economic concern.

3.8 SOILS

No official soil surveys have been conducted in the BCOEP. However, the BLM divided the Kemmerer Resource Area into five geomorphic groups. Four of these groups occur in the BCOEP. These geomorphic groups are Geomorphic Group I – Foothills of the Overthrust Belt, Geomorphic Group III – Mountains, Geomorphic Group IV – Alluvial Fans and High Terraces and Geomorphic Group V – Floodplains and Low Terraces (BLM, 1985). Geomorphic Groups within the BCOEP are shown on Figure 3.8-1. The only property associated with the groups is the drainage class. A well-drained classification with respect to soil texture indicates good absorption of precipitation into the soil rather than a soil type that would allow runoff of precipitation. Soil properties for each of the Geomorphic Groups are provided in Table 3.8-1.

Table 3.8-1. Geomorphic Group Soil Properties

Geomorphic Group	Parent Materials	Slope (%)	Drainage Class
I	Residuum formed over upthrust sediments, colluvium including landslide and earthflow deposits and alluvium on footslopes and drainages.	6 to 60	well drained
III	Residuum from sedimentary rock colluvium from landslides and earthflow and alluvium in fans and drainages.	3 to 70	--

IV	Alluvium on terraces, fans and pediments	0 to 15	well drained
V	Alluvium	0 to 15	--

Source: BLM, 1985

3.9 HYDROLOGY

3.9.1 Surface Water

Surface water resources located within the BCOEP are the Hams Fork River and its tributaries, Rock Creek, a tributary to Twin Creek, and the Bear River. The Hams Fork River and its tributaries drain the central and eastern portions of the BCOEP and are located in the Blacks Fork Hydrologic Unit, which is part of the Upper Colorado Drainage Basin. Floodplains are located along the Hams Fork River and Fish Creek within the BCOEP. Also located in the eastern portion of the BCOEP are the Kemmerer and Viva Naughton Reservoirs. BCOEP surface water features are shown on Figure 3.9-1. Rock Creek drains the western portion of the BCOEP and is located within the Upper Bear Hydrologic Unit, which is part of the Great Salt Lake Basin.

3.9.2 Groundwater

The primary aquifers in the eastern three quarters of the BCOEP are the Wasatch and Evanston Formations and the Gannett Group (Lines and Glass, 1975). The finer grained sandstones of the Wasatch and Green River Formations may also yield small quantities of water. In the northern Fossil Syncline water generally has a total dissolved solids (TDS) concentration from 300 mg/l to 2,000 mg/l. A TDS of 300 mg/l is within domestic water standards and a TDS of 2,000 mg/l is the upper end for irrigation water quality. The water in the northern Fossil Syncline tends to have larger concentrations of sodium, chloride and sulfate than in the southern and central areas (Lines and Glass, 1975).

In the western portion of the BCOEP, small quantities of water can be obtained from the Twin Creek Limestone, Gannett Group, Preuss Redbeds, and Stump Sandstone. Moderate quantities of water can be obtained from the Wells Formation and the Nugget Sandstone. The Thaynes Limestone and Phosphoria Formation yield moderate quantities of water in the southern portion of the Tunp Range (Lines and Glass, 1975). Water in the Wells, Thaynes, Nugget, Twin Creek, Gannett and Stump is a calcium bicarbonate type and contains 250 to 500 mg/L dissolved solids; however, water in the Preuss is a sodium chloride or sodium chloride bicarbonate type and contains 500 to 1000 mg/L dissolved solids (Lines and Glass, 1975).

According to the Wyoming State Engineers Office (WSEO) Water Rights Database, there are 12 domestic/stock wells rated “In Good Standing” located within the BCOEP. The WSEO Groundwater Division defines a well to be “In Good Standing” if all the required documentation has been received, the well has been completed, and is being used for the purpose it was applied for by the people who applied for it.

3.10 FISH AND WILDLIFE

The primary wildlife issues in relation to the proposed surface disturbance activity for this project are big game crucial winter ranges, elk calving areas, raptor nesting areas, greater sage-grouse (*Centrocercus urophasianus*) breeding and winter habitats, and other sensitive sagebrush steppe obligates such as the pygmy rabbit (*Sylvilagus idahoensis*).

3.10.1 Big Game Habitat Definitions

In 1990, the Wyoming Chapter of The Wildlife Society (TWS) formed a committee to standardize definitions for Seasonal Wildlife Ranges developed by the Chapter between 1984 and 1986, and subsequently adopted for Wyoming by the following agencies: Soil Conservation Service (SCS), Bureau of Land Management (BLM), Forest Service (FS), U.S. Fish and Wildlife Service (USFWS), and the Wyoming Game and Fish Department (WGFD). Based upon the committee's review with input from TWS members, standardized definitions developed by TWS between 1984 and 1986 were upheld with some minor refinements and additions of two new seasonal wildlife range definitions (Wyoming Chapter of The Wildlife Society 1990). Standardized definitions for seasonal wildlife ranges present in the BCOEP are listed below as follows:

Crucial: Crucial range can describe any particular seasonal range or habitat component (often winter or winter/yearlong range in Wyoming) but describes that component which has been documented as the determining factor in a population's ability to maintain itself at a certain level (theoretically at or above the WGFD population objective) over the long term. Currently, the BLM has a timing restriction to protect crucial winter ranges designated by the WGFD. The restriction prohibits permitted surface disturbing activities between November 15 and April 30 (exceptions can be considered on a case-by-case basis).

Spring/Summer/Fall: A population or portion of a population of animals uses the documented habitats within this range annually, only from the end of one winter to the onset of the next winter, designated by the WGFD as between May 1 and November 14.

Winter/Yearlong: A population or a portion of a population of animals makes general use of the documented suitable habitat within this range on a year-round basis. But during the winter months, designated by the WGFD between November 15 and April 30, there is a significant influx of additional animals into the areas from other seasonal ranges

3.10.1.1 Pronghorn Antelope (*Antilocapra americana*)

The BCOEP occurs within WGFD designated spring/summer/fall pronghorn antelope, including the development area for the well pad and along Dempsey Road south to its intersection with Highway 233 (see Figure 3.10-1 WGFD has identified two pronghorn antelope herds within the BCOEP: Carter Lease Herd Unit #419 and Sublette Herd Unit #401. Each herd unit is discussed below.

Carter Lease Herd (Hunting Unit #419)

The Carter Lease Herd (Unit #419) has a population objective of 6,000 pronghorn antelope. Since 1996, the Carter Lease Herd has exceeded its population objective. Furthermore, fawn ratios have been very high in recent years. WGFD observed fawn ratios of 59:100 in 2002, 76:100 in 2003, 89:100 in 2004, and 85:100 in 2005. If reproductive rates remain high, it may become difficult for the WGFD to maintain this population. Therefore, to limit high reproductive rates among the Carter Lease Herd, WGFD increased the number of hunting tags by 500 tags for the herd unit in 2006 (WGFD 2006a).

Sublette Herd (Hunting Unit #401)

The Sublette Herd (Unit #401) has a much higher population objective of 48,000 as compared to the Carter Lease Herd (Unit #419) which has a population objective of 6,000. WGFD estimates that the 2005 post-season population for the Sublette Herd was 47,800 pronghorn antelope. Because the Sublette Herd is so large, it is analyzed by three sub-units: North, South, and West. Following the 2005 hunting season, the South sub-unit population was below objective, the West sub-unit was at objective, and the North sub-unit was above objective. Overall, the Sublette Herd 2005 post-season population was close to target (WGFD 2006b).

One important parameter considered by the WGFD when managing pronghorn antelope populations is survival of the adult female cohort. Research was conducted by the WGFD from 2003-04 and 2004-2005 to estimate annual survival rates of adult female pronghorn in the Sublette Herd. Survival estimates for these seasons were respectively 90% and 79% (WGFD 2006b).

3.10.1.2 Mule Deer (*Odocoileus hemionus*)

WGFD has designated three ranges utilized by mule deer within the BCOEP consisting of 39,439 acres of spring/summer/fall range, 4,249 acres of crucial winter/yearlong range, and 3,370 acres of winter/yearlong range (see Figure 3.10-2). Similar to WGFD spring/summer/fall pronghorn antelope range, WGFD spring/summer/fall mule deer range occurs throughout most of the Project Area, including development areas for the well pad and along Dempsey Road south to its intersection with Highway 233. WGFD crucial winter/yearlong mule deer range, which also overlaps with designated crucial winter/yearlong mule deer range, occurs in the far western portion of the Project Area and is not located near proposed development. WGFD winter/yearlong mule deer range occurs in-between the two prior WGFD mule deer ranges and is not located near the proposed development.

WGFD has identified the Wyoming Range Herd (Unit #131) as utilizing the BCOEP. Specifics on this mule deer herd unit are discussed below.

Wyoming Range Herd (Hunting Unit #131)

The Wyoming Range Herd (Unit #131) is one of the largest mule deer herds in Wyoming. The herd covers 3,824 square miles of habitat in portions of three counties in southwestern Wyoming: Sublette, Lincoln, and Sweetwater Counties. Management direction for the Wyoming Range Herd has been conservative since 1993, when the population objective was raised from 38,000 mule deer to 50,000 mule deer. However, since 1993, the Wyoming Range Herd has failed to meet management's population objective in part due to periodic winter losses and ongoing drought conditions. Prolonged periods of sub-zero temperatures, in combination with deep, persistent snow cover and an absence of winter forage has resulted in losses during the 1992-93, 1996-97, 2001-02, 2003-04, and 2004-05 winters. In addition, moderate to severe drought conditions on summer and winter ranges have resulted in decreased browse production and reduced fawn production (WGFD 2006c).

The Wyoming Range Herd population is managed under a special designation, which stipulates that in the postseason the observed buck:doe ratios should range between 30-45 total bucks:100 does. The 2005 observed buck:100 doe ratio was 32:100. This was a slight increase from the 2004 observed buck:100 doe ratio of 29:100. Observed buck:100 doe ratios are important to management because as herd populations increase, so do observed buck:100 doe ratios. For example, the Wyoming Range Herd experienced a brief period of growth from 1998-2001 when severe winter losses for deer that winter on sagebrush-dominated winter ranges around Daniel, LaBarge, and Kemmerer were minimal. From 1998-2001, observed buck:100 doe ratios were respectively 38, 40, 38, and 38 (WGFD 2006c).

In addition to observed buck:100 doe ratios, the yearling buck:doe ratio can also serve as an indicator of population status. Observed yearling buck:doe ratios rarely exceed 10-12 yearling bucks:100 does during years lacking significant population increases. The observed yearling buck:100 doe ratio was 12:100 in 2005, which indicates that 2005 was a year of minimal to essentially no population growth. Winter mortality on the Cokeville/Sage Junction and Kemmerer winter ranges during 2004-05 was reflected in the this low yearling ratio. In contrast, during the brief period of growth from 1998-2001, the yearling buck:100 doe ratios ranged from 16-20:100 in the post hunt season (WGFD 2006c).

In May 2006, 16 volunteers and WGFD personnel conducted a winter mortality survey for the Wyoming Range Herd. Adult mule deer and fawns respectively comprised 35% and 65% of the carcasses that were

identified during the survey. Overall, the low number of carcasses (52 deer carcasses) indicated that mule deer losses for the herd were relatively low over the winter (WGFD 2006c).

3.10.1.3 Elk (*Cervus canadensis*)

WGFD has designated four ranges utilized by elk within the BCOEP including 27,413 acres of spring/summer/fall range, 14,148 acres of crucial winter/yearlong range, 5,497 acres of crucial winter range, and 22,585 acres of elk calving habitat (See Figure 3.10-3). WGFD spring/summer/fall elk range occurs east of Dempsey Road and along sections of Dempsey Road leading south to Highway 233. The proposed well pad lies outside of WGFD-designated spring/summer/fall elk range. WGFD crucial winter/yearlong elk range occurs in the central portion of the Project Area west of Dempsey Road. Finally, WGFD crucial winter range occurs in the far western portion of the Project Area and is not located near proposed development. Elk calving habitat is located within the central portion of the BCOEP and about half of it overlaps with BLM-designated crucial winter/yearlong elk range. The proposed well pad lies within BLM-designated elk calving habitat but not within BLM-designated crucial winter/yearlong range. However, the proposed access road will cross 9 miles of elk calving habitat; and 6 miles crucial winter/yearlong range. Finally, WGFD crucial winter range occurs in the far western portion of the Project Area and is not located near proposed development.

WGFD has identified the West Green River Herd (Unit #428) as utilizing the BCOEP. Specifics on this elk herd unit are discussed below.

West Green River Herd (Hunting Unit #428)

The West Green River Herd (Hunting Unit #428) has a population objective of 3,100 elk; however, as of 2005, the current population was estimated to be approximately 4,400 elk with a stable trend. The WGFD has experienced difficulty in managing the West Green River Herd population at its population objective of 3,100 elk because in recent years elk have been moving into Fossil Buttes National Monument prior to the established hunting season. In addition, elk are utilizing Cokeville Meadows National Wildlife Refuge year round, both of which are closed to hunting, limiting hunter success. Since the 2005 hunting season WGFD has experienced a lower than anticipated harvest, the WGFD extended its 2006 harvest season until November 5th to help bring the herd unit closer towards population objectives. If harvest objectives were met in 2006, the West Green River Herd would have decreased to 4,000 elk, which is still 900 elk above WGFD management's population objective (WGFD 2006d).

3.10.1.4 Moose (*Alces alces*)

WGFD has designated three ranges utilized by moose within the BCOEP to include crucial winter/yearlong range, winter/yearlong range, and yearlong range (see Figure 3.10-4). WGFD crucial winter/yearlong moose range, which also overlaps with WGFD-designated crucial winter/yearlong moose range, occurs in the far western portion of the Project Area and in the eastern half of the Project Area, west of Highway 233. WGFD yearlong range is adjacent to WGFD crucial winter/yearlong moose range and is located east of Highway 233. The winter/yearlong moose range, occurs throughout much of the BCOEP.

WGFD has also identified a moose migration corridor that falls between the proposed well location and Highway 233. WGFD recommendations for migration corridors would restrict developmental activities where migration corridors are restrictive. The current area would corridor is approximately five miles wide.

WGFD has identified the Lincoln Herd (Hunting Unit #417) as utilizing the BCOEP. Specifics on this moose herd unit are discussed below.

Lincoln Herd (Hunting Unit #417)

The Lincoln Herd (Hunting Unit #417) has a population objective of 1,650 moose; however, the current model indicates that the 2005 post-season population was approximately 1,500 moose. Although that 2006 post-season population figure has not yet been calculated, but since the proposed 2006 hunting season was identical to the two prior hunting seasons, WGFD estimates that the 2006 post-season population estimate should be about 1,495 moose, which is below its population objective. If so, this would be the fourth year in a row that Lincoln Herd population estimates have fallen short of population objectives. However, it should also be noted that Lincoln Herd population estimates have generally been on the rise since 1993 in accordance with changes to population objectives (WGFD 2006e).

3.10.2 Raptors

No raptor nests have been identified within 1 mile of the Bear Canyon 8-12 well location. However, the BLM has not surveyed the surrounding area thoroughly. Thus, there is a strong possibility that there are raptors nesting within the restricted buffer area. Based on the surrounding habitat types, the most probable raptor species in the area would be the Golden Eagle, Great horned Owl, Goshawk, Cooper's hawk, Sharp-shinned Hawk, or Red-tailed hawk.

3.10.3 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703-711), as amended, was implemented for the protection of migratory birds. Unless permitted by regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that federal actions evaluate the effects of actions and agency plans on migratory birds.

Numerous migratory bird species may occupy the BCOEP, including several species listed on the Birds of Conservation Concern (BCC) and Wyoming Partners in Flight (WPIF) lists. These migratory bird species are addressed below in Table 3.10-1 according to the habitat type with which they are most commonly associated. It should be noted that other migratory birds, including some raptor and other special status species, are not addressed in this table, but are discussed in their respective sections.

Table 3.10-1. Migratory Birds That May Potentially Be Present near the BCOEP

Common Name	Scientific Name	BCC ¹	WPIF Designation ²	Habitat
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>		Level II	Aspen
Calliope Hummingbird	<i>Stellula calliope</i>		Level II	Riparian corridors are important during migration
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	√	Level II	Basin-prairie shrublands
Cordilleran Flycatcher	<i>Empidonax occidentalis</i>		Level II	Aspen
Hammond's Flycatcher	<i>Empidonax hammondii</i>		Level II	Aspen
Lark Sparrow	<i>Chondestes grammacus</i>		Level II	Usually nests on the ground, or in a shrub up to 10 feet
McCown's Longspur	<i>Calcarius mccownii</i>	√	Level I	Basin-prairie shrublands

Common Name	Scientific Name	BCC ¹	WPIF Designation ²	Habitat
Olive-sided Flycatcher	<i>Contopus cooperi</i>		Level II	Coniferous, riparian, and aspen forests
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	√	Level II	Aspen
Vesper Sparrow	<i>Pooecetes gramineus</i>		Level II	Scattered shrubs and thin grass cover

¹Birds of Conservation Concern as prepared by USFWS Division of Migratory Bird Management (USFWS 2002).

²Wyoming Partners In Flight (WPIF) Priority Species from the Wyoming Bird Conservation Plan Version 2.0 (Nicholoff 2003). Level I are species that clearly need conservation action. Their declining population trend and/or habitat loss may be significant. Level II are species for whom the action and focus is monitoring. Their declining population trend and habitat loss are not known to be significant at this point.

3.10.4 Fisheries

The BCOEP is located within the Blacks Fork Watershed which is part of the Green River Watershed, which is part of the Colorado River Basin. BLM and WGFD records have identified various fish species in the Blacks Fork Watershed which are listed below according to streams and reservoirs present in the watershed (BLM 2007; WGFD 2005; WGFD 2007). Fisheries data has not been collected for Camp Creek, Robinson Creek, and Trail Creek.

- Dempsey Creek – mountain sucker and redbside shiner.
- Fish Creek – brook trout (non-native species), cutthroat trout (*Oncorhynchus clarki*) (not Colorado River cutthroat trout), mottled sculpin, mountain sucker, and rainbow trout (*Oncorhynchus mykiss*) (non-native species)
- Hams Fork River – brook trout, brown trout (*Salmo trutta*), channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), flannelmouth sucker (*Catostomus latipinnis*), lake chub (*Couesius plumbeus*), longnose dace, mottled sculpin, mountain sucker, mountain whitefish (*Prosopium wouldiamsoni*), rainbow trout (non-native species), redbside shiner, roundtail chub (*Gila robusta*), smallmouth bass (*Micropterus dolomieu*), speckled dace, Utah chub, and white sucker (*Catostomus commersoni*).
- Kemmerer Reservoir – bluehead sucker (*Catostomus discobolus*), mottled sculpin, mountain sucker, mountain whitefish, rainbow trout (non-native species), redbside shiner, speckled dace, splake (*Salvelinus namaycush* x *S. fontinalis*), and Utah chub.
- Viva Naughton Reservoir – mottled sculpin, mountain sucker, mountain whitefish, rainbow trout (non-native species), redbside shiner, speckled dace, splake, and Utah chub.

The bluehead sucker, flannelmouth sucker, and roundtail chub have been designated as BLM sensitive species by the BLM Kemmerer FO. They are discussed in Section 3.10.6, BLM Sensitive Species.

3.10.5 Threatened, Endangered and Candidate Species

The US Fish and Wildlife Service provided a list of Threatened and Endangered Species that would need to be analyzed by this document on January 3, 2007. Table 3.10-2 presents the federally-listed species that have identified for review due to their potential to be impacted by actions in the KFO. A discussion of each species is followed in the sections below.

Table 3.10-2. Federally-listed Species That May Occur in the BCOEP

Species Name	Common	Scientific Name	Federal ESA ¹	State Native Species Status (NSS) ²
Mammals				
Black-footed ferret		<i>Mustela nigripes</i>	E	NSS1
Canada lynx		<i>Lynx canadensis</i>	T	NSS1
Gray wolf		<i>Canis lupus</i>	T / non-essential experimental	
Birds				
Yellow-billed cuckoo		<i>Coccyzus americanus</i>	C	NSS2
Fishes				
Bonytail		<i>Gila elegans</i>	E	
Colorado pikeminnow		<i>Ptychocheilus lucius</i>	E	
Humpback chub		<i>Gila cypha</i>	E	
Razorback sucker		<i>Xyrauchen texanus</i>	E	

¹ E = endangered; T = threatened

² NSS numbers = from 1 (populations greatly restricted or declining, extirpation possible) to 4 (populations stable or increasing and not restricted in numbers or distribution), coupled with habitat rankings that range from ongoing losses to being stable.

3.10.5.1 Black-footed Ferret (*Mustela nigripes*)

Currently, no prairie dog colonies have been identified within the BCOEP analysis area. However, in the future, areas with short grasses or barren areas that sustain large prairie dog complexes or small prairie dog complexes within a larger aggregation of other colonies could potentially be considered for black-footed ferret reintroductions.

The black-footed ferret is listed as a federally endangered species; however, reintroduced populations have been classified as non-essential experimental populations, which enable more flexible management activities by the USFWS.

Since black-footed ferrets live in underground prairie dog burrows and eat prairie dogs as their primary food source, they are closely associated with white-tailed and black-tailed prairie dog towns (UDWR 2006). The USFWS Black-footed Ferret Recovery Plan (1988) states it appears that large prairie dog complexes are necessary to provide suitable habitat for viable ferret populations. Based on two habitat models, large complexes allow individual black-footed ferrets and thus genetic material to migrate among prairie dog colonies commonly and frequently (Forrest et al. 1985). Smaller prairie dog complexes may also be viable but only when they are found with a sufficiently large aggregation of other colonies (USFWS 1988).

The BCOEP is located within an area that was block-cleared for black-footed ferrets by the USFWS in a memorandum dated February 2, 2004 (ES-61411/BFF/WY7746). A block clearance indicates that enough is known about an area to eliminate the possibility of black-footed ferrets occurring within the Block Clearance Area, and therefore no surveys are required for the species prior to development projects. Although the BCOEP has been block-cleared for black-footed ferrets, the affected environment is addressed in this EA for the purposes of evaluating the area’s potential for future ferret reintroduction.

3.10.5.2 Canada Lynx (*Lynx canadensis*)

The majority of Canada lynx habitat in Wyoming is located in the northwestern corner of the state (Ehle and Keinath 2002). Suitable habitat throughout the rest of the State is more fragmented and is often separated by large tracts of shrublands (Ehle and Keinath 2002). Historically, the Canada lynx was found in portions of the KFO. This large carnivore inhabits subalpine coniferous forests of mixed age and structural classes, and usually hunts in mid-successional forests with high stem densities of saplings capable of supporting its preferred prey, snowshoe hares (*Lepus americanus*). Lynx den in mature forests with large downed logs. The BLM has identified a Lynx Analysis Unit (LAU) north of Viva Naughton Reservoir that includes Commissary and Dempsey Ridges (U.S. Department of the Interior [USDI] 2005). This LAU is being analyzed for suitable lynx habitat. Because the BCOEP is not within the designated LAU and does not contain suitable coniferous habitat for the lynx or the snowshoe hare, Canada lynx are unlikely to occur there.

3.10.5.3 Gray Wolf (*Canis lupus*)

To date, no breeding gray wolves have been identified within the BCOEP, but a number of individuals have been documented within the KFO; however, in the future, it is anticipated that if nonessential, experimental gray wolf populations reintroduced to Yellowstone National Park (released winters of 1995-96 and 1996-97) increase, they may extend their territories southward and eventually inhabit new territories within the BLM KFO. More specifically, in the BCOEP, gray wolves would most likely inhabit territories with abundant ungulates present as a prey base.

On January 29, 2007, the USFWS announced a proposal to remove the northern Rocky Mountain population of gray wolves (a distinct population segment of gray wolves) from the federal list of threatened and endangered species. This announcement came in recognition of the success of gray wolf recovery efforts under the ESA (USFWS 2007). The USFWS has approved wolf management plans in Montana and Idaho, but has yet to do so in Wyoming (USFWS 2007). Should Wyoming's wolf management plan not be approved before the USFWS makes a final decision on the delisting proposal, the agency would continue to protect wolves under the ESA in the significant portion of their range in northwest Wyoming (USFWS 2007). The USFWS could move forward to delist the remainder of Rocky Mountain gray wolves in Montana, Idaho, portions of Wyoming, Washington, Oregon, and Utah (USFWS 2007).

The gray wolf does not exhibit particular habitat preferences except for the presence of native ungulates within its territory on a year-round basis. Wolves are opportunistic carnivores that predominantly feed on ungulates, including deer, elk, and moose, and may alternatively prey on rodents, vegetation, livestock, or carrion (Montana Fish, Wildlife & Parks 2007).

3.10.5.5 Yellow-billed Cuckoo (*Coccyzus americanus*)

The yellow-billed cuckoo (YBC), a federal candidate for listing under the ESA, is a riparian obligate bird that feeds in cottonwood groves and nests in willow thickets. Currently, the range of the YBC is limited to disjunctive fragments of riparian habitats from southwestern Wyoming, northern Utah, western Colorado, and southeastern Idaho southward into northwestern Mexico and westward into southern Nevada and California (UDWR 2006).

In Wyoming, YBC prefer relatively large stands of cottonwood riparian habitat at elevations below 7,000 feet. This habitat is limited in Wyoming to areas along Bighorn, Powder, Laramie, Cheyenne, and North Platte River drainages. YBC may also nest in open woodlands, urban areas, and deciduous riparian woodlands. YBC are long-distance migrants that arrive in Wyoming in late May and depart for South American wintering grounds in late August through September. Peak breeding occurs from mid-July to

early August and concealed nests are constructed of twigs in dense foliage within 33 feet of the ground. The YBC is considered an uncommon summer resident to Wyoming; however, this designation is uncertain given the lack of data (Bennett and Keinath 2001). Although YBC have not been documented within the BCOEP, YBC could occur during the summer in riparian habitats associated with the two reservoirs or the Hams Fork River.

3.10.5.6 Fish

Four federally-endangered fish species, the bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) occur downstream of the BCOEP in the Green River. Even though these species do not occur within the Project Area, they are sensitive to water depletions and thus are addressed.

The four federally endangered fish were once abundant in the upper and lower Colorado River Basins. Today, their distributions are limited to a small portion of their historic habitats. Habitats of these species include backwaters, sloughs, oxbow lakes, seasonally inundated flood plains, and reservoirs (BLM 2006 and USFWS 2006). Surface waters (i.e., Viva Naughton Reservoir, Kemmerer Reservoir, Hams Fork River, etc.) within the Project Area do not provide habitat for these species. The nearest habitat for the endangered Colorado River fishes occurs downstream of the BCOEP below Flaming Gorge Reservoir, Utah in the Green River and its associated 100-year floodplain; this area has been designated by the USFWS as critical habitat (BLM and USFWS 2006).

3.10.6 BLM Sensitive Species and Other Special Status Species

The BLM KFO has a list of sensitive species not covered under the protection of the ESA that may have survival issues within the KFO. These BLM Sensitive Species are considered in analysis of projects that occur on federal lands to avoid contributing to their decline or the need for future federal listing. Both BLM Sensitive species and special status species with the potential to be impacted by BCOEP are presented in **Table 3.10-3** and are discussed in further detail below.

Table 3.10-3. BLM Sensitive Species and Other Special Status Species Potentially Impacted by the BCOEP

	Species Common Name	Scientific Name	State Native Species Status (NSS) ¹	Sagebrush Obligate	Grassland Endemic	WY Priority Bird Species Level ²	Potential to Occur in the BCOEP
Mammals	Grizzly Bear	<i>Ursus arctos</i>					N
	Idaho pocket gopher	<i>Thomomys idahoensis</i>	NSS3				Y
	Long-eared myotis	<i>Myotis evotis</i>	NSS2				N
	Pygmy rabbit	<i>Brachylagus idahoensis</i>	NSS3	Yes			Y
	White-tailed prairie dog	<i>Cynomys leucurus</i>	NSS4				N
Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>					Y
	Brewer's sparrow	<i>Spizella breweri</i>	NSS4	Yes		1	Y
	Burrowing owl	<i>Athene cunicularia</i>	NSS4			1	N
	Ferruginous hawk	<i>Buteo regalis</i>	NSS3			1	N

	Species Common Name	Scientific Name	State Native Species Status (NSS) ¹	Sagebrush Obligate	Grassland Endemic	WY Priority Bird Species Level ²	Potential to Occur in the BCOEP
	Golden Eagle	<i>Aquila chrysaetos</i>					N
	Greater sage-grouse	<i>Centrocercus urophasianus</i>	NSS2	Yes		1	Y
	Loggerhead shrike	<i>Lanius ludovicianus</i>		Yes		2	Y
	Long-billed curlew	<i>Numenius americanus</i>	NSS3		Yes	1	N
	Mountain plover	<i>Charadrius montanus</i>	NSS4		Yes	1	N
	Northern goshawk	<i>Accipiter gentilis</i>	NSS4			1	N
	Peregrine falcon	<i>Falco peregrinus</i>	NSS3			1	N
	Sage sparrow	<i>Amphispiza belli</i>	NSS4	Yes		1	Y
	Sage thrasher	<i>Oreoscoptes montanus</i>	NSS4	Yes		2	Y
Fishes	Bluehead sucker	<i>Catostomus discobolus</i>	NSS1				N
	Flannelmouth sucker	<i>Catostomus latipinnis</i>	NSS1				N
	Leatherside chub	<i>Gila copei</i>	NSS1				N
	Roundtail chub	<i>Gila robusta</i>	NSS1				N
	Bonneville cutthroat trout	<i>Oncorhynchus clarki utah</i>	NSS1				N
Amphibians	Boreal toad	<i>Bufo boreas boreas</i>	NSS1				N
	Great Basin spadefoot	<i>Spea intermontana</i>	NSS4				N
	Northern leopard frog	<i>Rana pipiens</i>	NSS4				N
	Spotted frog	<i>Rana pretiosa (lutiventris)</i>	NSS4				N

¹ NSS numbers = from 1 (populations greatly restricted or declining, extirpation possible) to 4 (populations stable or increasing and not restricted in numbers or distribution), coupled with habitat rankings that range from ongoing losses to being stable.

² From Wyoming Bird Conservation Plan, Version 2.0; Level 1 = birds requiring conservation action, and Level 2 = birds requiring monitoring (Nicholoff 2003).

³ Based on known occurrences or species habitat presence in the BCOEP.

3.10.6.1 Idaho Pocket Gopher (*Thomomys idahoensis*)

The Idaho pocket gopher (IPG) is designated as a BLM Sensitive Species by the Kemmerer FO. The IPG range extends from central Idaho to southern and western Montana, in addition to a separate area in southwestern Wyoming and areas of southeastern Idaho and northeastern Utah. This species is considered

uncommon in Wyoming and its habitat can be found in shallow, stony soils in open sagebrush, sagebrush-grassland, and mountain meadow habitats (WGFD 2007).

Similar to other species of gophers, the IPG is an herbivore that eats roots, tubers, and surface vegetation. This species is active throughout the year and individuals are primarily solitary, except during the breeding season. IPGs are ecologically important both as prey items for foxes and owls and to plants as they loosen the soil when constructing underground chambers (UDWR 2007).

IPGs have not been positively identified within the BCOEP, however, potential habitat and casts were observed on the proposed well pad location. Positive identification of this species requires that individuals are captured and genetic testing is completed.

3.10.6.2 Pygmy Rabbit (*Brachylagus idahoensis*)

Little information is known about this small lagomorph that inhabits sagebrush steppe intermountain basin areas of the northern Rocky Mountains. Wyoming represents the easternmost edge of the pygmy rabbit's range and extends east to Rawlins and north towards Riverton from the southwest corner of the State (Purcell 2005). A recent intensive study in Wyoming reported that the species requires fairly dense stands of big sagebrush between 6,200 and 7,350 feet in elevation (Purcell 2005). In habitat occupied by pygmy rabbits, vegetative canopies were evenly distributed, tall, structurally diverse, and had cover averaging 43 percent, and canopy size averaging 52 cm. Soils in southwestern Wyoming where the species was observed consisted mostly of sand dunes, mima mounds, and riverbanks. In addition, winter snow depths were often greater in heavy-use pygmy rabbit areas.

Pygmy rabbits dig burrows in deep, loose soils that extend to a depth of 1 meter and contain chambers for resting and nesting. Burrows may have several entrances and several rabbits may share entrances/burrows. Because of the loss of dense sagebrush stands, pygmy rabbit numbers have been declining across their range. In 2003, a petition to list the rabbit under the protection of the ESA was filed, but the USFWS concluded in May 2005 that there was not enough scientific evidence to move ahead with a detailed review of the species (Federal Register Volume 70, No. 97, 29253-29265, May 20, 2005). Today, the pygmy rabbit is designated as a BLM Sensitive Species by the Kemmerer FO.

It is unknown whether the species occupies the BCOEP; however, since potentially suitable big sagebrush habitat does exist with the Project Area and since the species is known to occur within the nearby Fossil Buttes National Monument, the pygmy rabbit is thought to potentially occur in big sagebrush communities within the BCOEP.

3.10.6.3 Brewer's Sparrow

The Brewer's sparrow, a common summer resident in Wyoming, is designated as a BLM Sensitive Species by the Kemmerer FO and as a Level I species by WPIF (Nicholoff 2003). It breeds from southeastern Alaska and Saskatchewan, south to southern California and southwestern Kansas, with wintering grounds in southern California, western Texas, and central Mexico (WGFD 2007). Brewer's sparrows can be abundant in sagebrush habitat and breed in high densities. Breeding begins May and early June in the northern regions of its range (The Nature Conservancy 1999).

The Brewer's sparrow is a sagebrush obligate species that is closely associated with sagebrush shrublands that have abundant, scattered shrubs and short grass. It can also be found to a lesser extent in mountain mahogany, rabbitbrush, pinyon-juniper, or bunchgrass grasslands. Brewer's sparrows are positively correlated with shrub cover, above-average vegetation height, bare ground, and horizontal habitat heterogeneity (i.e., patchiness) (WGFD 2007). Preferred nests occur in low sagebrush, other shrub, or cactus, from a few centimeters to about 3 feet above the ground; however, nests can also occur higher in

taller sagebrush (The Nature Conservancy 1999). In Wyoming, the average nesting shrub height is 20 inches (ranging from 12 to 26 inches) in shrubs that are entirely or mostly alive (Nicholoff 2003).

WGFD has also classified the Brewer's sparrow as a Species of Special Concern (NSS4) because breeding populations are declining and its nesting habitat is vulnerable. Populations are declining due to fragmentation and removal of sagebrush habitat (WGFD 2007). Additionally, the Brewer's sparrow is an occasional host for the brown-headed cowbird (*Molothrus ater*), an obligate brood parasite. Parasitized nests are occasionally deserted, thus decreasing reproductive success.

The Brewer's sparrow may be present during the summer in Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities within the BCOEP.

3.10.6.4 Greater Sage-grouse

In January 2005, the USFWS announced a 12-month finding for three petitions to list the greater-sage grouse as threatened or endangered under the ESA of 1973, as amended. The USFWS concluded that federal listing was not warranted at this time (70 CFR 2252) (USFWS 2005); however, because of the species' continued value as an upland game bird and ongoing habitat loss, the greater sage-grouse is designated as a BLM Sensitive Species by the Kemmerer FO.

The greater sage-grouse, a sagebrush obligate species, almost exclusively depends upon healthy sagebrush habitats for year-round survival. Also important is the presence of grasses and forbs in the understory (Wyoming Sage-grouse Working Group [WSGWG] 2003). Currently, sage-grouse occur in 11 States and 2 Canadian provinces, ranging from extreme southeastern Alberta and southwestern Saskatchewan, south to western Colorado, and west to eastern California, Oregon, and Washington (USFWS 2005).

Leks are traditional courtship display and mating areas attended by sage-grouse in or adjacent to sagebrush-dominated nesting habitat (Patterson 1952, Wakkinen et al. 1992). Leks are situated in relatively open areas with less herbaceous vegetation and shrub cover than surrounding areas (Klott and Lindzey 1990). Leks may be natural openings within sagebrush communities or openings created by human disturbances, including dry stream channels, edges of stock ponds, ridges, grassy meadows, burned areas, gravel pits, sheep bedding grounds, plowed fields, and roads (Patterson 1952, Dalke et al. 1963, Connelly et al. 1981). According to WGFD GIS data, four leks occur within the BCOEP: Nancy Hill Grave, Quakenasp, Viva Naughton West, and Viva Naughton (WGFD 2006). The former two leks occur close to Dempsey Road (respectively, approximately ½ and ¾ mile north of the road), while the latter two leks are not located near the proposed development.

Sage-grouse males opportunistically form leks at sites within or adjacent to potential nesting habitats. Sage-grouse generally nest under sagebrush, but may also utilize other plant species. Gregg (1991) reported that sage-grouse nest success varied by cover type (i.e., vegetative community). The greatest nest success occurred in mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) where shrubs were 40-80 cm in height and had greater canopy cover at the site of successful nests than at unsuccessful nests (Gregg 1991). Wallestad and Pyrah (1974) also indicated that successful nests occurred in sagebrush stands with greater average canopy coverage (27%) as compared to unsuccessful nests with less average canopy coverage (20%). Grass height and cover may also serve as important components of sage-grouse nest sites. Gregg (1991) found that grass associated with nest sites was taller and denser than grass at random sites. Moreover, grass height at nests under non-sagebrush plants was greater ($P < 0.01$) than grass under sagebrush stands (Connelly et al. 1991). Such herbaceous cover may provide scent, visual, and physical barriers to potential predators (DeLong et al. 1995). Although WGFD GIS data has not identified sage-grouse nests within the BCOEP, sage-grouse nests are likely to be present within the BCOEP adjacent to

leks in mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) stands with sufficient canopy coverage and an herbaceous understory.

Sage-grouse brooding areas generally occur in upland sagebrush habitats relatively close to nesting sites. Early brood-rearing areas are characterized by an abundance of forbs and insects, particularly ants (*Hymenoptera* spp.) and beetles (*Coleoptera* spp.). As sagebrush habitats desiccate during the summer, sage-grouse generally move to more mesic sites (i.e., late brood-rearing areas) adjacent to sagebrush habitats with abundant forb cover during June and July (Connelly et al. 1988). Although WGFD GIS data has not identified sage-grouse brooding areas (early or late brood-rearing areas), sage-grouse brooding habitats are likely to be present within the BCOEP near nesting sites in relatively open sagebrush stands with abundant forbs and insects.

3.10.6.5 Bald Eagle

The USFWS delisted the bald eagle from the endangered species list on August 8, 2007. Delisted species are addressed by BLM as sensitive species to ensure that the projects ensure that a further need to list the species is avoided. In addition, Bald Eagles are protected under the Migratory Bird Treaty Act and the Bald Eagle and Golden Eagle Protection Acts.

Bald eagle nests are generally built in large trees in riparian habitat along rivers or lakes and rarely occur further than two miles from water since fish are their predominate prey. Nests are also built on cliffs or on the ground, if no other suitable nesting habitat is available. Seven bald eagle nests are currently known within the Kemmerer Resource Management Plan (RMP) area. Four nests are located on privately-owned land and three are located on lands administered by federal agencies (e.g., Bureau of Reclamation [BOR], USFWS, or U.S. Forest Service [USFS]). None of the seven known nests within the Kemmerer RMP area are located on BLM-administered lands. These nests occur in riparian habitats associated with the Green River, Bear River, Smiths River, and Salt River (BLM 2003). Although limited riparian areas do exist within the BCOEP (i.e., along the two reservoirs and the Hams Fork River), no bald eagle nests have been identified within the Project Area.

During the winter months, bald eagles communally roost in cottonwoods and other large trees along rivers and forage in upland habitats for carrion and small mammals. Three communal winter roost sites are known to exist within the Kemmerer RMP area: Woodruff Narrows, Morgan Canyon, and Rock Creek Roost Sites. These roosting sites occur along streams dominated by mature cottonwood or coniferous trees. Each of the roost sites in the Kemmerer RMP area is located in crucial winter range for elk, mule deer, and moose. Big game deaths caused by winter mortality or vehicle collisions provide carrion to winter roosting bald eagles. In the Kemmerer FO, big game carrion is the primary food source for communal winter roosting bald eagles. Additionally, foraging habitats are particularly important during the winter when alternative prey sources may not be available. In the Kemmerer FO, winter foraging habitats may include ice-free streams and reservoirs (BLM 2003). No bald eagle winter roosting sites have been identified within the BCOEP; however, roosting sites could occur in big game crucial winter ranges (e.g., moose) that are close to ice-free water sources and roads.

3.10.6.6 Loggerhead Shrike

The loggerhead shrike is designated as a BLM Sensitive Species by the KFO and as a Level II species by WPIF (Nicholoff 2003). This species is found across Wyoming during breeding season within shrub-steppe, shrubland, and woodland habitats; and it winters in Mexico. Loggerhead shrike breeding habitats are located in basin-prairie shrublands, sagebrush grasslands, mountain-foothills shrublands, pinyon-juniper woodlands, and woodland-chaparral. They nest 1 to 5 feet above the ground in bulky nests protected by dense vegetation cover. In contrast, foraging habitat consists of low vegetation areas and bare

ground where the loggerhead shrike can swoop down on grasshoppers and large insects from a perch. Other takes include some small mammals and birds (Nicholoff 2003).

No loggerhead shrikes have been identified within the BCOEP; however, potential breeding and foraging habitats are present in portions of the Project Area, particularly in sagebrush and shrub-dominated areas.

3.10.6.7 Sage Sparrow

The sage sparrow is designated as a BLM Sensitive Species by the Kemmerer FO and as a Level I species by WPIF (Nicholoff 2003). The sage sparrow breeds from central Washington, east to northwestern Colorado and south to Baja California and northwestern New Mexico; however, it winters in Mexico. The sage sparrow is considered a common summer resident in Wyoming (WGFD 2007).

The sage sparrow is considered a sagebrush obligate that inhabits prairie and foothills shrubland habitat. It prefers shrublands with tall shrubs (3-6 feet) and low grass cover, where sagebrush is patchy across the landscape (WGFD 2007). Nesting populations need large patches of sagebrush stands with low disturbance and little fragmentation. Males have a high nesting fidelity and return to the same territory each year, even if habitat changes have occurred (Nicholoff 2003). Populations of sage sparrows are declining due to the fragmentation, vulnerability, and removal sagebrush habitat (WGFD 2007).

Like other sagebrush obligates, sage sparrows may be present during the summer in Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities within the BCOEP.

3.10.6.8 Sage Thrasher

The sage thrasher is designated as a BLM Sensitive Species by the Kemmerer FO and as a Level II species by WPIF (Nicholoff 2003). The sage thrasher breeds from southern British Columbia, south through the Great Basin to Arizona and New Mexico. It winters from central California, east to central Texas and south to central Mexico. During the summer, it is considered a common resident in Wyoming (WGFD 2007).

The sage thrasher is considered a sagebrush obligate that inhabits prairie and foothills shrubland habitat. It prefers shrubland habitat with tall shrubs and low grass cover, where sagebrush is patchy across the landscape (WGFD 2007). Nesting populations need habitat patches of at least 250 acres. Nesting either occurs in or under preferred shrubbery, usually in dense sagebrush stands. This may serve as protection from climactic fluctuations (Nicholoff 2003). Populations of sage thrashers are declining due to the fragmentation, vulnerability, and removal sagebrush habitat (WGFD 2007).

Like other sagebrush obligates, sage thrashers may be present during the summer in Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities within the BCOEP.

3.11 Visual Resources

BLM lands are inventoried and classified into Visual Resource Management (VRM) categories that reflect management objectives. The proposed BCOEP includes 6,351.6 acres of Class II, 40,703.2 acres of Class III, and three acres Class IV VRM areas (Figure 3.11-1). Objectives for these BLM classes are summarized below.

- Class II Objective: To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- Class III Objective: To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- Class IV Objective: To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

VRM Class II Areas in the BCOEP occur around the Kemmerer Reservoir and Lake Viva Naughton in the eastern part of the BCOEP. The well pad and road and the areas along Dempsey Road would be in the VRM Class III. In addition to the VRM classes within the BCOEP, visual intrusion and surface disturbance is restricted or prohibited within ¼-mile from either side of the historic Oregon Trail (BLM 1986).

3.12 Recreation

Recreational activities within the Bear Canyon BCOEP can be described as dispersed recreation, consisting mainly of historic appreciation, hunting, fishing, hiking, snowmobiling and cross-country skiing.

3.12.1 Hunting

The three major big game species that are hunted in the BCOEP are mule deer, elk, and pronghorn. Greater sage-grouse is the most popular upland bird game species hunted in the area (Wally 2006). Because of the importance of hunting to the area, the 1985 Kemmerer RMP includes pre-existing stipulations prohibiting geophysical exploration in a large portion of Lincoln County, including the BCOEP, during deer and elk hunting seasons (October 1 to October 31) (BLM 1985). Hunting seasons are generally September through November for pronghorn, and September through October for greater sage-grouse.

The BCOEP includes the following five Wyoming Game and Fish hunt areas:

- 5,571 acres of Elk Hunt Area 102
- 41,484 acres of Elk Hunt Area 104
- 6,120 acres of Pronghorn Hunt Area 93
- 40,937 acres of Pronghorn Hunt Area 98
- 47,058 acres of Mule Deer Hunt Area 135

3.12.2 Fishing

Kemmerer Reservoir, Viva Naughton Reservoir, and the Ham's Fork River provide popular fishing opportunities in the area due to their close proximity to Kemmerer, Wyoming, and easy access off of Bear Canyon Environmental Assessment

Highway 233. Fish species found within the Viva Naughton Reservoir include rainbow trout, brown trout, cutthroat trout, whitefish, and splake. Kemmerer Reservoir provides rainbow trout, brown trout, cutthroat trout, and whitefish. Viva Naughton Reservoir also provides boating opportunities. Kemmerer Reservoir, Viva Naughton Reservoir and Ham's Fork are all located in the eastern portion of the BCOEP.

3.12.3 Cultural Recreation/Historic Appreciation

Cultural recreation and historic appreciation are very popular in the BCOEP. Emigrants Springs is a popular place for visitors within the BCOEP due to its cultural and historical significance. Eligible for nomination for the National Register of Historic Places, Emigrant Springs receives several hundred visitors, mainly during the months May through October. Emigrant Springs is a historical emigrant campsite that is mentioned in multiple emigrant diaries. The site is popular among visitors because it conveys its original historic character, and visitors can read descriptions from historical diaries that describe the setting in the same way it appears today. Refer to the Cultural Resources Section 3.4 for more information on Emigrant Springs.

Segments of the Sublette Cutoff are located throughout the BCOEP, and, a section of the Sublette Cutoff is Dempsey Road, the project access road (see Figure 3.12-1). Apart of the Oregon/California National Trails system, the Sublette Cutoff is of high historical value and is frequented by visitors for historical appreciation. Original trail tracks and wagon ruts are still in tact and visitors can read pioneer diary descriptions while viewing the trail (Lynn 2006). For more information on the Sublette Cutoff, refer to Cultural Resources Section 3.5.

3.12.4 Off-highway Vehicle Use

Off-highway vehicle (OHV) use is not a popular sport in the BCOEP because access to existing trails is limited within the BCOEP due to lack of winter parking (Roberts 2007). OHV use is limited to existing roads and trails; however, users often travel off-trail because they cannot identify existing trails due to snow coverage (Roberts 2007). The Viva Naughton Trailhead is located in the eastern portion of the BCOEP and heads north-west. This trail provides 343 miles groomed trail in the Wyoming Range for snowmobilers (BLM 2007).

3.12.5 Cross-Country Skiing

The Viva Naughton Cross-country ski trail located directly east of Viva Naughton Reservoir offers four miles of groomed trail for beginner and intermediate skiers.

3.13 Socioeconomics

3.13.1 Local Economy and Employment

The proposed BCOEP is located within Lincoln County, Wyoming, which has a population of 15,999 persons (U.S. Census Bureau 2005a). The largest community and county seat of Lincoln County, is the community of Kemmerer with a population of 2,560 (U.S. Census Bureau 2005b). The Kemmerer community serves as the business center for several other small towns along the southern portion of the county. The median family income for Lincoln County, as reported by 2003, is \$46,996, which is higher than the national median household income of \$41,554 (U.S. Census Bureau 2007). In 2000, estimates by the Wyoming Economic Analysis Division, for jobs in Lincoln County, show the service and professional sector employ 47.6 percent of the employment base, government accounts for 18.6 percent, construction accounts for 10.3 percent, farm and agricultural services account for 10.2 percent, and mining for 6.3 percent. (Sonoran Institute 2000). Historically, the services and professional industry, and the agriculture

industry have been the predominant base industry in Lincoln County; however, in recent years the agriculture sector's earnings have declined 8.7 percent since 1970.

Historically, the major sources of employment in Lincoln County have been in the services and professional industry. The County's economy has become increasing dependant on these employment sectors. In 2000, 48% of jobs were in this industry, increasing 9.1% from 1970 (Sonoran Institute 2006). Employment rates are slowly rising, including jobs in the mining industry. Table 3.13-1 provides a summary of employment by sector in Lincoln County.

Table 3.13-1. Employment by Sector in Lincoln County, 2000.

Employment Sector	Number of Jobs	Percent of Total
Farm and Agricultural Services	825	10.2
Mining	514	6.3
Manufacturing	560	6.9
Services and Professional ¹	3,862	47.6
Construction	838	10.3
Government	1,508	18.6
Total	8,107	100

¹Services and Professional include transportation, public utilities, wholesale trade, retail trade, finance, insurance, real estate, health, business, and legal.

Source: Sonoran Institute, 2006

3.13.2 Revenues from Oil and Gas Activities

Revenue from federal mineral royalties as well as federal, state, and local taxes on mineral mining and extraction generates approximately two-thirds of the State of Wyoming's total revenue. These revenues provide funding for public schools, highways, government provided services and the State's general tax fund. Because mineral income is so high, the household tax burden in the State of Wyoming is amongst the lowest in the nation (Wyoming Department of Administration and Information- Economic Analysis Division 2006b).

Federal mineral lease royalties are collected from oil and gas operations located on federally administered public lands in Lincoln County. Federal mineral leasing regulations require the return of 50 percent of royalties collected from natural resource extraction on federal lands to the state of origin.

In 2005, mineral income was obtained from the following:

- \$727,000,000 in severance taxes
- \$629,000,000 in federal mineral royalties
- \$600,000,000 in mineral property taxes

3.13.3 Severance Tax

The State of Wyoming collects a six percent severance tax on oil and natural gas products produced, stored, or transferred from any field within the State. Severance tax revenues are distributed to the Wyoming Mineral Trust Fund, General Fund, Water Development Fund, Highway Fund, Budget Reserve Account, and to counties and incorporated cities. In fiscal year (FY) 2005, severance tax distributions totaled \$727 million (Wyoming Department of Administration and Information- Economic Analysis Division 2006).

3.13.4 Ad Valorem Property Tax, Payments-in-lieu of Tax, and Sales Tax

County government, school districts, and special service districts in Lincoln County receive ad valorem tax revenue from natural gas production and from gas-field facilities. Natural gas accounted for 82% of the \$650,000,000 mineral valuation in Lincoln County in 2006. (Hoffman and Fuller 2006).

In addition to ad valorem tax payments, Lincoln County also collects payments-in-lieu of taxes (PILT) from the federal government for public lands within the County. Wyoming and its counties received approximately \$13.5 million from payments-in-lieu of taxes (PILT) in 2002 (BLM 2003).

Wyoming has a statewide four percent sales and use tax that is distributed to local governments based on population. With voter approval, each county is authorized to levy an additional two percent tax. Sales taxes are paid by oil and gas operators when they purchase equipment, materials, or supplies in the local area. Examples of purchases that generate sales tax revenue include gravel, pipe, and fuel. In 2004, \$8.5 million or 31 percent of the total sales tax collected in Lincoln County was distributed to the county and municipal governments.

3.14 Fire

Fire danger in the area is considered high due to the continuing drought. The KFO is divided into nine Fire Management Units (FMUs). Each FMU shares common management objectives with similarities in topographic boundaries and landownership patterns (BLM 1986). Fire suppression efforts within each FMU are driven by factors such as property threatened, and resource benefit derived from the fire. All developments that can be potentially damaged by fire have fuel break stipulations to help prevent the spread of fire from adjacent vegetation to developed areas. The decision process that determines the effort of fire suppression is stipulated in the RMP/DEIS and broken down into several options. Option 1 is administered if a need for full suppression is clearly indicated and would result in full fire suppression activities. Option 2 is evaluated if full suppression is not warranted and the costs of suppression versus expected benefits are evaluated to determine suppression effort. This option may result in limited fire containment. Option 3 is used when fire may potentially result in a substantial resource benefit. This option relies on four parameters to determine if the fire would result in potentially unacceptable impacts or conditions that may result in difficult containment of the fire. These parameters include a threat to person or property, adverse weather and predicted weather conditions, and resource impacts. These parameters are monitored throughout the fire, and if one or more of the parameters become unfavorable, management may revert back to the full suppression Option 1.

The proposed BCOEP is located within KFO FMU 4, Rock Creek/Slate Creek. This management unit occurs in the northern portion of the KFO and ranges from 7,000 to 8,000 ft in elevation. The topography of the area is generally rolling slopes with many localized areas of steep slopes in excess of 50 percent (BLM 1986). Vegetation is primarily sagebrush with small patches of aspen and conifers scattered throughout the FMU. This FMU has the potential for high fuel concentrations in some areas, but slope conditions generally favor both fire management and prescribed burns. Lightning-caused fires account for the majority of fires in this area. Human-caused fires can be primarily attributed to recreational users and

industrial operations. From 1980 to 2003 approximately 46 fires have occurred in FMU 4, resulting in 51,542 total acres burned (BLM 2004c). This is an average of two wildfires a year, which burn an average of 1,120 acres per fire. Most fires typically occur during the dry summer months between July 1 and October 30. Past evaluations of fires in this FMU show desirable results when optimal conditions exist for proper fire management; however, due to prompt detection and suppression actions, fire has not played a significant role in this unit in recent years.

4.0 ENVIRONMENTAL CONSEQUENCES

The proposed well pad is located on fee ground. Since the action is to drill to federal minerals BLM is responsible to ensure protection of the resources (even on private surface). The operator is required to provide sufficient information necessary to identify that impacts on private ground would be protected. If BLM feels that the Surface Use Agreement does not adequately protect the surface and resources BLM would apply necessary restrictions

The following resources were those identified in the Project Area to have no potential effects from the Proposed Action alternatives: ACECs, Wilderness Areas, farmlands - prime and unique, Native American religious concerns, Wild and Scenic Rivers, environmental justice, floodplains, and fire management.

4.1 Air Quality

Proposed Action

The primary criteria pollutants emitted from the Proposed Action would be oxides of nitrogen (NO_x), volatile organic compounds (VOC), particulates (PM₁₀ and PM_{2.5}), and carbon monoxide (CO) resulting from drilling and sulfur dioxide from flaring. Elevated dust levels and vehicle tailpipe emissions would occur along Dempsey Road associated with the vehicular traffic to and from the drilling site.

During the construction of the well pad and associated access road, vehicle and fugitive dust emissions would increase. These emissions would be short-term (10 days). Vehicle emissions would result from work crews commuting to and from the work site and from the transportation and operation of equipment to construct wells pads, access roads, and pipelines. Vehicle tailpipes would emit NO_x, SO₂, and CO as they travel to and from the site. Fugitive dust concentrations would increase with additional vehicle traffic on Dempsey Road.

During drilling and completion, the emissions would be the highest. Drill rig emissions would result mainly in an increase of NO_x and CO emissions, with lesser amounts of SO₂. Emission rates for a drill rig diesel engine were calculated using emissions factors for EPA-dictated Tier 1 diesel engines shown on Table 4-1-1 (EPA 2006). The drill rig engine would produce these emissions for the 120-day drilling duration. The exhaust parameters for the drill rig are:

- stack height: 5.0 meters (16.4 feet);
- stack diameter: 0.2 meters 0.65 feet);
- exhaust temperature 675 degrees Kelvin (755 degrees Fahrenheit); and
- exhaust velocity 35 meters/second (114 feet/second) .

Table 4-1-1. Tier 1 Emissions from a 4,000 hp Drill Rig Engine.

Pollutant	Emission Factor (g/hp-hr)	Load Factor	Days	Emissions (lbs/hr)	Emissions (tons/year)
NO _x	6.9	0.4	120	54.71	31.5
CO	8.5	0.4	120	67.40	38.8
SO ₂	0.13	0.4	120	1.03	0.6
VOC	1.00	0.4	120	7.93	4.6
PM _{2.5}	0.4	0.4	120	3.17	1.8

g/hp-hr is grams pollutant per horsepower per hour
 All particulate is less than 1 micron so is defined as PM_{2.5}

Dispersion modeling was used with the EPA-approved SCREEN3 dispersion model. The SCREEN3 model predicts the maximum 1-hour ambient air impact and then scales this impact to the various averaging periods for each pollutant. The results of the modeling shown on Table 4-1-2 indicate that pollutant ambient air concentrations would be well below the WAAQS.

Table 4-1-2. Drill Rig Engine Ambient Air Impacts

Pollutant	Averaging Period	Predicted Concentration (µg/m³)	Background Concentration (µg/m³)	WAAQS (µg/m³)	Percent of WAAQS Project plus Background
NO ₂	Annual	16.2	4	100	20.2%
CO	1-hour	1899	3,336	40,000	13.1%
CO	8-hour	1329	1,381	10,000	27.1%
SO ₂	3-hour	26.1	93	1,300	9.2%
SO ₂	24-hour	11.6	32	260	16.8%
SO ₂	Annual	0.3	4	60	7.2%
PM _{2.5}	24-hour	11.8	30	65	64.3%
PM _{2.5}	Annual	1.0	8	15	60.0%

(µg/m³) is micrograms of pollutant per cubic meter of air

After construction, minor NO_x and CO emissions would result from the long-term operation of heaters for the 3-phase separator on the pad, VOCs (including HAP) emitted from stock tank vents, and road dust generated by vehicles serving wells.

If the well is successful, an incinerator would be installed to burn incinerate potential H₂S in the gas stream. The byproduct of the incineration is sulfur dioxide (SO₂). The incinerator would have a conversion from H₂S to SO₂ efficiency of 99.9 percent. The incinerator exhaust characteristics would be:

- stack height: 12.2 meters (40 feet);
- stack diameter: 1.556 meters (5.1 feet);
- exhaust temperature 1,254 degrees Kelvin (1797 degrees Fahrenheit); and
- exhaust velocity 12.71 meters/second (41.7 feet/second).

The resultant SO₂ emissions would be 9.25 tons per year at a continuous emissions rate of 0.27 grams/second. The procedures used in the analysis of the SO₂ emissions and impacts are described in Appendix C. The resultant analysis showed that the predicted SO₂ impacts at 100 to 500 feet from the incinerator would be considerably below the WAAQS as shown in Table 4-1-3.

Table 4-1-3. Incinerator Ambient Air Impacts

Pollutant	Averaging Period	Predicted Concentration (µg/m³)	Background Concentration (µg/m³)	WAAQS (µg/m³)	Percent of WAAQS Project plus Background
SO ₂	3-hour	7.5	93	1,300	7.7%
SO ₂	24-hour	2.2	32	260	13.1%
SO ₂	Annual	0.3	4	60	7.2%

(µg/m³) is micrograms of pollutant per cubic meter of air

No Action

Emissions would not occur under the No Action alternative. Therefore, no changes in local or regional air quality would occur.

4.2 Noise

Proposed Action

The EPA established an average 55 dBA noise level as a guideline for acceptable environmental noise (EPA 1974). The BLM, State of Wyoming or Lincoln County have not established noise laws and regulation. Therefore, the established EPA environmental noise level is used for a basis of evaluating noise effects when no other local, county, or state standard has been established. It is important to note that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value of the public

health and welfare. Additionally, this noise level is directed at sensitive receptors (residences, schools, medical facilities, certain recreational areas) where people would be exposed to an average noise level over a specific period of time. Finally, this noise level represents an average noise level over a period of time, e.g., 24 hours. Higher intermittent and short-term noise levels, e.g., a heavy truck passing a location, could occur during the period of time. However, the short-term higher noise levels would be balanced by lower noise during most of the period of time.

The context of public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance as well as the absence of clinical symptoms such as hearing loss or demonstrable physiological injury. Therefore, a 55 dBA noise level should not be misconstrued as a regulatory goal. Rather, the 55 dBA noise level should be recognized as a level below which there is no reason to suspect that the public health and welfare of the general population would be at risk from any of the identified effects of noise.

Noise regulatory standards have not been established by the BLM, Lincoln County, or the State of Wyoming. Therefore, a 55 dBA noise level is considered as a reasonable average level that WRPA noise sources could produce without an adverse effect to the general 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 would be 64 dBA, and 58 dBA at 200 feet.

Noise has been measured as about 50 dBA at $\frac{1}{4}$ mile (1,320 feet) from a drill rig. At $\frac{1}{2}$ mile from a drill rig, the noise level would be reduced to 44 dBA. The closest gathering of people would be at Immigrant Springs about 1.5 miles from the closest proposed drilling rig. While people visiting Immigrant Springs may hear the noise, it would not be an adverse effect on hearing, but may disturb the solitude of the experience.

During the summer/early fall season when construction and drilling operations would occur, the presence and noise associated with traffic, construction equipment and drilling rigs may cause individuals or small family groups of animals to temporarily leave the immediate area of activity and move to adjacent suitable habitat. However, wildlife displacement and subsequent reduction in habitat effectiveness is expected to be brief and localized within about $\frac{1}{2}$ mile of the active well pad. Therefore, effects on individuals would be negligible.

The potential for disturbance of game species also exists during the early fall hunting period (September 1 through potentially early October). Because animals are already under stress from hunting pressures, additional noise from construction and drilling effects may be incremental for some wildlife individuals within about $\frac{1}{2}$ of drilling activities.

No Action

The No Action Alternative would not change the existing noise effects from current conditions.

4.3 Geology/Minerals

Proposed Action

Potential impacts to geologic resources are increased landslides and seismic hazards. According to the BLM (1985), the majority of the Project Area is located in a high landslide potential area. Within the Project Area, areas containing the Green River–Wasatch Formation have the highest landslide potential (BLM, 1985). The line of contact between the Green River and Wasatch Formations is particularly susceptible to slumping, and the Wasatch Formation is prone to swelling and failures due to the presence of bentonite clay (Rubey et al., 1975).

According to the Wyoming State Geological Survey's (WSGS) Geo-Notes 66 (2000), Rock Creek Fault is capable of having earthquakes of magnitude 7.2 to 7.5; however it is not known when this fault may activate. Probabilistic seismic hazard assessments are generated by analyzing three elements and using a probability model. The three elements are seismic sources or zones, magnitude distribution and rate of occurrence for sources or zones and ground motion estimation (Wyoming Geo-Notes 67, 2007).

Today, ground motions are represented by peak ground accelerations. The accelerations are represented in term of percent gravity. The WSGS generated maps that show peak ground accelerations that have a 10%, 5% and 2% change of being exceeded in 50 years. Another way to look at these maps is to assume the 2% probability map is equivalent to ground motions that have 100% chance of being exceeded in 2500 years. The 5% map is roughly equivalent to ground motions that have 100% chance of being exceeded in 1000 years and the 10% map is roughly equivalent to ground motions that have 100% chance of being exceeded in 500 years. The 2500 year map represents larger earthquakes than the 500 year map because as more time goes by, the greater chance of a larger earthquake would occur. Within the Project there is potential for damaging earthquakes on all three maps (Wyoming Geo-Notes 67, 2007). Fault movement and ground motion from earthquakes could cause damage to roads and other facilities and could induce landslides and mass-wasting.

Fortuna's committed mitigation measures (thicker casing, remote access to seal off well downhole, Blind Rams on rig that would shear the casing and drill stems resulting in total loss of access to well bore, and Emergency Shutdown Valves) would minimize the potential hazard from a large earthquake. However, no available measures would totally eliminate the risk of failure during a major earthquake.

No Action

Geologic and mineral resource would not change from current conditions under the No Action Alternative.

4.4 Paleontological Resources

Proposed Action

The entire Project Area has the potential for producing significant fossil material. Potential impacts to paleontological resources include the loss of scientifically important fossils due to surface-disturbing activities such as well pad and access road excavation and grading. The magnitude of the potential losses cannot be quantified. Alternatively, construction of well pads and access roads for the Proposed Action may uncover scientifically important fossils. The Wasatch and Green River formations are Class I paleontological areas that have the potential to contain important fossils. A paleontological survey of the

areas of new disturbance associated with the proposed action was completed in 2007. Based upon the survey it was determined that the area may possess significant paleontological resources.

No Action

Under the No Action Alternative, the project would not proceed and the potential for destruction of fossils or discovery of new species would be unchanged from current conditions.

4.5 Cultural Resources

Proposed Action

No direct impacts to cultural resources would occur as a result of constructing and operating the proposed well location #8-12 and associated access roads. There is potential for indirect impacts to the historic setting and character of important historic sites and trails that are located in proximity to the Project Area. Although the area has already changed somewhat from its original historic setting as a result of existing road construction/upgrades, it retains the overall feeling of its historic condition.

Indirect impacts as a result of the Proposed Action could include visual contrast caused by the proposed access road and well pad, noise from construction equipment, and other effects on the location, design, setting, feeling, or association of the historic properties. The viewshed analysis from the Sublette Cutoff Trail indicated that structures over 12 feet high would be visible from the Sublette Cutoff Trail. These facilities would include the drill rig during drilling, and the tops of the tanks and the flare or incinerator placed on the well pad for permanent operations. However, these actions would be two to three miles from historic sites and would not have the potential to draw the attention of visitors to these historic sites and trails. Additionally, the strong view of an existing heavy duty power lines near the trail has already negatively impacted the integrity of the trail landscape and setting.

Therefore, the effects to cultural resources in the Project Area would not be adverse. Based on this conclusion, a determination of "*no historic properties adversely affected*" is proposed for this project pursuant to Section 106 of CFR 800.

No Action

Under the No Action Alternative the project would be denied and no new impacts would occur to cultural resources within the Project Area.

4.6 Wastes Solid or Hazardous

Proposed Action

The addition of vehicles and equipment to the BCOEP could result in hazardous situations arising such as crashes, spills, or fires. An Emergency Response Plan (ERP) and an H2S Contingency Plan for the Proposed Action would be prepared and submitted to the BLM by Fortuna. This ERP addresses each potential emergency situation with written instructions and flow charts outlining the response procedures pertaining to medical, fire, spill, vehicle incident, search and rescue, severe weather, helicopter, and hydrogen sulfide emergencies. Given the detail of the ERP, no new hazardous situations are expected to cause significant impacts as a result of the Proposed Action.

No Action

Under the No Action Alternative the project would be denied and no new hazardous impacts resulting from this project would occur within the proposed Project Area.

4.7 Vegetation and Noxious Weeds

Proposed Action

The proposed action activities would remove the existing mountain big sagebrush vegetation from 11.4 acres. If the well is not successful, reclamation would begin immediately. If the well is successful, the pad would remain until a decision is made whether to drill another well. The successful implementation of interim reclamation and revegetation actions on those disturbed areas not directly needed for production activities would reduce these direct impacts. The remaining acreage would remain devoid of vegetation until completion of the project and final successful reclamation and revegetation. Both the total estimated short-term disturbance and the long-term disturbance acreage would be less than 1 percent of the project area.

Vegetation would be affected by wind-blown dust coming from bare ground on the well pad and access roadways. Dust would settle on the vegetation interfering with its natural transpiration actions, thus affecting this vegetation's affect its long-term health. Applicant-committed dust control activities would reduce the amount of fugitive dust that could settle on vegetation. Interim reclamation and revegetation actions would further reduce the amount of bare ground and the amount of fugitive dust that could settle on down-wind vegetation.

No Federally-listed, proposed-for-listing or candidate plant species would be involved with the proposed action. Three plant species (entire-leaved peppergrass, tufted twinpod and prostrate bladderpod) currently listed by BLM as sensitive, have potential to occur within or near the project area. These species are restricted to narrowly defined habitats within the sagebrush community. No new disturbance is proposed within the habitats associated with these species. Thus there would be no direct impacts to these plant species and their habitats such that there would be a need to list any one of these species under the protection of the Endangered Species Act.

The proposed action would result in surface disturbance to about 11.4 acres (less than 1 percent of the area). Surface disturbing activities create opportunities for noxious and invasive weed species to become introduced in and/or spread through the project area. The applicant's commitment to aggressively control noxious weeds in the project area as a result of actions associated with the proposed action would minimize direct/indirect, short- and long-term impacts to the existing vegetation communities.

No Action

No vegetation would be removed under the No Action alternative.

New disturbance would not occur so there would be no new mechanism for the introduction or spread of noxious weeds.

4.8 Soils

Proposed Action

Under the proposed action, potential soil hazards within the Project Area include landslides, compaction, erosion and sedimentation to nearby waterways. Potential direct impacts resulting from construction of the proposed location include removal of vegetation, exposure of the soil, mixing of soil horizons, soil compaction, loss of topsoil productivity, and an increase susceptibility of the soil to wind and water erosion. The proposed action would effectively impact approximately 11.4 acres of soil surface.

An additional 450 feet of soils would have the vegetation mowed in order to provide a secondary form of egress from the well pad. This may result in an additional 0.1 acre of impact to the soil resources.

According to the BLM (1985), areas of high landside potential are located within the Project Area and mitigation is limited by the landslide potential and soil depth in the vicinity of the proposed well location. In accordance with the WYDEQ and BLM requirements, a Storm Water Pollution Prevention Plan (SWPPP) and Erosion Restoration Reclamation Plan (ERRP) would be implemented to prevent erosion and sedimentation. These plans will be kept in the Fortuna local office. Additionally, the well pad would be constructed on slopes of 1-2 percent so the risk of landslide would be minimal. Therefore, impacts to soil resources should be negligible.

No Action

Under the No Action Alternative the project would be denied on BLM lands and there would be no increased impacts to soils within the proposed Project Area.

4.9 Hydrology

4.9.1 Surface Water

Proposed Action

Potential impacts to surface water are increased sedimentation, decline in water quality and depletion of the watershed. Three ac-ft of water would be used for the drilling of the well and application on roads. The location where the water would be obtained from is within the drainage of the Hams Fork River and ultimately the Colorado River Basin drainage. The 3.0 ac-ft depletion would have negligible impacts to the Colorado River Basin.

In accordance with the Wyoming Department of Environmental Quality (WYDEQ) and the BLM, Fortuna would implement a Storm Water Pollution Prevention Plan/Erosion Reclamation and Restoration Plan (SWPPP/ERRP) in order to prevent sedimentation into "Waters of the State". These plans would be kept at the site, at Fortuna's local office, and on file at the Kemmerer BLM Office.

Surface runoff from the proposed action will drain towards South Fork Creek and ultimately into the Hams Fork River. The WYDEQ 303d list of impaired waters were reviewed and found that none of the impacted drainages is currently listed as impaired. The proposal may result in minimal amounts of sediment reaching the streams live waters but would not increase sediment levels to result in future listings.

4.9.2 Groundwater

Potential impacts to groundwater resources from the Proposed Action include contamination of groundwater with produced water, drilling mud, or petroleum constituents.

The operator would implement a Spill Prevention, Control, and Countermeasure (SPCC) plan per the provisions of 40 CFR 112. 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 SPCC would contain measures for the construction of containment dikes around production facilities that contain fluids (i.e., production tanks, produced water tanks), additional spill prevention and control measures established for each type of facility or operations, and training materials and procedures.

All freshwater bearing (less than 10,000 ppm TDS) zones encountered during drilling of the proposed well would be properly protected and the presence of these zones reported to the appropriate agencies. After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD. This would isolate all water-bearing formations in the borehole and would effectively eliminate communication between hydrocarbon-bearing zones and the shallow groundwater aquifers.

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).”

Groundwater would further be protected because Fortuna is using a closed loop system for their drilling fluids.

No Action

Under the No Action Alternative, the project would be denied on BLM lands and there would be no increased impacts to surface water or groundwater within the proposed Project Area.

4.10 Fish and Wildlife

4.10.1 Pronghorn Antelope

All habitat encompassing the well pad, new access road, and along Dempsey Road is considered WGFD spring/summer/fall range for pronghorn antelope. Surface disturbances associated with the Proposed Action would result in the direct loss of up to 11.4 acres of pronghorn antelope WGFD spring/summer/fall range, which could result in a very small reduction of habitat used by pronghorn antelope within and near disturbed areas. In addition, disturbances from increased traffic and noise could cause temporary displacement of pronghorn antelope from areas of human activity, thereby increasing animal densities in adjoining habitats, and increasing stress from intra- and interspecific competition for resources.

Although surface disturbance activities would likely diminish utilization of some pronghorn antelope habitat due to habitat loss and temporary displacement associated with the Proposed Action, these impacts would likely be minimal due to current WGFD population estimates of the Carter and Sublette Herds, magnitude of WGFD spring/summer/fall range across the region, and incremental nature of the proposed

development schedule. As such, it is determined that the Proposed Action would not affect the trend or viability of pronghorn antelope populations in the area.

4.10.2 Mule Deer

All habitat encompassing the well pad, new access road, and along Dempsey Road is considered WGFD spring/summer/fall range for mule deer. Surface disturbances associated with the Proposed Action would result in the direct loss of up to 11.4 acres of mule deer WGFD spring/summer/fall range, which could result in small habitat reduction for mule deer within and near disturbed areas. In addition, disruption from increased traffic and noise could cause temporary displacement of mule deer from areas of human activity, thereby increasing animal densities in adjoining habitats, and increasing stress from intra- and interspecific competition for resources.

WGFD population estimates for the Wyoming Range Herd that are currently below management objectives are not expected to improve with implementation of the Proposed Action.

Although surface disturbance activities would likely diminish utilization of some mule deer habitat due to habitat loss and temporary displacement associated with the Proposed Action, these impacts would likely be minimal due to the magnitude of WGFD spring/summer/fall range across the region and incremental nature of the proposed development schedule. As such, it is determined that the Proposed Action would not affect the trend or viability of mule deer populations in the area.

4.10.3 Elk

Surface disturbances associated with the Proposed Action would result in the direct loss of approximately 11.4 acres of BLM-designated elk calving habitat. Habitat loss and fragmentation of habitat resulting from this disturbance, could result in reduced habitat use by elk within and near disturbed areas. Impacts resulting from the development of single well locations within elk crucial winter ranges and parturition (calving) areas can result in a high level of impact to this species. Elk have been documented avoiding wells by 1 mile or more.

Approximately, 6 miles of the existing Dempsey Road lies within BLM-designated crucial winter/yearlong habitat for elk. Disruption from increased traffic, maintenance, snow removal, and noise along Dempsey Road from November 15 to April 30 could cause temporary displacement of elk from areas along the road, thereby increasing animal densities in adjoining habitats and increasing stress from intra- and inter-specific competition for resources. In addition, proposed year round snow removal could create migration barriers, and entrapments due to high snow levels. This displacement could become more long-term if the well is determined to be productive and associated human activities continue in the BCOEP beyond construction, drilling, and completion activities.

In addition, the Dempsey Road would impact 9 miles of identified elk calving areas. Impacts resulting from disturbance to parturition areas have been identified as high (WYGD 2004) with well pad densities from 1-4 well locations. Increased vehicle traffic and increased noise levels within from May 1 to July 10 may result in the avoidance of areas in and around the BCOEP analysis area. This displacement could become more long-term if the well is found to be productive and associated human activities continue within the BCOEP beyond construction, drilling and completion activities. Permanent displacement of elk could be caused by an increased use of Dempsey Road and year-round access during crucial times for elk (i.e., winter and calving seasons).

Stipulations outlined in the Kemmerer RMP/ROD (1986), which were applied to Fortuna's lease, will be applied to decrease the above-mentioned potential impacts to elk during the winter and calving seasons.

The Kemmerer RMP/ROD states that elk calving areas would be protected from disturbances during the calving period (May 1 through June 30). Oil and gas leases in elk calving would be conditioned to restrict activities which would disturb calving elk. If inspections indicate that elk have not moved into their traditional calving areas, activities may be allowed. By beginning operations in October it is anticipated that drilling and completion activities would be completed prior to calving restrictions.

4.10.4 Moose

All habitats encompassing the well pad, new access roads, and along Dempsey Road is considered WGFD winter/yearlong range for moose. In addition, a migration corridor was identified along the eastern edge of section 12 that runs north and south. Surface disturbances associated with the Proposed Action would result in a small loss of up to 11.4 acres of winter/yearlong range, which could result in a small reduction of habitat used by moose within and near disturbed areas. In addition, disruptions from increased traffic and noise could cause temporary displacement of moose from areas of human activity, thereby increasing animal densities in adjoining habitats, and increasing stress from intra- and inter-specific competition for resources.

The proposed well location occurs within ¼ mile of an identified moose migration corridor. WGFD identifies that no disturbances within narrow migration corridors or bottlenecks. The identified corridor was not identified as a narrow corridor as approximately four miles of available habitat would be available for necessary migration.

WGFD population estimates for the Lincoln Herd that are currently below management objectives are not expected to improve with implementation of the Proposed Action. Although surface disturbance activities would likely diminish use of some moose habitat due to habitat loss and temporary displacement associated with the Proposed Action, these impacts would likely be minimal due to the magnitude of winter/yearlong range across the region. As such, it is determined that the Proposed Action would not affect the trend or viability of moose populations in the area.

4.10.2 Raptors

There are not any known raptor nests in the BCOEP. Since potential nesting and foraging habitats for various raptor species occur both in and near the BCOEP, if construction activities occur during the raptor breeding and nesting season (i.e., February 1 – July 31), breeding or nesting raptors could potentially be affected by associated visual and noise impacts, possibly leading to nest abandonment, temporary displacement, or nest failure. The Proposed Action would also result in a loss of up to 11.4 acres of habitat for prey species.

The Kemmerer RMP/ROD (1986) prohibits activity and surface disturbances within 1-mile of an active ferruginous hawk nest, and within a ¾-mile radius from other active raptor sites, from February 1 through July 31. The Kemmerer RMP/ROD (1986) defines a nest site as active if it has been used within the past three years.

4.10.3 Migratory Birds

If surface disturbing activities occur during the migratory birds nesting season, those utilizing habitats in or near the BCOEP could be temporarily displaced, which may alter nest establishment or cause nest abandonment. In addition to temporary displacement, the Proposed Action would also result in the removal of up to 11.4 acres of potential nesting and foraging habitats which could destroy nests and potentially kill migratory birds. It would be expected for these impacts to have a greater effect on BCC and WPIF (Level I and Level II) migratory bird species that may be nesting and/or foraging in the Project Area, due to their smaller population sizes and limited distributions.

Overall, implementation of the Proposed Action may affect individual migratory birds through displacement, habitat loss or death, but given the small area of impact, it would not likely result in a trend towards Federal listing of these species.

4.10.4 Fish

Direct impacts to fish would be associated with disturbances to their habitat, including spawning habitat. Roadside drainage ditches along Dempsey Road or new access roads could change surface water runoff, thereby increasing sediment load entering the streams which would influence stream flows. In addition, vegetation removal associated with new access road construction near streams may increase erosion by removing shrub root systems prevent erosion. However, no disturbance would occur within 500 feet of perennial streams or live water as outlined by the Kemmerer RMP/ROD (1986).

4.10.5 Threatened and Endangered Species

All federally listed species analyzed in the KFO, with the exception of Colorado River endangered fish species, had a “No Effect” determination. Table 4.10-1 gives justifications for these determinations. Impacts to the Colorado River fish are analyzed in Section 4.10.4.1.

Table 4.10-1. Justifications for Effects Determinations of Federally Listed Species

	Species Common Name	Project Effects Determination	Justification for Effects Determination
Mammals	Black-footed ferret	NE	The project area is not located in suitable BFF habitat, and the project area has been block-cleared by USFWS
	Canada lynx	NE	The project is not within a LAU and no lynx suitable habitat or prey base occurs in Project Area.
	Gray wolf	NE	Known to inhabit the area, but there are no known breeding populations in the area.
Birds	Yellow-billed cuckoo	NE	Proposed development is not near riparian habitat
Fish	Colorado River fish	MA - LAA	3.0 acre-feet depletion would occur to the Colorado River Basin
Project Effects Determinations are as follows: No Effect (NE); May Affect (MA); Likely to Adversely Affect (LAA); Not Likely to Adversely Affect (NLAA).			

4.10.4.1 Colorado River Fish

The Colorado River endangered fish species are affected by activities that deplete or degrade the flow of waters in the Upper Colorado River Basin. Consumptive water uses reduce flows throughout the Colorado River Watershed, leading to habitat losses for these species. Since water used for drilling comes from the Blacks Fork Watershed and therefore causes a depletion to this watershed, surface disturbance impacts to Colorado River endangered fish populations downstream of the Project Area in the Green River would occur because the Blacks Fork Watershed is part of the Upper Colorado River Basin.

As required under Section 7 of the ESA, all actions of Federal agencies that may affect these listed species must undergo consultation with the USFWS. This is to ensure that actions undertaken by a Federal agency

are not likely to jeopardize the continued existence of listed species. Therefore, depending on the water source used for drilling activities, BLM determinations for impacts to the Colorado River endangered fish species would be as follow:

The Blacks Fork Watershed would be used as a water source for drilling. Formal consultation with the USFWS was completed on July 20, 2007. Impacts from the proposed action were determined to be a May Affect – Likely to Adversely Affect. The USFWS follows the Recovery Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) (USFWS 1988). As a part of the Recovery Program was the requirement that if a project was going to result in a depletion, a depletion fee would be paid to support Recovery Program. On July 5, 1994, the USFWS issued a biological opinion determining that the fee for depletions of 100 acre-feet or less would no longer be required. The current proposed action requires a depletion of 3 acre feet and would not require a depletion payment.

4.10.6 BLM Sensitive and Other Special Status Species

Proposed development may impact individual BLM sensitive and other special status species analyzed in the Kemmerer FO, but is not likely to impact these species at a population level basis, nor is it likely to result in trends towards Federal listing of these species. Those BLM sensitive species with additional analysis considerations are addressed below.

4.10.6.1 Ferruginous Hawk

Since potential ferruginous nesting and foraging habitats occur in and near the BCOEP, construction activities that occur during breeding and nesting season could potentially affect Ferruginous Hawks by associated visual and noise impacts, possibly leading to nest abandonment, temporary displacement, or nest failure. The Proposed Action would also result in a loss of up to 11.4 acres of habitat for prey species. However, successful interim well pad reclamation (as described in Section 2.1.12) could potentially increase the raptor prey base in the Project Area by increasing small mammal populations within and near reclaimed areas.

4.10.6.2 Greater Sage-grouse

Although no single factor has been deemed responsible for sage-grouse population declines, the discovery and subsequent development of gas and oil fields throughout the western United States beginning in the 1930s and 1940s has been identified as one potential causative agent (Braun 1987, Connelly et al. 2004). Recent research by Holloran (2005) suggests that greater sage-grouse in western Wyoming avoid breeding within or near the development boundaries of natural gas fields. Comparisons made by Holloran (2005) suggest that the extirpation of leks near anthropogenic disturbances resulted from a combination of emigration and decreased survival, and also suggest that increased noise intensity at leks negatively influenced male lek attendance. Braun et al. (2002) contend that oil and gas development may have negative short-term (e.g., site construction and drilling), and long-term (e.g., road developments) effects on the greater sage-grouse.

Some potential direct and indirect impacts of development to sage-grouse under the Proposed Action could include 1) direct habitat loss and fragmentation due to well pad and access road construction/upgrades; 2) increased avoidance and displacement caused by increased human activity (i.e., associated increased noise and traffic levels); 3) increased potential for collisions with vehicles along Dempsey Road; and 4) increased predation caused by improved hunting perches (e.g., tanks) for raptors.

Mountain big sagebrush and Wyoming big sagebrush are the dominant vegetative communities in and around the BCOEP, with these habitats occurring along a majority of the proposed development areas. Surface disturbance would result in the direct loss and fragmentation of 11.4 acres of sagebrush habitat.

As this habitat removal would be minimal in comparison to the amount of existing sagebrush habitat in the area, and since no habitat removal would occur within ¼ mile of a lek, the impacts associated with the removal of this habitat for well pad and access road construction would be negligible.

In addition to direct habitat loss, another primary impact of the Proposed Action on sage-grouse would be the increased potential for displacement or abandonment of nesting sites and leks due to increased disturbance from human activity, increased traffic, and noise associated with construction and drilling activities. Numerous studies have determined that sage-grouse are affected by human activity (Braun 1976; Lyon and Anderson 2003; Remington and Braun 1991). These studies have determined that hens nested further away from leks in areas where human disturbance occurred, and that nesting initiation rates were also lower. In addition, it was determined that male attendance at leks was lower when human activity occurred within 3.2 km. Despite these trends, Remington and Braun (1991) reported that sage-grouse displaced by surface-disturbing activities returned to fluctuating pre-disturbance levels once activity ceased. Lyon and Anderson (2003) also stated that although disturbed areas had lower initiation rates than undisturbed areas, nest success between the two areas was the same. Despite these findings, there is no evidence that populations attain their pre-disturbance levels, and population reestablishment could require 20 to 30 years (Braun et al. 2002).

The increased potential for vehicle collisions with sage-grouse along Dempsey Road could also result under the Proposed Action from increased traffic levels within the BCOEP. Holloran (2005) found that declines in lek attendance were positively correlated with vehicle traffic levels, and vehicular activity during the daily strutting period on roads within 0.8 miles (1.3 km) of a lek intensified the negative influence of traffic. Reducing overall traffic volumes and isolating traffic disturbance within gas fields could reduce road effects, and additionally, enforcement of daily travel timing restrictions could further dampen road effects (Holloran 2005).

No leks occur within ¼-mile of the proposed well site (well 8-12) or within ¼-mile of the access along Dempsey Road; however, the BCOEP does fall within potential sage-grouse nesting and brooding habitats. The Kemmerer RMP requires the application of a timing restriction to protect sage-grouse nesting and brood-rearing habitats from March 15 – July 15. Based on implementation of this timing restriction, impacts associated with increased surface disturbance, avoidance and displacement, and traffic levels in the BCOEP would likely be negligible under the Proposed Action.

4.10.6.3 Idaho Pocket Gopher

During the onsite inspection of the proposed well site it was determined that the proposed action may impact Idaho Pocket Gopher. Direct impacts would be the direct loss of habitat and direct mortality of individuals during the construction of the proposed well site. The direct loss of habitat would be the result of approximately 10 acres of potential habitat. The 1.4 acres for the proposed emergency egress would not result in direct loss of habitat since the proposal would not result in the disturbance of soil resources.

Due to the large scale of potential habitat for the species the entire BCOEP would be identified as potential habitat for this species. BLM's sensitive species management for this species includes: (1) determine the distribution and current habitat needs for the species; (2) incorporate sensitive species in land use and activity plans; (3) develop conservation strategies; (4) ensuring that sensitive species are considered in NEPA analysis; and (5) prioritizing what conservation work is needed.

Although direct loss of habitat and potential for loss of individuals it is anticipated that the impacts to this species would not result in the need to list the species.

4.10.6.4 Bluehead Sucker, Flannelmouth Sucker, Roundtail Chub, and Leatherside Chub

Direct impacts to these four BLM sensitive fish species would be associated with disturbances to their habitat, including spawning habitat. Roadside drainage ditches along the new access road could change surface water runoff, thereby increasing sediment load entering the streams which would influence stream flows. In addition, vegetation removal associated with new access road construction near streams may increase erosion by removing shrub root systems prevent erosion. However, the well pad would not be constructed within 500 feet of perennial streams or live water as outlined by the Kemmerer RMP/ROD (1986), and proper erosion control as specified within the SWPP will be implemented. Therefore, no impacts to these fish species are anticipated.

No Action Alternative

Under the No Action Alternative, impacts to BLM sensitive and other special status species within the BCOEP would be the same as current conditions.

4.11 Visual Resources

Impacts to visual resources in the Project Area are analyzed in terms of the consistency of the Proposed Action with the existing VRM Class III designation. Class III areas allow for a moderate level of change to landscape.

The construction and maintenance of oil facilities and the associated access roads would result in short-term and long-term changes to the visual character. Short-term visual impacts would primarily be related to construction and drilling activities and long-term impacts would be related to the installation of permanent facilities on the well pad if the well proves successful.

Development activities (e.g., dozers, drilling rigs, truck traffic, heavy equipment, dust, and lights) would increase visual contrasts within the existing landscape by modifying the natural lines, colors, forms, and textures of the area. Drilling activity typically would occur 24-hours per day, and lighting associated with nighttime drilling activities would be visible from reasonably long viewing distances. Once construction activities are completed, long-term landscape contrasts would result from vegetation removal associated with well pads, pipelines, and roads.

These landscape modifications would yield a more industrialized visual setting. However, the visual simulations (Appendix D) prepared by Fortuna show that the effects would be consistent with the moderate change to landscape allowed in VRM Class III lands. The simulations depicted show the predicted view of the facilities from three viewpoints. They are “actual” in the sense of simulated views based on digital models, and illustrate the minor visual impact the project would have. Due to the distances from the roads, most of the facilities are not visible except for the Sublette cutoff viewpoint, where only the tallest structure would be visible. Although a moving pumpjack could be noticeable, it would not be tall enough to be seen from the key observation point.

The three viewpoints evaluated for the Federal #8-12 well pad show the following. The facilities on the well pad would not be visible looking south from the Dempsey/Hockaday Cutoff. The incinerator stack would be visible looking east from the Sublette Cutoff. No facilities would be visible from Emigrant Springs looking northeast.

Fortuna’s Applicant Committed Environmental Protection Measure and the application of “Gold Book” construction guidelines in the placement and design of the well pad and access road would decrease the impacts to visual resources making the Proposed Action consistent with the VRM Class III classification.

No Action

Under the No Action Alternative, the project would be denied and there would be no additional impacts to the visual resources within BLM lands of the proposed Project Area.

4.12 Recreation

The potential effects to recreation from oil development in the Project Area would consist primarily of lost recreational opportunities or diminished recreational experience due to oil facilities and human activity in the Project Area. These impacts would particularly be felt by the limited number of visitors seeking solitude or recreational opportunities in a relatively pristine landscape. However, the year round access to the area would increase the year round use.

Additionally, the recreational experience of visitors to the trail for historical recreation and cultural appreciation would be diminished as well. During hunting season, noise from construction, drilling and completion activities and associated traffic would impact the experience of hunters and could reduce the number of animals in the project area to be hunted.

Increasing the use of Dempsey Road within the Project Area during winter months would provide recreational users with increased access to broader portions of the Project Area, some of which were previously limited in access. The improved access could expand trail-related recreational opportunities such as snowmobile use and cross-country skiing. However, currently, OHV and snowmobile use is limited to existing roads and trails. But many OHV-users end up traveling off the existing roads and trails. If improved access could increase the numbers of OHV-users, then the number of OHV-users traveling off existing roads and trails could increase.

No Action

Under the No Action Alternative, the proposed action would not be approved. Therefore no impacts to recreation would occur.

4.13 Socioeconomics

Implementation of the Proposed Action would generally have positive socioeconomic effects for Lincoln County, including the following:

- Increased employment opportunities for residents of Lincoln County,
- Revenues to Lincoln County and the State of Wyoming, and
- A minor demand for housing and public services in rural communities and unincorporated areas located near the Project Area in Lincoln County.

The Proposed Action has the potential to affect attitudes and opinions regarding the use of public lands. Lincoln County has a history of oil and gas development. Consequently, residents are familiar with oil and gas activities and their economic benefits. The combination of familiarity and anticipated economic benefit creates a climate of general acceptance of, and support for, continued oil and gas development within the County.

4.13.1 Local Economy and Employment

Implementation of the Proposed Action would create additional employment opportunities in Lincoln County during the construction phase and over the production lifetime of the well. Opportunities for direct

employment (e.g. positions hired for construction, production, and decommissioning) and indirect employment (jobs available in support industries) would arise as a result of project operations. When feasible, local sub-contractors and workers would be hired for the proposed well field development. Once the well is in production, a minimal, yet sustained level of permanent employment would be required for operation and maintenance of the well and ancillary facilities.

It can be assumed that there would be a population of “non-local” construction workers that would work in conjunction with local workers within the Project Area. The non-local population would consist of short-term (construction and drilling) and local residents would secure the majority of the long-term employment. Some of the non-local settlement is likely to occur in Kemmerer, Wyoming. Temporary housing is available, but limited, in Kemmerer, which has historically offered accommodations for the oil and gas industry.

Non-local populations contribute to the local economy of these cities through the purchase of motels, housing, or other accommodations, as well as meals, groceries, gasoline, and various other goods and services. Due to increased non-local population, there would be a corresponding increase to the service sector.

The Proposed Action would result in a minor increased demand for local services (e.g., housing, law enforcement, fire protection, medical and social services). In addition, the Proposed Action would result in increased wear on main county roads and other county infrastructure. Impacts on roads are discussed in the Chapter 4 Transportation Section.

In terms of employment, personal income, housing, facilities and services, and local, state and federal government fiscal conditions, the analysis indicates that the effect would be minor to negligible, because the project involves one well pad.

4.13.2 Local Government Fiscal Conditions and Revenues

Since no production estimates are available for the Proposed Action, the amount of revenue that could be earned from production royalties and taxes by local, state and federal governments cannot be estimated. Without revenue estimates, specific monetary impacts to overall fiscal conditions, which consider both revenues and costs, cannot be estimated. Experience with natural gas production in Lincoln County and estimates from other analyses suggest that the fiscal impacts of the proposed action would be positive and temporary for local government.

4.13.3 Federal Mineral Royalties

Federal mineral royalties are collected by the Mineral Management Services, U.S. Department of Interior, for oil and gas produced on Federal leases. Federal royalties are collected at a fixed rate of 12.5 percent and are split evenly between the Federal government and state of origin. In 2003, approximately \$689,488,150 was collected in mineral royalties from BLM-managed lands and minerals in Wyoming (BLM 2006). Federal Mineral Royalties would be collected for oil produced during the production of this project.

4.13.4 Severance Tax

The State of Wyoming collects a six percent severance tax on oil and natural gas products produced, stored, or transferred from any field within the State. Crude oil and natural gas production paid over \$497 million in severance taxes, about 77% of all the severance taxes paid by mineral produced in 2004. Severance tax would be collected from oil produced during this lifetime of this project.

No Action

Under the No Action Alternative, the Proposed Action would be denied. Additional employment, tax revenues, and royalties to the Federal governmental would not be realized.

4.14 Hazardous Materials/ Health and Safety

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

The construction of well pads, roads, pipelines, compressors, and other oil and gas facilities and operation and maintenance of those facilities involves the use of heavy equipment, drill rigs, trucks, welding equipment, power tools, and other machinery that inherently exposes workers to risks for accidents and injuries.

Truck and other vehicle traffic using Dempsey Road driving to the site would create a risk of traffic accidents and hazards, particularly during periods of inclement weather or poor visibility. Oil and gas exploration and production inherently has the potential to cause wildfires due to the presence of flammable liquids and gasses and the use of welding equipment, vehicles, and other potential ignition sources. Accidents involving leaks of natural gas and/or hydrogen sulfide in some cases are also possible.

Various hazardous materials are used in the construction, operation, and maintenance of oil and gas exploration and production projects, including, diesel fuel and gasoline, various oils and lubricants, and cleaners. Potential effects to human health and safety that could be associated with additional oil and gas development in the BCOEP 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;
- 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. It is assumed that the oil and gas development project in the BCOEP would 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.

In general, compliance with 43 CFR Ch. II, subpart 3162.5, and other regulations related to health and safety and environmental protection would minimize risks to human health and safety. The following is a discussion of health and safety impact issues identified as concerns for the Proposed Action.

4.14.1 General Emergency Preparedness and Accident Prevention

In general, to reduce the risk and seriousness of accidents and injuries to workers and the public, Fortuna has developed 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, Fortuna would not allow firearms to be brought into the area by employees and contractors. The emergency plans would be posted at Fortuna's local offices and field facilities.

4.14.2 Increased Vehicular Traffic

Implementation of the Proposed Action would result in an increase in traffic on Dempsey Road, along with proportionate increases in the risk of traffic accidents from project-related vehicles. With compliance with adherence to recommended speed limits, the risk of additional accidents is expected to be low and the resulting health and safety impact would be minor.

4.14.3 Fire Hazards

Project-related construction and operation would increase the risk of wildfire 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 impact 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.

4.14.4 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.

Table 4.14-1 identifies the general products that will be transported to the site and stored on site during drilling and completion.

Federal and State of Wyoming regulations address the transport, storage, and disposal of hazardous materials or wastes. The application of these regulations 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.

An H₂S Contingency Plan has been developed in the event of encountering large amounts of H₂S that cannot be sent to a flare for incineration to SO₂. The description in Section 4.1 indicate that ambient SO₂ impacts would be well below the limits established to protect human health and welfare with an adequate margin of safety. Pertinent parts of the H₂S plan include the following:

- The entrance to the location is designed so that it can be barricaded if a hydrogen sulfide emergency condition arises. An auxiliary exit route will be available so that in case of emergency, a shift in wind direction would not prevent escape from the location.
- A minimum of two safe briefing areas (SBA) shall be designated for assembly of personnel during emergency conditions. These will be located at least 150 feet or as practical, from the wellbore and in such a location that at least one area will be upwind of the well at all times. Upon recognition of an emergency situation, all personnel will be trained to assemble at the designated briefing area for instructions.
- Reliable 24 hour telephone communications will be available at the drilling foremen's office.
- A mud-gas separator will be rigged up and manifolded to the choke system.
- All equipment that might come in to contact with hydrogen sulfide - drill pipe, drill stem test tools, blowout preventers, casing, choke system will meet Fortuna (US) LP(US) metallurgy requirements for H₂S service.
- The drilling rig will have a continuous electronic H₂S detection system that automatically will activate visible and audible alarms if hydrogen sulfide is detected. The visible light will activate if 10 ppm H₂S is present. The audible siren will activate if 15 ppm H₂S or higher concentration is present. There will be at least four H₂S sensors in place on the drilling rig. They will be located to detect the presence of hydrogen sulfide in areas where it is most likely to come to surface. The sensor head locations will be: 1) rig floor by driller's console, 2) substructure area near the bell nipple, 3) the shale shaker, 4) the mud mixing area. Additional sensors will be positioned at the discretion of the drilling foreman. At least one light and one siren will be placed on the rig to indicate the presence of hydrogen sulfide. The light and siren will be strategically placed to be visible to all personnel on the drill site. Additional alarm lights & sirens may be added to ensure that all personnel on the drill site are able to notice the alarms at any time.
- The H₂S detection equipment will be calibrated as recommended by the manufacturer. Calibration records will be maintained on location.
- At least 4 windsocks will be placed around the drill site to ensure that everyone on the drilling location can readily determine wind direction. One windsock will be mounted on or near the rig floor to be readily visible to rig crews when tripping pipe.

No Action

Under the No Action Alternative, the proposed action would not be approved. Therefore no impacts to health and safety would occur.

Table 4.14-1. Products on site for Bear Canyon #8-12 Well.

Product Name	Unit Size	Chemical Name	Group/Function	Product Usage/Contingency
Alkapam 1103	25.0 kg	PHPA	Flocculant	25
Barite	45.4 Kg	Barium Sulphate	Weighting Agent	200
Bentonite	45.4 Kg	Sodium	Viscosifier, Fluid	600

		Montmorillonite	Loss Reduction	
Bicarbonate of Soda	22.7 Kg	Sodium Bicarbonate	pH Control	20
Caustic Soda	22.7 Kg	Sodium Hydroxide	pH Control	60
Celloflake	11.4 Kg	Sized Cellophane	L.C.M.	140
Clean Spot	208 L	Proprietary	Spotting Agent	2
Desco CF	11.4 Kg	Proprietary	De-flocculant	5
Drilling Detergent	20.0 L	Surfactant	Dispersant	5
Envirofloc	36.4 kg	Calcium Nitrate	Coagulant	150
Kelzan XCD	25.0 Kg	Xanthan Gum Biopolymer	Viscosifier	70
Myacide	18.9 L	Liquid Biocide	Biocide	20
Nut Shell	22.7 Kg	Sized Walnut Hulls	L.C.M.	40
ProDrill 2000	20.0 L	Multivalent Polymer	Clay Inhibitor	80
ProDrill HD	20.0 L	PHPA - Liquid	Shale Stabilizer	110
Safe Carb (Calcium Carbonate)	25.0 Kg	Calcium Carbonate	L.C.M., Density, & Fluid Loss	600
Sawdust	Sack	Fibrous Wood Chips	L.C.M.	600
Soda Ash	22.7 Kg	Sodium Carbonate	pH Control, Calcium Remover	20
Stardril	22.7 Kg	Modified Polysaccharide	Fluid Loss Reduction, Viscosifier	350
Ultra-Seal	11.4 Kg	Cellulosic Material	L.C.M.	200
Ultracpac/Drispac	22.7 Kg	Polyanionic Cellulose	Fluid Loss Reduction, Viscosifier	180
Zinc Oxide	25 Kg	Zinc Oxide	Hydrogen Sulphide Scavenger	20

Source: Fortuna 2007.

4.14 Cumulative Effects

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions regardless of who is responsible for such actions. Cumulative impacts may result from individually minor, but collectively significant actions occurring over a period of time (40 C.F.R. 1508.7)

Historic Impacts

PGS conducted a 3D Geophysical project to the south of the BCOEP analysis area. The Absaroka Ridge 3-D Project was completed in March 2006 (BLM 2006) and approved the proponent conduct shot hole geophysical operations on approximately 51.8 square miles of mixed federal, state, and privately owned lands within Lincoln County, Wyoming south of the BCOEP.

The Expanded Moxa Arch Environmental Impact Statement (EMAEIS) analysis boundary (1997) is located approximately 27 miles east of the proposed analysis area. EMAEIS analyzed the construction, drilling, and production of approximately 2444 gas wells within the analysis boundaries.

The proposed action is located within 27 miles of the area analyzed under the 1983 Road Hollow EA. In addition, the project is approximately 30-40 miles north of the other oil and gas developments analyzed for the development of the Whitney Canyon and Carter Creek Natural Gas Processing Projects Environmental Assessment 1981. The project analyzed the proposed ROW for the transportation of elemental sulfur from the Whitney Canyon (Amoco) and the Carter Creek (Chevron) natural gas processing plants to a load out terminal near an existing railroad facility. The Bear River Divide has been an area of interest due to the Whitney Canyon, Road Hollow, Ryckman Creek, and Carter Creek oil and gas developments.

The Dempsey Ridge area has been reviewed previously for exploration and development of oil and gas resources. Exxon completed nine previous wells within the analysis area. The closest of these locations is the Exxon Rock Slide #1 which is within approximately 300 feet of the current well proposal.

The majority of the historic impacts within the analysis area are related to recreation and livestock grazing while minor impacts resulting from oil and gas exploration and development occur in and around the project area.

In addition, to oil and gas development other mineral developments have resulted in additional impacts within the analysis area. The P&M Coal Mine is located approximately 16 miles south east of the proposed well location.

An existing Right-of-Way crosses through the proposed project area and was installed in the late 1970's. The power line increases the amount of human intrusion that can be observed throughout much of the proposed analysis area.

Additional impacts resulting from federal management may increase the overall impacts within the region on specific resources. Prescribed burns, natural burns

In addition, non-energy impacts are the result of casual use recreational activities and potentially the result of grazing and livestock operations which have been ongoing over the past 100 years.

5.1 Current Impacts

With the exception of this well no additional wells are currently being developed or are proposed within the existing BCOEP analysis area. However, a number of additional on going management actions were identified within the region which adds a cumulative impact to various resources throughout the area.

The Moxa Arch Infill Development EIS the existing EMAEIS analysis area is being analyzed for increased infill development. The proposed action would result in the increase development of approximately 1,861 additional well pads resulting in increased disturbance to crucial big game ranges, sage grouse, water quality, and air quality throughout the resource area.

5.2 Future Impacts

This EA evaluates the effects of constructing one well pads and the drilling of one oil well. However, the full extent of the project depends upon the success of this well and further wells. If the initial well is found to be capable of producing economic quantities, 15-25 mile pipelines would be constructed to transport oil and gas out of the BCEOP. Since ultimate success of the field cannot be determined at this time, a cumulative analysis cannot include future wells beyond the level of this EA. The effects of any subsequent development above the well considered for this EA would be disclosed in a subsequent NEPA document.

So cumulatively, the total disturbance from the three projects could exist of:

- 1) 11.4 acres disturbance from the Bear Canyon well pad and short access road;
- 2) 151 acres short-term disturbance for a 25-mile oil and natural gas right-of-way (50-foot wide x 25 miles long (5280 x 25) / 43560 square feet / acre; and
- 3) 40 acres estimated for 4 well pads, roads, and pipelines within the Absaroka Ridge exploratory development project.
- 4) 40 acres estimated for 4 well pads, and roads for the exploratory development within the BOECP analysis area.

Approximately 196 acres of vegetation could be removed through foreseeable developments in the region. Interim reclamation would be implemented on the 151-acre pipeline right-of-way and on portions of the well pads that would no longer be needed. However, due to current drought conditions, vegetative reclamation may take a period of years rather than a season.

The main air quality impacts would be associated with drill rigs. It is expected that another drill rig would operate simultaneously with a Bear Canyon rig. However, these drill rigs would only operate from May 1 at the earliest to November 15 because of wildlife protection. Air quality impacts would be insignificant because the drill rigs would only operate five to six months and the drill rigs would be placed sufficiently distant from each other such that the effects would not overlap.

More oil and gas truck traffic would occur on Dempsey Road. Although the traffic increase would mirror that of BCOEP and be relatively minor, the overall experience for to people visiting the historic trails and recreational users in the general area would be more affected than the effects of just the BCOEP. However, the higher level of truck traffic to refineries in Utah could lead to an increased accident rate. Effects from pipeline construction would occur but only for the duration of the construction (about 2-3 months).

Potential economic effects from oil and gas production would increase from royalties, severance tax, and increased employment potential especially during the well construction, pipeline construction, and drill and completion activities.

5.0 DESCRIPTION OF PROPOSED MITIGATING MEASURES

The following mitigation measures have been proposed for each alternative to minimize and avoid impacts to environmental resources.

5.1 AIR QUALITY/NOISE EFFECTS

Fortuna would acquire all the required air quality permits from the Wyoming Department of Environment Quality. All equipment would be operated in accordance with the permit conditions.

The EPA developed a standard that noise levels should not exceed 55 dBA at noise sensitive receptors (residences, medical facilities, recreation areas, etc.). Since there is a lack of research documenting harmful noise levels to wildlife, the BLM uses 55 dBA as a maximum acceptable noise level allowable before there would be disturbances to wildlife. For similar project in Wyoming, noise levels of no higher than 10 dBA above background levels are used as stipulations in the Decision Records. Noise levels from drilling rigs should be less than 55 dBA within ¼ mile of well pads.

5.2 CULTURAL RESOURCES

Several measures could mitigate the indirect impacts to the historic setting and character of the important historic sites and trails that are located in proximity to the Project Area. Mitigation measures may include the following:

- All above ground equipment would be painted in environmentally blending colors and the edges of pads would be feathered to blend with the surrounding landscape.
- Using vegetation or other methods to screen project facilities from visitors to the historic properties.
- If screening is not possible, the preconstruction setting should be documented with photographs or video, with the resulting materials used to provide public access through interpretive displays or deposition in historical archives.

All facilities would be designed to be less than 12 feet in height, or not visible from the Oregon Trail. If facilities cannot meet these requirements and are operationally necessary additional NEPA analysis will be required prior to installation.

- If cultural resources are discovered during construction and drilling activities, all activity within the immediate area of impact would cease. Fortuna would immediately notify BLM of the find. The BLM and Wyoming State Historic Preservation Office representatives would then determine how to avoid impacting the site or artifact.

5.3 PALEONTOLOGICAL RESOURCES

Because the Project Area has the potential to produce significant vertebrate fossils, a BLM-approved paleontologist would be on-site and observe all surface-disturbing activities. Care would be taken during construction activities to observe the bedrock and soils for signs of fossils. If significant fossils resources are encountered, construction activities would be halted and the BLM notified of the occurrence

immediately. The paleontologist would then make site-specific recommendations for impact avoidance. Operations in the area of the discovery would not resume until written authorization to proceed has been received from the BLM Authorized Officer. The following steps may be taken to reduce loss of paleontological information and resources:

- Sampling. Fossil material may be sampled if needed to determine the significance of the find.
- Salvage. Salvage may be required if the fossil discovery is of scientific interest and the proposed development would destroy the site, if time- and cost-effective. Often, once the material from a particular site has been collected and properly recorded, the need for further protection ceases.
- Rerouting. Rerouting of project facilities may suggested if critical or significant fossil material is discovered directly on the access roads or proposed well pads. This option would be considered if the fossil locality is scientifically very important and should be left undisturbed for subsequent scientific evaluation.
- Relocation. Occasionally it might be appropriate to move fossils out of the impact zone and relocate them nearby. This option might apply to poorly-preserved fossils of limited extent.

5.4 NOXIOUS WEEDS

The following noxious weed control measures would be employed with the approval of the Proposed Action:

Invasive weeds would be managed in accordance with the BLM and State of Wyoming. To prevent the introduction of new weeds, the Proponent would establish a mobile vehicle washing station on staging areas to wash equipment on site in the event of exposure to invasive and/or noxious weeds. The Proponent shall thoroughly wash with water all field vehicles before transporting them to the Project Area.

To help prevent the spread of existing populations of invasive and/or noxious weeds, information on the more common species with potential for occurrence in the Project Area, including photographs, would be distributed to the Proponent. Personnel would be instructed to avoid any populations of these species that they encounter, and asked to report the locations of the populations to the AO.

The Proponent would be responsible for total control of all invasive/noxious weeds species on any and all disturbed site(s). The Proponent is also responsible for consultation with the AO and/or local authorities for acceptable weed control methods, and shall comply with the following:

- Use of pesticides shall comply with the applicable federal and state laws. Pesticides shall be used only in accordance with their registered uses within limitations imposed by the Secretary of the Interior. Prior to the use of the pesticides, the Proponent shall obtain from the AO written approval of a plan showing the type and quantity of material to be used, pest(s) to be controlled, method of application, locations of storage and disposal of containers, and any other information deemed necessary by the authorized officer.
- Only those chemicals listed on the BLM-approved label list are authorized for use on public lands. A Pesticide Use Proposal (PUP) must be submitted for each chemical used and it cannot be used until approval has been provided in writing by the AO. The PUP needs to include any surfactants or dyes used in the spraying operation.

- Applicator(s) of chemicals used must have completed the pesticide certification training and have a current up-to-date Certified Pesticide Applicators license.
- Pesticide application records for the areas and acres treated must be submitted to the BLM KFO each year. This includes brand or product name, Environmental Protection Agency (EPA) registration number, total amount applied (use rate #A.I./acre), date of application, location of application, size of area treated, method of treatment (air/ground), name of applicator and certification number. The record information must be recorded no later than 14 days following the pesticide application and must be maintained for 2 years.

5.1.5 VEGETATION

The recommended seed mix for the project area is shown below. These species are suitable to the area and have the best chance to successfully revegetate disturbed areas. Reseeding should be completed after September 1 and prior to ground frost, or after frost has melted and prior to May 15. Fall seeding after the potential for germination is the preferred method. Additional seeding may be necessary in order to attain successful revegetation where soils are stable and vegetative composition and establishment are similar to other naturally occurring disturbances. At that time BLM determines the actions are acceptable for bond release.

Table 4.7-1. Recommended Seed Mix

Plant Species	Scientific Name	Drill Seeding Rate (lb/acre of pure live seed)
Thickspike or western wheatgrass	<i>Elymus lance-latus</i> or <i>Pascopyrum smithii</i>	3.0
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	4.0
Canby bluegrass	<i>Poa secunda</i> var. Canby	2.0
Indian ricegrass	<i>Oryzopsis hymenoides</i>	2.0
Great Basin wildrye	<i>Elymus cinereus</i>	2.0
White yarrow or Lewis Flax	<i>Achillea millefolium</i> or <i>Linum lewisii</i>	0.5
Total		13.5

5.6 SOILS

Implementation of the BLM and DEQ approved Storm Water Pollution Prevention Plan and Erosion Restoration Reclamation Plan would minimize erosion potential. These plans would be on location at the site and the local Fortuna offices.

5.7 WILDLIFE

Prior to any new surface-disturbing activities between February 1 and July 31, Fortuna or their contractor would survey all areas within ¼-mile of proposed surface disturbance for the presence of raptor nests. If occupied/active raptor nests are found, construction would not occur for up to a ¾-mile radius during the critical nesting season for that species within the species-specific buffer.

Prior to any new surface-disturbing activities between February 1 through August 15, Fortuna or their contractor would survey all areas within 1-mile of proposed surface disturbance for the presence of active ferruginous hawk nesting sites. If occupied/active nests are found, construction would not occur for up to a 1-mile radius during the critical nesting season for that species within the species-specific buffer.

No activity or surface disturbance would be allowed within designated sage-grouse nesting habitat to protect nesting sage-grouse from March 15 - July 15.

No activity or surface disturbing activities would occur from May 1 – June 30 to protect elk calving habitat.

If the well were to be found capable producing economical quantities Fortuna will install a locked gate at the Dempsey road entrance to reduce the overall impacts

5.8 VISUAL RESOURCES

Fortuna would paint the facilities with a suitable color and feather the edges of the well pads so that facilities and the well pad would blend with the surrounding landscape.

Fortuna would use vegetation or other methods to screen project facilities from visitors to the historic properties.

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APPENDIX A – FIGURES

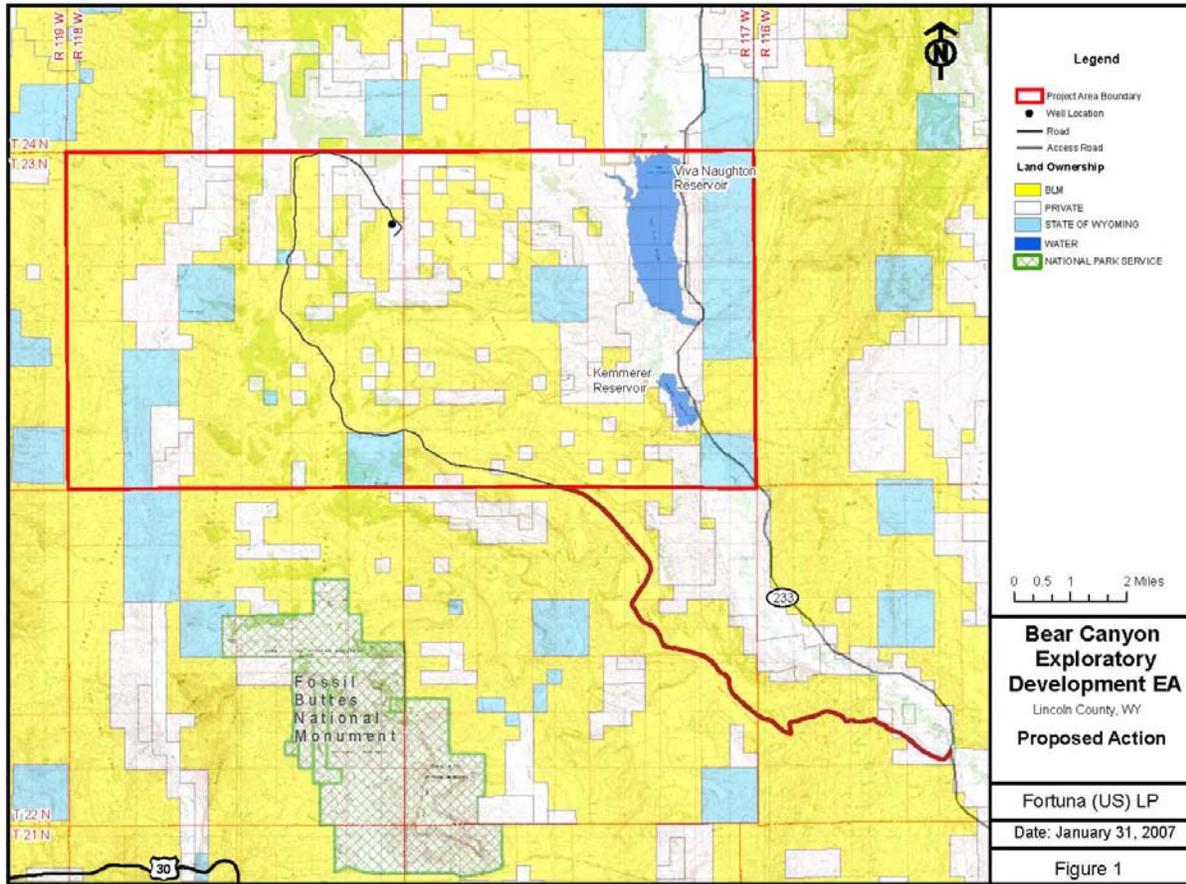


FIGURE 1-1

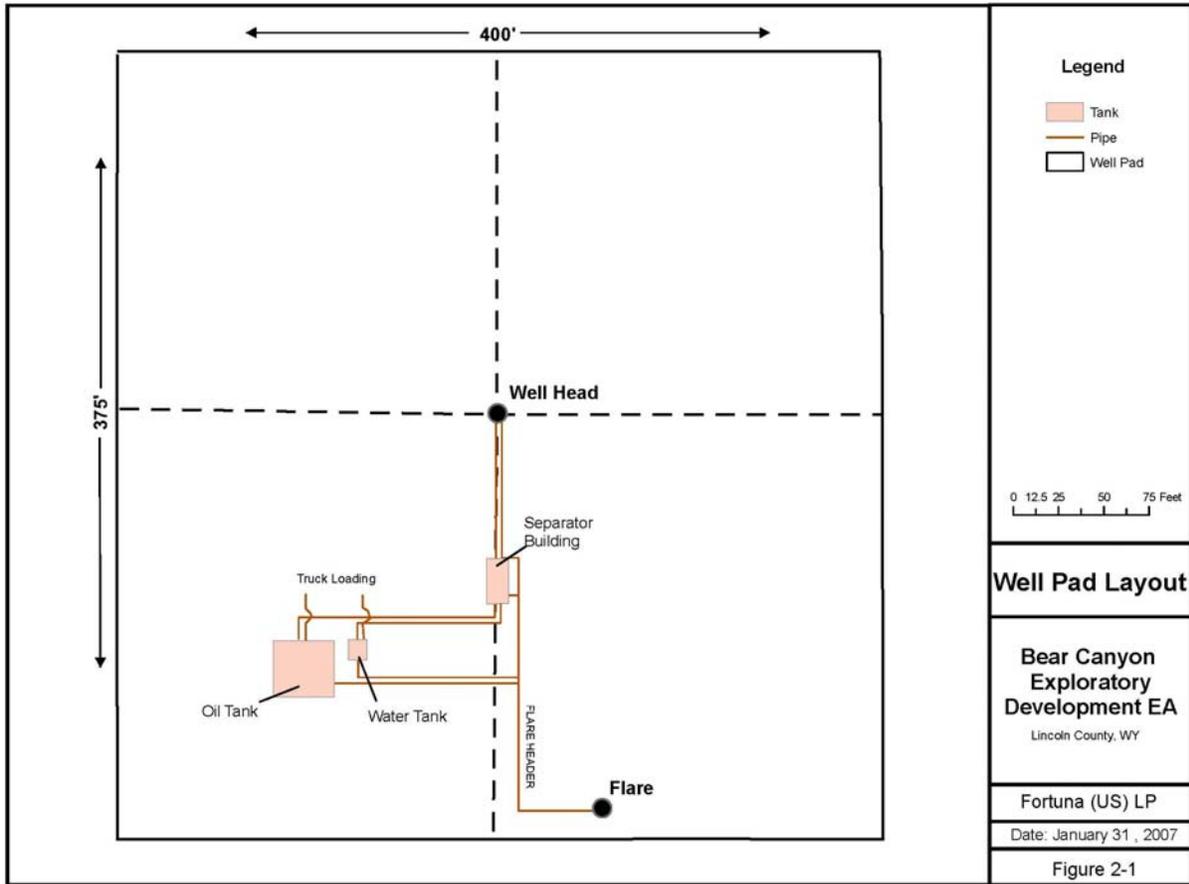


FIGURE 2-1

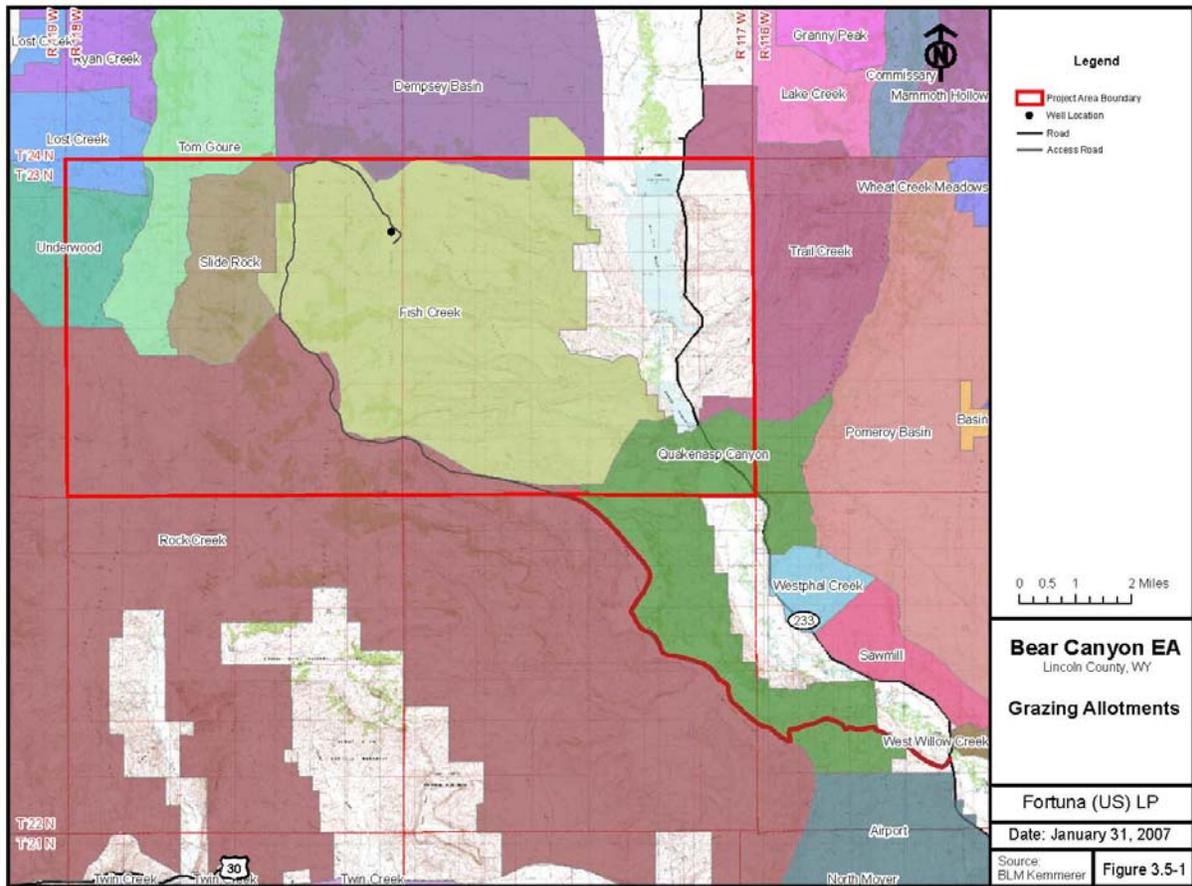


FIGURE 3.5-1

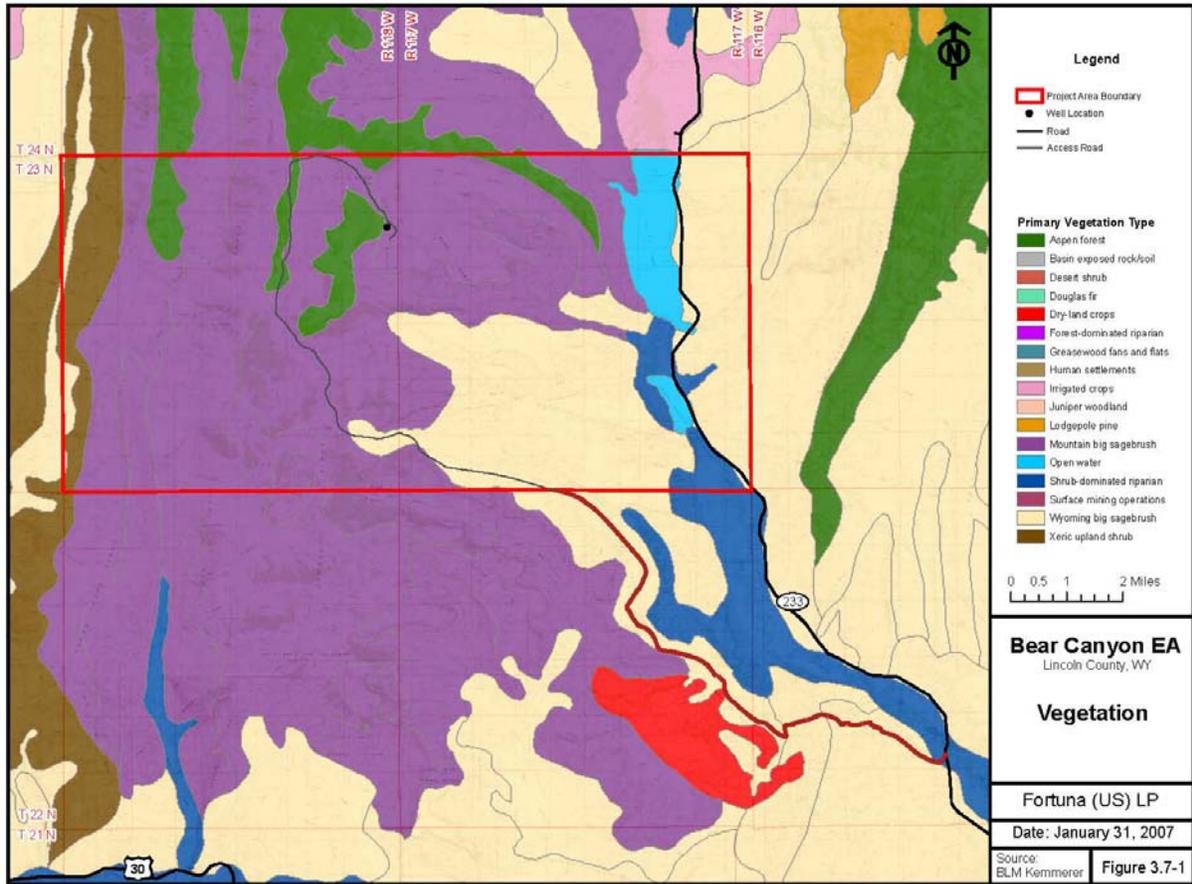


FIGURE 3.7-1

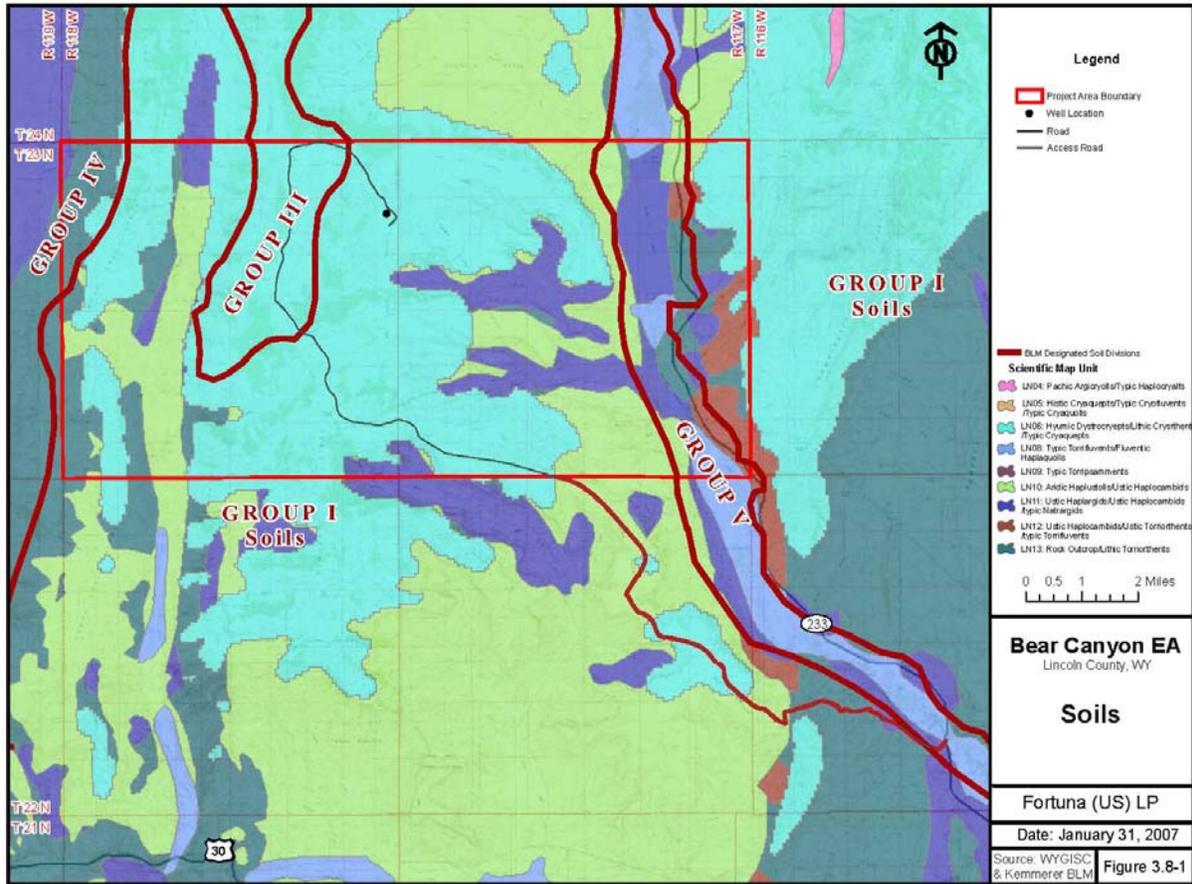


FIGURE 3.8-1

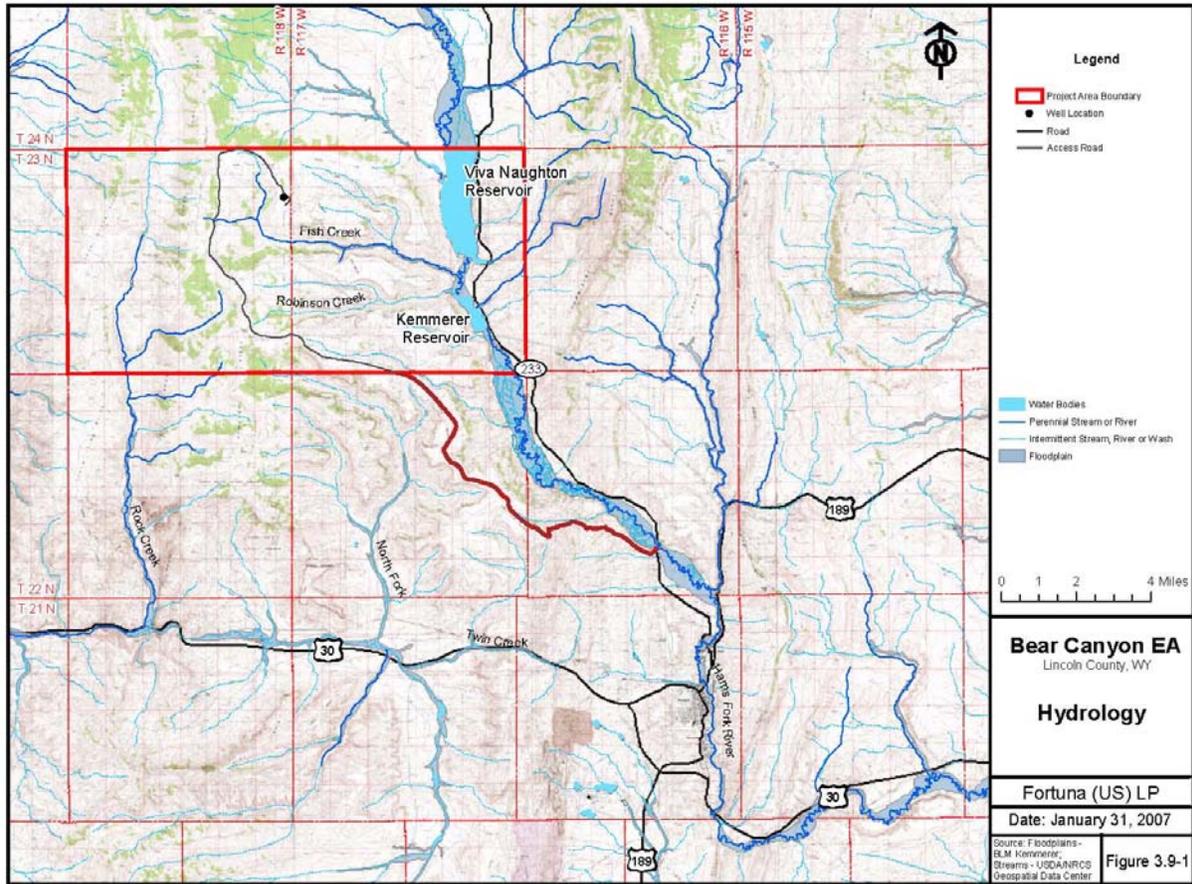


FIGURE 3.9-1

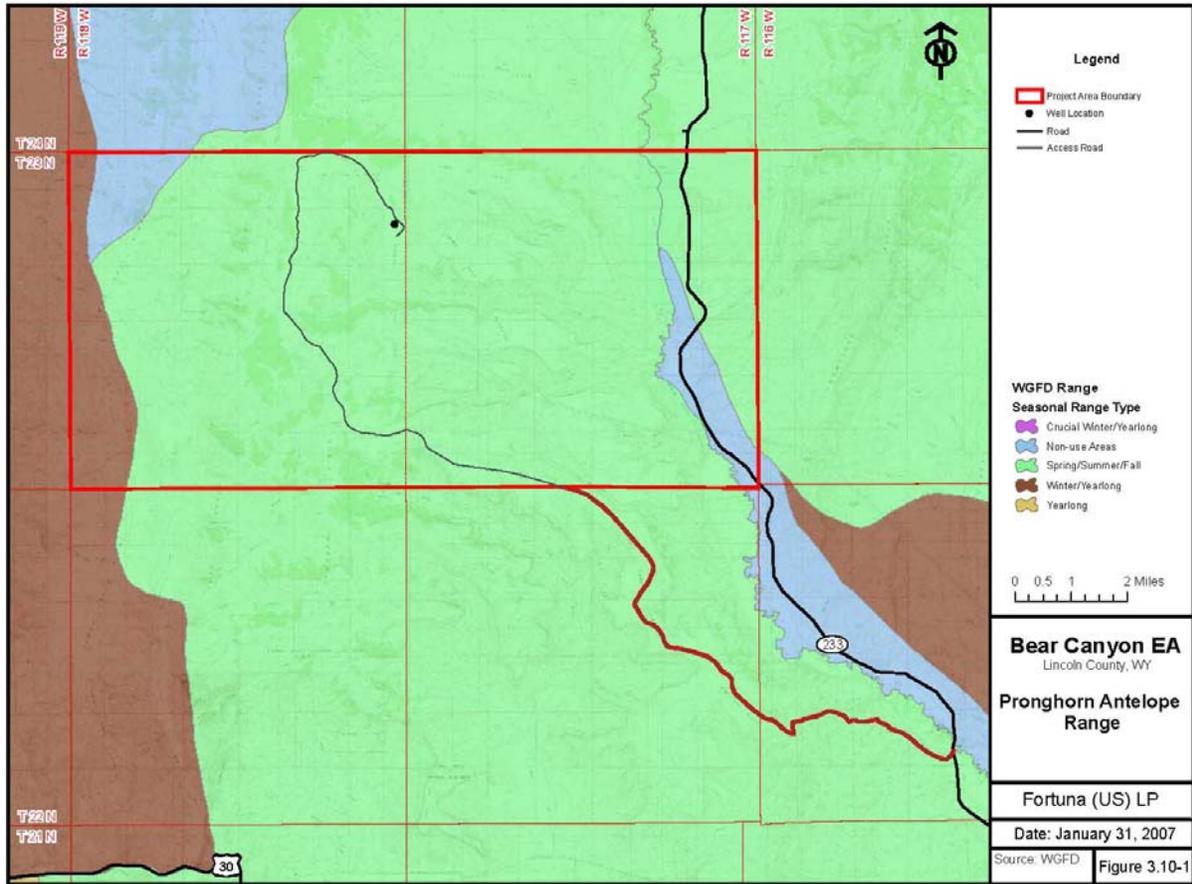


FIGURE 3.10-1

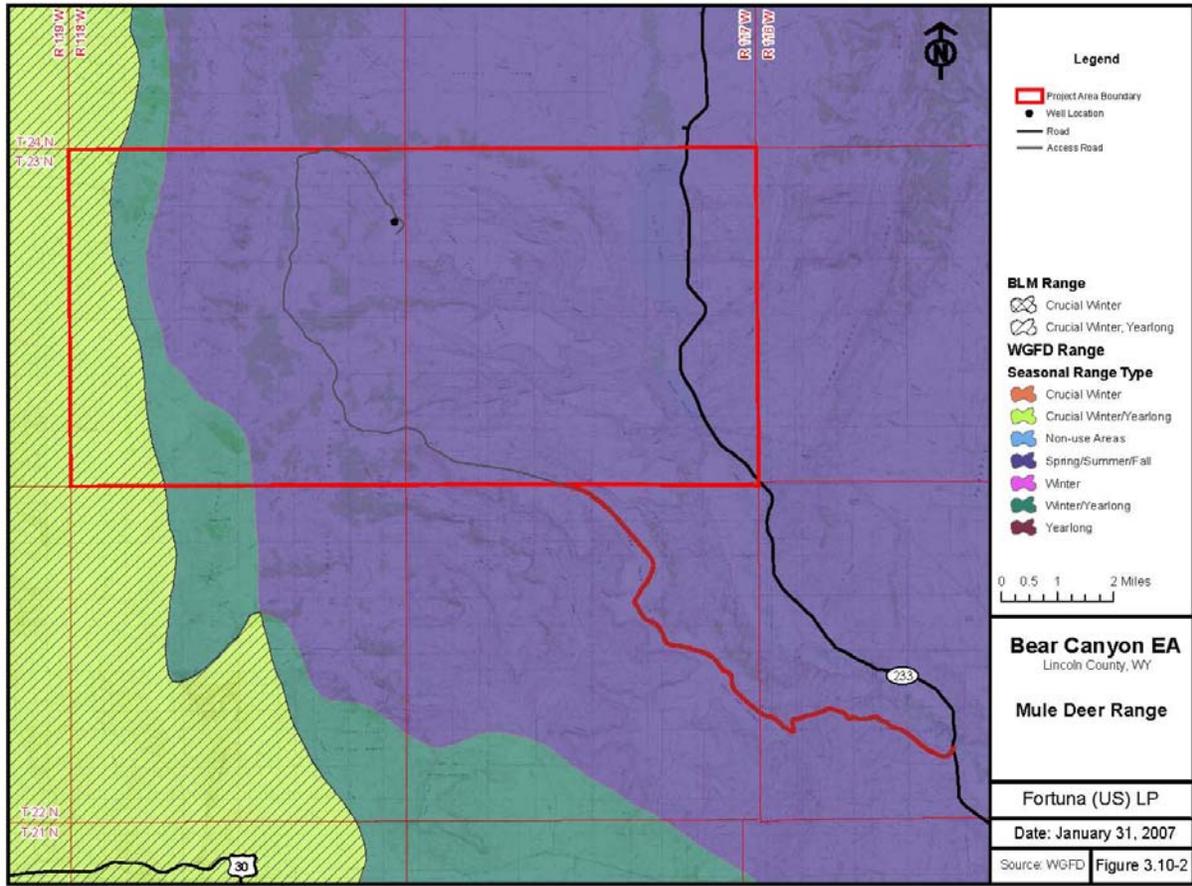


FIGURE 3.10-2

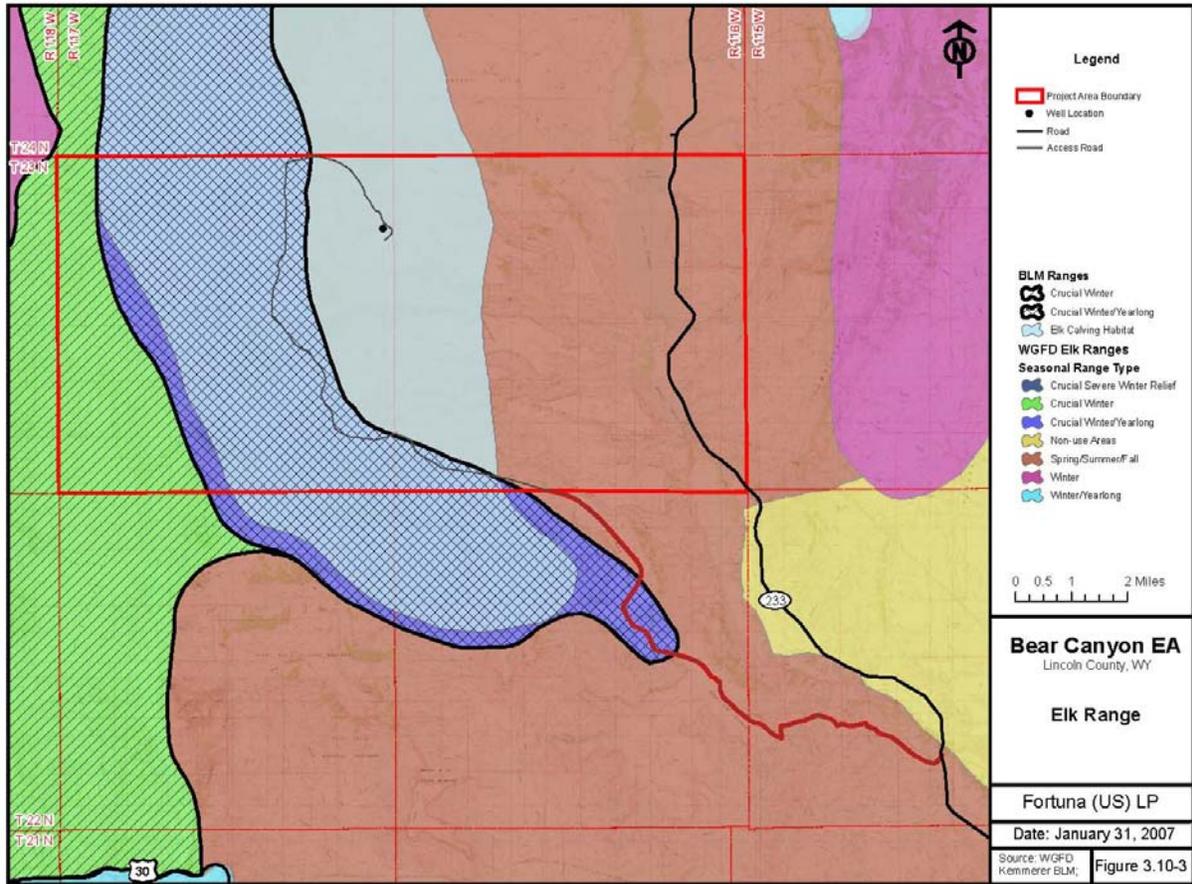


FIGURE 3.10-3

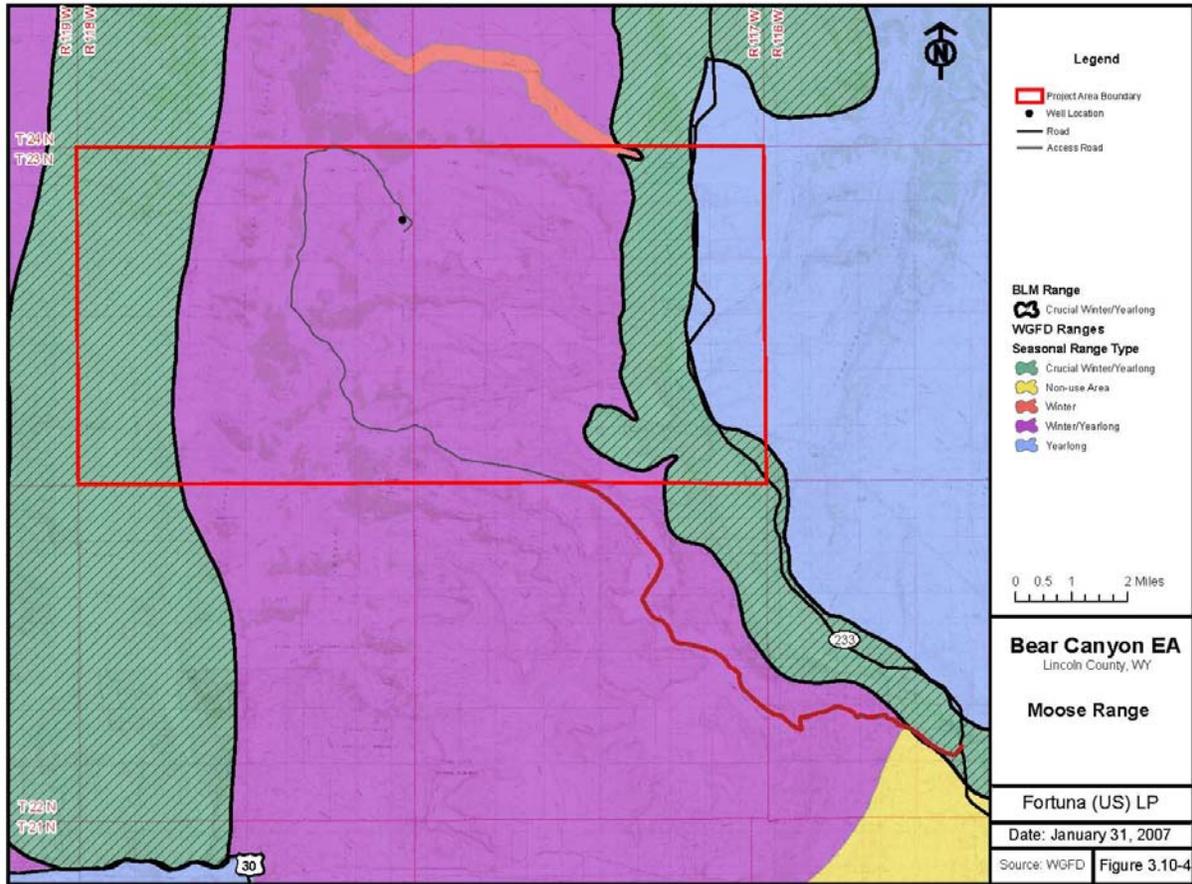


FIGURE 3.10-4

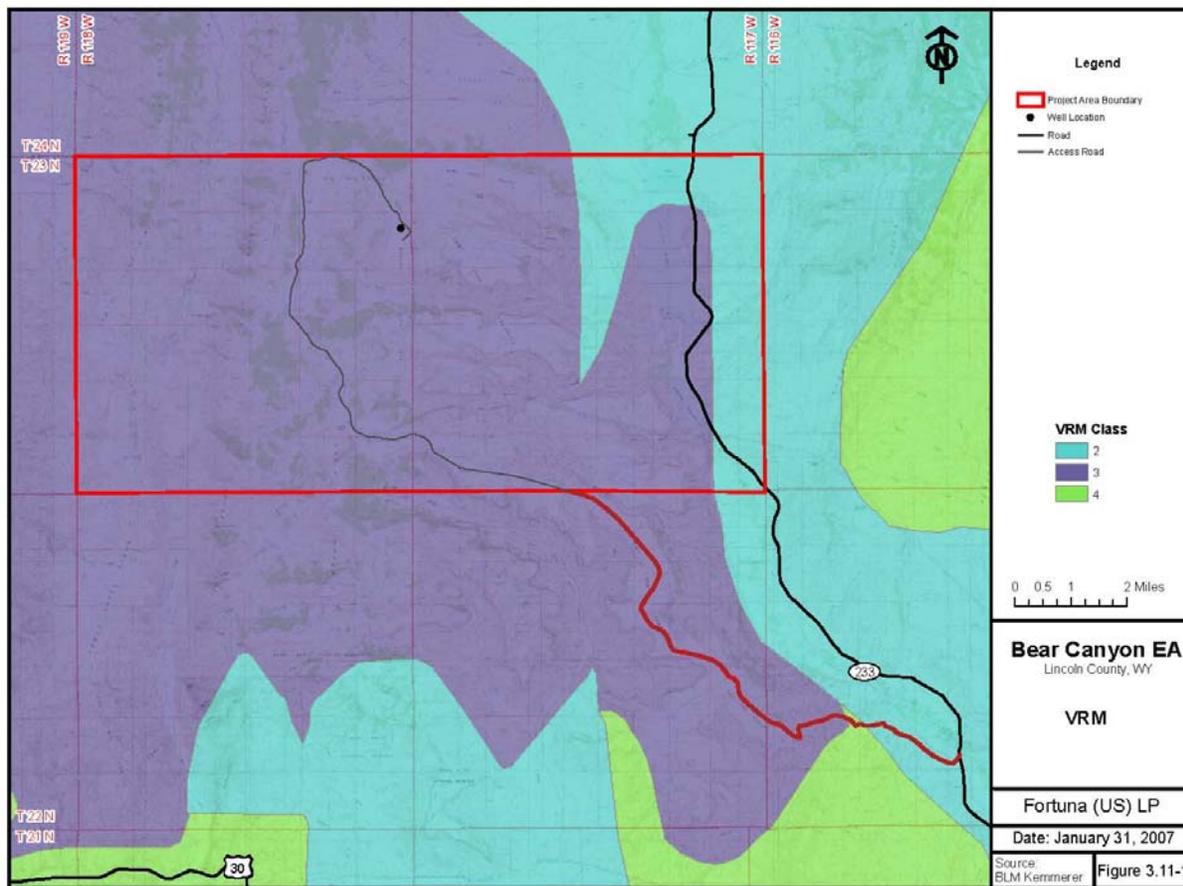


FIGURE 3.11-1

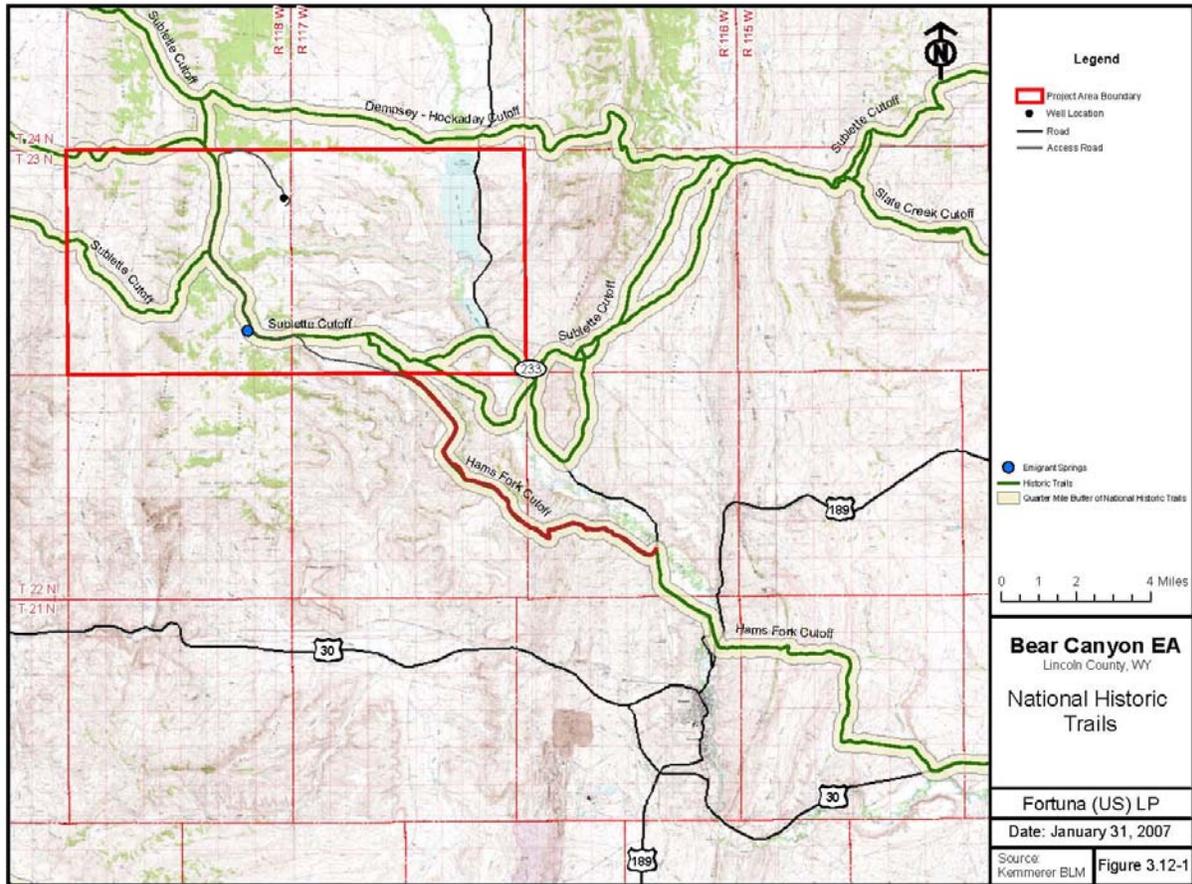


FIGURE 3.12-1

APPENDIX B – BLM IDENTIFIED MITIGATION MEASURES

BLM Identified Mitigation Measures

1. This authorization is contingent upon receipt of and compliance with all appropriate federal, state, county and local, permits.
2. Verbal notification shall be given to the Authorized Officer's representative at least 48 hours in advance of access road/well pad construction, seeding and the initiation of any reclamation work, including the reduction of the drill pad to a well pad.
3. The spud date will be reported orally to the Authorized Officer's representative 48 HOURS PRIOR TO SPUDDING, unless otherwise required in site specific conditions of approval.
4. Verbal notification shall be given to the Authorized Officer's representative at least 24 hours in advance of formation tests, Blowout Prevention Equipment tests, running and cementing casing (other than conductor casing), and drilling over lease expiration dates.
5. Drilling progress reports shall be filed directly to the Kemmerer Field Office on a weekly basis.
6. All Blow Out Prevention Equipment shall be isolated from the casing and tested to stack working pressure.
7. All Blow Out Prevention Equipment tests shall be recorded on a chart and that chart shall be submitted to the Kemmerer Field Office.
8. All Blow Out Prevention Equipment tests shall include a 5 minute low pressure test between 250 psi and 500 psi with no drop in pressure with the only exception being the chokes. The chokes are only required to have the high pressure test held for a minimum of 2 minutes.
9. Low test on Blow Out Prevention Equipment shall be performed and passed before moving onto the high test for each component.
10. This APD is valid for a period of one year from the date of approval or until the oil and gas lease expires/terminates, whichever occurs first. If the APD terminates, any surface disturbance created under the application must be reclaimed in accordance with the approved plan.
11. Approval of this APD does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon. In addition, approval of this APD does not imply that the operator has legal access to the drilling location. When crossing private surface 43 CFR 3814 regulations must be complied with and when crossing public surface off-lease the operator must have approved rights-of-way.
12. A complete copy of the approved APD must be at the drill site during the construction of the roads and drill pad, the drilling of the well, and the completion of the well.
13. The operator is responsible for informing all persons associated with this project that they shall be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects or sites. If archaeological, historical, or vertebrate fossil materials are discovered, the operator is to suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Operations are not to resume until written authorization to proceed is issued by the Authorized Officer.

Within five (5) working days, the Authorized Officer will evaluate the discovery and inform the operator of actions that will be necessary to prevent loss of significant cultural or scientific values. The operator is responsible for the cost of any mitigation required by the Authorized Officer. The Authorized Officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the

Authorized Officer that the required mitigation has been completed, the operator will be allowed to resume operations.

14. The operator shall notify the Authorized Officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony. The operator shall immediately stop all activities in the vicinity of the discovery and protect it until notified to proceed by the Authorized Officer.
15. All survey monuments found within the area of operations shall be protected. Survey monuments include, but are not limited to: General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U. S. Coast and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any survey monuments, the incident shall be reported in writing to the Authorized Officer.
16. The operator shall be responsible for the prevention and suppression of fires on public lands caused by its employees, contractors or subcontractors. During conditions of extreme fire danger, surface use operations may be limited or suspended in specific areas.
17. New hard-band drill pipe shall not be rotated inside any casing. Hard-band drill pipe shall be considered new until it has been run at least once.
18. A sundry notice must be submitted and approved prior to any pit closures or reclamation work. An additional sundry notice (subsequent report) must be submitted including the date of initial seeding and a copy of the seed tags used for each well location.
19. The operator must comply with all applicable Federal, State, and local laws and regulations, existing or hereafter enacted or promulgated, with regard to any Hazardous Materials (Hazmat), as defined in this paragraph, that will be used, produced, transported, stored on or within any of the area affected by this proposal, or used in the construction, operation, maintenance, or termination of operations. "Hazardous Materials" means any substance, pollutant, or contaminant that is listed as hazardous under the CERCLA or 1980, as amended, 42 U.S.C. 9601 et seq., and its recalculations. The definition of hazardous substance under CERCLA includes any "Hazardous waste" as defined in the RCRA of 1976, as materials also includes any nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended. 42 U.S.C. 2011 et seq. The term does not include petroleum, including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCLA section 101(14), 42 U.S.C. 9601(14), nor does the term include natural gas.

The operator agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 421 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901 et seq.) on the Proposed action (unless the release or threatened release is wholly unrelated to the Proposed action). This agreement applies without regard to whether a release is caused by the operator, its agent, or unrelated parties.

20. Construction activity shall not be conducted using frozen or saturated soil material or during periods when watershed damage is likely to occur.
21. The contents of the reserve pit(s) shall be allowed to dry. Any fluids that will not dry after six months shall be moved to a site approved by the Wyoming Department of Environmental Quality.
22. All permanent above-ground structures, e.g., production equipment, not subject to safety requirements shall be painted to blend with the natural color of the landscape. The color selected for this project shall match Slate Green 5Y 4/2 or be an acceptable substitute pre-approved by the local manager. Standard environmental color charts are available from the local BLM Office.

23. Rat and mouse holes shall be filled and compacted from the bottom to the top immediately upon release of the drilling rig from the location.
24. All storage batteries (tanks), including drain sumps and sludge holdings at compressor facilities, installed on location and designed to contain any oil, glycol, produced water, or other fluid which may constitute a hazard to public health or safety, shall be surrounded by a secondary means of containment for the entire contents of the largest single tank in use plus one foot of free board for precipitation or 110 percent of the capacity of the largest vessel. The appropriate containment and/or diversionary structures or equipment, including fire walls and floor, to prevent discharge fluid from reaching the ground, surface, or navigable waters, shall be impervious to any oil, glycol, produced water, or other fluid for 72 hours and shall be constructed so that any discharge from a primary containment system, such as a tank or pipe, will not drain, infiltrate, or otherwise escape to ground surface, or navigable waters before cleanup is completed.

Treaters, dehydrators, and other production facilities installed on location, that have the potential to leak or spill oil, glycol, produced water, or other fluids which may constitute a hazard to public health or safety, shall be placed on or within appropriate containment and/or diversionary structure to prevent spilled or leaking fluid from reaching ground, surface, or navigable waters. The appropriate containment and/or diversionary structures or equipment, including fire walls and floor, to prevent discharge fluid from reaching the ground, surface, or navigable waters, shall be impervious to any oil, glycol, produced water, or other fluid for 72 hours and shall be constructed so that any discharge from a primary containment system, such as a tank or pipe, will not drain, infiltrate, or otherwise escape to ground surface, or navigable waters before cleanup is completed.

Notice of any spill or leakage, as defined in BLM NTL 3A, will be immediately reported by the Operator to the Authorized Officer and other such federal and state officials (e.g. Wyoming DEQ) as required by law. Any oral notice shall be given as soon as possible, but within 24 hours, and shall be confirmed in writing within 72 hours of any such occurrence.

25. All vehicles shall use only the authorized access road, as depicted in this approval. Vehicles shall not use any other access route into the drill/well pad and any ancillary facilities including, but not limited to any two-tracks, pipeline rights-of-way etc..
26. The Holder shall be responsible for total control of all invasive/noxious weed species on any and all disturbed sites. The Holder is responsible for consultation with the Authorized Officer and/or local authorities for acceptable weed control methods, and shall comply with the following:

Use of pesticides/herbicides shall comply with all applicable Federal and State laws. Pesticides/herbicides shall be used only in accordance with their registered uses within limitations imposed by the Secretary of the Interior. Prior to the use of the pesticides/herbicides, the Holder shall obtain from the Authorized Officer, written approval of a Pesticide/Herbicide Use Proposal Plan showing the type and quantity of material to be used, pest(s) to be controlled, method of application, locations of storage and disposal of containers, and any other information deemed necessary by the Authorized Officer.

Applicator(s) of chemicals used must have completed the pesticide/herbicide certification training and have a current up to date Certified Pesticide/Herbicide Applicator's License.

Pesticide/Herbicide Application Records for the areas and acres treated must be submitted to the BLM Kemmerer Field Office each year. This includes the following:

- Brand or Product name
- EPA registration number
- Total amount applied (use rate #A.I./acre)
- Date of application
- Location of application
- Size of area treated
- Method of treatment (air/ground)
- Name of applicator

Certification number

Amount of surfactants or dyes used in spraying operation

The record information must be recorded no later than 14 days following the pesticide/herbicide application and must be maintained for ten years

27. The proposed access road and well location turn around will be graveled with four inches of three inch minus pit run gravel prior to completion of the well, and prior to using for all season travel.
28. Any disturbance outside of the construction corridors for roads and pipelines, must have prior written approval.
29. If snow removal outside the roadway is undertaken, equipment used for the operations will be equipped with shoes to keep the blade six (6) inches off the ground surface. Special precautions shall be taken where the surface of the ground is uneven to ensure that equipment blades do not destroy vegetation.
30. **Prior to any new surface-disturbing activities between February 1 and July 31, Fortuna or their contractor would survey all areas within 3/4-mile of proposed surface disturbance for the presence of raptor nests. If occupied/active raptor nests are found, construction would not occur for up to a 3/4-mile radius during the critical nesting season for that species within the species-specific buffer.**
31. **Prior to any new surface-disturbing activities between February 1 through August 15, Fortuna or their contractor would survey all areas within 1-mile of proposed surface disturbance for the presence of active ferruginous hawk nesting sites. If occupied/active nests are found, construction would not occur for up to a 1-mile radius during the critical nesting season for that species within the species-specific buffer.**
32. **No activity or surface disturbance would be allowed within designated sage-grouse nesting habitat to protect nesting sage-grouse from March 15 - July 15.**
33. **No activity or surface disturbing activities would occur from May 1 – June 30 to protect elk calving habitat.**
34. **No construction activity and surface disturbance will be allowed along the 6 miles of identified crucial big game winter range between November 15 through June 30 for the protection of crucial big game winter range.**
35. **The operator will be required to complete snow removal to maintain access, they will install “wildlife get off gaps” at 1/2 mile intervals along the road to allow for wildlife to cross plowed snow drifts.**
36. **The operator will contain all produced fluids within tanks until given written approval by the Authorized Officer of the proposed disposal location.**
37. **The operator will not store materials (i.e. drums, pipe, miscellaneous equipment) on location without previous is permitted for this location.**
38. **No activity or surface disturbing activities will be allowed from May 1 through June 30 for the protection of elk calving areas.**
39. **If the well is found to be productive the operator in coordination with BLM and WGFD must develop a mitigation and monitoring plan that would minimize the long-term direct and indirect impacts associated with the continued development of the area. This plan would be develop off set the identified impacts of long term development on sensitive resources values (i.e. elk crucial winter range, elk calving, recreation, etc).**
40. **The operator is responsible for informing all persons associated with this project that they shall be subject to prosecution for damaging, altering, excavating or removing any archeological, historical or**

vertebrate fossil objects or sites. If archeological, historical or vertebrate fossil materials are discovered, the operator is to suspend all operations that further disturb such materials immediately and contact the Authorized Officer. Operations are not to resume until written authorization to proceed is issued by the authorized Officer. Within five (5) working days, the Authorized Officer will evaluate the discovery and inform the operator of actions that will be necessary to prevent the loss of significant cultural or scientific values. The operator is responsible for the cost of any mitigation required by the Authorized Officer. The Authorized Officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, the operator will be allowed to resume operations.

41. All regular traffic on the Dempsey Road (BLM Road 4211) related to the authorized APD is allowed only before 10:00 a.m. and after 4:00 p.m., and routine travel to and from the well is prohibited between 10:00 a.m. and 4:00 p.m. Exceptions may occur during emergencies that threaten human health and safety. Other exceptions may be granted on a case by case basis, upon request in advance of planned travel, with written permission of the Authorized Officer.
42. All production facilities, including static components (structures and equipment) and dynamic elements (flare flames), may not exceed 12 feet in total visible height above the ground surface.
43. The recommended seed mix for the project area is shown below. These species are suitable to the area and have the best chance to successfully revegetate disturbed areas. Reseeding should be completed after September 1 and prior to ground frost, or after frost has melted and prior to May 15. Fall seeding after the potential for germination is the preferred method. Additional seedings may be necessary in order to attain successful revegetation where soils are stable and vegetative composition and establishment are similar to other naturally occurring disturbances. At that time BLM determines the actions are acceptable for bond release.

Table 4.7-1. Recommended Seed Mix

Plant Species	Scientific Name	Drill Seeding Rate (lb/acre of pure live seed)
Thickspike or western wheatgrass	<i>Elymus lance-latus</i> or <i>Pascopyrum smithii</i>	3.0
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	4.0
Canby bluegrass	<i>Poa secunda</i> var. Canby	2.0
Indian ricegrass	<i>Oryzopsis hymenoides</i>	2.0
Great Basin wildrye	<i>Elymus cinereus</i>	2.0
White yarrow or Lewis Flax	<i>Achillea millefolium</i> or <i>Linum lewisii</i>	0.5
Total		13.5

The holder may request an exception in writing to the above conditions of approval. Any exceptions to the conditions of approval must have prior written approval from the authorized officer. The exception requests must explain the reason(s) for the exception, and the conditions that exist that would no longer require the condition of approval. All data supporting the exception must accompany the written request.

Decisions on waivers, exceptions, or modifications submitted after drilling has commenced are final for Department of Interior and are not subject to administrative review by the State Director or appeal pursuant to 43 CFR part 4.

Appendix C – AIR QUALITY ANALYSIS

Job No. 05C5482

04th April 2007

Ms. Cory Hemmingway
Talisman Energy Inc.

Dear Ms. Hemmingway:

Re: Dispersion Analysis for SO₂ emissions at Talisman's Proposed Bear Canyon Well Site

We have, as requested, conducted a dispersion analysis to predict ambient SO₂ concentrations associated with the proposed Incinerator at Talisman Energy's proposed Bear Canyon Well Site. The dispersion modeling was conducted using CALPUFF model and the predicted concentrations are compared against Wyoming Ambient Air Quality Standards (WAAQS).

INTRODUCTION

Talisman Energy intends to incinerate waste gas streams continuously during normal operations at their Bear Canyon Well Site located within Uinta County, Wyoming, USA.

In order to assess potential air quality impacts resulting from SO₂ emissions due to incineration of waste gas streams, dispersion modelling was conducted by Colt Engineering Corporation. Ambient SO₂ concentrations in the vicinity of the subject site associated with the normal operations scenario were predicted. This report presents the modelling methodology and provides predictions of ground-level ambient sulphur dioxide (SO₂) concentrations.

ASSUMPTIONS

- An oil battery configuration was assumed for the well site facility for the purposes of this study.
- The gas processing configuration would only result in the worst case scenario of emergency flaring event for a maximum duration of 15 minutes and hence was not included in this study.

METHODOLOGY

Model Selection

The US EPA CALPUFF Model (in 2-dimensional mode) was used to predict the SO₂ ground-level concentrations for 3-hour, 24-hour and annual averaging periods. CALPUFF is an advanced non-steady-state puff dispersion model recommended for use in complex terrain situations for modelling ground-level and ambient concentrations of pollutants from industrial sources. CALPUFF model is one of the recommended models for conducting refined assessments and is acceptable by USEPA.

Meteorology

SAMSON (Solar and Meteorological Surface Observation Network) Data from Rock Springs and SCRAM Mixing Height Archived Data for Wyoming State were utilized for this study. Utilizing PCRAMMET, a meteorological time series was prepared using the dataset to contain hourly observations for four years, from 01 January, 1987 to 31 December, 1990.

Modelling Domain and Receptors

The Universal Transverse Mercator (UTM, NAD 83) co-ordinate system was used for the purpose of this modelling. With the Well Site located near the center, a 50 km × 50 km receptor grid formed the modeling domain. Topography was derived from 1-degree USGS DEM terrain data, with receptors placed at:

- 50 m spacing within 0.5 km from the well site boundary;
- 250 m spacing from 0.5 km to 2.5 km from the well site;
- 500 m spacing from 2.5 km to 5 km from the well site;
- 1000 m spacing from 5 km to the outer range of the domain;

SO₂ Emissions at Bear Canyon Well Site

Table 1 summarizes the emission parameters associated with the proposed Incinerator, that were provided by the Incinerator manufacturer and used in the CALPUFF modelling.

Table 1 Gas Composition and Emission Parameters associated with the proposed Incinerator at the Talisman Bear Canyon Well Site

Emission Parameter	Incinerator
Stack Height (m)	12.2
Stack Diameter (m)	1.556
Exit Temperature (K)	1254
Exit Velocity (m/s)	12.71
SO ₂ Emission Rate (g/s)	0.27

MODELING RESULTS

The air dispersion modeling was conducted using Rock Springs Meteorological data set, in conjunction with the above emission parameters, and terrain data to predict ground-level SO₂ concentrations. The maximum predicted ambient ground-level concentrations of SO₂ associated with emissions from the proposed Incinerator are presented in Table 2.

Table 2 Maximum predicted ambient ground-level SO₂ concentrations associated with the proposed Incinerator at the Talisman Bear Canyon Well Site

Averaging Time	Maximum Predicted SO ₂ Concentration [µg/m ³]	Background Concentration* [µg/m ³]	Maximum Predicted SO ₂ Concentration including background concentrations [µg/m ³]	Wyoming Ambient Air Quality Standards [µg/m ³]
3-hour	7.5	93	100.5	1300
24-hour	2.2	32	34.2	260
Annual	0.33	4	4.33	60

* Data collected at Lost Cabin Gas Plant (preconstruction monitoring) Fremont County, WY 1986-1987 La Barge Study Area at the Northwest Pipeline Craven Creek site, 1982-1983 (WDEQ).

CONCLUSIONS

All the predicted three-hour, 24-hour and annual average ambient SO₂ concentrations in the vicinity of the Talisman Bear Canyon Wellsite associated with the proposed Incinerator, including background concentrations are below the Wyoming Ambient Air Quality Standards (WAAQS). Therefore, based on these modelling results, normal operations at Talisman Bear Canyon Wellsite should not result in any violations of WAAQS.

We hope that this letter is sufficient for your informational needs. If you have any additional questions please do not hesitate to contact me directly at (403) 640-3970.



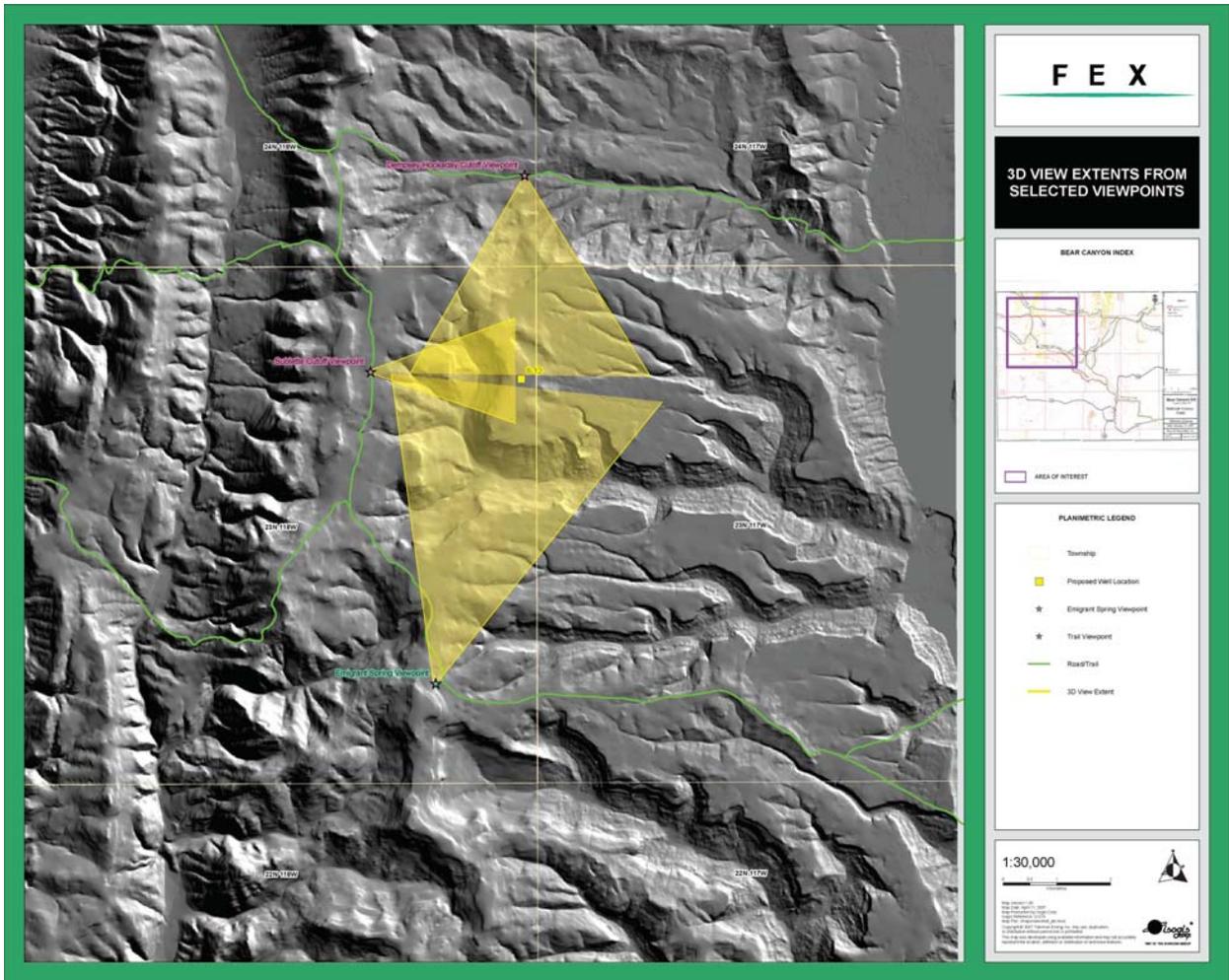
Amit Bhargava, P. Eng.
Senior Environmental Engineer

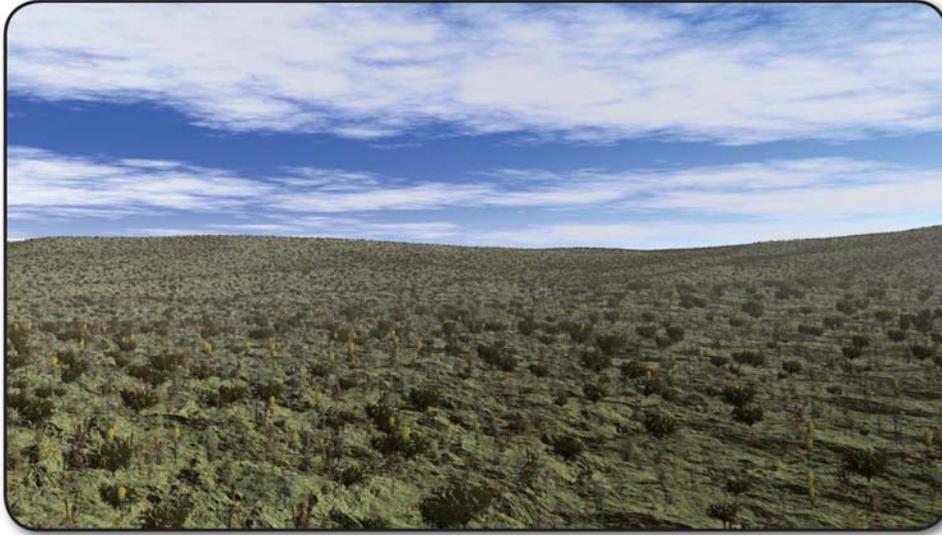
H2S and SO2 Calculations

	<i>Stream 1</i>	<i>Stream 2 (4</i>	<i>Combined</i>
Composition	Mole fraction		
Hydrogen	0.0002	0.0000	0.0002
Nitrogen	0.0610	0.0086	0.0598
CO2	0.0422	0.0324	0.0420
H2S	0.0005	0.0007	0.0005
Methane	0.5595	0.1889	0.5512
Ethane	0.1342	0.1577	0.1347
Propane	0.0951	0.2234	0.0980
i-Butane	0.0223	0.0717	0.0234
n-Butane	0.0442	0.1524	0.0466
i-Pentane	0.0114	0.0447	0.0121
n-Pentane	0.0102	0.0405	0.0109
n-Hexane	0.0067	0.0275	0.0072
n-Heptane+	0.0051	0.0209	0.0055
Flowrate (MMSCF)	0.02426	0.0006	0.0248151

Ambient Pr. (kPa)	101.325
Volumetric flowrate of H2S (Sm ³ /s)	9.84685E-05
Rydberg's Constant (R)	8.3144
Temperature (K)	288
No. of moles of H2S (moles/s; n= PV/R'	0.004166682
Incinerator conversion efficiency	99.9%
No. of moles of SO2 (moles/s)	0.004162515
Mol. Wt. Of SO2 (g/mol)	64
SO2 emission rate (g/s)	0.27

APPENDIX D – VISUAL SIMULATIONS

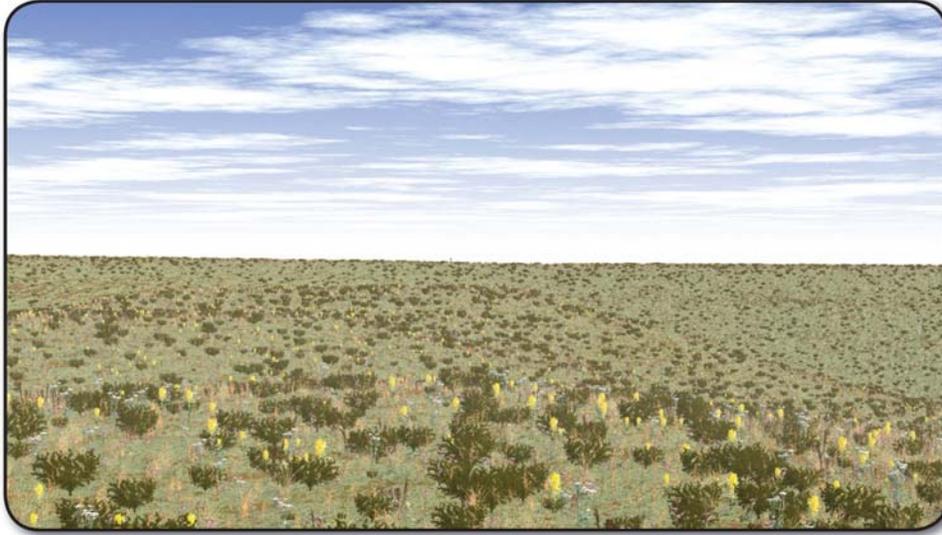




Bear Canyon
VISUALIZATION

View from the Dempsey-Hockaday Cutoff Trail – Example #1 – Actual View





Bear Canyon
VISUALIZATION

View from the Sublette Cutoff Trail – Example #1 – Actual View

DEVELOPED WITH  **Isogis**
Group
PART OF THE SILVACOM GROUP

