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DRAFT OIL AND GAS TECHNICAL REPORT

DRAFT

TECHNICAL REPORT

FOR

OIL AND GAS, AND GEOTHERMAL
RESOURCES

FOR THE

UNCOMPAHGRE BASIN RESOURCE AREA

RESOURCE MANAGEMENT PLAN
AND
ENVIRONMENTAL IMPACT STATEMENT

U.S. DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT
MONTROSE DISTRICT

JULY 1987

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I. INTRODUCTION

A. PURPOSE AND NEED

The purpose of this technical report is to provide an informational basis for the analysis of oil and gas and geothermal resource management in the Uncompahgre Basin Planning Area Resource Management Plan (RMP). This report describes the history of and potential for oil and gas and geothermal operations in the planning area. The impacts of these operations on important resources within the planning area are analyzed and mitigating measures are described. These mitigating measures provide the basis for lease stipulations described in the RMP. This analysis is necessary to fulfill the documentation requirements of the National Environmental Policy Act.


B. REGIONAL GEOLOGIC SETTING


Oil and gas are known to occur in most of the sedimentary geologic formations that underlie the planning area including the Dakota, Entrada, and Mesaverde formations. With the exception of the Gunnison Gorge, all lands within the planning area are considered prospectively valuable for oil and gas. There are three designated Known Geologic Structures (KGSs) within the planning area (see Map 1). These KGSs, each 360 acres, are located north of Delta on the southern slopes of Grand Mesa. These KGSs were designated on


M-1.

Known Oil and Gas Resources on Federal Lands within & Adjacent to the Planning Area



Key:  Producing Oil & Gas Field

 KGS Area

 Planning Area

the basis of one test well each. These wells are presently closed but available for production (shut-in). Two of the KGSs show evidence of oil and gas; the other shows evidence of gas.

The southern edge of the planning area is prospectively valuable for geothermal resources. Geothermal spring waters have been used privately for hot springs swimming pools along with domestic and greenhouse heating. These hot springs originate in the San Juan Volcanic District.

C. LEASING HISTORY

Only non-competitive oil and gas leases have been issued in the Uncompahgre Basin Planning area. A total of 67 tracts were offered for lease by simultaneous listing in 1985. Of these tracts, 33 received no bids and 34 received an average of 4 bids, with a bid range of one to 36. Approximately 519,015 acres were leased and 48,710 acres were under lease application as of April 1986. The average annual rental received on all oil and gas leases within the planning area is approximately \$800,000.

No geothermal leases have been issued in the planning area. There are, however, seven pending lease applications.

D. CURRENT TRENDS IN EXPLORATION AND DRILLING

From 1975 to 1981, three to five applications for a Permit to Drill (APD) were processed annually within the planning area. The majority of these APDs were drilled. One seismic line and no APDs have been processed since 1981. No production facilities presently exist in this area. Given the low incidence of oil and gas producing formations along with the little past and no recent oil and gas production in the planning area, the favorability for production of these resources is considered to be low to moderate.

E. OIL, GAS, AND GEOTHERMAL OPERATIONS

1. Exploration and Development Operations

Subsurface characteristics are explored by geophysical methods that measure gravitational and magnetic fields along with seismic characteristics. Gravitational and magnetic surveys involve small portable units that are transported using light 4x4 vehicles or occasionally helicopters. Surface disturbance usually involves ORV tracks and small hand-dug holes (1 foot x 2 feet x 2 feet) for instruments placement.

Seismic lines are the most popular of the geophysical methods. An energy source and seismic sensors are located along lines in a one to two mile grid. Some surveys may be designed that exceed 40 miles of grid or single line

patterns. In areas where little is known about the subsurface, a series of short seismic lines may be initiated to determine the attitude of subsurface formations. After this preliminary study, seismic line lay-outs are designed with a specific alignment to achieve the study objective. Some adjustments, up to one-quarter mile, can be made to line spacing without affecting the results.

Existing roads are used to conduct seismic operations wherever possible. Some lines may require clearing of vegetation and loose rock to improve access for trucks. Each mile of line, cleared to a width of 8 to 14 feet, typically disturbs about an acre of land. Completely clearing a seismic line is unusual; most off-road lines are bladed only at wash crossings. A bulldozer is often utilized to tow vehicles through rough spots or sandy areas.

Seismic exploration methods utilize shock waves to determine subsurface characteristics. Thumpers, vibroseis, and dinoseis utilize different methods of shock wave generation but have similiar surface disturbance effects. Typically, four or five energy source trucks (weighing two to ten tons), along with cable and recording trucks travel along a two-lane off-road trail. More than one pass may be required during operations. Some use of parallel and closely aligned trails may be utilized to reduce surface impacts.

The thumper method utilizes a three ton weight to generate seismic waves. This weight is dropped several times in succession from a crane mounted truck.

The vibroseis method utilizes three to four trucks or tractors equipped with vibrators mounted between the front and back wheels. Several additional vehicles and a crew of ten to fifteen people are necessary to support this operation. The vibrator pads are lowered to the ground and triggered from the recorder truck.

The dinoseis method utilizes a bell-shaped chamber mounted underneath a vehicle. Seismic energy is generated using an ignition of propane and oxygen that is confined within the chamber.

Explosives are also utilized to generate seismic waves. In the subsurface method, explosives are detonated within holes drilled to a 25 to 200 foot depth. The amount of surface disturbance from these explosions ranges from no disturbance to a crater up to 6 feet in diameter. Drill cuttings can be scattered or placed back in the hole. The same hole may be reloaded and shot several times.

Small and easily portable drilling equipment can be used where access is limited. These easily portable operations utilize a pattern of holes drilled to a 25 foot depth that are detonated simultaneously. Truck-mounted drill

rigs, weighing 15 to 20 tons, are utilized in more accessible areas. Construction of roads and trails is often necessary to allow use of these truck mounted drill rigs.

The surface method involves detonating explosives either directly on the surface or on a variety of stakes and platforms. Surface explosive methods are very mobile and typically result in little surface disturbance. Equipment can be transported using pickup trucks, helicopters, or pack teams. Detonating explosives above the surface or on deep snow often results in little to no surface disturbance. Detonating explosives on the surface typically results in vegetation loss and soil compaction in the immediate vicinity (6 feet) of the charge.

Wells are drilled in areas determined by seismic operations to have oil and gas or geothermal formations. Existing county or BLM roads are utilized to access the general drilling area. These roads may be upgraded, including crowning and ditching, grade reduction, realignment, culverts, and cattleguards, to accomodate construction and drilling equipment. New roads that typically are 16 to 20 feet wide are constructed to the well site. Surface disturbance from road construction is often greater on steep slopes due to the requirements for cuts and fills.

The average drill pad size in the planning area is two acres. These pads are leveled to accommodate machinery and equipment. Deep wells may require larger drill rigs and well sites up to three acres in size. The average drilling depth in the planning area ranges from 3,000 to 5,000 feet. The deepest well drilled in the area is approximately 10,000 feet.

A pit to contain waste drilling fluids and drill cuttings is constructed on the drill pad. The size of the pit depends on the well depth and the methods of drilling. Deep and mud-drilled wells require large pits; shallow and air-drilled wells require smaller pits. These reserve pits may vary from 10x250x6 feet to 30x100x15 feet. Pits are typically fenced and lined with an impermeable material to prevent leakage.

The drill rig is usually moved to the drill site within one or two weeks after site construction. Up to 25 truck loads of equipment are required to transport a typical drill rig. After the rig and support structures are emplaced, drilling is accomplished by a rotating drill bit at the end of a drilling column (string). Drill cuttings are pushed up the hole using compressed air or a mud mixture of water, clay, and chemical additives. Caustic, acidic, or toxic chemical additives are occasionally used. Drill cuttings, contaminated mud, and waste drilling fluids are held in the reserve pit. The drill hole is typically cased with steel pipe.

Drilling operations are maintained continuously for 24 hours a day, seven days a week. Drilling usually lasts for two to 30 days, depending on the well depth and drilling complications. From 5,000 to 15,000 gallons of water a day is usually required for drilling muds, cooling equipment, cleaning equipment, and other drilling operations. Water is typically piped or trucked from the nearest suitable source.

When the planned depth of the well is achieved, one or more of the following completion operations is conducted: (1) logging to measure porosity, permeability, and saturation of the formation; (2) drill stem testing to measure production levels; (3) installing and perforating the production casing to allow production of the formation; and (4) formation stimulation that usually involves fluid fracture or dissolving the formation with acid to increase the flow and available capacity of the formation. If producible oil and gas or geothermal resources are discovered, the well is shut-in until production is desired. The well is plugged and abandoned if producible amounts of oil and gas or geothermal resources are not discovered.

2. Abandonment Operations

Wells are abandoned if no resource is discovered. Abandonment of dry holes typically involves filling the area below the casing with heavy mud, plugging the bottom of the casing with cement, filling the casing with heavy mud, and capping the casing with cement. Protection of aquifers and known

producing formations may require placement of additional cement plugs. A surface marker is usually required with the location and name of the well. If this marker is not required, the casing may be cut and capped below the ground level and backfilled with soil.

Drill rigs are removed after plugging and the surface of the well pad is restored to the requirements of the surface management agency. Restoration often includes evaporation or removal of drilling fluids from the reserve pit, recontouring the drill pad, spreading the stockpiled topsoil, and seeding an appropriate seed mixture. A fence is often erected to protect the site from livestock or other disturbance until revegetation is complete.

Reclamation typically involves 10 years to reestablish the previous ground cover. This reclamation period varies depending on the soil type and other site-specific conditions. Reclamation efforts are usually approved by the BLM within three years if all required measures are completed and if revegetation success appears likely. Approval of reclamation releases the operator from future reclamation requirements.

II. DESCRIPTION OF THE REASONABLE FORESEEABLE LEVEL OF OPERATIONS

The reasonable foreseeable level of operations for the planning area during the next ten to fifteen years is anticipated to be three to ten APDs per year. These operations would result in a maximum of 30 acres of surface

disturbance and three seismic lines annually. No production facilities would be developed. The probability for production or pipeline facilities is considered low given the past and present trends within the planning area for oil and gas and geothermal exploration and development.

The analysis of this production level will not include spacing requirements or other detailed analysis specified in Information Bulletin WO-84-261 as the probability of oil and gas production is so minimal.

III. IMPACTS FROM THE REASONABLE FORESEEABLE LEVEL OF OPERATIONS

A. AIR QUALITY

Carbon monoxide, hydrocarbon, and airborne particulate levels would increase slightly in the immediate vicinity of exploration operations. This air quality deterioration would result from windblown erosion from up to 30 acres of access roads and drill pads that would be developed annually (totalling up to 300 acres after ten years), and from vehicle and machinery exhaust.

Airborne particulates would decrease to pre-development levels within ten years as reclamation measures become effective. Carbon monoxide and

hydrocarbon increases would be present only during periods of operation (six months or less) for the three to ten annual operations. These substances would be readily dispersed and would not have a measurable effect on local or regional air quality.

B. SOILS

The reasonable foreseeable operational level would decrease the short-term productivity of very small and scattered areas within the planning area. At a disturbance level of 30 acres per year and a typical rehabilitation period of 10 years, a maximum of 300 acres of disturbed soils would be anticipated at the end of 10 years. This acreage total would remain fixed after 10 years and would involve areas ranging from being disturbed by on-going operations to being nearly rehabilitated. Long-term impacts to soil productivity would depend on the success of rehabilitation.

Construction of up to three acres of access roads and drill pads per operation would decrease soil productivity in up to 300 acres of affected areas after ten years. Protective vegetative cover would be removed or trampled allowing for water and wind erosion. Soil infiltration rates would decrease as use of heavy equipment increases soil density and decreases both soil porosity and permeability. Loss of soil infiltration would cause accelerated sheet, gully, and channel erosion.

The severity of soil disturbance depends on many factors including soil type and slope along with both the season and duration of operations. Soil disturbance from these three-acre operations would be greatest on 69,414 acres of the planning area determined to be highly erodible and of low soil productivity. These areas are located in Mancos shale derived soils (80 percent) and in areas of previously chained pinyon-juniper woodlands (20 percent). These soils are most susceptible to damage during periods of high soil moisture (typically March 1 to May 31). A 34,800-acre portion of these highly erodible soils have a higher probability for oil and gas operations than most of the planning area as they are located in the vicinity of shut-in wells with measurable oil and gas resources.

Operations in areas of steep terrain typically result in greater soil loss than in areas of moderate to no slope. This increased soil loss is a function of the shallow and unstable soils characteristic of steep slopes and of the increased velocity of precipitation run-off. Operations with longer durations increase the time that soils are susceptible to both erosion and disturbance by heavy machinery. These disturbances are increased over time by recreational ORV use.

Effective rehabilitation depends on many factors including the degree of disturbance and the soil productivity. Scalping and stockpiling topsoil during the construction phase can decrease rehabilitation time by providing a good plant germination and growth medium. Typical rehabilitation measures

include recontouring, soil ripping, and seeding. Rehabilitation of these three-acre disturbances would be especially difficult in the 69,414 acres of low productive soils.

C. WATER RESOURCES

The reasonable foreseeable operational level would very slightly increase sediment and possibly salinity levels in watersheds within the planning area. Soils eroding from up to 300 acres of disturbed areas (see impacts to soils) could enter local watersheds in the form of dissolved solids. This soil would originate from scattered disturbances of up to three acres in size. These dissolved solids would degrade water quality in the immediate vicinity of the disturbances but would not be transported significant distances given the small size and scattered distribution of the soil sources.

Operations within saline soil areas would increase salinity levels in local surface waters. The influx of salinity originating from up to ten scattered disturbances of three acres in size annually, could be transported into local watersheds and contribute to the overall salinity problem within the Upper Colorado River Basin. This contribution, although very small, would be significant given federal efforts to reduce or eliminate salinity sources in the Colorado River Basin.

Water quality deterioration, although very slight, would be greatest from operations within 69,414 acres of highly erodible soils. A 55,807-acre portion of these soils are also highly saline. Of these highly saline soils, 34,800 acres have a higher probability for oil and gas operations than most of the planning area as they are located in the vicinity of shut-in wells with measurable oil and gas resources. Sediment and salinity contributions from these acres would be greatest from surface-disturbing activities occurring during the high soil moisture periods (March 1 to May 31) when soils are most vulnerable to damage.

Contamination of groundwater systems during or after exploration operations is considered very unlikely as current regulations require measures to protect against inter-formational groundwater movement and groundwater contamination. These regulations also protect against surface and groundwater contamination from brine or mud pit seepage.

D. VEGETATION

The reasonable foreseeable operational level would degrade or eliminate vegetative communities on very small and scattered areas within the planning area. At a disturbance level of 30 acres per year and a typical rehabilitation period of 10 to 20 years to reestablish a plant community, a maximum of 300 acres of disturbed vegetative communities would be anticipated at the end of 10 years. This acreage could increase to and remain stable at

600 acres at the end of 20 years if the low operational level remains in effect and if all operations affect plant communities that require 20 years for full rehabilitation. Given the scattered distribution of these operations, no one particular plant community in the planning area would likely be adversely impacted.

Vegetation would be disturbed or destroyed during the construction of roads, drill pads, and seismic lines. Vegetation cover, density, diversity, and composition would be affected. The success of vegetative rehabilitation depends on a variety of factors including the levels of soil disturbance, the methods of construction, the reclamation techniques utilized, and both the original plant community and the soil productivity of the area. Scalping and stockpiling of topsoil during the construction phase can decrease revegetation time by providing a good plant germination and growth medium. Irrigation and planting of root or potted plant stock may be necessary in some areas to achieve reestablishment of a plant community. Ease in rehabilitation varies throughout the planning area from the very easy sage flats to the very difficult adobe soil slopes.

Threatened, endangered, or candidate (T&E) plant species would be protected on a site-specific basis at the APD stage. Table 1 lists T&E species that are known to occur within the planning area. Consultation with the U.S. Fish and Wildlife Service would be initiated in all APDs involving lands with T&E species. Several concentrations of T&E species that qualify

Table 1

ENDANGERED, THREATENED, CANDIDATE, OR SENSITIVE PLANT SPECIES KNOWN TO OCCUR WITHIN THE PLANNING AREA

COMMON NAME	SCIENTIFIC NAME	STATUS	HABITAT	ESTIMATED ¹ POPULATION	ESTIMATED ¹ ACRES OF HABITAT
Spineless hedgehog cactus	Echinocereus triglochidiatus var. inermis	Endangered	Gravelly soils on flats and low hills along major drainages	13,000 plus	app. 20,000
Clay-loving wild buckwheat	Eriogonum pelinophilum	Endangered	Whitish soil within Mancos shale	app. 300	app. 40
Uinta Basin hookless cactus	Sclerocactus glaucus	Threatened	Rocky soils	6,000 plus	app. 40,000
Montrose penstemon	Penstemon retrorsus	Candidate ²	Shallow slopes on Mancos shale	Unknown	Unknown
Delta lomatium	Lomatium concinnum	Candidate ²	Low altitude Mancos shale areas in association with saltbrush	500 plus	Less than 40
Grand Junction milkvetch	Astragalus linifolius	Candidate ²	Steep rocky slopes and bottoms in major canyons	Unknown	Unknown
Eastwood monkeyflower	Mimulus eastwoodiae	BLM Sensitive	Limestone seeps, hanging gardens	Unknown	Very restricted
Barneby's columbine	Aquilegia barnebyi	BLM Sensitive	Base of vertical cliffs often in rock crevices	Unknown	Less than one

Notes:

- ¹ Estimated populations and acres of habitat are on public land only.
- ² Listing as endangered or threatened would possibly be appropriate with further study.

for Research Natural Area (RNA) or Area of Critical Environmental Concern (ACEC) designation have been identified within the planning area. Oil and gas operations within these areas would very likely affect populations and potential habitats of these species. A 1,895-acre portion of Escalante Canyon, in the vicinity of Cottonwood Spring, provides habitat for the threatened Uinta Basin hookless cactus (Sclerocactus glaucus), and the candidate Grand Junction milkvetch (Astragalus linifolius). The Fairview T&E plant areas, totalling 377 acres east of Montrose, provide habitat for the endangered clay-loving wild buckwheat (Eriogonum pelinophilum) and the candidate Montrose penstemon (Penstemon retrorsus).

Operations located within riparian zones would degrade this productive and diverse ecosystem. Riparian areas characteristically display greater diversity of plant and animal species and of vegetation structure than adjoining ecosystems. Healthy riparian systems filter water as it moves through the riparian zone, reduce sediment loads and enhance soil stability, provide microclimatic moderation when contrasted to extremes in adjacent areas, contribute to aquifer recharge, and enhance the stability and amount of base water flow. Riparian zones also disipate stream energies associated with water high flows.

Removing riparian vegetation during access and drill pad construction would reduce or eliminate these positive attributes associated with riparian zones. These impacts would be long-term if the site-specific riparian

vegetation is slow growing or if the disturbance either reduces or eliminates the available water that sustained the riparian system. The level of overall impact depends on the amount of riparian areas disturbed by operations in the planning area. Given a maximum of 30 disturbed acres per year throughout the planning area, the probability of any extensive riparian disturbance is considered low.

E. TERRESTRIAL WILDLIFE

The reasonable foreseeable operational level would degrade terrestrial wildlife habitat on small and scattered areas within the planning area. Small mammals, reptiles, amphibians, invertebrates, and young birds would be killed or forced to abandon the area during access, drill pad, and seismic line development. Given the scattered distribution of these operations, none of the animal populations in the planning area would likely be adversely impacted to any great extent.

Oil and gas operations in crucial or important habitat for some species may increase mortality or decrease breeding success of populations throughout the area. The presence of human activities, equipment use, and disturbed areas can exceed the tolerance levels for some species resulting in increased stress, altered behavioral patterns, and abandonment of optimal or home ranges.

Operations located within crucial deer and elk winter ranges, totalling 159,000 acres in the planning area, would likely force populations of these species to abandon areas of adequate winter cover and forage for less suitable ranges. Disturbance would increase the winter energy deficit for these animals at a time of annual negative energy balance. The viability if these populations would decrease as a lack of cover and food during harsh winter conditions increases stress and mortality. These stress conditions would also decrease population recruitment by decreasing spring fawning rates. These impacts would be greatest in the Cedaredge and Paonia areas along with the slopes of the Uncompahgre Plateau south of Highway 50.

The amount of deer and elk displacement from an operational area depends on site-specific factors such as the amount of available forage in relation to screening by timber stands and topography, the configuration of access routes, and the level of operational activities. The dependency of deer and elk populations on a particular crucial winter range relates directly to the severity and duration of deep snows and low temperatures. These populations typically utilize crucial winter ranges from December 1 to April 30.

Operations located within elk calving areas, totalling 3,292 acres, would likely force elk to abandon these areas during critical calving periods (April 15 to July 15). These historic calving areas, located in the Storm King Peak and High Park areas, provide the necessary calving habitat requirements of old-growth forest and downfall areas with adjacent forage areas and water

sources. These elk calving areas are increasing in importance within the planning area as human developmental pressures encroach on the remaining suitable calving areas.

Oil and gas operations that remove portions of old-growth forest and downfall areas would cause long-term decreases in suitable elk calving habitat. Disturbances from human activity and from vehicle and equipment use during the calving period would result in lower calf vitality and often in higher calf mortality. Displacement of calves to areas of less suitable forage, cover, water, and thermal regimes results in slower calf maturation and decreased buildup of necessary winter fat reserves. Crowding of elk into undisturbed areas increases these impacts due to increased intraspecific forage competition.

Increased calf movements often result in calf loss due to predation, accidents, and cow-calf separation. These impacts are especially pronounced during the three-week post-parturition period when calves are not completely mobile. The level of overall impacts from an operation depends on site-specific factors such as the amount of available forage in relation to screening by timber stands and topography, the configuration of access routes, and the level of operational activities. Calving elk are typically displaced up to one mile if operations are visible, and from one-half to three-quarters mile if operations are screened.

Oil and gas operations located within 25,927 acres of pronghorn antelope ranges would force populations of antelope to abandon areas of adequate food and water for less suitable ranges. These pronghorn ranges have a higher probability for oil and gas operations than most of the planning area as they are located in the vicinity of shut-in wells with measurable oil and gas resources. Operations would likely result in small and scattered antelope displacements during the operational periods. These displacements would become important during the antelope kidding season (June 1 to June 30) when doe are less tolerant of human disturbance and more susceptible to predation. These doe are typically displaced up to one-half mile if operations are visible. Displacement to less suitable range would likely increase kidding mortality and decrease population recruitment.

Operations located within sage grouse strutting grounds would decrease breeding success of this specie within the planning area. A total of ten to eleven sage grouse strutting grounds, totalling 2,560 acres, are presently inventoried on Fruitland Mesa and Simms Mesa. These areas provide the necessary strutting ground requirements of sagebrush cover with adjacent openings. Noise and human activity, along with vehicle and equipment use within or in the immediate vicinity of strutting grounds during the breeding period (March 15 to June 1) would alter breeding behavior and decrease breeding success of these populations. The level of overall impact depends on the number of strutting grounds that would be disturbed by operations.

Operations located within 1,990 acres of waterfowl habitat during the breeding period (March 15 to July 1) would decrease waterfowl breeding success within the vicinity of operations. Noise and human activity, along with vehicle and equipment use would alter breeding behavior and increase the incidence of nest abandonment. These effects would be especially prevalent in breeding populations of Canadian geese. Any decrease in suitable waterfowl habitat during the breeding season would be significant given the lack of these areas in the Uncompahgre Valley.

Threatened, endangered, and candidate (T&E) animal species would be protected on a site-specific basis at the APD stage. Consultation with the U.S. Fish and Wildlife Service (USFWS) would be initiated in all APDs involving lands with T&E species. Threatened, endangered, and candidate species known to occur within the planning area are identified in Table 2. The majority of these T&E species are seasonal occupants and occur in scattered locations throughout the planning area. Oil and gas operations from December 1 to April 30 along both the North Fork of the Gunnison River and the Gunnison River would likely cause bald eagles to abandon winter concentration areas.

The 140-acre Gunnison Forks Wildlife Management Area is managed for wildlife and recreation purposes. These lands were purchased by the federal government in the late 1970s with the primary objective of partially mitigating the effects on riparian areas of developing Blue Mesa Reservoir. Under terms of an agreement between the BLM and the Bureau of Reclamation

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DRAFT OIL AND GAS TECH SUPPLEMENT
Table 2

Table 2

ENDANGERED, THREATENED, AND CANDIDATE ANIMAL SPECIES KNOWN TO OCCUR WITHIN THE PLANNING AREA

COMMON NAME	SCIENTIFIC NAME	STATUS	COMMENTS
Bald eagle	<i>Haliaeetus leucocephalus</i>	Federal and state endangered	Winter resident; hunting habitat
Peregrine falcon	<i>Falco peregrinus anatum</i>	Federal and state endangered	Yearlong resident; hunting habitat
Ferruginous hawk	<i>Buteo regalis</i>	Federal candidate	Possible breeder; winter migrant
Swainson's hawk	<i>Buteo swainsoni</i>	Federal candidate	Summer resident; migrant
Whooping crane	<i>Grus americana</i>	Federal and state endangered	Fall and spring migrant
Long-billed curlew	<i>Numenius americanus</i>	Federal candidate	Migrant
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	Federal candidate	Summer resident; migrant
White-faced ibis	<i>Plegadis chihi</i>	Federal candidate	Migrant
Colorado squawfish	<i>Ptychocheilus lucius</i>	Federal and state endangered	Resident; Gunnison River
Razorback sucker	<i>Xyrauchen texanus</i>	State endangered and federal candidate	Resident; Gunnison River

(dated March 29, 1979), this tract would remain in the jurisdiction of the BLM as long as the area was managed for wildlife values. This area, though, would be transferred to the Colorado State Division of Wildlife if management is inconsistent with this primary purchase objective. Oil and gas operations on these lands that disturb wildlife habitat and species would not be compatible with this objective.

F. AQUATIC WILDLIFE

Operations that directly affect streamside vegetation would degrade adjacent and downstream aquatic habitats. Removing streamside vegetation during access and drill pad construction would eliminate the vegetative canopy that acts to insulate aquatic habitats from adverse temperature fluctuations during both summer and winter. Removing this vegetation would also decrease streambank stability, allow sediments to enter the water from overland water flows, reduce the roots and overhanging banks necessary for trout rearing, reduce the influx of detritus and insects into the aquatic food chain, and allow for deleterious aquatic productivity of the type that depends on solar radiation. The level of overall impact depends on the amount of aquatic habitats disturbed by operations in the planning area. Given the maximum of 30 disturbed acres per year throughout the planning area, the probability of any extensive aquatic disturbance is considered low.

G. WILDERNESS

Three wilderness study areas (WSAs), totalling 41,865 acres, exist within the planning area. These areas would be closed to oil and gas leasing if designated as wilderness by Congress. Wilderness study areas are presently (at this writing) closed to oil and gas leasing. This closure could be lifted at any time. In the interim, prior to a designation determination and if oil and gas leasing is permitted within WSAs, no oil and gas activities would be permitted that would impair the wilderness character of these areas. No pre-FLPMA oil and gas leases exist within these WSAs that would have rights to impair wilderness character. By regulation, development of any new and post-FLPMA leases would be permitted only if activities would result in no impairment of wilderness character.

H. RECREATION

Oil and gas operations could degrade recreation opportunities and disrupt recreation activities on public lands. The majority of the planning area is managed for dispersed recreation opportunities where recreationists have a freedom of recreational choice with a minimum of regulatory constraints. There are few BLM recreation facilities or supervisory efforts on these lands. Given the diversity of recreation opportunities with these areas, analyzing the affects of oil and gas operations on recreation would be done at the APD phase.

In general, operations would result in small and scattered impacts on recreation within the planning area. Machinery and vehicle use during the two to six month operational phases would disrupt opportunities for recreation in undisturbed settings. Surface disturbances could degrade recreation opportunities to view natural environments until rehabilitation is complete (typically ten years).

Several areas exist in the planning area where recreation use is concentrated and frequent. These areas are located in the Escalante Canyon, Lower Gunnison River, Storm King Peak, Needle Rock, and Gunnison Gorge.

Recreation opportunities in Escalante Canyon include sightseeing, auto touring, camping, and swimming in a roaded but scenic and natural canyon environment. A well-maintained county road provides vehicular access throughout the 15-mile length of the canyon. The BLM has constructed a shelter for recreationists in the vicinity of Cottonwood Springs. Oil and gas operations would degrade opportunities for scenic viewing in an undisturbed and generally natural setting. Mitigating these impacts would be difficult due to the narrow configuration of this canyon and the lack of topographic or vegetative screening. These impacts would be especially significant in the Cottonwood Springs area where recreation use is most concentrated.

Recreation opportunities on an 18-mile portion of the lower Gunnison River (downstream from Delta) include sightseeing, boating, fishing, hunting, and camping in a predominantly natural but motorized environment. There are no BLM recreation facilities on these lands. Land status consists of interspersed private and public (BLM) tracts. Oil and gas operations would degrade opportunities for scenic viewing in this undisturbed and generally natural setting. These impacts would be most significant if operations were in close proximity to the river. Mitigating these impacts would be difficult given the small size and scarcity of public land tracts in this area and the lack of topographic or vegetative screening.

Storm King Associates, a Montrose based partnership, is proposing development of a destination-style ski area and resort complex on Storm King Peak. Plans include intensive ski facility, commercial, residential, and golf course development involving 1,000 acres of public and 7,000 acres of private lands. Plans also include promotion of skiing, snowmobiling, fishing, mountaineering, tennis, and swimming in the winter; golf, tennis, hiking, camping, hunting, and horseback riding would be offered throughout the remainder of the year. Oil and gas operations could occupy lands needed for ski facilities or other year-long recreational activities.

Needle Rock is designated as an Outstanding Natural Area (ONA) due to the high-value scientific, interpretive, and scenic characteristics of this volcanic structure. Recreation opportunities in the 80-acre ONA include

sightseeing, picnicking, and geologic study in a roaded but natural environment. The BLM has constructed a shelter and an interpretive nature trail in the area. Machinery use and surface disturbance from oil and gas operations would degrade opportunities to view and study this geologic feature. Any disturbance of this volcanic lacolith would decrease the usefulness of this structure for future scientific studies.

The Gunnison Gorge SRMA, totalling 61,067 acres, is managed to provide a variety of recreation opportunities and settings. These include whitewater boating, backpacking, fishing, and horseback riding in very natural and roadless settings; vehicle camping and scenic viewing in natural but roaded settings; and ORV activities in badland areas that are dissected by numerous vehicle tracks.

The probability of oil and gas operations within the Gunnison Gorge is slight as this canyon complex has a low favorability for oil and gas discoveries. Portions of this SRMA, totalling 40,792 acres and located outside of the canyon, would be more likely to be explored for these resources. This 40,792-acre area provides two different types of recreation opportunities. A 25,584-acre area is utilized by ORV recreationists. This ORV area is located west of the Peach Valley Road and in the Elephant Skin and Black Ridge areas. Oil and gas operations would not be anticipated to negatively impact ORV recreationists or opportunities.

The other 15,208 acres provide opportunities for recreation in a scenic and predominantly natural environment. Roads provide vehicular access to portions of this area. Machinery use during oil and gas operations would degrade opportunities for scenic viewing within small and undisturbed viewsheds. After the operational phase, this impact on recreation would diminish significantly as the visual impact from these small and scattered operational areas would be slight.

I. CULTURAL RESOURCES

Necessary protective measures for cultural sites would be established at the APD stage. Any excavation of high-value cultural sites, to allow for oil and gas operations, would eliminate the educational and interpretive potential of these sites. Excavation would also eliminate the opportunity to protect high-value sites until development of more informative excavation techniques. The level of overall impact depends on the number of cultural sites that require excavation to accommodate operations. Given the maximum of 30 disturbed acres per year throughout the planning area, the probability of any extensive cultural disturbance is considered low. However, these impacts would be most significant on 5,848 acres of the planning area that are determined to have numerous high-value cultural resources that may qualify for special management designations.

J. MINERALS

Coal mining presently occurs in the vicinity of Hotchkiss and Paonia. No conflicts between oil and gas operations and coal development are known to exist. Coal mining could result in delays in oil and gas drilling schedules, higher drilling and development costs, and requirements for use of special drilling techniques and alternate drilling sites. Coal mining could reduce gas resources if potential gas producing zones were located within mineable coal beds.

IV. MITIGATION - LEASE STIPULATIONS

The following stipulations have been developed to mitigate the impacts of the two operational levels. At the discretion of the authorized officer, these stipulations could be added to future oil and gas leases issued in areas identified in the RMP as having resources that need protection. The number and types of stipulations attached to leases would depend on the resources present in the area. The BLM would coordinate at the APD stage with any leasee that holds a pre-RMP lease to provide maximum protection for these resources within the rights granted by the lease.

A. STIPULATIONS

1. Highly Erodible and/or Saline Soil Areas of Low Productivity

Stipulation: In order to protect watersheds from salinity infusions and highly erodible soil areas where low soil productivity would prolong or disallow revegetation, all development activities (exploration, drilling, etc.) will be allowed only from June 1 through February 28. Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. The affected portions of this lease are (legal description).

This stipulation may be waived or reduced in scope if circumstances change or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified. Variances could be allowed if soils are not saturated during the typical high soil moisture period when these soils are most susceptible to damage (March 1 to May 31), if impacts could be mitigated, or if site-specific conditions do not warrant the stipulation (small amount of disturbance, short duration of operations, etc.).

2. Threatened, Endangered, and Candidate Plant Areas

Stipulation: The following portions of this lease are within known habitats of threatened, endangered, and candidate plant species (species names) that are designated as an Area of Critical Environmental Concern (legal description).

The lessee/operator shall submit a plan for avoidance or mitigation of impacts on the identified species to the BLM's Authorized Officer. This may require completion of an intensive inventory by a qualified biologist. The plan must be approved prior to any surface disturbance. The Authorized Officer may require additional mitigation measures such as relocation of proposed roads, drilling sites, or other facilities. Where impacts cannot be mitigated to the satisfaction of the Authorized Officer, surface occupancy on that area must be prohibited.

3. Riparian and Riparian/Aquatic Areas

Stipulation: In order to protect riparian vegetation from disturbances that would degrade adjacent aquatic habitat and that could reduce or eliminate surface or subsurface water that is necessary for reestablishment of riparian plant communities, no surface occupancy would be permitted within existing riparian or riparian/aquatic areas. The affected portions of this lease are (legal description).

Exceptions to this limitation may be specifically authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified.

4. Crucial Deer and Elk Winter Ranges

Stipulation: In order to protect crucial deer and elk winter ranges from activities that would cause these species to abandon areas of crucial winter cover and forage for less suitable ranges, all development activities (exploration, drilling, etc.) will only be allowed from May 1 to November 30. Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. The affected portions of this lease are (legal description).

This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified. Variances could be allowed if these crucial ranges are not being utilized due to mild winter conditions or temporary changes in winter range utilization, if impacts could be mitigated, or if site-specific conditions do not warrant the stipulation (small amount of disturbance, short duration of operations, etc.).

5. Elk Calving Areas

Stipulation: In order to protect elk calving areas from activities that would force elk to abandon these areas during critical calving periods, all development activities (exploration, drilling, etc.) will only be allowed from July 16 to April 14. The affected portions of this lease are (legal description).

Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified.

6. Pronghorn Antelope Kidding Ranges

Stipulation: In order to protect pronghorn antelope ranges from activities that would force antelope doe into less suitable areas during the kidding season, all development activities (exploration, drilling, etc.) will only be allowed from July 1 to May 31. The affected portions of this lease are (legal description).

Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be

conducted without causing unacceptable impacts on the concern(s) identified. Variances could be allowed if these ranges are not being utilized, if impacts could be mitigated, or if site-specific conditions do not warrant the stipulation (small amount of disturbance, short duration of operations, etc.).

7. Sage Grouse Strutting Grounds

Stipulation: In order to protect sage grouse from activities that would alter breeding behavior and decrease breeding success, all development activities (exploration, drilling, etc.) will only be allowed on strutting grounds from June 2 to March 14. The affected portions of this lease are (legal description).

Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified. Variances could be allowed if these strutting grounds are not being utilized or if impacts could be mitigated.

8. Waterfowl Habitat

Stipulation: In order to protect waterfowl from activities that would alter breeding behavior, increase the incidence of nest abandonment, and decrease breeding success, all development activities (exploration, drilling etc.) will only be allowed in waterfowl habitats from July 1 to March 14. The affected portions of this lease are (legal description).

Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified. Variences could be allowed if these breeding habitats are not being utilized, if impacts could be mitigated, or if site-specific conditions do not warrant the stipulation (few individuals affected, short duration of operations, etc.).

9. Bald Eagle Winter Concentration Areas

Stipulation: In order to protect bald eagles from activities that would cause abandonment of winter concentration areas, all development activities (exploration, drilling, etc.) will only be allowed in these areas from May 1 to November 30. Exceptions to this limitation may be authorized in writing by

the BLM's Authorized Officer if determination is made that operations can be conducted without causing unacceptable impacts on wintering bald eagles. The affected portions of this lease are (legal description).

10. Gunnison Forks Wildlife Management Area

Stipulation: No surface occupancy would be permitted within the Gunnison Forks Wildlife Management Area (140 acres) to protect wildlife species and habitat from disturbance. Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified. The affected portions of this lease are (legal description).

11. Wilderness Study Areas (WSAs)

Stipulation: Wilderness Protection Stipulation Form CSO 3000-1 (July 1980) is attached per Washington Office Instruction Memo No. 80-509 (5/12/80). This memo implements the Interim Management Policy and Guidelines for Land Under Wilderness Review (12/12/79 and amendments).

This stipulation will be attached to all leases involving lands within WSAs. This stipulation will apply until the area is released from WSA status.

12. Needle Rock Outstanding Natural Area

Stipulation: No surface occupancy would be permitted within the Needle Rock Outstanding Natural Area (80 acres) to protect opportunities for viewing and scientific study of this geologic structure. Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified. The affected portions of this lease are (legal description).

13. Cultural Resource Areas

Stipulation: In order to protect high-value cultural sites from activities that would eliminate the potential for cultural interpretation and education, or for protection until development of more informative excavation techniques, no surface occupancy would be permitted within designated cultural sites. The affected portions of this lease are (legal description).

Exceptions to this limitation may be specifically authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified.

14. Lower Gunnison River Special Recreation Management Area

Stipulation: No surface occupancy would be permitted within the Lower Gunnison River Special Recreation Management Area (353 acres) to protect recreational boating opportunities in natural settings. The affected portions of this lease are (legal description).

Exceptions to this limitation may be authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified. Variances could be allowed if operations are not in close proximity to the river bank and do not occur during the typical boating season.

15. Storm King Peak Ski Area

Stipulation: No surface occupancy would be permitted within the Storm King Peak Ski Area to protect the yearlong recreational use of these lands. The affected portions of this lease are (legal description).

Exceptions to this limitation may be specifically authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified.

16. Escalante Canyon

Stipulation: No surface occupancy would be permitted within the Escalante Canyon to protect recreational opportunities in natural settings. The affected portions of this lease are (legal description).

Exceptions to this limitation may be specifically authorized in writing by the BLM's Authorized Officer. This stipulation may be waived or reduced in scope if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts on the concern(s) identified.