Alternative III

On the Grasslands, standard stipulations effectively mitigate impacts to most soils, and reclamation on hard lands and sandy lands can be accomplished in the short term. The Controlled Surface Use stipulation provides additional protection for fragile soils on canyon escarpments on the Comanche and sensitive alluvial soils in riparian or flood plain areas, mostly on the Cimarron. These areas are avoided by relocating activities to suitable land types.

Table IV-57
Predicted Soil Loss

	Alternatives I & III			Alternatives II & IV		
Soil/Land Type	Initial Disturbed Acres	(Year 1) Potential Soil Loss Tons/Yr	(Outyrs) With Reclam. Tons/Yr	Initial Disturbed Acres	(Year 1) Potential Soil Loss Tons/Yr	(Outyrs) With Reclam. Tons/Yr
GRASSLAND ENVIRONMENT						
CIMARRON Hard lands	138	110	18	136	109	18
Sandy lands	256	34,304	2,202	241	32,294	2,073
Riparian[1]	0	0	0	17	2,283	155
Totals	394	34,414	2,220	394	34,686	2,246
COMANCHE Hard lands	25	30	5	23	27	5
Sandy lands	56	7,504	482	54	7,236	464
Canyon lands	0	0	0	2	14	14[2]
Riparian	0	0	0	2	269	18
Totals	81	7,534	487	81	7,546	501
MOUNTAIN ENVIRONMENT						
BLM-RFD Non-fragile soils	18	67	11	18	67	11
GRAND TOTALS	493	42,015	2,718	493	42,299	2,758
Conc. RFD Fragile soil	29	335	63	44	920	920[2]

Under Alternative I, riparian/flood plain areas on the Cimarron National Grassland would be subject to Standard Lease Terms with the same direct effects as Alternatives II and IV. Under Alternative III, riparian/flood plain areas are protected from surface disturbances with supplemental stipulations.

Accelerated erosion is expected to continue on sites with low reclamation potential (i.e., shallow soils, steep slopes, dry climatic conditions).

Alternative IV

Under this alternative, direct effects to the soil resource would be similar to Alternative II. However, surface disturbance could only occur on lands currently under lease. The soil resource would be fully protected when leases expire. Short-term, unavoidable impacts in the Grassland environment can be effectively mitigated on hard land and sandy land soils. The Conditions of Approval would not be sufficient to protect shallow soils of canyon escarpments, and these areas have high risk for long-term irreversible damage. Detrimental impacts to sensitive alluvial soils would potentially cause long-term damage to riparian areas.

Mountains-BLM RFD

The four BLM RFD wells would be located on moderate slopes and non-fragile soils. The figures displayed in Table IV-57 indicate that potential soil loss would be the same under Alternatives I through IV. Direct and indirect impacts from the BLM RFD could be mitigated with Standard Lease Terms under any alternative.

Mountains-Concentrated RFD

Alternative I

Under Alternative I, the current Forest Plan provides direction and guidelines for surface disturbance of erosive soils and unstable slopes. This alternative would protect erosive soils and unstable slopes by relocating activities of the Concentrated RFD to suitable sites with better reclamation potential.

Individual analysis at the time of lease request would likely result in an analysis and decision notice that will recognize other sensitive soil conditions that are not in the Forest Plan. The fragile granitic soils of the Rampart Range, sensitive alpine ecosystems along the Continental Divide, and riparian areas would be identified for additional protection above the Standard Lease Terms.

Alternative II

The four Concentrated RFD wells 1C through 4C would be located on steep slopes and fragile soils. Extensive areas of highly-erodible, shallow soils occur throughout the Rampart Range. Well movement within 200 meters under Standard Lease Terms may not always be sufficient for soil resource protection. Accelerated erosion could continue if reclamation on these sites is unsuccessful. These sites with low reclamation potential, will require expensive and possibly long term mitigation measures. Unsuccessful reclamation of these sites will result in significant long-term effects and risk of irreversible soil resource damage.[17]

Alternative III

Effects on the soil resource would be similar to Alternative I, since the current Forest Plan provides direction and guidelines for surface disturbance of erosive soils and unstable slopes. Concentrated RFD wells 1C through 4C would be relocated to sites with gentler slopes and better reclamation potential through application of the Controlled Surface Use (Soils) stipulation. The relocated Concentrated RFD wells 1R through 4R would cause insignificant short-term impacts to the soils resource.

Alternative IV

Effects to the soil resource would be similar to alternative II, since Concentrated RFD wells 1C through 4C are located on existing leases. The concentrated RFD wells would cause significant, localized reductions in soil productivity on steep slopes and fragile soils.

WATER

Oil and gas activity can adversely affect the water resource. Road construction and pad development associated with the exploratory drilling phase and full development phase will cause an increase in sediment yield. Drilling fluids contain toxic substances that could pollute the surface water and ground water if not properly contained.[18] Salt water is sometimes found in association with oil and gas in the underground formations. This salt water can cause serious degradation to water quality and aquatic life if not handled properly. Oil and gas products themselves are also a threat to water quality. The major water issues identified as part of this EIS include maintaining the surface and ground water quality as well as protecting the stream systems themselves.

The largest volume of waste associated with oil and gas exploration activities is the produced water. Most produced water is strongly saline. The total dissolved solids (TDS) in produced water ranges from several hundred parts per million to over 150,000 parts per million. Seawater, by comparison, is typically about 35,000 parts per million TDS. Produced water also contains trace quantities of petroleum hydrocarbons, metals, and additives used in the production process. The primary issue associated with the produced water is the potential for contamination of surface and ground water, soil, vegetation, and animals. Oil and gas wastes from exploration, development and production activities include sediment, brine, drilling fluids, well bore cuttings and chemical additives related to the drilling and well completion process, hydrocarbons and sanitary wastes.[19]

Another potential effect on water quality is increased sediment. Sediment transport is a natural stream process. The amount of sediment moved, increases and decreases with streamflow. Each stream can transport a maximum amount of sediment without substantially adjusting its dimensions, slope, or pattern; this maximum amount is called the sediment threshold. Sediment in excess of this limit is stored in the channel, is not easily displaced, and disrupts the dynamic equilibrium between the streamflow, the sediment load, and the channel. The channel may degrade (cut down), aggrade (build up), or migrate laterally around a deposit resulting in accelerated bank erosion.

The Forest Plan currently gives direction for all watersheds on the unit. Specific direction includes maintaining instream flows for stream channel maintenance, reducing erosion to naturally occurring rates, and preventing sediment thresholds from being exceeded. Sediment thresholds can be determined by measurement or by use of predictive models. Sediment threshold limits were determined for the major planning watersheds in the Mountains during the Forest Land Management Plan analysis. Nine out of 146 planning watersheds on the Mountains exceed sediment thresholds and an additional seven watersheds have sediment levels that are very near the threshold level. Many, but not all of these watersheds are associated with highly erosive soils derived from granitic bedrock. These watersheds are listed in the Affected Environment, Chapter III.

Table IV-58
Total Delivered Sediment (Tons/year) Mountains

	BLM RFD	Concentrated RFD
Alternative I	0.87	0
Alternative II	1.65	29.19
Alternative III	0.87	0
Alternative IV	1.65	29.19

Grasslands-BLM RFD

Alternative I

Quantitative impacts of oil and gas activity on the watershed resource of the Grasslands are difficult to determine, due to the hypothetical nature of the RFD wells on the Grasslands. In general, on-site erosion is of more concern than delivered sediment because there are so few defined stream channels to transport sediment and so few perennial streams to be impacted. Sediment delivery would be negligible if the wells are located 500 feet or greater from drainages. Due to the relatively flat terrain, sediment delivery will be only about 1 percent of the calculated soil loss for wells within 500 feet of a drainage. Impacts to water quality will primarily be from waste products such as oil, brine, and drilling fluids. Percolation of these products into the soils could be a problem on sandy soils, or in areas with a high water table. The Forest Plan does not specifically prohibit mineral and energy resource development in riparian areas. The standard lease term that would allow movement of a well up to 200 meters would not be adequate for the extensive riparian area along the Cimarron river. The chance for groundwater pollution is greatly increased if oil and gas activity occurs in riparian and flood plain areas due to the high water tables. Pollution of the groundwater resource would be a significant impact which would be irreversible and irretrievable.[20]

Alternative II

As discussed under Alternative I, wells could still be developed in the Cimarron riparian area even with the 200 meter move allowance. Impacts to the groundwater quality could occur from wells in riparian and flood plain areas.

Alternative III

The No Surface Occupancy (riparian) and Controlled Surface Use (soils) supplemental stipulations would prohibit wells from occupying riparian and flood plain areas. This would reduce the chance for groundwater pollution in these areas. This would also reduce the chance for sediment to directly impact these areas.

Alternative IV

The impacts to the groundwater quality will be similar to Alternative II. Wells currently occupy riparian areas along the Cimarron River on currently existing bases. Wells could be relocated up to 200 meters under Standard Lease Terms. This may not be enough distance to relocate wells out of the extensive riparian and flood plain areas that occur along the Cimarron River.

Mountains-BLM RFD

Alternative I

The Forest Plan specifies that sediment thresholds will not be exceeded. Activities have been allowed in watersheds that exceed sediment thresholds but only after enough disturbed acres in the watershed are rehabilitated so that new activities will not result in sediment threshold limits being exceeded. This type of management strategy still allows for activities but only after the existing problem areas in the watershed are taken care of.

Wells 3 and 4 are in drainages within 10 percent of exceeding or are exceeding sediment threshold levels. Wells 1 and 2 are in drainages that are within acceptable threshold limits. If BLM RFD wells 3 and 4 were developed before enough existing disturbed acres in the watersheds could be rehabilitated, the sediment thresholds could be exceeded. This would be a violation of the Forest Plan and would be considered a significant impact since this action threatens a violation of requirements imposed for the protection of the environment as described in 40 CFR Ch. V 7-1-88 Edition, 1508.27 b-10. Exploration on wells 1 and 2 would be allowed under Standard Lease Terms and a slight increase in sediment to the drainages is expected as shown in Table IV-58. The increased sediment would remain within acceptable levels.

Alternative II

Under Standard Lease Terms, well locations can only be moved a maximum of 200 meters to protect the watershed resource. There is no provision in Standard Lease Terms to curtail development in watersheds exceeding sediment thresholds until a specified amount of existing disturbed acres are rehabilitated. Wells that are developed, even with mitigation, would produce sediment that could impair water quality and aquatic life in the drainages affected. Watersheds with BLM RFD wells 3 and 4 are either close to exceeding or are exceeding sediment threshold limits. Any additional sediment would be a violation of the Forest Plan. Sediment quantities delivered to affected streams in the Mountains are shown in Table IV-58.

Alternative III

The Controlled Surface Use (Water) stipulation applied by this alternative would not allow oil and gas development in drainages that are within 10 percent of sediment thresholds, or exceeding sediment thresholds, until a specified amount of existing disturbed acres are rehabilitated. So that new activities will not result in sediment threshold limits being exceeded. This would prevent any watersheds from exceeding sediment threshold limits, which would be in agreement with the Forest Plan.

Alternative IV

Effects to the watershed resource would be similar to effects in Alternative II except that effects would be limited to existing lease parcels.

Mountains-Concentrated RFD

Alternative I

All of the Concentrated RFD wells are located in the Jackson Creek watershed. This watershed is already exceeding sediment threshold limits. No increase in sediment over threshold levels is expected from the development of the four Concentrated RFD wells if current management

strategy is followed. No new ground-disturbing activities can occur until enough disturbed acres in the watershed are rehabilitated so that new activities will not result in sediment threshold limits being exceeded.

Alternative II

There would be significant impacts from the four concentrated wells in Jackson Creek for the same reasons discussed for BLM RFD wells 3 and 4 on the Mountains. Jackson Creek is exceeding sediment threshold limits and any additional sediment would be a violation of the Forest Plan, if new activities occur before enough existing disturbed acres in the watershed are rehabilitated.

Alternative III

The Controlled Surface Use (Water) supplemental stipulation formalizes the management strategy currently being followed on the unit. New activities are allowed in watersheds that exceed thresholds, but only after enough existing disturbed acres are rehabilitated. No increased is sediment yield are expected.

Alternative IV

Effects from the alternative are limited to existing lease parcels. Wells 1C through 4C are on existing lease parcels and the effects would be similar to those discussed in Alternative II.

Wildlife and Threatened and Endangered Plant and Animal Species

Effects of oil and gas activities on wildlife are dependent on such factors as time of year, duration, and sensitivity of the species involved. In the case of the Pike and San Isabel National Forests and the Comanche and Cimarron National Grasslands, the following habitats or groups of animal species would be affected by oil and gas operations. These are:

(1) Critical big game or turkey winter range
(2) Wildlife production areas
(3) Management Indicator Species (MIS).
(4) Threatened and Endangered plant and animal species.

Temporary disturbance, such as seismic operations, during non-critical periods seldom cause major impacts to big game because of minimal habitat disturbance and short duration of the activity. There would be a temporary movement away from the affected area with no permanent adverse consequences.

The greatest impacts from oil and gas operations would occur during critical periods and within critical habitats, such as winter ranges. During severe winters, excessive snow depth forces big game animals into smaller, more critical winter range habitats. These areas are essential for their survival and wintering big game animals may become highly susceptible to mortality if unduly disturbed over a long period of time. However, if only a single well is involved, there would not be a significant effect on the availability of critical habitat. Activity would be restricted by timing stipulations to non-critical periods, therefore, disturbance would not be a factor.[21]

A wildlife production area is where animals traditionally go to give birth. These areas are preferred because of the optimal conditions that exist for the maximum survival of newborn animals. If displaced by oil and gas activities, the animals may still give birth, but reproductive success would

probably be reduced. Protecting these areas can be managed through the use of Timing Stipulations.

Activities during oil and gas operations can exceed the tolerance levels for some species resulting in increased stress, altered behavior patterns and abandonment of preferred habitat. Some examples of the effects of oil and gas activities on some MIS are:[22]

- Lesser Prairie Chicken-The breeding season is from mid-March to early June. Dancing grounds (leks) and an area within a one mile radius of the display grounds are essential to the maintenance of prairie chicken populations. Any activity during this period could have a significant impact on prairie chickens.

- Raptors (hawks, eagles, owls)-These birds normally cannot tolerate disturbance or harassment during the nesting period. Nest destruction and abandonment could occur during this period if harassed.

The effects of oil and gas activities on other MIS can be described. However, habitat for all MIS can be protected from disturbance under the Standard Lease Terms and Conditions of Approval and supplemental stipulations.

The Endangered Species Act stipulates that no action would be taken that would jeopardize any Federally listed and/or proposed candidate species for listing. Impacts to Colorado and Kansas designated T&E and sensitive species would also be evaluated and applicable mitigation developed prior to the initiation of any action on public lands. No adverse environmental impact would be permitted that cannot be properly mitigated.[23]

Where site-specific locations are known and T&E plant and animal species may be adversely affected, mitigation measures would be in the form of a Lease Notice with site-specific location(s). By using the various Notices and Stipulations there would be no significant impact on T&E species and their habitats that could not be mitigated.

Grasslands-BLM RFD

Alternative I

Oil and gas effects on the wildlife resource can be mitigated in most cases through the use of site-specific timing restrictions which would prohibit activity during critical periods for wildlife. The current Forest Plan timing restrictions require more wildlife solitude than is afforded by the Standard Lease Terms that only allow activities to be prohibited for a 60 day period.

Alternative II

Standard Lease Terms allow for the prohibition of oil and gas activity for a maximum of 60 days. This time period is not sufficient to protect wildlife populations during breeding and birthing periods. Effects of this alternative on the wildlife resource would include animal displacement to marginal habitat, resulting in poor animal condition, deaths, and reduced birth rates.

There is no documentation in the Standard Lease Terms that would require the protection of calving or fawning areas. These areas are found throughout the Grasslands.

Alternative II could cause significant impacts on the wildlife resource, particularly on the Cimarron, where more post-leasing activity is anticipated.

Alternative III

Effects of this alternative would be similar to the effects of Alternative I. Timing stipulations (Winter Range and MIS) would be applied to leases and the resulting impacts on wildlife would be insignificant.

Alternative IV

Wildlife would not be adequately protected during critical periods under this alternative, since Standard Lease Terms only allow prohibition of activity for a maximum of 60 days.

Mountains-BLM RFD

BLM RFD well 2 would be located within critical deer winter range. BLM RFD wells 1, 3 and 4 would not occur within identified critical wildlife areas or known threatened and endangered plant or animal habitat.

Alternative I

Current Forest Plan direction would prohibit activity in the critical deer winter range near BLM RFD well 2 from December 1 to April 15. This timing restriction would apply for the duration of exploratory drilling and subsequent reclamation activities. Alternative I would cause insignificant, short-term impacts to the wildlife resource in the vicinity of the four BLM RFD wells.

The current Forest Plan includes timing direction for critical lambing areas for bighorn sheep, and calving and fawning areas for elk and deer. An example would be in several lambing areas in the Sangre de Cristo Mountains, where activities would not be allowed between the dates of April 1 and June 15 annually. There are a number of areas throughout the Forest that would require inactivity between May 15 and June 30 for elk and deer calving and fawning, respectively.

Alternative II

Alternative II would negatively impact critical deer winter range in the vicinity of BLM RFD well 2. Post-leasing activity under Standard Lease Terms may cause potentially long-term, significant impacts on deer population in that area.[24]

Alternative II would cause insignificant short-term impacts on wildlife news wells 1, 3 and 4.

However, other potential well sites could negatively impact the wildlife resource. An example might be wintering bald eagles in the South Platte River corridor. As a result of activity during critical winter periods, eagles could be displaced to less desirable areas. A result could be an increase in winter mortality.

Alternative III

Under Alternative III, the timing stipulation (Winter Range) would be applied in the vicinity of BLM RFD well 2. Standard Lease Terms would adequately protect wildlife near wells 1, 3 and 4. Alternative III would cause insignificant, short-term impacts to the wildlife resource in the vicinity of the four BLM RFD wells.

Alternative IV

Alternative IV effects would be similar to Alternative II effects, since all four wells are on existing leases subject to Standard Lease Terms. However, other potential well sites and associated effects would be limited to existing leases.

Mountains-Concentrated RFD

All four concentrated RFD wells would be located in critical turkey winter range under all alternatives. None of the concentrated RFD wells would be located in known threatened and endangered plant or animal habitat under all alternatives.

Alternative I

The current Forest Plan timing direction would prohibit activity from November 15 to April 15 for the duration of post-leasing activities. Alternative I would cause insignificant, short-term impacts to the wildlife resource in the vicinity of wells 1R through 4R.

Alternative II

Alternative II would negatively impact critical turkey range in the vicinity of wells 1C through 4C.

Alternative III

Effects on the wildlife resource would be similar to Alternative I. The Timing (Winter Range) supplemental stipulation would be applied as mitigation for all four well locations.

Alternative IV

Alternative IV effects would be similar to Alternative II effects, since all four wells are on existing leases subject to Standard Lease Terms. However, potential impacts would be limited to lands currently under lease.

AQUATIC AND RIPARIAN[25]

Sediment input to streams would be the most important, direct impact of oil and gas exploration and development on fishery and aquatic resources. Soil erosion from newly constructed facilities could result in significant amounts of sediment entering streams and standing water environments within the impacted watershed. Stream crossings also could result in excessive amounts of sediment entering stream systems.

The effects of introduced sediment on aquatic systems have been extensively studied, although are difficult to quantify. In a direct sense, sediment can result in reduced growth rates and size at maturity, altered feeding behavior, clogged gills, and reduced reproduction success. Habitat alterations also can result from increased sediment in streams. Areas that were once low-velocity refuges for fish become shallow high-velocity areas of unsuitable habitat. Indirectly, sediment may alter the food community by smothering bottom-dwelling invertebrates used by both lake and stream fish.

The other potential main impact from oil and gas activities is from chemicals used in the drilling process and the effluent that comes to the surface. Both substances may contain a variety of chemical constituents that could be toxic to aquatic life.

The impact on riparian areas from oil and gas activities can be related to direct manipulation of the land as well as indirect effects from soil movement and/or chemical releases. Road and pad construction can directly impact riparian areas, through direct disturbance of the soil, vegetation, and hydrologic conditions. Compaction and other alterations of riparian soils may be difficult if not impossible to mitigate.

Grasslands-BLM RFD

Alternative I

The Forest Plan does not specifically prohibit mineral and energy resource development in riparian areas. Consent to lease can be denied if the well sites occur on soils with high erosion hazard ratings. In most cases, soils in riparian areas are in this category. The soils in the riparian area along the Cimarron river do not fit into this high erosion hazard rating classification. Standard Lease Terms allow movement of wells up to 200 meters. This would not be adequate for relocating wells outside of the riparian area along the Cimarron river. Riparian areas are considered to be ecologically critical areas. Impacts in ecologically critical areas could be significant per 40 CFR Chapter V, 1508.27, b-3.

Alternative II

Standard Lease Terms allow wells to be moved up to 200 meters. This would not be adequate to relocate wells outside of the extensive riparian and flood plain areas that occur along the Cimarron river. There could be significant impacts under this alternative.

Alternative III

The NSO (Riparian) supplemental stipulation prohibits oil and gas activity from occurring in riparian areas, flood plain areas, and in wetlands. Roads may be allowed only if no other practical alternative exists. Roads will not be allowed to parallel streams and roads must cross streams at right angles to limit the amount of area impacted. There would be no significant effects to the fisheries or riparian areas under this alternative.

Alternative IV

Impacts to the aquatic and riparian resource would be similar to Alternative II. Only existing leases would be affected.

Mountains-BLM RFD

Alternative I

Wells 3 and 4 are in drainages that are close to exceeding or are exceeding sediment thresholds. As discussed under the water section, sediment yields would not be increased based on current Forest Plan direction. The aquatic resource would not be impacted by excessive sediment yield. Sediment yields would increase with the activities for wells 1 and 2, but the increases will not cause significant impacts to the aquatic resource. None of the wells impact riparian areas.

Alternative II

Standard Lease Terms would not prohibit development of wells 3 and 4 until enough existing disturbed acres are rehabilitated. Any increases in sediment to streams would impact aquatic resources.

Alternative III

The Controlled Surface Use (Water) supplemental stipulation would prevent development of wells 3 and 4 until enough existing disturbed acres are rehabilitated. Sediment yields would not be increased in these watersheds. The aquatic resource would not be impacted.

Alternative IV

All of the BLM RFD wells are on existing leases. This alternative is similar to Alternative II.

Mountains-Concentrated RFD

Alternative I

All of the Concentrated RFD wells are located in a watershed that exceeds sediment threshold limits. As discussed in the water section, new activities would be prohibited until some existing disturbed acres are rehabilitated. No increases in sediment are expected. None of the concentrated wells would be in riparian areas.

Alternative II

Any new ground-disturbing activities would increase sediment yields. Activities cannot be curtailed under Standard Lease Terms until existing disturbed acres are rehabilitated. The aquatic resources would be impacted from increased sediment under this alternative.

Alternative III

The CSU (Water) supplemental stipulation would prohibit development in this watershed until enough existing disturbed acres are rehabilitated. No increases in sediment are expected.

Alternative IV

Potential impacts would be limited to existing leases. Impacts under this alternative would be the similar to Alternative II.

ALPINE

Alpine areas occur from timberline to the highest elevations on the Mountain districts. Vegetation plays a major role in alpine surface stability and succession. Due to harsh climatic conditions and very slow soil formation, plant succession and growth, alpine areas are fragile ecosystems which are very sensitive to disturbances that alter vegetation cover and expose bare soil.[28]

None of the BLM RFD or Concentrated RFD wells and road locations would impact alpine areas or subalpine areas near timberline. However, there is a low likelihood that other potential well sites could impact alpine ecosystems. Potential impacts are described below, by alternative. Refer to the Representative Wells Analysis for site-specific effects disclosure for representative wells 3 and 34.

Alternative I

Current Forest Plan lacks specific oil and gas management direction for alpine ecosystems. However, the Controlled Surface Use (Alpine) stipulation would be applied to alpine leases to meet general direction found on pages III-55 through III-57 of the Forest Plan. This direction allows the use of special operating constraints to prevent irreversible and irretrievable surface resource damage. Special operating constraints, lease proposal monitoring requirements, and Conditions of Approval would minimize alpine surface disturbance and the potential for long-term, significant impacts to alpine vegetation, soils, and visual quality.

Alternative II

Standard Lease Terms would not allow severe restriction of alpine disturbance and therefore would not adequately protect fragile alpine ecosystems. As noted earlier, alpine areas are very sensitive to ground-disturbing activities. Post-leasing activities may require relocation farther than 200 meters to find acceptable microsites for development. Standard development could cause potentially long-term and significant impacts to alpine areas if suitable microsites for development and subsequent reclamation could not be found within 200 meters of the proposed locations.[27]

Alternative III

Alternative III would allow application of a supplemental stipulation specifically designed to protect alpine ecosystems. The Controlled Surface Use (Alpine) stipulation would allow relocation of potential wells greater than 200 meters, either outside alpine or to alpine microsites more favorable for disturbance and subsequent reclamation. Special operating constraints,lease proposal monitoring requirements and conditions of approval are designed to minimize alpine surface disturbance and the potential for long-term, significant impacts to alpine vegetation, soils, and visual quality.

Alpine within Discretionary No Lease (DNL) areas could not be impacted for the duration of the DNL protection.

Alternative IV

Potential impacts to alpine would be similar to Alternative II, except limited to the one existing lease above timberline near the Spanish Peaks. This existing lease is not within the Spanish Peaks National Natural Landmark.

RANGE

There are approximately 305,400 acres of suitable range on the Mountain districts. This acreage figure is based on current data contained in the Forest Service Range Management Information System (FSRAMIS). Suitable range is also defined as land accessible and capable of producing forage on a sustained yield basis.

There are approximately 522,005 acres of suitable range on the National Grasslands. The scoping process identified the following issues and concerns on the Range resource:

- Impacts of oil and gas leasing causing a reduction of range forage
- Impacts of oil and gas leasing on range improvements

The effects of oil and gas activities on the range resource are determined by the amount of suitable range land that can be disturbed and/or removed from use. Roads, drill pads, pipelines and other activities can remove the forage used by livestock for a period of time. Some activities, such as seismic exploration, are insignificant as virtually no surface disturbance takes place.

Exploratory post-leasing activities would cause short-term or long-term removal of forage and impacts on the range resource. Some suitable range would be lost until sites can be restored to their former production. The small amount of land removed from the suitable range land base is negligible and nor reduction of grazing capacity in anticipated.

Full production would cause minor long-term effects on the range resource. Seeding of road cuts, fills and barrow pits with suitable forage plants would result in an insignificant forage reduction. In some vegetation types disturbance and partial reclamation might increase forage.

Alternatives

Effects on the range resource are essentially the same throughout all alternatives during the 15-year planning period and were identified earlier in this chapter. However, under Alternative IV, all projected level of development would occur on lands currently under lease, creating the potential for slightly greater impacts on a more limited number of range allotments. Well pad construction and road construction would cause a short-term or minor long-term loss of forage production. Most exploratory well sites would be completely revegetated during the planning period. Producing wells would only occupy about 1 acre each, once unused portions of well pads have been reclaimed.

Grasslands-BLM RFD

The projected development would impact 394 acres on the Cimarron National Grassland and 81 acres on the Comanche. This is less than 1% of the suitable range on the Grasslands. The impacts to range are negligible.

Mountain-BLM RFD

Wells 1 through 4 would impact a total of 18 acres. Only well 2 would occur in a grazing allotment. This well would only disturb 5 acres out of 2769 suitable acres of range which is less than 1%. The impacts on range are negligible.

Mountain-Concentrated RFD

There are no grazing allotments affected by the Concentrated RFD wells.

VISUAL RESOURCES

Oil and gas activities would impact visual quality as development occurs. Impacts would result when contrast is created between the natural landscape and the oil and gas developments. The

natural landscape is described in terms of line, form, color, and texture. Oil and gas developments may introduce new elements into the landscape such as: roads, site developments, soil disturbance, structures, and vegetation removal. Developments may affect visual quality from several viewpoints, or on the Grasslands, entire viewsheds.

Visual absorption capability is an important consideration in the analysis of potential impacts to the visuals resource. Visual absorption capability is an estimate of the relative ability of a tract of land to withstand management manipulations without significantly affecting its visual character. High visual absorption capability areas can withstand the most visual change, while low visual absorption capability areas can withstand little or no change.

The summit of Kenosha Pass is an example of an area with low visual absorption capability. Open meadows provide little screening of middle ground and background areas. Highway 285 near Bailey would have high visual absorption capability. This area has more landform variety and vegetation is dominated by fairly dense wooded areas.

Exploration drilling may last from three to six weeks. Associated equipment storage, dust and lights would cause short-term direct impacts to visual quality. Production facilities on the Grasslands would cause long-term impacts to visual quality.

Grasslands-BLM RFD

Due to the lack of taller vegetation and topographical relief, the most viable mitigation would be distance between the viewer and development, and site-specific facilities design which is compatible with the landscape. Planting vegetation for screening would be a suitable option in some situations.

Visual quality mitigation is designed to protect views from the Santa Fe Trail, recreation developments and State and Federal Highways. Standard Lease Terms would protect retention visual quality objective areas under all alternatives.[28]

Alternative I

The current Forest Plan allows relocation of wells off Comanche canyon lands slopes to protect the soils resource. This would also reduce visual impacts in these more scenic areas by providing more distance between viewers and post-leasing activities. The current Forest Plan also allows the use of the Controlled Surface Use (Visual) stipulation to ensure oil and gas activities do not occur in areas with low visual absorption capability which, cannot be reclaimed to the established visual quality objective (VQO). For example, representative well 51 on the Cimarron would be relocated, if necessary, to ensure the retention VQO would be met near the Sante Fe Trail. Alternative I would cause insignificant short-term (exploratory wells) and long-term (producing wells) effects on visual quality on the Comanche. Riparian wells on the Cimarron could cause localized significant short-term or long-term impacts on visual quality, if current Forest Plan direction would not allow well relocation and wells occurred in areas with retention VQO.[29]

Alternative II

Post-leasing activities could be relocated up to 200 meters, if necessary to improve on-site visual quality mitigation. Alternative II could cause significant impacts on visual quality in areas with retention VQO.

Alternative III

Effects on visual quality would be slightly less than Alternative I. The Controlled Surface use (Visual) stipulation would be applied in all areas with retention VQO, when Standard Lease Terms would not adequately protect the visual resource.

Alternative IV

Effects on visual quality would be similar to alternative II, since RFD wells would occur on existing leases with standard lease term protection of the visual resource.

Mountains-BLM RFD

Alternatives

All four well sites are geographically separated and are situated in areas with moderate visual sensitivity. Visual impacts of these developments would be insignificant and short-term under all alternatives.

Other potential well sites could be moved more than 200 meters, if necessary to meet Forest Plan direction under Alternative I or to meet retention VQO under Alternative III. Alternatives I and III would reduce potential impacts on visual quality more than Alternatives II and IV. Under the latter alternatives, other potential well sites could negatively impact visual quality in such areas as the Highway 285 corridor, roadless areas or the Spanish Peaks National Natural Landmark.

Mountains-Concentrated RFD

All four concentrated RFD wells are located in Jackson Creek. Jackson Creek is in the Rampart Range area, an area of the Pike National Forest which receives a considerable amount of recreational use, including driving for pleasure and sightseeing.

Alternative I

Current Forest Plan direction allows relocation of wells 1C and 2C to meet the retention VQO. Wells 3C and 4C would be moved to protect the soils resource, to sites where visual impacts can also be successfully mitigated. Visual impacts associated with exploratory drilling would be short-term and insignificant.

Alternative II

Well relocation would be limited to a maximum of 200 meters. Alternative II would cause potentially significant impacts on visual quality in the area around Devil's Head Trail and Campground, Rampart Range Road and Jackson Creek Road. Mitigation would be difficult since this area has a low visual absorption capability. Visual impacts would be long-term if revegetation is unsuccessful on these sites with low reclamation potential.

Alternative III

The Controlled Surface Use (Visual) stipulation would be applied to relocate all four Concentrated RFD wells or other potential wells in visually sensitive areas to meet the retention VQO. Discretionary No Lease would offer additional protection of visual quality at other potential well sites in

areas such as the Aspen Ridge roadless area and segments of the South Platte River being considered for classification as Wild and Scenic river.

Alternative IV

On existing leases subject to Standard Lease Terms, the effects of Alternative IV on visual quality would be similar to the effects of Alternative II. However, negative impacts to the visuals resource under Alternative IV would be limited to lands currently under lease.

CULTURAL, PALEONTOLOGICAL AND CAVE RESOURCES

Most of the historic, architectural and archeological values of cultural sites can be protected effectively through application of the National Historic Preservation Act (NHPA) of 1966 as amended and the Archeological Resources Protection Act (ARPA) of 1979 as amended in the event of oil and gas development. However, according to the General Counsel,[30] the NHPA may not protect all historic values associated with a cultural property, especially if the property has more than scientific worth. Cultural sites may contain educational and recreational values that are not protected by NHPA or ARPA; these values are the ones most endangered by oil and gas development as they are not protected by law or the current Forest Plan. Standard Lease Terms may not be sufficient to protect these resources with recreational, educational, and interpretive values as the linear extent of most of these resources and a sensory buffer is greater than 200 meters. Thus, oil and gas development might result in degradation of these resources or of the sensory environment associated with these resources, or create conflicts with recreation and traditional place user of these resources and areas.

Paleontological and cave resources usually are not protected by the NHPA and ARPA laws unless they have characteristics that qualify them as cultural sites. Very important paleontological sites may be protected by the Antiquities Act of 1906, although this law is vague in its specific application. The Federal Cave Resources Act of 1988 requires the protection and maintenance, to the extent practical, of significant caves on Federal lands. Implementing regulations are not currently available. Thus, paleontological and cave resources may be more vulnerable to direct effects caused by oil and gas activities. Mitigation measures consistent with Standard Lease Terms would be developed on a case-by-case basis. Paleontological and cave resources may contain educational and recreational values in addition to their scientific attributes; these values are not protected by law and potentially are threatened by oil and gas development.

Oil and gas activities could cause indirect effects on cultural, paleontological and cave resources. Increased public access may increase illegal artifact collecting at archaeological and paleontological sites. There appear to be no measurable indirect effects on cave resources.

Grasslands-BLM RFD

Alternative I

Current Forest Plan direction stipulates interpretation and protection of cultural resources that are eligible to or listed in the National Register of Historic Places. However, no specific areas for cultural resources protection or interpretation are listed in the text or depicted on the management prescription maps. Provision in the Forest Plan is made for protection of special interest historical or paleontological areas through implementation of management prescription 10C; however, no such areas on the Unit are afforded this prescription in the current Forest Plan.

Wells could be drilled adjacent to known cultural, paleontological and cave resources. The actual resources would be protected from physical disturbance, but oil and gas activity could impact recreational or interpretive values. Examples of areas containing these values include Picture Canyon, Vogel Canyon and segments of the Santa Fe Trail on the Comanche, and other segments of the Santa Fe Trail on the Cimarron.

Alternative II

Potential effects on the recreational and interpretive values of cultural and paleontological resources would be similar to Alternative I.

Alternative III

Alternative III is the only alternative which would allow application of a No Surface Occupancy (Cultural) stipulation and would provide added protection to significant cultural, resources on the grasslands [Exhibit III-10]. The No Surface Occupancy (Cultural) stipulation for the Santa Fe National Historic Trail would prohibit surface occupancy on the trail itself and within a buffer of specified distance. This stipulation would adequately protect the recreational and interpretive values of this significant cultural resource. The Controlled Surface Use (Special Area) stipulation would avoid disturbance to important geologic features within the Spanish Peaks National Natural Landmark.

Discretionary No Lease would prohibit leasing in several other areas with significant, interpretable cultural resources until those areas needing special management designation are identified during Forest Plan revision. Areas not identified for special management would then be subject to standard lease protection.

Areas protected by No Surface Occupancy and Discretionary No Lease are listed in Exhibit III-10.

Alternative IV

Standard lease development would cause impacts similar to Alternative II. However, impacts to cultural resources would be limited to lands currently under lease. Post-leasing activity on current leases could negatively impact significant cultural resources such as the Santa Fe Trail on the Cimarron, the Aubrey Cut-off area of the Santa Fe Trail on the Comanche and Picture Canyon on the Comanche.

Mountains-BLM RFD

None of the four wells analyzed would impact significant cultural, paleontological or cave resources under any alternative.

Alternative I

Wells could be drilled adjacent to known cultural, paleontological and cave resources. The actual resources would be protected from physical disturbance, but oil and gas activity could impact recreational or interpretive values. Examples of areas containing cultural resources with these values include Cloverdale Basin in the Sangre de Cristos the proposed Chalk Creek Historic District in the Collegiate Peaks and Elevenmile Canyon.

Alternative II

Potential effects on the recreational and interpretive values of cultural and paleontological resources would be similar to Alternative I.

Alternative III

Alternative III is the only alternative which would allow Discretionary No Lease to provide added protection to significant cultural and cave resources, such as the Cave Creek Caverns in the Mosquito Range.

Discretionary No Lease would prohibit leasing in several other areas with significant, interpretable cultural resources until those areas needing special management designation are identified during Forest Plan revision [Exhibit III-10]. Areas not identified for special management would then be subject to standard lease protection.

Alternative IV

Standard lease development would cause impacts similar to Alternative II. However, impacts to cultural resources would be limited to lands currently under lease.

Mountains-Concentrated RFD

None of the Concentrated RFD wells analyzed would impact significant cultural, paleontological or cave resources. There would be no measurable difference among the effects of the four alternatives for these well locations. However, under Alternative IV potential impacts would be limited to existing leases.

RECREATION

The two main types of recreational experiences managed by the Forest Service are dispersed and developed recreation. Oil and gas activities could impact both types.

Grasslands-BLM RFD

All 12 representative wells occur in the dispersed recreation sector. Eleven of 12 wells are within the Roaded Natural Recreation Opportunity Spectrum (ROS) class and the remaining well is in the Rural ROS Class on the Cimarron. Predominate uses that occur near these well locations include driving for pleasure and sightseeing, hunting, fishing, and study of flora, fauna and history.

Under all alternatives, Standard Lease Terms would be used to mitigate dispersed recreation impacts. During post-leasing activity, recreation in the dispersed section could be displaced on a short-term basis (exploratory wells) or long-term basis (producing wells). Dispersed recreation impacts would be insignificant.[31]

Alternative I

Current Forest Plan direction does not allow the use of supplemental stipulations to protect developed and dispersed recreation experiences. Standard Lease Terms as supplemented by standard conditions of approval prohibit surface occupancy within developed recreation sites and within a limited buffer of unspecified distance around the sites. Wells could be drilled within 1/4 mile of developed recreation sites. Nearby oil and gas activity could cause direct negative impacts

to the recreation experience, such as dust, noise, lights, increased vehicle traffic, and potential loss of the environment that made the site desirable for development.

Certain dispersed recreation areas considered for special designation are currently under multiple use management. These areas include Roadless Areas inventoried under the RARE II inventory, areas in Wilderness Study Areas identified by Congress as not suitable for Wilderness, roadless areas adjacent to BLM Wilderness Study Areas, and Wild and Scenic River segments not found to be eligible for classification under the inventory guidelines and process. All these areas would be available for leasing subject to Standard Lease Terms. Standard Lease Terms would not provide the extensive site protection necessary in Roadless Areas and other unclassified areas to protect the character of these areas for further evaluation for special designation.

Alternative II

Under Alternative II, Standard Lease Terms would offer the same level of protection of developed and dispersed recreation areas as Alternative I.

Alternative III

The No Surface Occupancy (Recreation) stipulation would prohibit surface occupancy within 1/4 mile around developed recreation sites listed in Exhibit A-2 of Appendix A. In most cases, this distance would reduce direct negative impacts that users might experience, such as dust, noise, lights, increased vehicle traffic, loss of recreation activities in close proximity to the developed site, and loss of the environment that made the site desirable for development.

Alternative IV

Under Alternative IV, Standard Lease Terms would offer the same level of protection of developed and dispersed recreation areas as Alternative I or Alternative II. However, potential direct negative impacts to developed and dispersed recreation experiences would be limited to lands currently under lease.

Mountains - BLM RFD

Wells 1 through 4 are located in the dispersed recreation sector. Wells 1 and 2 are within the Roaded Natural ROS class, well 3 is in the Semiprimitive Motorized ROS class and well 4 is in the Rural ROS class. Driving for pleasure and sightseeing are the predominant dispersed recreation uses near wells 1 through 3. Secondary uses include 4WD driving, hunting, hiking and dispersed camping.

Alternative I

Drilling activity at the four hypothetical well sites would have no direct impacts on developed sites or users. Exploratory wells would cause a short-term, insignificant impact on dispersed recreation in the vicinity of the four wells.

Other potential wells could be drilled within 1/4 mile of developed recreation sites. Nearby oil and gas activity could cause direct impacts to the recreation experience, such as dust, noise, lights, increased vehicle traffic, and potential loss of the environment that made the site desirable for development.

Alternative II

Under Alternative II, Standard Lease Terms would offer the same level of protection of developed and dispersed recreation areas as Alternative I.

Alternative III

The No Surface Occupancy (Recreation) stipulation would prohibit surface occupancy within 1/4 mile around developed recreation sites, listed in Exhibit A-2 of Appendix A. In most cases, this distance would reduce indirect negative impacts that users might experience, such as dust, noise, lights, increased vehicle traffic, loss of recreation activities in close proximity to the developed site, and loss of the environment that made the site desirable for development.

Discretionary No Lease would be applied on tracts of land that are undergoing analysis for designation as Wilderness or classification as Wild and Scenic River, to protect the character of the lands until final decisions are made on special designations.

Alternative IV

Under Alternative IV, Standard Lease Terms would offer the same level of protection of developed and dispersed recreation areas as Alternative I or Alternative II. However, potential direct and indirect negative impacts to developed and dispersed recreation experiences would be limited to lands currently under lease.

Mountains-Concentrated RFD

All Concentrated RFD wells are located in an area comprised of developed and dispersed recreation uses in the Roaded Natural ROS class.

Alternative I

Post-leasing activity would cause short-term direct impacts to the developed recreation experience in the Jackson Creek Campground, Devils Head Campground and Topaz Point Picnic Ground. Oil and Gas development would also cause short-term direct impacts to the dispersed recreation experience in the vicinity of the Devils Head fire lookout tower, and Rampart Range Road near Jackson Creek.

Alternative II

Under Alternative II, Standard Lease Terms would offer the same level of protection of developed and dispersed recreation areas as Alternative I.

Alternative III

The No Surface Occupancy (Recreation) stipulation would prohibit surface occupancy within 1/4 mile around developed recreation sites, listed in Exhibit A-2 of Appendix A, including the three sites in Jackson Creek. In most cases this distance would reduce direct negative impacts that users might experience, such as dust, noise, lights, increased vehicle traffic, loss of recreation activities in close proximity to the developed site, and loss of the environment that made the site desirable for development.

Alternative IV

Under Alternative IV, Standard Lease Terms would offer the same level of protection of developed and dispersed recreation areas as Alternative I or Alternative II. However, potential direct and indirect negative impacts to developed and dispersed recreation experiences would be limited to lands currently under lease.

RESEARCH NATURAL AREAS & SPECIAL INTEREST AREAS

Research Natural and Special Interest Areas are established to provide emphasis for research, study, observations, monitoring and educational activities that are nondestructive and nonmanipulative, that maintain unmodified conditions, or ensure the protection of species of interest.

Grasslands-BLM RFD

Alternative I

Prescriptions 10A in the Forest Plan provides for Research Natural Areas and prescription 10C provides for Special Interest Areas. The Research Natural Areas on the Grasslands include the Cimarron RNA and the Campo RNA. A Discretionary No Lease will be applied to the Cimarron RNA until it has been formally withdrawn from mineral entry. The designated documents and plans for the Campo RNA stipulate that this area will be managed with a No Surface Occupancy stipulation. Management plans for the Lesser Prairie Chicken Zoological Area and the Colorado State University, Southeastern Colorado Branch Experimental Station allow development under a Controlled Surface Use stipulation. The Carrizo Frasera Botanical Special Interest Area will be protected by a Discretionary No Lease until an approved plan is in place.

Alternative II

The Standard Lease Terms do not allow for adequate protection of Research Natural Areas or Special Interest Areas. Significant impacts could occur to these areas.

Alternative III

The same level of protection is provided under this alternative as that shown under Alternative I.

Alternative IV

The same level of protection is provided under this alternative as that shown under Alternative I for areas that are currently leased.

Mountains-BLM RFD

Alternative I

The Hurricane Canyon RNA, Saddle Mountain RNA, Hoosier Ridge RNA, Windy Ridge Bristlecone Pine Scenic Area and Queen's Canyon Geologic Area are protected by a Discretionary No Lease until they are formally withdrawn from mineral entry. These areas are protected by the 10A prescription in the Forest Plan. Prescription 10E in the Forest Plan protects Special Interest Areas. These areas include the Mt. Bross Botanical Area, the West Hoosier Ridge Botanical Area, the Iron Mountain Botanical Area, Lost Lake Botanical Area, the Lost Park Botanical Area, the Spout Lake

Botanical and the Droney Gulch Botanical Area. These Special Interest Areas will be protected by a Discretionary No Lease until management plans are implemented.

Alternative II

The Standard Lease Terms do not allow for adequate protection of Research Natural Areas or Special Interest Areas. Significant impacts could occur to these areas.

Alternative III

The same level of protection is provided under this alternative as that shown under Alternative I.

Alternative IV

The same level of protection is provided under this alternative as that shown under Alternative I for areas that are currently leased.

Mountains-Concentrated RFD

There are no Research Natural Areas or Special Interest Areas in the concentrated BLM RFD affected environment.

SPECIAL USES

This discussion will focus on potential effects of oil and gas development on the recreation experience in winter sports sites under special use permit on the Mountains. The current Forest Plan direction calls for the formal withdrawal of existing winter sports sites from mineral entry. The withdrawal process is not complete for all areas. The effects of the alternatives on the recreation experience of users will therefore vary by alternative.

There are no winter sports sites in Jackson Creek, the drainage affected by the Concentrated RFD. None of the analyzed BLM RFD wells would occur on or near winter sports sites. The following discussion pertains to other potential well sites.

Alternative I

Discretionary No Lease would prohibit oil and gas development on existing winter sports sites until these areas are formally withdrawn from mineral entry. Impacts on the recreation experience would be limited to the existing lease in a portion of the Cuchara Ski Area. Oil and gas development could cause short-term direct impacts on the recreation experience of users, such as dust, noise, lights and increased traffic.

Alternative II

Standard Lease Terms would allow surface occupancy on existing winter sports sites which are not formally withdrawn from mineral entry. Post-leasing activity would cause short-term impacts on the recreation experience of users.

Alternative III

Discretionary No Lease would prohibit oil and gas development on existing winter sports sites until these areas are formally withdrawn from leasing. Potential impacts would be similar to Alternative I.

Alternative IV

Impacts would be limited to one existing lease within the Cuchara Ski Area permit boundary. After lease expiration, this ski area would be protected by Discretionary No Lease until formal withdrawal from mineral entry.

BLM RFD Effects Versus Concentrated RFD Effects on the Mountains

As discussed in the introduction of this chapter and the introduction of the RFD Well Analysis, the IDT analyzed the effects of 4 wells on the Mountains in general areas identified by the BLM as having the highest likelihood of exploratory development (BLM RFD), as well as the effects of 4 wells located in the Jackson Creek drainage in the Rampart Range area of the Pike National Forest (Concentrated RFD). Wells were located on existing leases for both scenarios. The Concentrated RFD was developed in one of the "most sensitive" watersheds by the IDT and analyzed strictly for comparison with the BLM RFD. Its primary purpose was to identify the high range of effects that could be anticipated as a result of drilling 4 exploratory wells on the Mountains. It is highly unlikely that this scenario, and its effects, would occur.

Tables IV-1 and IV-4 depict the quantifiable differences between the BLM RFD and the Concentrated RFD on the Mountains. The BLM RFD would disturb a total of 18 acres in widely dispersed drainages on non-fragile soils. All disturbed acres would be reclaimed during or shortly after the planning period. The Concentrated RFD would disturb a total of 44 acres (Alternatives II and IV) or 29 acres (Alternatives I and III) in one drainage which is over its sediment threshold limit and has extensive areas of steep slopes and fragile soils. Under Alternatives II and IV, disturbed acres could not be reclaimed in a timely manner, resulting in adverse impacts on vegetation, soils, water and fishery resources. Under Alternatives I or III, the sediment problem in Jackson Creek would be mitigated prior to ground-disturbing post-leasing activities. Wells would be moved to gentler slopes with better reclamation potential. All disturbed acres would be reclaimed during or shortly after the planning period.

The RFD Well Analysis also disclosed non-quantifiable effects on resources due to both RFD scenarios. Under Alternatives II and IV, the Concentrated RFD would cause a greater impact to visual quality and recreation experiences than the BLM RFD. Under Alternatives I and III, the Concentrated RFD impacts on resources could be mitigated to acceptable levels through the application of Supplemental Stipulations to meet current Forest Plan direction or Alternative III objectives. The effects of four actual wells on the Mountains may differ from those disclosed in this analysis since their locations would vary from those that were analyzed. The actual effects of development is expected to be within the range of the BLM and Concentrated RFD effects. A single well's effect on an individual resource may exceed the effect disclosed for an individual RFD well, however, that difference is expected to be insignificant.
Once again, the BLM RFD is the more likely RFD scenario on the Mountains. Therefore, the BLM RFD is the basis for the following cumulative effects discussion.

Cumulative Effects

This section describes the cumulative environmental effects that are anticipated to occur as a result of implementing the management alternatives.

Cumulative Effects, or Impacts, are defined in the Council on Environmental Quality (CEQ) regulations, 40 CFR 1508.7, as "..the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency...or person undertakes such other actions." The Forest Service interpretation of that direction is that only the "reasonably anticipated effects of the proposed action need to be incorporated into the cumulative effects analysis. The BLM RFD is the most likely to occur so we will base the analysis on it. The BLM RFD includes projected activity on NFS lands and split-estate lands on the Unit.

The direct and indirect effects of well development appear to be somewhat limited in area for most resources. The scope of a well's effect varies depending on the area being studied. If we were to use the Mountains as the affected environment to analyze cumulative effects of leasing, the anticipated development would have very little to no effect. Only 18 of 2.1 million acres would be disturbed and most effects would be temporary in nature. In order to more clearly combine and display cumulative effects they will be discussed on what is generally a watershed basis.

To determine cumulative effects the Forest Service analysts added the impacts of the proposed action, Alternative III, to the impacts of all other management activities within the analysis areas where oil and gas development is anticipated to occur. The management activities studied include past actions whose environmental effects are still present, activities presently occurring, and future activities whose effects can be reasonably anticipated.

AFFECTED ENVIRONMENT

We superimposed the occurrence of these past, present and reasonably foreseeable activities on and adjacent to the analysis areas onto the map of the "Reasonably Foreseeable Development Scenario." Our analysis of the combination of the environmental effects of these various sources indicates that there are four independent *areas of combined effects* on the Pike and San Isabel National Forests and three *areas of combined effects* on the Comanche National Grasslands. This is because the anticipated activity based on RFD is relatively widespread, low in number and localized in direct effect. On the Cimarron National Grassland, the level of existing and projected development is high and evenly distributed so there are only two *areas of combined effects*. The North Fork Cimarron River area was kept separate from the Cimarron River area, because these are two separate watersheds with varying potentials for impacts on several resources, including water, aquatic habitat and visuals. Thus, there are nine *affected environments* for the cumulative effects of this proposed action. The nine environments include the Oak Creek, Rock Creek, Rampart, and Beaver Creek areas on the Mountains, and the Campo, Vilas, King Arroyo, Cimarron River and North Fork of the Cimarron River areas on the Grasslands. These nine *affected environments* are shown in Figures IV-2, IV-3 and IV-4.

Figure IV - 2
Affected Environments For Cumulative Effects

PIKE AND SAN ISABEL NATIONAL FOREST

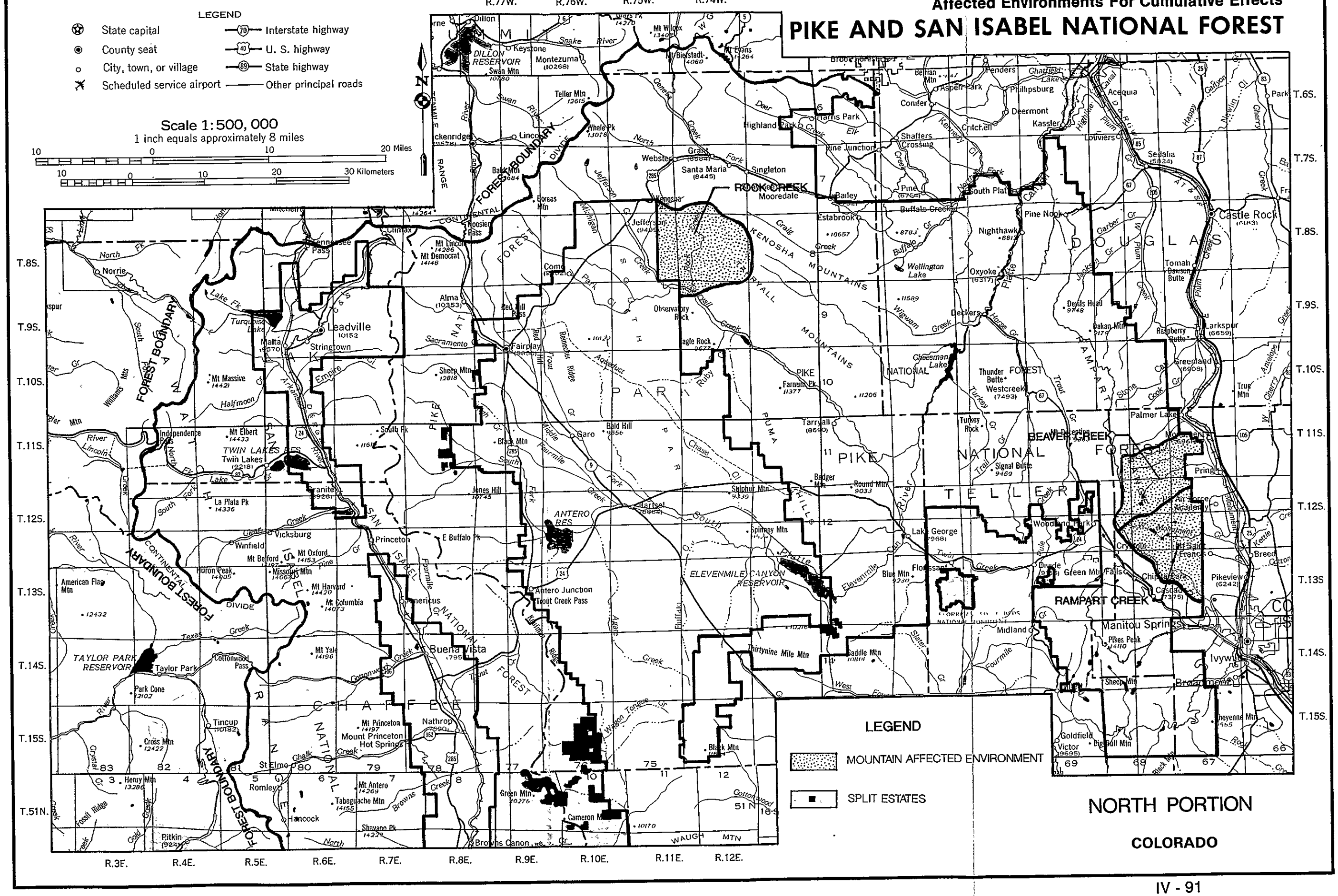


Figure IV - 3
Affected Environments For Cumulative Effects

PIKE AND SAN ISABEL NATIONAL FOREST

R.7E. R.8E. R.9E. R.10E. R.11E.

T.50N. T.49N. T.48N T.47N. T.46N. T.45N. T.44N. T.43N. T.42N. T.41N. T.40 N. T.39N.

T.17S. T.18S. T.19S. T.20S. T.21S. T.22S T.23S. T.24S. T.25S. T.26S. T.27S. T.28S T.29S T.30S. T.31S T.32S

Brown's Canon Ute Cr. Badger Creek WAUG

Maysville Salida (7080) Poncha Springs (7465) Poncha Pass Cleora Wellsville Arkansas River Howard Burned Timber Mtn Simmons Pk (12051) Alder (9536) Bushnell Pk 13105 Bonanza Baldy Mtn 12972 Villa Grove Nipple Mtn Hillside Gem Mtn Buck Mtn Cottonwood Peak 13573 Hectic Peak 13621 Mineral Hot Springs Mt Ouray 13987 Saguache Rito Alto Pk Gibson Pk 12816 Horn Peak 13459 Moffat Crestone Crestone Peak 14294 Burnt Mtn 8761 Center Hooper (7560) Ansel Dunul Sevenmile Plaza Torres Mosca Great Sand Dunes Nat Monument Sand Spring Gr Sun Luis Lake Blanca Pk 14345 Mt Lindsey 14042 Little Bear Peak 14037 Buck Mtn 10440 Blanca Fort Garland (7930) Harrison Pk 11598 Raspberry Mtn Cuchara W Spanish Pk Cuchara Pass

Cactus Mtn Twin Mtn Parkdale Royal Gorge Canon City (5332) Oak Creek Florence (6186) Rockvale Horseshoe Mtn Penrose Portland Hobson Kirby Pk Vetmore (6081) Adobe Pk 10188 Greenwood Bear Pk 9577 De Weese Res Westcliffe (7668) Silver Cliff Querida Rosita Wixson Mtn Fairview Beulah Valley View Goodpas Antelope Creek San Isabel Colorado Rye Greenhorn Greenhorn Mtn 12349 Texas Creek Coaldale Cotopaxi Rock Creek Kerber Creek Oak Gr Texas Creek Copper Gulch Newlin Gr Tarryscribble Creek Red Tail Gr Peck Gr Grape Creek Frazer Gr Muddy Creek Middle Creek Gardner Red Wing Farisita Huerfano Sheep Mtn Black Hills Iron Mtn Slide Mtn 12344 N La Veta Pass Silver Mtn 10522 Veta Pass Mt Mestas Sand Arroyo Cuchara Abeyta Gr Russell Sierra Codo La Veta (7013) Goemmer Butte Three Bridges Mortimer W Indian Gr Bear Creek Raspberry Mtn Harrison Pk 11598 E Spanish Pk 13604 W Spanish Pk Cuchara Pass

SAN ISABEL NATIONAL FOREST — FREMONT — CUSTER — HUERFANO — COSTILLA

FOREST BOUNDARY — WESTERN RIO GRANDE DENVER AND RIO GRANDE WESTERN

SAN LUIS VALLEY — SANGRE DE CRISTO MOUNTAINS — WET MOUNTAIN VALLEY — SAN LUIS HILLS — CULEBRA RANGE

LUIS MARIA BACA GRANT NO 4

NEW MEXICO — COLORADO

Arkansas Ute Creek Badger Creek Poncha Creek Rock Creek San Luis Creek Oak Gr Texas Creek Copper Gulch Newlin Gr Tarryscribble Creek Red Tail Gr Peck Gr Grape Creek Frazer Gr Muddy Creek Middle Creek Sand Arroyo Cuchara Abeyta Gr Antelope Creek Bear Creek Saguache Creek Rock Creek Kerber Creek Hooper Lat Farmers Union Canal Rio Grande Canal Camel Creek Crestone Creek Indian Creek Isabel Creek Gibson Creek Blanca Creek Cottonwood Creek Grape Creek Gulch Creek Sand Spring Gr Pass Creek Gr Williams Creek Gr

LEGEND

MOUNTAIN AFFECTED ENVIRONMENT

SPLIT ESTATES

LEGEND

State capital	Interstate highway
County seat	U. S. highway
City, town, or village	State highway
Scheduled service airport	Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

N

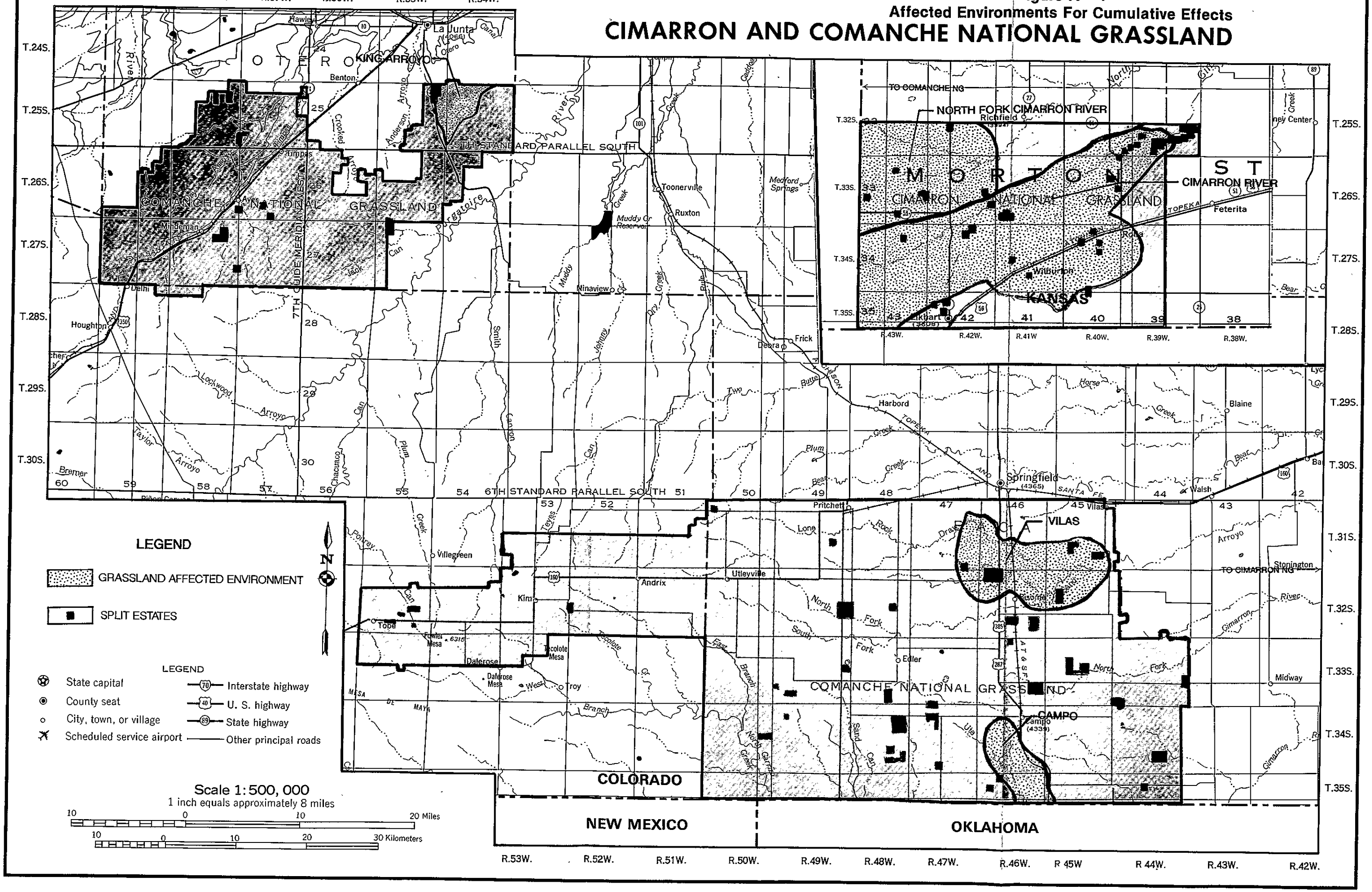
SOUTH PORTION

COLORADO

Figure IV - 4

Affected Environments For Cumulative Effects

CIMARRON AND COMANCHE NATIONAL GRASSLAND



LEGEND

GRASSLAND AFFECTED ENVIRONMENT

SPLIT ESTATES

LEGEND

State capital	Interstate highway
County seat	U. S. highway
City, town, or village	State highway
Scheduled service airport	Other principal roads

Scale 1:500, 000

1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

Numerous present and reasonably foreseeable actions are proposed for the Unit and the area immediately adjacent to the Unit. Because of the large number of these actions, they are listed in a table format and briefly described for each affected environment. A full description of these actions can be found in the various Specialist's Reports. These actions were pulled from a variety of records, plans, and maps that are incorporated by reference into the Administrative Record.

THE CUMULATIVE EFFECTS

Cumulative effects will be discussed in detail for the preferred alternative. Only the significant cumulative effects will be discussed for the other alternatives. Past, present and future non oil and gas activities are the same for all alternatives. The only difference between alternatives will be the location of the oil and gas wells.

PREFERRED ALTERNATIVE (ALTERNATIVE III)

Mountains

The following general information is the same for all cumulative analysis areas in the Mountains.

As discussed earlier in this chapter, ground-disturbing activities directly affect the vegetation and soils resources which in turn affect the water and aquatic habitat resources. Vegetation impacts are quantified in terms of disturbed acres, which is the basis for soil loss calculations. Disturbed acres which are reclaimed are also revegetated, thereby mitigating vegetation and soils impacts. Vegetation and soils will be discussed together in this cumulative effects analysis.

The potential for cumulative impacts on air quality are greater in the Rampart and Beaver Creek affected environments near Colorado Springs. However, the contribution of exploratory well development toward degradation of air quality would be negligible. In the other affected environments, dust and smoke are common pollutants. Cumulative impacts to air quality would be short-term, localized and insignificant.

The cumulative effects of four exploratory wells on the socio-economic environment would be insignificant for all affected environments on the Mountains.

Acres disturbed by special uses which are not occupied by above-ground facilities have been reclaimed on the Mountains.[32] Special uses were included in this analysis because they can cause unquantified effects on other resources such as visual quality and recreation. Cumulative effects on special uses would be insignificant on the Mountains. No ski areas would be affected by the BLM RFD. Standard Lease Terms would protect existing valid uses authorized by special use permit.

Perennial streams and fishery resources occur in all four affected environments, however, the population dynamics are unknown at this time. There are no planned fishery or riparian activities in the affected environments. Sediment from ground-disturbing activities can impact the fishery resource if sediment is delivered to streams.

Except for two placer claims in the Rampart watershed, all other hard-rock claims in the mountains are undeveloped in the affected environments. Future development of these claims is not anticipated due to the low market value for hard-rock minerals currently existing. Disturbance for oil and gas activity include the area utilized by the well pad, storage areas, and reserve pit.

There are no known paleontological or cave resources in any of the affected environments. This discussion is limited to cumulative effects on cultural resources.

All future road construction is associated with oil and gas development in affected environments on the Mountains except in the Rampart area. The Rampart Reservoir North Shore Recreation Development will have 7 miles of new road construction. New road construction for foreseeable oil and gas activity is also shown in future increase for roads.

OAK CREEK AREA

BLM RFD Well 1

Table IV-59
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASES
Timber Sales	0 sales	0 sales
Roads	28 miles	0.1 miles
	86 disturbed ac	0.3 disturbed ac
Trails	16 miles	0 miles
	8 disturbed acres	0 disturbed acres
Minerals	49 hard-rock claims	1 oil/gas well
	0 disturbed acres	4 disturbed acres
	Gravel Pit-12 ac	0 disturbed acres
Grazing	0 AUM's	0 AUM's
Recreation	1 site	0 sites
	14 disturbed ac	0 disturbed acres
Special Uses	3 uses	0 uses

Vegetation and Soils

The Oak Creek area covers approximately 21,500 acres. Total area disturbed by all past and present activities equals 120 acres. Reasonably foreseeable ground-disturbing activities are limited to one oil or gas well that would occur on non-fragile soils with slight to moderate limitations for successful reclamation potential. Douglas-fir and oakbrush are the dominant vegetation types, with lesser amounts of ponderosa pine, aspen, mountain mahogany and mountain grass. Approximately 86 acres of mountain grass and riparian have been disturbed by existing roads. Trails have disturbed approximately 8 acres of various vegetation types, primarily Douglas-fir and oakbrush. Roads, trails and the Oak Creek Campground are long-term impacts on vegetation for public transportation and recreation purposes.

There are 4,107 acres that are suitable for timber production in this watershed. However, these acres tend to occur in scattered clumps on north aspects, often in areas with few existing roads. Past and current activities have had an insignificant impact on vegetation and suitable acres. Well 1 would not impact suitable acres, but other potential well sites could cause an insignificant

long-term impact on timber production. Well 1 would be abandoned and reclaimed/revegetated during the planning period. Cumulative effects on vegetation and soils due to total disturbances in a watershed of this size would be insignificant.

Water, Aquatic Habitat and Riparian

Oak Creek is the major drainage in this watershed. Small portions of Coal Creek and its tributaries are also included within this area. These streams support a self sustaining brook trout population. Well 1 is the only anticipated ground-disturbing activity. Current sediment yield from existing disturbed acres is 872 tons. The proposed oil and gas activity would increase the sediment yield by 0.7 tons. This increased sediment yield is well within the sediment threshold limit for the Oak Creek area. The cumulative effect of the sediment on water quality and aquatic habitat would be negligible. None of the past or present activities have caused significant impacts to riparian areas, and well 1 would not impact any riparian area. Cumulative effects on riparian areas would be insignificant.

Alpine

There are no alpine areas in the Oak Creek area.

Minerals

There is a 12 acre gravel pit in this area. It will be in use for the entire planning period. The only foreseeable future mineral activity would be one oil or gas well which would disturb 4 acres.

Wildlife

There are no critical wildlife areas within the Oak Creek area. The cumulative effects on wildlife would be insignificant, particularly with the relatively low disturbance levels in Oak Creek. Other uses, such as roads, recreation and special uses can affect wildlife. Wildlife displacement during the construction phase of activities is short term. Roads have been in place for many years and resident wildlife have become accustomed to them. Roads that provide access to some of the area must have a seasonal closure to reduce undue disturbance to wintering wildlife.[33]

Range

There has been no grazing in the Oak Creek area, and none is projected in the foreseeable future. The cumulative effects on the range resource would be insignificant.

Visual Resources

The natural landscape character of the Oak Creek area has not been significantly altered by past management activity. Well 1 would cause short term visual impacts. The terrain characteristics are such that the intervisibility of the sites, duration of views, and vantage points to a single site are limited. Well #1 could meet its inventoried visual quality objective (VQO) without the need for Controlled Surface Use (Visual) stipulation. Cumulative effects on the visual resource would be insignificant.

Cultural Resources

There are no known interpretable cultural resources warranting Discretionary No Lease protection in the Oak Creek area. Two known cultural resource sites would be protected to the extent of the existing laws. Cultural resources compliance work done for past activities resulted either in "no

properties' findings or avoidance of significant or potentially significant resources. There would be no cumulative effects on cultural resources.

Recreation

Well 1 is located approximately 5 miles northeast of the Oak Creek Campground and east of the Tanner Peak - Curley Peak trail system. The No Surface Occupancy (Recreation) stipulation would prohibit well location within 1/4 mile of Oak Creek Campground. Dispersed recreation use in this area consists of sightseeing, hiking, hunting, nature study and camping. Roads and trails enhance some of these uses. The area is comprised of Semiprimitive Motorized and Roaded Natural Recreation Opportunity Spectrum (ROS) classifications. The future oil or gas well would not change the ROS classification. Cumulative effects on developed and dispersed recreation would be short-term and insignificant in this area.

ROCK CREEK AREA

BLM RFD Well 2

Table IV-60
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASES
Timber Sales	5 sales 90 disturbed Ac	1 sale 20 disturbed acres
Roads	68 miles 135 disturbed Ac	.5 miles 1 disturbed acre
Trails	14 miles 7 disturbed Ac	0 miles 0 disturbed acres
Minerals	14 hard-rock claims 2 disturbed acres	1 oil/gas well 4 disturbed acres
Grazing	475 AUM's	0 AUM's
Recreation	0 sites	0 sites
Special Uses	1 use	0 use

Vegetation and Soils

This watershed covers approximately 32,400 acres. Two hundred thirty four acres are disturbed by past and present activities. Most disturbances have been reclaimed, with the exception of long-term uses such as roads, trails, old mineral exploration activity and special use facilities. Reasonably foreseeable ground-disturbing activities are limited to one oil or gas well that would occur on non-fragile soils with slight to moderate limitations for successful reclamation.

Spruce-fir, lodgepole pine and aspen are the dominant vegetation types below timberline at higher elevations. Ponderosa pine, aspen and mountain grass are common at lower elevations. Over half the acres disturbed by existing roads affected mountain grass; about 30% affected aspen; and the remainder affected ponderosa pine and spruce-fir. Trails have disturbed only 7 acres of various vegetation types, primarily spruce-fir and mountain grass. Roads and trails are long-term impacts on vegetation for public transportation and recreation purposes.

There are 12,186 acres suitable for timber production in this watershed. Five fuelwood sales have been cut on approximately 90 acres. Aspen is currently regenerating on these acres. Past and current activities have had an insignificant impact on vegetation and suitable acres. Well 2 would not affect suitable acres, but other potential well sites could cause a long-term insignificant impact on timber production. Well 2 would be abandoned and reclaimed/revegetated during the planning period. Cumulative effects on vegetation and soils would be insignificant.

Water, Aquatic Habitat and Riparian

Rock Creek and its tributaries make up the major drainage in this area although there are a few small drainages which bypass Rock Creek and eventually flow into Tarryall Creek. These streams support a self sustaining brook trout population. Current activities yield about 108 tons of sediment annually. Well 2 development would cause a negligible increase in this yield. The Rock Creek area would remain well within its sediment threshold limits. The No Surface Occupancy supplemental stipulation (Riparian/Wetlands/Flood plains) would ensure the well would not be located in a riparian area. Grazing can directly impact riparian areas. Good grazing management will prevent this from occurring. Roads are allowed to cross riparian areas. Mitigation can be designed to keep sediment yields from roads to a minimum. Cumulative effects on water quality, aquatic habitat and riparian areas would be insignificant.

Alpine

There are approximately 1,150 acres of alpine outside wilderness in the Rock Creek area. It is estimated that 5 to 10% of the acres disturbed by existing trails have impacted alpine in the headwaters of Rock Creek. Trails for recreation purposes are long-term impacts to the alpine resource. Well 2 would not impact alpine. If a well actually occurred in alpine, the Controlled Surface Use (Alpine) would minimize the potential for significant cumulative effects on alpine surface resources in the headwaters of Rock Creek.

Minerals

The 2 acres of disturbance shown in the preceding table are a result of old mineral exploration activity. The future increase in disturbed acres will be from 1 oil or gas well.

Wildlife

Well 2 would avoid approximately 6,000 acres of critical big game winter range in the Rock Creek watershed. In general, wildlife have become accustomed to the roads within the watershed, however, during the winter months some of the local roads must be closed to reduce undue disturbance to wintering wildlife. The Timing (Critical Winter Range) stipulation would prohibit activity during critical periods for wildlife, should a well actually occur in winter range. Cumulative effects on wildlife would be insignificant.

Range

The Buffalo-Craig Cattle and Horse allotment is grazed by 90 head of cattle for an annual use of 475 AUM's. Past and current activity has not significantly affected the range resource. There are 2,769 acres of suitable range in the affected area. One oil or gas well will be the only foreseeable activity and it will only affect 5 acres. Cumulative effects on range would be insignificant.

Visual Resource

Past and current timber sales have caused moderate impacts to visual quality. Aspen has been regenerating relatively quickly in the affected areas resulting in short term visual impacts. Visual impacts associated with well 2 could be mitigated with Standard Lease Terms. Oil and gas developments can be designed to meet inventoried visual quality objectives. Well 2 development would cause insignificant, short-term impacts to the visual resource in the Rock Creek watershed.

Cultural Resources

There are no known interpretable cultural resources warranting Discretionary No Lease protection in the Rock Creek area. There are two potentially significant cultural resources. None of the past or current activities have resulted in the identification of significant resources or any effects on known significant resources. Cultural resources would be protected to the extent of the existing laws. There would be no significant cumulative effects on known cultural resources.

Recreation

There are no developed sites in Rock Creek and no plans to construct any. The Rock Creek watershed is comprised of Semiprimitive Motorized and Roaded Natural ROS classifications. The foreseeable oil or gas activity will not affect the ROS classification. The Tarryall Road and the Lost Park Road are popular access routes to various nearby sites and dispersed recreation opportunities, including Tarryall Reservoir, the Lost Creek Wilderness and the Colorado Trail. Both roads should experience increased recreation traffic in the foreseeable future. Cumulative effects on recreation would be short-term and insignificant.

RAMPART AREA

BLM RFD Well 3

Table IV-61
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASES
Timber Sales	0 sales	0 sales
Roads	76 miles	7.5 miles
	235 disturbed Ac	23 disturbed Ac
Trails	6 miles	8 miles
	3 disturbed acres	4 disturbed acres
Minerals	3 hard-rock claims	1 oil/gas well
	15 disturbed Ac	49 disturbed acres
Grazing	0 AUM's	0 AUM's
Recreation	7 sites	11 sites
	54 disturbed Ac	85 disturbed Ac
Wildlife Habitat Impr.	0 acres	800 acres
Special Uses	12 uses	0 uses

Vegetation and Soils

The Rampart area covers approximately 21,700 acres. This watershed has been identified as being within 10% of exceeding sediment threshold limits. There are 307 acres currently disturbed in the watershed. The disturbed acres include roads and trails, developed mining claims, and recreation sites. There are unsanctioned trails caused by uncontrolled motorcycle, four wheel drive, and off-road vehicle use. This disturbance has not been quantified to-date, however, inventory of this activity is planned. These unsanctioned trails are not mitigated in any way. Adequate drainage is lacking, proper buffer widths may not be maintained and adequate reclamation or rehabilitation measures are not taken. These trails often run straight up and down steep slopes destroying all ground cover protection in localized areas of repeated use. Where these activities occur on steep slopes and fragile soils, significant detrimental impacts such as rill and gully erosion would occur to the soil resource. Off-road vehicle use has primarily impacted ground cover vegetation in the ponderosa pine, Douglas-fir, and mountain grass types.

Douglas-fir and ponderosa pine are the dominant vegetation types, with lesser amounts of mountain grass and spruce-fir. Most disturbance has occurred, or will occur, in the ponderosa pine and Douglas-fir vegetation types. The proposed Rampart Reservoir North Shore recreation development would disturb an additional 92 acres of predominantly ponderosa pine and Douglas-fir on gentle slopes on shallow, granitic soils.

Soil loss from construction of the recreation area is estimated to be 304 tons in the first year after disturbance. Soil loss would be reduced to 59 tons per year within 5 years, after reclamation is complete. Potential soil loss from the oil or gas well is estimated to be 24 tons in the first year following disturbance. Erosion will be reduced to 5 tons per year after reclamation is complete. This amount is within the soil loss tolerant limit.[34] Forest development roads and trails, recreation sites and most special uses are long-term commitment of the vegetation and soils resources.

There are 3,943 acres that are suitable for timber production in this watershed. However, existing access is generally limited to the ponderosa pine or Douglas-fir types on relatively narrow ridge tops or near the Rampart Reservoir, and mountain grass and some riparian in West Monument Creek. Relatively rugged terrain and steep side slopes reduce opportunities for economical access to suitable acres. The planned Ormes Peak prescribed burn would reduce mixed conifer overstory on approximately 800 acres and increase aspen and forage for bighorn sheep range. This project would not impact suitable acres nor would it cause a significant impact on vegetation or soils. Past and current activities have had an insignificant impact on vegetation and suitable acres.

Well 3 would cause an insignificant long-term impact on timber production. Tree planting would mitigate this impact. Well 3 would occur on non-fragile soils with slight to moderate limitations for successful reclamation. Well 3 would be abandoned and reclaimed/revegetated during the planning period. Cumulative effects on vegetation would be insignificant. Unsanctioned trails within the watershed may be causing significant impacts to the soil resource.

Water, Aquatic Habitat and Riparian

Several streams drain the Rampart area. The major drainages include West Monument Creek and Camp Creek. These drainages support a self sustaining brook trout population. The Rampart area is within 10% of exceeding its sediment threshold limit. Sediment yield will increase due to oil and gas development and the North Rampart recreation development. Since the watershed is close to exceeding its sediment threshold, the aquatic population may be impacted. Sediment can result in reduced growth rates and size at maturity, altered feeding behavior, clogged gills, and reduced reproduction success. Several areas along the Rampart Range Road have been identified in the watershed improvement needs inventory. The actual acres to be rehabilitated have not yet been

quantified. Rehabilitation of these areas will reduce sediment yield in the Rampart area. Other disturbed areas, not yet inventoried, will also be rehabilitated after they are identified and added to the watershed improvement needs list. Under the Controlled Surface Use (Water) stipulation, new ground-disturbing activities will be allowed only after enough disturbed acres in the watershed are rehabilitated so that new activities will not result in sediment limits being exceeded. The No Surface Occupancy supplemental stipulation for riparian/wetlands/flood plains would ensure that oil or gas wells would not occur in riparian areas. Cumulative effects from ground disturbing activities on the water, aquatic habitat and riparian resources are considered to be significant since the watershed is close to exceeding sediment threshold. The major concerns are with the unsanctioned activities, such as off-road vehicle use, because they are not mitigated.

Alpine

There are no alpine areas in the Rampart area.

Minerals

There are 3 unpatented placer claims in this area which cover 60 acres. The placer claims are located in a limestone environment and the market for limestone is currently very good. Active operations exist on two claims for a total of 15 acres of disturbance. All 3 claims are expected to be fully developed during the planning period resulting in a future disturbance of 45 acres. The remaining 4 acres of future disturbance will be from the 1 oil or gas well for a total of 49 acres of future disturbed acres.

Wildlife

There are no critical wildlife areas within the Rampart area, however, there is a small resident herd of bighorn sheep that use the area during the summer months. Well 3 would not impact this bighorn sheep area. The Timing (MIS) stipulation would prohibit activity during critical periods for sheep, should the well actually occur in the area used by bighorn sheep. There is a proposal to prescribe burn approximately 800 acres of mixed conifer to improve bighorn sheep range. The burning will reduce overstory vegetation and increase forage. Burning would be done when conditions would not cause severely hot fires that would damage the soil resource. In general, wildlife have become accustomed to the roads within the watershed, however, during the winter months some of the roads must be closed to reduce undue disturbance to wintering wildlife. Cumulative effects on wildlife would be insignificant.

Range

There has been no grazing in the Rampart area, and none is projected in the foreseeable future. The cumulative effects on the range resource would be insignificant.

Visual Resources

Past and present management activities have not significantly impacted the visual resource. The additional short term impacts associated with oil or gas developments would not add significantly to the existing disturbances. Only the new recreation development along the shore of Rampart Reservoir would add to the cumulative effects. Oil and gas development and the North Rampart recreation development will be designed to meet the inventoried visual quality objectives. Cumulative effects on the visual resource would be insignificant.

Cultural Resources

There are no known interpretable cultural resources warranting Discretionary No Lease protection in the Rampart area. One known potentially significant cultural resource site would be protected to the extent of the existing laws. None of the past and current Forest Service activities affected any significant cultural resources. There would be no significant cumulative effects on known cultural resources.

Recreation

The Rampart Reservoir recreation area is located within the Rampart area. The Rampart Reservoir North Shore recreation development will add new developed sites to this high use recreation area nearly doubling the current capacity. The construction of new recreation sites could have a significant short-term effect on current users of the recreation area. The primary dispersed recreation activity is sightseeing/driving for pleasure on the Rampart Range Road from Garden of the Gods to Woodland Park. Developed and dispersed use is expected to increase during the planning period. This area has both Roaded Natural and Semiprimitive Motorized ROS classification. Cumulative effects on these recreation experiences would be insignificant.

BEAVER CREEK AREA

BLM RFD Well 4

Table IV-62
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASES
Timber Sales	0 sales	0 sales
Roads	47 miles	0.1 miles
	145 disturbed Ac	0.3 disturbed ac.
Trails	7 miles	0 miles
	3 disturbed ac.	0 disturbed acres
Minerals	0 hard-rock claims	1 oil/gas well
	0 disturbed acres	4 disturbed acres
Grazing	348 AUM's	0 AUM's
Recreation	1 site	0 sites
	5 disturbed acres	0 disturbed acres
Wildfires	1000 acres	0 acres
Special Uses	11 uses	0 uses

Vegetation and Soils

The Beaver Creek area covers approximately 13,400 acres. This watershed has 1,153 acres of ground-disturbing activities, primarily in the ponderosa pine and Douglas-fir vegetation types. The 1989 Berry fire burned approximately 1,000 acres near the town of Monument, including 700 acres dominated by ponderosa pine and Gambel oak growing on shallow, granitic soils. Emergency fire rehabilitation was conducted on steeper slopes and natural erosion rates are expected to be restored within 5 years.[35] This watershed is also affected by uncontrolled motorcycle, four wheel drive and other off-road vehicle use. These unsanctioned trails are not mitigated in any way. Adequate drainage is lacking, proper buffer widths may not be maintained and adequate reclama-

tion or rehabilitation measures are not taken. These trails often run straight up and down steep slopes destroying all ground cover protection in localized areas of repeated use. Where these activities occur on steep slopes and fragile soils, significant detrimental impacts such as rill and gully erosion would occur to the soil resource. Rehabilitation of these areas will occur after they have been inventoried and added to the watershed improvement needs list. Reasonably foreseeable ground-disturbing activities are limited to one oil or gas well that would disturb 4 acres of ponderosa pine on non-fragile soils with slight to moderate limitations for successful reclamation.

Douglas-fir and ponderosa pine are the dominant vegetation types, with lesser amounts of mountain grass, aspen and spruce-fir. There are 1,724 acres that are suitable for timber production in this watershed. However, access limitations are similar to those in the Rampart area. Past and current activities have had an insignificant impact on vegetation and suitable acres. Well 4 would not impact suitable acres, but other potential well sites could cause an insignificant long-term impact on timber production.

Well 4 would occur on non-fragile soils with average or better reclamation potential. Well 4 would be abandoned and reclaimed/revegetated during the planning period. Cumulative effects on vegetation would be insignificant. Unsanctioned trails within the watershed may be causing significant impacts to the soils resource.

Water, Aquatic Habitat and Riparian

The major drainages in this watershed include North and South Beaver Creek and their tributaries which support a self sustaining brook trout population. As previously discussed under the vegetation and soils section, there are numerous unsanctioned motorcycle, 4-wheel drive and off-road vehicle trails in the area. These trails will be inventoried and added to the Watershed Improvement Needs list as areas to be rehabilitated. The rehabilitation of these unauthorized trails will reduce sediment levels in the future. Well 4 would cause a negligible sediment yield increase from the current level of 84 tons. Since the Beaver Creek area is currently exceeding its sediment threshold limit, the aquatic population may be impacted. Sediment can result in reduced growth rates and size at maturity, altered feeding behavior, clogged gills, and reduced reproduction success. The Controlled Surface Use (Water) stipulation would prohibit additional ground-disturbing activities until enough disturbed acres in the watershed have been rehabilitated so that proposed activities would not exceed the sediment threshold. The No Surface Occupancy (Riparian/Wetlands/Flood plains) stipulation would prevent oil or gas wells from occupying these areas. With the addition of the foreseeable oil and gas development, cumulative effects on water and aquatic habitat would not differ from existing effects with the application of these stipulations. The existing cumulative effects from ground disturbing activities on the water, aquatic habitat and riparian resources are considered to be significant since the watershed is exceeding sediment threshold levels. The major concerns are with the unsanctioned activities, such as off-road vehicle use, because they are not mitigated.

Alpine

There are no alpine areas in the Beaver Creek area.

Wildlife

There are no critical wildlife areas in the Beaver Creek watershed. In general, wildlife have become accustomed to the roads within the watershed, however, during the winter months some of the roads must be closed to reduce undue disturbance to wintering wildlife. Cumulative effects on wildlife would be insignificant.

Range

Well 4 would not affect the portion of the Limbaugh Allotment which occurs in this watershed. There are approximately 1,367 acres of suitable range grazed by 140 head of cattle for a permitted use of 348 AUM's. The only foreseeable development will be one well which will only disturb 5 acres. If development were to occur on suitable range, the effect would be negligible. Cumulative effects on the range resource would be short-term and insignificant, even if the well actually occurred in this allotment.

Visual Resources

Past and present management activities have not significantly impacted the affected viewshed. Oil and gas development is the only foreseeable future action. Well 4 could meet the inventoried visual quality objective without application of the Controlled Surface Use (Visual) stipulation available under this alternative. Cumulative effects on this resource would be short-term and insignificant.

Cultural Resources

There are no known interpretable cultural resources warranting Discretionary No Lease protection in the Beaver Creek area. Two known cultural resource sites would be protected to the extent of the existing laws. Cultural resource surveys done on past/current projects did not yield any significant cultural resources, nor did they affect the two known significant resources. The Berry fire did not affect any known historical properties. There would be no significant cumulative effects on known cultural resources.

Recreation

The Springdale Group Area is the only developed site in this watershed. This site will probably be closed after completion of the nearby Rampart Reservoir North Shore Recreation Area expansion. No new developed sites are planned in this watershed. The primary dispersed recreation use is sightseeing/driving for pleasure along the Rampart Range Road and the Mt. Herman Road. Cumulative effects on developed and dispersed recreation would be short-term and insignificant.

Grasslands

The following general information is the same for all cumulative analysis areas in the Grasslands.

As discussed earlier in this chapter, ground-disturbing activities directly affect the vegetation and soils resources which in turn affect the water and aquatic habitat resources. Vegetation impacts are quantified in terms of disturbed acres, which is the basis for soil loss calculations. Disturbed acres which are reclaimed are also revegetated, thereby mitigating vegetation and soils impacts. Vegetation and soils will be discussed together in this cumulative effects analysis.

All future road construction is associated with oil and gas development in affected environments on the Grasslands. New road construction for foreseeable oil and gas activity is shown in future increase for roads.

The dust, exhaust and possible discharge of hydrogen sulfide due to oil and gas exploration and development would cause short-term, localized impacts to air quality. Other management activities could cause similar impacts, with the exception of possible hydrogen sulfide. Cumulative effects on air quality would be short-term and insignificant.

Positive cumulative impacts on the socio-economic environments on the Grasslands include contributions toward local economies and employment. Alternative IV could cause a significant cumulative impact to local economies, if its implementation negatively impacted other local economies during the planning period.

Acres disturbed by special uses which are not occupied by above-ground facilities have been reclaimed on the Grasslands.[36] Special uses were included in this analysis because they can cause unquantified effects on other resources such as visual quality and recreation. Cumulative effects on special uses would be insignificant on the Grasslands. Standard Lease Terms would protect existing valid uses authorized by special use permit.

There are no perennial streams in any of the five affected environments on the Grasslands. There are no known fishery resources in the affected environments on the Comanche National Grassland. Fishery resources on the Cimarron National Grassland include man-made ponds and isolated pockets of water in the Cimarron River corridor. Future management may include construction of additional ponds in these general areas. Sediment delivery is low on the Grasslands due to flat terrain and few defined stream channels to transport sediment. Water, aquatic habitats (including fishery resources) and riparian will be discussed together in this analysis.

There are no hard-rock claims currently exisitng in the Grasslands. Disturbance for oil and gas activity include the area utilized by the well pad, pipelines, tank placement and reserve pit.

There are no known paleontological or cave resources in any of the affected environments on the Grasslands. This discussion is limited to cumulative effects on cultural resources.

COMANCHE NATIONAL GRASSLANDS

Campo Area

Table IV-63
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASE
Roads	201 miles 401 disturbed ac.	7 miles 10 disturbed ac.
Minerals	26 wells 28 unreclaimed ac.	31 oil/gas wells 46 disturbed acres
Grazing	780 AUM's	0 AUM's
Special Uses	8 uses	0 uses

Vegetation and Soils

The Campo analysis area covers 28,000 acres in the southern part of the Comanche National Grasslands. Land types are characterized by rolling, sandy lands with narrow riparian areas and some limited canyon lands in the extreme southern portion of the area. The sandy lands are dominated by midgrass prairie vegetation. Shortgrass prairie and pinyon-juniper are common in the canyon lands. Current and future oil and gas activities will cause some soil erosion and soil compaction, which could impact revegetation and vegetation growth on affected areas. However, these impacts can be minimized through the use of the Controlled Surface Use (Soils) stipulation and other required mitigation.

Other activities which could disturb vegetation and soils include grazing, fires, roads and special uses. Grazing is managed to maintain adequate ground cover protection for erosion control. Vegetation disturbance and soil compaction problems are usually confined to concentration areas around watering sites and salt licks. Existing roads and many special uses are considered a long-term commitment of the vegetation and soils resources. Most direct effects on soils occurred during the first year after construction, and reclamation practices have since stabilized surface erosion to within soil loss tolerance levels.[37] Past, current and planned activities would disturb a total of 485 acres of vegetation and soils. Cumulative effects would be insignificant.

Water, Aquatic Habitat and Riparian

All of the drainages in this analysis area are intermittent. Most of the BLM RFD wells are located on sandy lands so there will be little if any sediment yield from them due to the high permeability rates of sandy soils. One well was located in a canyon land. The Controlled Surface Use (Soils) stipulation will allow wells to be moved out of the fragile canyon land areas. There are no known fishery resources in this area. There may be some riparian areas present in the bottoms of some of the canyons, however, the No Surface Occupancy stipulation for riparian/wetlands/flood plains would prevent wells from occupying these areas. Grazing is managed to protect the riparian and canyon land areas. There are few if any impacts from vehicles in the riparian and canyon land areas. Cumulative effects to the riparian resource are considered to be negligible.

Wildlife

Part of the Lesser Prairie Chicken Zoological Area is located in this unit. It is unique in that the Lesser Prairie Chicken has a rather large breeding area here. This special interest area allows some development under a Controlled Surface Use stipulation. Grazing is allowed in the Lesser Prairie Chicken Zoological Area, however, there is a limit on allowable use. There are no threatened or endangered plant or animal species in this area. The Lesser Prairie Chicken might occupy other parts of this unit that are not included in the Carrizo Zoological Area. The Timing stipulation for management indicator species will protect the nesting areas as well as the dancing grounds.

Range

The estimated grazing capacity in this area is 780 AUM's. Producing wells would cause an insignificant, long-term commitment of the range resource. However, unreclaimed rangeland acres at the end of the planning period would be relatively low when compared with total available and suitable rangeland of 28,000 acres. Cumulative effects on range would be insignificant, and there should be no need to reduce livestock carrying capacity during the planning period.

Visual Resources

Activities that could effect the visual resource include oil and gas development, road construction, fencing, livestock grazing, new recreation developments and dispersed recreation. The gentle topography and lack of screening vegetation make most projects intervisible. The area of primary concern would be along Highway 285/387. New oil and gas activity will parallel the existing oil and gas activity. Impacts could be high if visual resource management direction is not complied with. The Controlled Surface Use stipulation for visuals would mitigate visual impacts in the foreground zones that have visual quality objectives of retention.

Cultural Resources

There are several known archeological sites in this area. Past and current activities, such as wildlife and grazing improvements were done prior to current regulations regarding cultural resource

protection and hence their effects are unquantifiable. Other activities done since the implementation of the cultural resource laws have not resulted in any effects on cultural resources. Effective implementation of the National Historic Preservation Act, and the Archeological Resources Protection Act should be sufficient to protect these resources from future foreseeable cumulative effects.

Recreation

Sightseeing and hunting are the predominant recreation uses in this area. There are no plans to construct any recreation facilities in this area. The impacts to the recreation resource from oil and gas activity as well as other resource development is insignificant.

Vilas Area

Table IV-64
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASES
Roads	175 miles 350 disturbed ac.	1 mile 2 disturbed acres
Minerals	0 wells 0 disturbed acres	8 wells 12 disturbed acres
Grazing	1650 AUM's	0 AUM's
Special Uses	7 uses	0 uses

Vegetation and Soils

This area covers 59,500 acres. The land types consist of hard lands, rolling sandy lands and riparian areas. The hard lands are dominated by shortgrass prairie vegetation, while the sandy lands are dominated by midgrass prairie. The main ground-disturbing activities in this area include roads, special uses and grazing. Grazing is managed to maintain adequate ground cover protection for erosion control. Impacts are normally localized in concentration areas such as water sources and salt licks. Existing roads and many special uses are considered a long term commitment of the vegetation and soils resource. Most direct effects on soils occurred during the first year after construction, and reclamation practices have since stabilized surface erosion to within soil loss tolerance levels.[38] Direct impacts from the foreseeable oil and gas activity can be mitigated through use of the Controlled Surface Use (Soils) stipulation and other erosion control measures designed to restore ground cover protection. Past, current and future activities would disturb a total of 364 acres. Cumulative effects on vegetation and soils would be insignificant.

Water, Aquatic Habitat and Riparian

The largest drainage in this area is Lone Rock Draw which is intermittent. Sediment yield is negligible due to the gentle topography and few defined stream channels to transport the sediment. There are no known fishery resources in this area. Small riparian areas do occur and could be impacted by oil and gas activity, grazing and vehicle use. The No Surface Occupancy stipulation for riparian/wetland/flood plain areas will prohibit oil and gas wells from occupying these areas. Grazing is managed to prevent significant impacts and vehicle use is minimal.

Wildlife

Upland game birds such as scaled quail and pheasant are the primary wildlife species in this unit and will not be affected. There are no threatened and endangered species in this area.

Range

The NFS lands are used primarily for grazing while the intermingled private lands have a mix of dry land farming and grazing of 1,650 AUM's. Grazing will not be impacted by the temporary loss of 14 acres.

Visual Resources

Gentle topography and lack of screening vegetation make most activities intervisible along Highway 285/387. New oil and gas activity will be mitigated to meet the visual resource management direction in the foreground zones with visual quality objectives of retention.

Cultural Resources

Based on our current information, there are no significant cultural sites in this area.

Recreation

Sightseeing and hunting are the predominant recreation uses in this area. There are no plans to construct any recreation facilities.

King Arroyo Area

Table IV-65
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASES
Roads	42 miles 84 disturbed ac	1 mile 2 disturbed acres
Minerals	0 wells 0 disturbed acres	6 oil/gas wells 9 disturbed acres
Grazing	150 AUM's	0 AUM's
Special Uses	3 uses	0 uses

Vegetation and Soils

This analysis area covers 7,100 acres. The land types consist of hard lands dominated by shortgrass prairie and riparian areas. The main ground-disturbing activities in this area include roads, special uses and grazing. Grazing is managed to maintain adequate ground cover protection. Impacts are normally localized in concentration areas such as water sources and salt licks. Existing roads and many special uses are considered a long term commitment of the vegetation and soils resource. Most direct effects on soils occurred during the first year after construction, and reclamation practices have since stabilized surface erosion to within soil loss tolerance levels.[39] Direct impacts from the foreseeable oil and gas activity can be mitigated through use of the

Controlled Surface Use (Soils) stipulation and other erosion control measures designed to restore ground cover protection.

Past, current and future activities would disturb a total of 95 acres of vegetation and soils. Cumulative effects on vegetation and soils would be insignificant.

Water, Aquatic Habitat and Riparian

King Arroyo and several other unnamed arroyos drain this analysis area. All of these drainages are intermittent. Sediment yield is negligible due to the gentle topography and few defined stream channels to transport the sediment. There are no known fishery resources in this area. Small riparian areas do occur and could be impacted by oil and gas activity, grazing and vehicle use. The No Surface Occupancy stipulation for riparian/wetland/flood plain areas will prohibit oil and gas wells from occupying these areas. Grazing is managed to prevent significant impacts to these areas. Vehicle use is minimal, and is currently causing no significant impacts to riparian areas.

Wildlife

Scaled quail are common in this area and use it year-round. It has been identified by the Colorado Division of Wildlife as an overall distribution and concentration area. There will be no impacts to scaled quail or other native species such as pronghorn from the six RFD wells. There are no threatened or endangered plant or animal species in this unit.

Range

The current grazing capacity in this area is 150 AUM's. The 6 wells will result in a temporary loss of 11 acres. This is negligible when compared with the 7,100 acres available for grazing. There are no other effects to grazing from past activities.

Visual Resources

Activities that could effect the visual resource include oil and gas development, road construction, fencing, livestock grazing, and dispersed recreation. The gentle topography and lack of screening vegetation make most projects intervisible. The area of primary concern would be the foreground areas of Highway 109 and middle ground views along the Military route of the Santa Fe Trail. No projects other than oil and gas are planned. New oil and gas activity will have impacts to visual quality. The level of impact can only be determined by a site-specific analysis, however, mitigation is designed to meet the visual resource management direction. The Controlled Surface Use stipulation for visuals would mitigate visual impacts in the foreground zones that have visual quality objectives of retention.

Cultural Resources

Based on current information, there are no known significant cultural resources in this area and thus no known past or future cumulative effects on this resource. The knowledge regarding cultural resources in this area is not comprehensive.

Recreation

Sightseeing and hunting are the predominant recreation uses in this area. There are no plans to construct any recreation facilities. The impacts to the recreation resource from the foreseeable oil and gas activity are insignificant.

CIMARRON NATIONAL GRASSLAND

Cimarron River Area

Table IV-66
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASES
Roads	603 miles 1205 disturbed ac	45 miles 65 disturbed ac
Trails	16 miles 8 disturbed ac.	23 miles 33 disturbed ac.
Minerals	263 wells 368 unreclaimed ac Gravel Pits-57 ac	155 wells 305 disturbed acres 0 ac
Grazing	4140 AUM's	0 AUM's
Recreation	10 sites 37 disturbed ac	2 sites 4 disturbed ac
Special Uses	210 uses	0 uses

Vegetation and Soils

The Cimarron River area encompasses approximately 99,500 acres. As shown in the preceding table, the Cimarron River has experienced a relatively high level of ground-disturbing activities, primarily in the shortgrass and midgrass prairie types on hard lands and sandy lands respectively. There are 1,675 disturbed acres in the affected environment. Unreclaimed acres listed under minerals are due to existing producing oil and gas wells.

Planned trail construction along the Santa Fe Trail would disturb another 33 acres, mostly in midgrass prairie on sandy lands. Wildfires burn an average of 100 acres of midgrass prairie per year on sandy lands. Grazing impacts are normally localized in concentration areas such as the Cimarron riparian and salt licks. Existing roads and many special uses are considered a long-term commitment of the vegetation and soils resources. Most direct effects on soils occurred during the first year after construction, and reclamation practices have since stablilized surface erosion to within soil loss tolerance levels.[40]

Past, present and future activities would disturb a total of 2,082 acres, or 2% of the total land base. Roads, trails and long-term special use areas would not be revegetated during the planning period. Over half the acres disturbed by oil and gas activity, wildfires and prescribed fires would be reclaimed/revegetated by the end of the planning period. Cumulative effects on vegetation and soils would be insignificant with effective reclamation practices.

Water, Aquatic Habitat and Riparian

The intermittent Cimarron River is the main drainage in this analysis area. Sediment delivery from disturbed acres to the Cimarron River is low due to the gentle terrain and few defined stream channels to transport the sediment. A variety of fish and wildlife species inhabit the area. Small pools along the river are the distributional range of several category 2 listed T & E species as well as state listed fish. These species include the Arkansas darter, the Arkansas River shiner and the

flathead chub. These pools may be recharged with fish periodically when the river flows. Middle springs is an important riparian area that provides aquatic habitat. Fishery and riparian management has included construction of several small ponds used for recreational fishing and waterfowl.

The No Surface Occupancy stipulation would prevent location of new wells within these areas along the Cimarron River, however, there are existing wells in the riparian area. Approximately 70% of the river corridor is currently under lease and new well development under these leases is allowed. Wastes associated with oil and gas development could significantly impact the riparian area, water quality and aquatic habitat. Vehicle use in the river corridor is restricted to a few authorized roads and trails. Grazing is not allowed in the Middle Springs area. Grazing is allowed in the Cimarron River riparian area, however, it is only grazed for a maximum of 30 days each year and never grazed later than mid-August. The accumulation of spilled wastes such as oil, salt water and drilling fluids could impact the riparian area, water quality and aquatic habitat. Effects would be significant during high water periods when these wastes could be entrained in the flows.

Wildlife

There are no critical wildlife areas or known Threatened or Endangered plant or animal species within the Cimarron River area. This area is used by elk, upland game birds and other wildlife species. No significant, long-term cumulative effects on wildlife are expected from oil and gas activity. Uncontrolled vehicle use in the river corridor could be detrimental to wildlife. Travel management restrictions are currently in place and any impacts to wildlife from vehicle use should be negligible. The Cimarron Research Natural Area occurs within this unit. This area is protected by Discretionary No Lease until it is formally withdrawn from mineral entry.

Range

The estimated grazing capacity in this area is 4140 AUM's. Future producing wells would cause an insignificant, long-term commitment of the range resource. However, unreclaimed rangeland acres at the end of the planning period would be relatively low when compared with total available and suitable rangeland. Cumulative effects on range would be insignificant, and there should be no need to reduce livestock carrying capacity during the planning period.

Visual Resources

Current activities that have an effect on the visual resource include grazing, gravel pits, recreation developments, the Santa Fe Trail, private land inholdings, windmills and oil and gas activity. Most management activities are intervisible, due to the gentle topography and lack of screening vegetation except along the Cimarron River corridor. The majority of these facilities are located in the foreground zones of state and county roads. Others are located within the corridor of the Cimarron River or are visible from recreation-sites and the Santa Fe Trail. The level of projected oil and gas development would not add significantly to the visual impacts from current or other future management activities. The Controlled Surface Use (Visual) stipulation would mitigate visual impacts in foreground zones that have visual quality objectives of retention.[41]

Cultural Resources

There are several cultural resources in this area. These resources have been subject to cumulative effects in the past such as grazing, natural erosion, surface collection by collectors, reclamation activities and grazing improvement activities. These actions have resulted in the loss of most of the surface information and some subsurface deposits. The National Historic Preservation Act and the process described in 36 CFR 800 would protect archeological values from significant cumulative effects. Segments of the Santa Fe National Historic Trail occur in the Cimarron River area. The

interpretive and recreational values of the Trail would not necessarily be protected by law. The No Surface Occupancy (Cultural) stipulation would provide additional protection to the Cimarron Cut-off Route along the Trail. Discretionary No Lease would protect the Point of Rocks site and the Middle Spring site along the Trail until these areas can be analyzed for special management designation during Forest Plan revision. Cumulative effects on known cultural resources would be insignificant with this additional protection.

Recreation

The 10 developed recreation sites are concentrated along the river corridor. Two new developed sites will be built just north of the river in the next two years. Most developed sites are fenced to keep livestock out. The No Surface Occupancy (Recreation) stipulation would prevent well location within 1/4 mile of developed sites. No developed sites occur in the area near Rolla. Cumulative effects on developed recreation would be insignificant.

Dispersed recreation activities include driving for pleasure/sightseeing, hunting, hiking, horseback riding and nature study. The future construction of the companion trail to the Santa Fe Trail will add to the dispersed recreation that is currently occurring in this area. Oil and gas activities could affect dispersed recreation activities such as hunting and bird watching in the river corridor. These effects are expected to be insignificant.

Approximately 70% of the river corridor is currently under lease and the high level of oil and gas development has likely impacted the Cimarron River's eligibility characteristics for Wild and Scenic River classification. Existing leases are likely to be extended by production or communization. Therefore, Discretionary No Lease will not apply to the Cimarron River corridor. The No Surface Occupancy (Riparian/Wetlands/Flood plains) stipulation would prevent oil and gas development only in the area that has not been leased.

North Fork Cimarron River Area

Table IV-67
Past, Present & Future Activities

ACTION	PAST/PRESENT	FUTURE INCREASE
Roads	135 miles 270 disturbed ac	3 miles 4 disturbed ac
Minerals	17 wells 24 unreclaimed ac	10 wells 20 disturbed acres
Grazing	238 AUM's	0 AUM's
Special Uses	23 uses	0 uses

Vegetation and Soils

This analysis area covers 8,600 acres. The area is located southwest of Richfield, and the land types consist primarily of hard lands with some sandy lands and small amounts of riparian along the North Fork of the Cimarron River. Predominant vegetation consists of shortgrass and midgrass prairie. The main ground-disturbing activities in this area include current oil and gas activity, roads, special uses and grazing which affect a total of 294 acres. Grazing impacts are normally localized in concentration areas such as water sources and salt licks. Existing roads and many special uses are considered a long-term commitment of the vegetation and soils resources. Most direct effects

on soils occurred during the first year after construction, and reclamation practices have since stablilized surface erosion to within soil loss tolerance levels.[42]

Past, present and future activities would disturb a total of 318 acres in this 8,600 acre analysis area. Cumulative effects on vegetation and soils would be insignificant.

Water, Aquatic Habitat and Riparian

The North Fork of the Cimarron River is the main drainage in this analysis area. This is an intermittent drainage. Sediment delivery from disturbed acres to the Cimarron River is low due to the gentle terrain and few defined stream channels to transport the sediment. There is no fishery resource in this area. Riparian areas exist along the North Fork of the Cimarron River. Impacts to the riparian area could occur from grazing, vehicle use and oil and gas activities. The No Surface Occupancy stipulation for Riparian/Wetlands/Flood plains would prevent location of wells within these areas. The North Fork of the Cimarron River is included in the adjacent allotments and grazing can occur up to a maximum of 60 days a year. Off road vehicle travel is not a problem in this area. Cumulative effects on ground water and riparian would be insignificant

Wildlife

There are no critical wildlife areas or known Threatened or Endangered plant or animal species in this analysis area. This area is used by elk, upland game birds and other wildlife species. No significant, long-term cumulative effects on wildlife are expected.

Range

There are 8,600 acres of suitable range in this area. The estimated grazing capacity is 238 AUM's. Producing wells would cause an insignificant, long-term commitment of the range resource. However, unreclaimed rangeland acres at the end of the planning period would be relatively low when compared with total available and suitable rangeland. Cumulative effects on range would be insignificant, and there should be no need to reduce livestock carrying capacity during the planning period.

Visual Resources

Current activities that have an effect on the visual resource include grazing, gravel pits, private land inholdings, windmills and oil and gas activity. Most management activities are intervisible, due to the gentle topography and lack of screening vegetation except in riparian areas. The majority of these facilities are located in the foreground zones of state and county roads. The level of projected oil and gas development would not add significantly to the visual impacts from current or other future management activities. The Controlled Surface Use (Visual) stipulation would mitigate visual impacts in foreground zones that have visual quality objectives of retention.

Cultural Resources

There are several known archeological resources in this area. There have been some substantial cumulative effects in the past resulting from surface collecting, erosion, grazing, road construction, reclamation activities and range improvement activities. These actions have resulted in the loss of most of the surface information and some subsurface deposits. The National Historic Preservation Act and the process described in 36 CFR 800 would protect archeological values from significant cumulative effects.

Recreation

Dispersed recreation activities include driving for pleasure/sightseeing, hunting, hiking, horseback riding and nature study. Although there are no stipulations to afford additional protection of dispersed recreation activities, the No Surface Occupancy (Riparian/Wetlands/Flood plains) stipulation would reduce cumulative effects to activities such as hunting and bird watching in riparian areas. Cumulative effects on dispersed recreation activities would be insignificant.

CUMULATIVE EFFECTS OF ALTERNATIVES I, II AND IV

Only the significant cumulative effects are discussed for Alternatives I, II and IV. As previously discussed, past, present and future non-oil and gas activities do not vary by alternative. These activities are disclosed in Tables IV-59 through IV-67. Only the location of the oil and gas wells change by alternative.

Alternative I

The existing ground disturbing activities have caused significant cumulative effects to the soil, water, aquatic habitat and riparian resources in the Rampart analysis area and in the Beaver Creek analysis area. These impacts are discussed in greater detail in the writeup for alternative III.

There could be significant cumulative effects to the aquatic and riparian resources and to the groundwater quality in the Cimarron River area. The Forest Plan does not prohibit mineral development in riparian areas. Any spill of wastes such as oil, salt water, drilling fluids, etc. would impact water quality. Standard lease terms only allow relocation of a well up to 200 meters. This is not enough to move the well out of the extensive riparian areas along the Cimarron River.

The visual resource may be impacted on the Grasslands due to the lack of screening potential due to low vegetation and flatter terrain. Unknown future opportunities for scenic viewing may be lost on the Cimarron National Grasslands due the extensive future oil and gas development.

Alternative II

There could be significant cumulative effects to the lesser prairie chicken in the Campo analysis area. Standard lease terms only allow timing restrictions for up to 60 days. This is not a sufficient length of time for protection of both the nesting areas and the dancing grounds.

There could be significant cumulative effects to the aquatic and riparian resources and to the groundwater quality in the Cimarron River area. Standard lease terms only allow relocation of a well up to 200 meters. This is not enough to move the well out of the extensive riparian areas along the Cimarron River. Any spill of wastes such as oil, salt water, drilling fluids, etc. in the riparian area would impact water quality.

There would be significant cumulative effects from excessive sediment yields in two affected environments on the Mountains. Standard lease terms don't prohibit oil and gas development in watersheds that are exceeding sediment threshold or are within 10% of exceeding sediment threshold limits. The Beaver Creek area is over its sediment threshold and the Rampart area is within 10% of exceeding its sediment threshold. Future ground-disturbing activities would add

more sediment to streams that are already impacted. Excess sediment is detrimental to aquatic life as well as the stability of the stream channels. There are existing significant cumulative effects to the water, soil, aquatic habitat and riparian resources in these two planning areas from ground disturbing activities. These impacts are discussed in greater detail in the writeup of Alternative III for the Rampart and Beaver Creek analysis areas.

The visual resource may be impacted on the Grasslands due to the lack of screening potential due to low vegetation and flatter terrain. Opportunities for scenic viewing opportunities may be lost on the Cimarron National Grasslands due the extensive future oil and gas development.

There could be significant cumulative effects on the Cimarron Research Natural Area since standard lease terms don't allow for adequate protection of this area.

Alternative IV

The existing ground disturbing activities have caused significant cumulative effects to the soil, water, aquatic habitat and riparian resources in the Rampart analysis area and in the Beaver Creek analysis area. These impacts are discussed in greater detail in the writeup for alternative III.

There are existing leases in the Cimarron River corridor. There will be significant cumulative effects to the aquatic and riparian resources and to the groundwater quality in the Cimarron River area. The Forest Plan doesn't prohibit mineral development in riparian areas. Any spill of wastes such as oil, salt water, drilling fluids, etc. would impact water quality. Standard lease terms only allow relocation of a well up to 200 meters. This is not enough to move the well out of the extensive riparian areas along the Cimarron River.

Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources results from actions altering an area to the extent that future options are lost. The term "irreversible" applies primarily to the effects of use of nonrenewable resources, such as minerals, or to factors such as soil productivity that are renewable only over long periods of time. An irretrievable commitment of resources results from the loss of production, harvest or use of natural resources. Irretrievable losses are not necessarily irreversible losses.

VEGETATION

BLM RFD well 3 and Concentrated RFD well 4R would cause an insignificant irretrievable loss of timber production. This irretrievable loss would be insignificant even if all 4 RFD wells actually occurred on sites suitable for timber production on the Mountains. Tree planting mitigation would ensure there would be no irreversible loss of timber production.

None of the BLM RFD alternatives or the Concentrated RFD alternatives would cause an irreversible effect on the vegetation resource, given monitoring requirements and the application of site-specific mitigation. However, revegetation mitigation would likely be costly and potentially long-term on the Concentrated RFD well sites on the Mountains or on the canyon land well sites on the Comanche (Alternative II and IV well sites only).[43]

SOILS

Alternatives II and IV of the Concentrated RFD could cause irreversible and irretrievable impacts on soil productivity on steep slopes and fragile soils associated with Pikes Peak granite and other localized areas in mountainous terrain if mitigation were to fail and accelerated erosion were to occur. These areas can be revegetated but the mitigation measures would be expensive. Shallow soils on scarp slopes of the Canyon lands could also be subjected to irreversible and irretrievable losses in soil productivity, due to the high erosion rates and low reclamation potential. Mitigation would be expensive.

WATER QUALITY

There is always the potential of a spill of wastes such as oil, salt water and drilling fluids, associated with oil and gas development. Mitigation measures are designed to make this potential as small as possible. However, any spill in a riparian area would have direct and immediate impacts on the water resource due to the high water table. Alternatives I, II and IV would have a higher potential for impacts to the ground water resource. Such impacts would be long-term, irreversible and irretrievable.[44]

AQUATIC AND RIPARIAN

There are possible irreversible and irretrievable impacts to fishery and riparian resources under Alternatives II and IV. This is due to the sensitive nature of riparian areas that if not fully protected may not recover. Sediment and chemical spills may cause similar impacts to the fishery resources.

RANGE

All alternatives would cause a relatively minor short-term or irretrievable long-term loss of forage production on the Grasslands. Revegetation mitigation would minimize this effect.

MINERALS

The production of oil and gas under any of the alternatives on the Grasslands would be an irreversible and irretrievable impact to these nonrenewable mineral resources.

Summary By Alternative

The significant effects for each alternative are displayed in Table IV-69. Alternatives with potential for significant effects depending on well location are listed with a +, non-significant with a 0.

Table IV-68 combines the discounted revenues and costs to yield measures of the overall cost efficiency of the alternatives. Two different measures are presented: 1) the Present Net Value, defined as the difference between discounted revenues and costs; and 2) the ratio of discounted revenues and costs, listed as the benefit/cost ratio. Information in Table IV-68 is the basis for effects on Human and Community Development shown in Table IV-69, Summary of Significant Effects by Alternative.

Refer to Appendix H for additional information on the economic analysis.

Table IV-68
Present Net Value and Benefit/Cost Ratio

	Alt. I	Alt. II	Alt. III	Alt. IV
Present Net Value	$67,722.60	$90,023.60	$73,476.80	$5,849.60
Benefit/Cost Ratio	22.9	30.1	24.8	6.0

Table IV-69
Summary of Significant Direct/Indirect Effects for the Unit by Alternative

	Alt. I		Alt. II		Alt. III		Alt. IV	
Resource	BLM	Conc	BLM	Conc	BLM	Conc	BLM	Conc
Vegetation	0	0	0	+	0	0	0	+
Soils	0	0	0	+	0	0	0	+
Water Quality	+	+	+	+	0	0	+	+
Wildlife	0	0	+	+	0	0	+	+
Aquatic & Riparian	+	+	+	+	0	0	+	+
T & E Species	0	0	0	0	0	0	0	0
Range	0	0	0	0	0	0	0	0
Visual	+	+	+	+	0	0	+	+
Cultural	0	0	0	+	0	0	0	+
Paleontological	0	0	0	0	0	0	0	0
Caves	0	0	0	0	0	0	0	0
Recreation	0	0	0	+	0	0	0	0
Special Areas	0	0	+	0	0	0	0	0
Mineral Resources	+	+	+	+	+	+	+	+
Human & Community	0	0	0	0	0	0	+	+
Transportation	0	0	0	0	0	0	0	0
Air/Noise Pollution	0	0	0	0	0	0	0	0

Key: BLM = Grassland BLM RFD and Mountain BLM RFD; Conc = Grassland BLM RFD and Mountain Concentrated RFD; + = significant effect; 0 = non-significant effect.

ALTERNATIVE I

This alternative implements the current Forest Plan direction. Existing mitigation tools would be used including consent denial on slopes over 60 percent and on highly erosive soils. There would be an NSO in place on the eligible section of the South Platte River. Impacts under this alternative would be insignificant unless activities occurred on a few sensitive areas such as riparian areas where Forest plan direction does not specifically prohibit oil and gas activity.

ALTERNATIVE II

This alternative uses Standard Lease Terms as the means to mitigate oil and gas activities. Under this alternative, significant impacts could occur on sensitive locations. Specific resources that could be significantly impacted based on well location and negotiated mitigation include vegetation, water quality, soils, aquatic, riparian, visual and recreation.

Due to the higher rate of activity, the Grasslands also could be impacted for both the entire Grassland and on a site-specific basis. Resources impacted would include those listed above plus cultural sites.

ALTERNATIVE III

This alternative allows the use of supplemental stipulations. The impacts under this alternative for both the Mountains and Grasslands would be insignificant to all resources. The additional stipulations maximize resource protection but increase the cost of exploration and development. Some loss of drilling opportunities would occur.

ALTERNATIVE IV

This alternative would not permit future oil and gas leasing. Alternative IV would not cause any surface resource impacts on lands without leases. However, the lost drilling opportunities and associated lost revenues could have a significant social and economic effect on some local areas on the Grasslands. Resource impacts on currently leased lands would be similar to those shown for Alternative II.

Effects of Alternatives on Consumers, Civil Rights, Minority Groups and Women

None of the alternatives would affect civil rights, minority groups or women.

Any alternative could affect consumers if oil and gas prices are kept lower or higher due to increased or decreased supplies of these items. Alternative IV would remove all NFS lands from future leasing. The resultant loss of revenues could affect consumers during the 15 year planning period.

Effects of Alternatives on Prime Farm Land, Range Land and Forest Land

"Prime" range land and "prime" forest land does not apply to lands on the Unit. None of the alternatives would affect prime farm land. Under all alternatives, National Forest System lands would be managed with a sensitivity to the effects on adjacent lands.

Effects of Alternatives on Wetlands and Flood Plains

Alternatives I, II and IV do not prohibit well development in riparian areas or flood plains. The management of wetlands and flood plains are subject to Executive Orders 11990 and 11988, respectively. The purpose of the executive orders are to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and flood plains. Development of oil and gas wells in riparian areas could cause significant effects to the water quality and aquatic habitat.

Effects of Alternatives on Threatened and Endangered Species and Critical Habitat

The list of threatened and endangered wildlife species and threatened and endangered plant species are identified in Exhibits III-5 and III-6 respectively. Oil and gas operations, under all alternatives, will be governed by the Endangered Species Act on all known locations of T&E species. A mitigation plan will be prepared and approved prior to any ground-disturbing activity on all known locations of T&E species and in consultation with the U.S. Fish and Wildlife Service and the Colorado Natural Areas Program.

Effects of Alternatives on Cultural Resources

As discussed earlier in this Chapter, all Alternatives would meet legal requirements for protection of, or the mitigation of impacts to, significant cultural resources. However, only Alternative III would provide additional protection of significant cultural resources with recreational and interpretive values. Discretionary No Lease (DNL) would prohibit oil and gas development in the vicinity of most cultural resources listed in Exhibit III-10 until these areas can be analyzed for special management designation during Forest Plan revision.

The Preferred Alternative

The preferred alternative is Alternative III. This alternative provides the greatest resource protection while leaving the majority of the National Forest System lands available for leasing. As discussed in more detail in Chapter I and the introduction to this Chapter, the Record of Decision will document three related decisions: a) Forest Plan Amendment; b) land availability decision; and

c) specific lands decision. The specific lands decision will be made for all lands administratively available for leasing, subject to monitoring prior to lease advertisement and sale, and another site-specific NEPA decision at the Application for Permit to Drill (APD) stage.

Implementation of Site-Specific Decisions

The decisions the Forest Supervisor will make are based on the best information available to date. Analysis for oil and gas leasing in the past has dealt with leasing decisions for specific known and proposed lease parcels on a case-by-case basis with the same level of knowledge about future development that is disclosed here.

The analysis presented in this document, appendices and supportive reports identifies well impacts on projected sites with known conditions. The procedure outlined in Chapter I, page 39, will be used to make site-specific determinations for future leases.

FOOTNOTES

[1] USDA, Forest Service; Smith, Eugene L., Transportation System Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO; April, 1991; pp. 43-52.

[2] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. IV-3; Addendum, October, 1991, pp. A-I-1 to A-I-3.

[3] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. IV-38.

[4] USDA, Forest Service; Chavez, Lee, Hydrology Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. 20.

[5] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. IV-39; Addendum, October, 1991, p. A-V-2.

[6] USDA, Forest Service; Gordon, Christi, Vegetation Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, November, 1991, Representative Well Analysis section.

[7] Ibid.

[8] USDA, Forest Service; Weierbach, Neal, Visual Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, October, 1991, p. 34.

[9] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. IV-58; Addendum, October, 1991, p. A-V-3.

[10] USDA, Forest Service; Weierbach, Neal, Visual Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, October, 1991, p. 34.

[11] USDA, Forest Service; Gordon, Christi, Vegetation Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, November, 1991, Representative Well Analysis section.

[12] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. IV-69.

[13] USDA, Forest Service; Chavez, Lee, Hydrology Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. 21.

[14] USDA, Forest Service; Martinez, M.C., Minerals Resources Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, p. 30.

[15] Personal communication with Rodney Jorgensen, IDT Soil Scientist, March, 1991.

[16] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, October, 1991, pp. A-V-5 and A-V-8.

[17] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. IV-88.

[18] USDA, Forest Service; Chavez, Lee, Hydrology Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, pp. 16 and 21.

[19] Ibid., p. 13.

[20] Ibid., p. 21.

[21] USDA, Forest Service; Verner, Jon, Wildlife, Range and Special Areas Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. 16.

[22] USDA, Forest Service; Verner, Jon, Wildlife, Range and Special Areas Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. 17.

[23] Ibid.

[24] Ibid., p. 24.

[25] USDA, Forest Service; Winters, David, Aquatic and Riparian Resources Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, March, 1991, Appendix II, pp 70-71.

[26] USDA, Forest Service; Johnston, B.C., Alpine Ecosystems and Their Management in the Southern and Central Rocky Mountains, March, 1991, p. 5.

[27] USDA, Forest Service; Gordon, Christi, Vegetation Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, November, 1991, Representative Well Analysis section.

[28] USDA, Forest Service; Weierbach, Neal, Visual Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, October, 1991, pp. 39, 41, 43.

[29] Ibid., pp. 44-45.

[30] Bacon, Glenn H.; Tribal Participation in Federal Historic Preservation Efforts; article published in ASCA Report, Vol. 17, No. 1, 1990.

[31] USDA, Forest Service; Foster, Emmett, Recreation Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. 34, part 6C.

[32] USDA, Forest Service; Zimmer, William, Special Uses Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, April, 1991, p. 33.

[33] USDA, Forest Service; Verner, Jon, Wildlife, Range and Special Areas Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, November, 1991, p. 4.

[34] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. A-V-10.

[35] Ibid., p. A-V-9.

[36] USDA, Forest Service; Zimmer, William, Special Uses Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, April, 1991, p. 33.

[37] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. A-V-19.

[38] Ibid.

[39] Ibid.

[40] Ibid., p. A-V-14.

[41] USDA, Forest Service; Weierbach, Neal, Visual Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. 43.

[42] USDA, Forest Service; Jorgensen, Rodney K., Soils Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, p. A-V-14.

[43] USDA, Forest Service; Gordon, Christi, Vegetation Resource Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991; Addendum, November, 1991, Irreversible and Irretrievable Effects section.

[44] USDA, Forest Service; Chavez, Lee, Hydrology Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, CO, May, 1991, pp. 21

CHAPTER V

CHAPTER V

LIST OF PREPARERS AND REVIEWERS

This EIS was prepared by an Interdisciplinary Team composed of individuals of varied specialties and backgrounds. Throughout the planning process, an interdisciplinary approach was used to conduct the analysis and to develop the alternatives. The following are those who helped in the analysis and in the preparation of this EIS.

Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Pueblo, Colorado

Dick Bennin - Minerals/Lands Specialist. Cimarron National Grassland, Elkhart, Kansas. B.S. Degree Forest Management. Fifteen years Forest Service experience at Ranger District level in minerals management.

Robert D. Bishop - Primary Staff Officer, Engineering and Resources Staff. B.S. Degree Civil Engineering. Twenty-four years Forest Service experience at Ranger District and Forest Supervisor's Office levels in engineering.

Lela Chavez - Forest Hydrologist. B.S. Degree Watershed Science. Nineteen years experience at Ranger District and Supervisor's Offices.

Linda Davis - Resource Specialist. Thirteen years Forest Service experience at Supervisor's Office level, including five years in land management planning. Assisted in document and administrative records preparation.

Emmett Foster - Recreation Staff. B.S. Degree Landscape Design. Twenty-six years Forest Service experience at Ranger District, Supervisor's Office, and Regional Office levels in recreation planning, administration, and landscape architecture. Provided input for developed recreation, wilderness, wilderness study areas, and roadless area evaluation.

Christi Gordon - Forest Silviculturist and Timber Sales Forester. B.S. Degree Forest Management, Washington State University. Eleven years Forest Service experience at Ranger District and Supervisor's Office levels in the fields of timber sale preparation, administration, silviculture, lands, and planning. Provided input for vegetation and alpine.

Joe Hartman - District Ranger, Cimarron National Grassland, Elkhart, Kansas. B.S. Degree Forest Management, Oklahoma State University. Twenty-six years of resource management experience with the Forest Service in timber, fire, range, wildlife, minerals, soils and water.

Steven Holdsambeck - Interdisciplinary Forester. B.S. Degree Forest Recreation. Eleven years Forest Service experience in the fields of reforestation, silviculture, fire, human resources, special uses, civil rights, wildlife, watershed, recreation and wilderness. Certified Silviculturist in Regions 2 and 8.

Rodney K. Jorgensen - Soil Scientist. B.S. Degree Soil Science. Thirteen years of Forest Service experience at the Supervisor's Office and Regional Office inventory team levels. Provided soil resource and alpine information.

Allen E. Kane - Archaeologist. B.A. and M.A. Degrees Archaeology. Four years Forest Service experience in cultural resources management at Supervisor's Office level. Provided technical direction for cultural resources, paleontological resources and cave resources.

Clinton D. Kyhl - Forester. B.S. Degree Forest Management, Iowa State University. Eight years of experience on three different Ranger Districts.

Logan Lee - Deputy Forest Supervisor. B.S. Degree Forest Biology, Colorado State University, 1978. USFS for 13 years; 2 years State & Private Forestry, 11 years at District and Forest level programs.

Daniel J. Jiron - Public Affairs. B.S. Social Science and Public Administration, University of Southern Colorado. Served five and a half years as aide to U.S. Rep. Ben Nighthorse Campbell (03-CO) in the Washington, D.C. and District Offices. Prior experience included special projects and administrative support City of Pueblo, CO.

Martl C. Martinez - Forest Geologist. B.A. Degree Environmental Studies with emphasis on geology; plus three years in geology. Five years on the Forest IDT for the Forest Plan, and five years in minerals management on the Forest, Pueblo, CO.

Susan Mease - Computer Specialist, CEO & DBA/Oracle Manager. B.S. Degree Computer Information Systems with emphasis on Business Administration, A.S. Computer Programming. Five years Forest Service experience.

Darryl Murphy - Cartographic Technician. Four years Forest resource support management working with soil surveys, mineral reversions and field work. Prepared cartographic displays for this EIS.

Paul L. Lewin - Civil Engineering Technician. B.S. Civil Engineering Technology, University of Southern Colorado, 1990. Assisted in preparation of cartographic displays.

Mari Nakada - Hydrologist trainee. B.A. Degree Biology, University of California at Santa Cruz. Approximately two years of Forest Service experience: one summer as volunteer at the Arapahoe-Roosevelt, two summers at the Umatilla National Forest, Oregon, one summer at the Routt, nine months working on the Water Division I adjudication case and approximately one year at the Pike and San Isabel National Forests.

Heidi L. Pfosch - Assistant Forest Land Surveyor. B.S. Land Surveying, Michigan Technological University, 1984. Forest Service 1988 to present.

Charles Richmond - District Ranger, Comanche National Grasslands, Springfield, Colorado. B.S. Degree Range/Forest Management from Colorado State University. Thirteen years of resource management experience with the Forest Service at the District level in range, wildlife, soils, water, and minerals.

Richard R. Roth - Primary Staff Officer, Wildlife, Fisheries and Range. B.S. Degree Forestry, M.S. Degree Wildlife Biology. Fifteen years Forest Service experience at District, Supervisor's Office and Area Office levels. Three years with the USFWS in water resource project evaluation.

Eugene L. Smith - Professional Engineer. B.S. Degree Civil Engineering, Municipal University of Omaha, 1968; Forest Engineering Institute, Oregon State University, 1978. Fifteen years Forest Service experience, Operations Engineer.

Lidia M. Swope - Writer/Editor Trainee. B.S. Degree Psychology with English Minor, University of Southern Colorado, 1982. Six years with Forest Service at Supervisor's Office. Editorial assistance for EIS.

Marvin P. VanderKolk - Primary Staff Officer, Recreation and Lands. B.S. Degree Forestry. Twenty-seven years Forest Service experience at District, Supervisor's Office, Regional Office, and Washington Office levels in recreation, lands and timber. Four years as District Ranger.

Jon Verner - Forest Wildlife Biologist. B.S. Degree Range/Wildlife Management. Twenty-eight years Forest Service experience at Ranger District and Forest Supervisors Office levels in the fields of range, wildlife, recreation, special uses, threatened and endangered species and minerals. Provided input for wildlife, threatened and endangered plant and animal species, range, experimental forests, research natural areas and special interest areas for this EIS.

Neal P. Welerbach - Forest Landscape Architect. Bachelor of Landscape Architecture Degree, Virginia Tech, 1985. Six years Forest Service experience.
Provided input for visual.

David S. Winters - Fishery Biologist. Associate of Applied Science Degree Fishery and Wildlife Technology, State University of New York, 1977; B.S. Degree Fishery Biology, Colorado State University, 1979; M.S. Degree Aquatic Ecology, Colorado State University, 1987. Seven years experience as an aquatic ecologist/biologist for private and federal organizations.

Bill Zimmer - Lands Staff Forester. B.S. Degree Forest/Range Management. Twenty-nine years Forest Service experience at District and Supervisor's Office levels with responsibilities in timber, lands, minerals, range, and wildlife. District Ranger for eight years. Provided expertise in areas of special land uses and minerals.

Region 2 Regional Office, USDA Forest Service, Lakewood, Colorado

Rosemary Bailey - Leasable Technician. USFS, Lakewood, Colorado. Responsible for technical aspects of reviewing, processing, reporting and record keeping for the Region-2 mineral leasing program. Twenty-three years Federal service, the last 15 years (3 years engineering; 8 years Water Rights Technician; 4 years minerals) with the Forest Service in the Regional Office, Lakewood, Colorado.

Pam Case - Regional NEPA Coordinator, Planning and Program Budget, Rocky Mountain Region, Lakewood, Colorado. B.S. Degree International Relations, Ph.D. Political Science. Seven years as Professor of Forest Management, Statistics, and Political Science; twelve years Forest Service experience at Forest Supervisor's and Regional Office levels. Advisor to the IDT and editor of this EIS.

John S. Dersch - Regional Geologist, Watershed, Soils & Minerals Area Management, Region 2 Regional Office. B.S. Degree Geology, Colorado State University. Responsible for Mining Law Administration and Geological Services, including the determination of mineral potential for locatable, leasable, and salable minerals. Fifteen years Forest Service minerals experience at District, Supervisor's, and Regional Office levels. Member of American Association of Petroleum Geologists and Society of Mining Engineers. Provided locatable, leasable, and salable mineral potential information to the Planning Staff for the Pike and San Isabel Land and Resource Management Plan.

Bud Phillips - Minerals Staff, Pawnee National Grassland, Arapaho-Roosevelt National Forest. Five years experience in oil and gas management.

William Robinson - Energy and Leasable Minerals Specialist, Region 2 Regional Office. Responsible for Regional minerals programs, including oil and gas leasing and operations. B.S. Degree Forest Management, Louisiana State University, 1959; M.S. Degree Forest Watershed Management, North Carolina State University, 1972. Thirty-one years Forest Service experience with eight years on Ranger Districts in Oregon and Mississippi; six years State and Private watershed programs, Southeast U.S.; three years watershed and land use planning, Region-2; nine years Deputy Director, Watershed, Soils and Minerals Area management, Region-2; and six years Leasable and Energy Minerals Specialist, Region-2.

Bureau of Land Management, U.S. Department of the Interior, Colorado

Kevin Anderson - Petroleum Geologist, Canon City, Colorado. B.S. Degree Geology, Colorado State University. Two years experience U.S. Geological Survey Coal Geologist, one year experience Mine Supervisor, Ideal Basic Industries, six years experience Geologist, Royal Gorge Resource Area and five years experience current position.

Ernie Gillingham - Surface Reclamation Specialist, Oil and Gas Inspection and Enforcement Coordinator, Canon City, Colorado. B.S. Degree Biology, University of Texas. Two years experience Fire Command Officer, Pindale Ranger District, three years experience Range Technician, Bridger-Teton National Forests, two years experience Range Technician, Royal Gorge Resource Area, two years experience Surface Reclamation Specialist, Royal Gorge Resource Area, six years experience current position.

David Hallock - Realty Specialist. Environmental Coordinator, Royal Gorge Resource Area, Canon City, Colorado. B.S. Degree Forestry, University of Florida. One year experience Forester, USDA Forest Service, California; three years experience Forester, Florida State Division of Forestry; three years experience BLM Forester, Idaho; five years experience Planning and Environmental Coordinator, Canon City; four years experience current position.

Jim Rhett - Geologist, Fluid Minerals Operations, BLM Colorado State Office, Lakewood, Colorado. B.S. Degree Geology, University of South Carolina. Two years experience as Hydrologic Technician, U.S. Geologic Survey, six years experience as Environmental Scientist, U.S Geologic Survey, Minerals Management Service and BLM, two years experience as Geologist, Craig District and two years experience, current position.

Ken Smith - Planning and Environmental Coordinator, Canon City, Colorado. B.S. Degree, Pennsylvania State University, M.S. Degree, West Virginia University, both in Park and Outdoor Recreation. Two years experience Park Technician, U.S. Army Corps of Engineers; two years experience Wilderness Specialist, Royal Gorge Resource Area; two years experience Outdoor Recreation

Planner, Canon City District; four years experience Outdoor Recreation Planner, Royal Gorge Resource Area; and three years experience current position.

David Telafaro - RMP Project Manager, Canon City, Colorado. B.A. Degree Recreation Park Administration; M.S. Degree Recreation Resource Planning, University of Missouri. Six and a half years experience, Park Departments of Idaho and Missouri; two years experience, Bureau of Outdoor Recreation; sixteen years experience with BLM in planning and environmental projects.

Roger Underwood - Assistant District Manager, Mineral Resources, Canon City, Colorado. B.S. Degree Geology, Oklahoma State University; Graduate work in Economic Geology, Missouri School of Mines. One year in oil and gas industry; three years experience Project Geologist, BLM; ten years experience District Geologist (two BLM Districts); four years experience in current position.

Kermit Witherbee - Supervisory Geologist, BLM Colorado State Office, Lakewood, Colorado. B.S. Degree Geology, M.A. Degree Geology, State University of New York, Oneonta, New York. Two years experience as consultant, one year experience as Geologist, Wyoming BLM State Office, six years experience in private industry (Powers Resources and Total Minatome), three years experience as BLM Area and District Geologist, four years experience current position.

Bureau of Land Management, U.S. Department of the Interior, Oklahoma

Brian Mills - Planning Coordinator, Oklahoma City, Oklahoma. B.S. Degree Wildlife Management, Oklahoma State University. Fifteen years experience BLM Wildlife Biologist, Coal Team Leader and RMP Team Leader. Experience with Amoco Production Research Division prior to government service.

Paul Tanner - Area Manager, Oklahoma City, Oklahoma. B.S. Degree Forestry, Stephen F. Austin University. Seventeen years experience as Natural Resource Specialist, Area Manager. Experience with USDA Forest Service as a Forester. Forestry experience with the Battelle Institute prior to government service.

CHAPTER VI

CHAPTER VI

PUBLIC COMMENTS AND RESPONSES

INTRODUCTION

This chapter details the Pike and San Isabel National Forests' and the Comanche and Cimarron National Grasslands' efforts to involve and consult with the public during the review of the Draft Environmental Impact Statement (DEIS).

Part I of this chapter describes the Forests' public involvement process.

Part II lists the people, organizations and agencies who responded to the DEIS, and the number assigned to each response. A summary of the FEIS or a complete FEIS has been sent to those listed, unless they chose to have their name removed from the mailing list.

Part III contains summary statements made by respondents, followed by a response to each statement.

In Part IV, copies of response letters from government agencies are shown.

PART I - PUBLIC PARTICIPATION

Availability Announcements and Press Releases

Press Releases - 4

Federal Register Notices

Notice of Availability - July 26, 1991
Closing date for public comments - September 9, 1991

Distribution of DEIS

The DEIS was distributed to the public in July 1991. Approximately 400 copies were initially distributed.

Mailings

The initial mailing list for the DEIS included 462 individuals, businesses, organizations and agencies which had either asked to receive the information, or were required by NEPA regulations to receive it. In March 1991, a letter was mailed to the 462 names on the mailing list. This letter was accompanied by a preaddressed, postage paid, postcard requesting that the recipient indicate whether or not they wished to receive a copy of the DEIS and to also indicate any address corrections. From these 462 names, 180 responded with only 15 indicating that they did not wish to receive a copy of the DEIS. Additional names were added to the mailing list as a result of phone calls and letters bringing the total to 370 names. A copy of the DEIS was mailed to these people.

Public Meetings

Informational Open Houses were held in Pueblo, Colorado on August 6, 1991, Lakewood, Colorado on August 7, 1991, and Elkhart, Kansas on August 13, 1991. At these meetings people were shown a video tape illustrating how to review the DEIS, followed by a discussion period where people could express their opinions regarding issues. A total of 26 people attended these open houses.

Presentations to Organizations and Individuals

Upon request, briefings were given to the following organizations.

Rocky Mountain Oil & Gas Association (8/29/91)
Colorado Environmental Coalition (9/5/91)
Colorado Mountain Club (10/19/91)

PART II - LIST OF RESPONDENTS AND LETTER NUMBERS

When a letter was received by the Forest Service it was numbered and entered into a computer tracking system. Each substantive comment from each letter was also identified and entered into the system. The respondent and the number identifier assigned to their letter is listed below.

Agencies and Public Officials

U.S. Department of Housing and Urban Development	(1)
USDA Soil Conservation Service	(2)
U.S. Public Health Service	(5)
Kansas Department of Wildlife & Parks	(8)
USDI Office of Environmental Affairs	(17)
Colorado Division of Wildlife	(20)
Environmental Protection Agency	(48)

Organizations

Colorado Mountain Club	(7)
Wilderness Study Group	(13)
Trappers Lake Sierra Club	(15)

Sierra Club - Sangre de Cristo Group	(19)
American Rivers	(34)
Rocky Mountain Oil and Gas Association	(38)
Sierra Club, Rocky Mtn. Chapter	(42)
Colorado Environmental Coalition	(46)

Businesses

Anadarko Petroleum Corporation	(6)
Oxy USA, Inc.	(21)
Marathon Oil Company	(22)
Texaco Exploration & Production, Inc.	(39)
Chevron, USA, Inc.	(40)
Exxon Company, U.S.A.	(49)

Individuals

Martinez, Marti	(3)
Scott, Robert D.	(4)
Berger, Bruce	(9)
Siegel, Myrna	(10)
Johnson, Eric	(11)
Olsen, David	(12)
Geiser, Mildred	(14)
Scar, Dick & Jan	(16)
Funk, Wendell	(18)
Johnson, David	(23) (26)
Vickory, Ann	(24)
Bright, Leon	(25)
Kuzniak, John	(27)
Sullivan, Dan	(28)
Tillman, Bob	(29)
Robertson, Todd	(30)
Mosley, Claire	(32)
Cockrell, Michael	(33)
Geppert, Bonnie	(35)
Gibb, Henry	(36)
Gang, Pamela	(37)
McConkey, Andrew	(41)
Foiles, Les & Barbara	(43)
Zingg, Barbara	(44)
Rea, Kim	(45)
Holeton, Elaine	(47)

PART III - RESPONSE TO COMMENTS

Introduction

Public comments received on the Draft Environmental Impact Statement (DEIS) for oil and gas leasing released in June of 1991, totaled 49 letters.

Each letter on the DEIS was read and considered as the Final EIS was developed. Comments were separated into categories and similar comments paraphrased, while still attempting to reflect subtle differences in meaning. These comments are presented on the following pages and are displayed under headings to facilitate review. The numbers shown under each heading refer to the commentor letter number and the comment number to aid in tracking the comment back to a particular letter.

Letters from local, state and federal government agencies and from public officials are reproduced at the end of this chapter.

Public Comments and Response

1. SPECIAL INTEREST AREAS (GENERAL)

3-4, 9-4, 11-2, 13-2, 16-1, 18-2, 19-8, 36-1, 37-5, 43-38

COMMENT:

All Special Interest Areas should be permanently off limits to oil and gas development.

RESPONSE:

Research Natural Areas, based on Forest Plan direction, are to be withdrawn, and will be Discretionary No Lease (DNL) until the withdrawal process is complete. Special interest areas, Queens Canyon & S.E. Colorado Experimental Station, call for a Controlled Surface Use stipulation. All other identified "Special Areas", mostly proposed and existing botanical areas, will have DNL until the individual management plans are complete. (See supplemental stipulations in Appendix A of FEIS)

2. LOST PARK ROAD #77

30-7, 10-4, 12-5, 36-4, 37-6, 46-58

COMMENT:

The Lost Park Road No. 77 should be permanently protected from oil and gas development to protect recreation values, and exceptional resource values (scenic, natural, wilderness).

RESPONSE:

The direction in the Forest Plan is to manage the areas along the Lost Park road for grazing, wood fiber production and utilization. Minerals management is compatible with this direction. In addition, most of the areas along the Lost Park road are covered with the supplemental stipulations of No Surface Occupancy (NSO), Timing or Controlled Surface Use (CSU) which will protect the recreational and visual qualities of this area.

3. NATIONAL PARK SYSTEM LANDS

17-1, 17-2

COMMENT:

The Final Environmental Impact Statement (FEIS) should describe the Great Sand Dunes National Monument, Florissant Fossil Beds National Monument, Two National Natural Landmarks, South Platte River, and Santa Fe National Historical Trail in the "Affected Environment Chapter" and analyze the impacts to each in the "Environmental Consequences" Chapter.

RESPONSE:

The Great Sand Dunes National Monument is two miles west of any portion of the San Isabel National Forest; the Forest is not visible from the Monument. The Florissant Fossil Beds National Monument is one half to one mile east of the closest portion of the Pike National Forest. Thus, there would be no direct effects on either Monument. Given the reasonable foreseeable projection of oil and gas development on the Pike and San Isabel National Forest, there would be no wells on the portions of the San Isabel Forest closest to the Sand Dunes, or within ten miles of the Florissant Fossil Beds. Given the extremely low probability of any development, there would be no anticipated impacts on the Monuments, including on visual quality, air quality or visitor experience. Because there are no anticipated impacts, the National Monuments were not considered in the analysis. The two National Natural Landmarks (the Lost Creek and the Spanish Peaks Landmarks) are discussed in the "affected environment" section of the document (refer to Cultural Resources discussion) and impacts were analyzed. The Lost Creek Landmark is in the Lost Creek Wilderness which is a no lease area. Consequently, there will be no impacts on this resource. The Spanish Peaks Landmark is potentially subject to impacts; however, the probability of any impacts occurring is very low given the Bureau of Land Management projections of reasonably foreseeable oil and gas future development. To protect the features of the Landmark, a Controlled Use Stipulation (CSU) has been developed and will be implemented if the preferred alternative is selected. The stipulation protects the significant natural features of the landmark including the East and West Peaks and the radiating dikes. South Platte River is discussed in the "affected environment" section of the document (Refer to Special Areas - Wild and Scenic Rivers). The entire river and its one-half mile wide corridor from the Forest Boundary near Kassler to Elevenmile Dam will be managed to preserve its character for wild, scenic or recreation river classification. The river corridor will be placed under Discretionary No Lease (DNL). The Santa Fe National Historic Trail is discussed in the "affected environment" section of the document (refer to Cultural Resources discussion) and was analyzed for impacts. Trail segments and features will be protected by a No Surface Occupancy (NSO) stipulation under the preferred alternative.

4. CURLEY PEAK - TANNER PEAK

19-3

COMMENT:

Pleased to see Discretionary No Lease (DNL) applied to North end of Wet Mountains. Oil and gas development would be very detrimental to scenic and recreational values.

RESPONSE:

The Tanner Peak and Curley Peak area was included in the DNL because it was adjoining Grape Creek, which is a Bureau of Land Management (BLM) Wilderness Study Area and was thought to be a logical addition to their area in the event it became Wilderness. Since then the BLM has released their list of recommended Wilderness and Grape Creek was not included. Because of that, the Forest Service has removed the DNL from the Curley and Tanner Peak areas. Standard and supplemental stipulations will be used in the appropriate situation to manage the minerals and protect the recreation and visual resources of this area.

5. APACHE CREEK AREA

19-6

COMMENT:

Mexican spotted owls are known to occur at several sites in the Wet Mountains. Recommend that Discretionary No Lease (DNL) be extended to Forest Boundary all along eastern slope of Wet Mountains especially in the Apache Creek Area.

RESPONSE:

The number of Mexican spotted owls, found in the Wet Mountains to date, are small and confined to just a few drainages. These drainages have a No Surface Occupancy (NSO) stipulation for other resource protection, which will also protect the owls. We have no justification to remove lands from leasing where the owls are not known to exist.

6. BANDITO CONE

19-7

COMMENT:

Recommend Discretionary No Lease (DNL) be applied even though Bandito Cone is roaded and mined.

RESPONSE:

The Bandito Cone area is covered under standard stipulations because of past and possibly future mining activity. There are numerous roads in the area as well as an electronic facility under permit to Huerfano County. These activities are inconsistent with the values that generate DNL requirements.

7. ALTERNATIVE III

46-39

COMMENT:

Many lands with No Surface Occupancy (NSO) in Alternative III should be changed to Discretionary No Lease (DNL) because development cannot realistically occur given current technology.

RESPONSE:

The NSO stipulation is intended for use only when other stipulations are determined insufficient to adequately protect the public interest. If the lessee demonstrates that operations can be conducted without causing unacceptable impacts, the NSO stipulation may be waived or modified if such action is consistent with the provisions of the Forest Plan.

Current technology for oil and gas development allows some flexibility for operators to extract the mineral resource from a well site off of the lease, i.e. on adjacent lands or from a lease where surface occupancy is not prohibited. Existing terrain and subsurface geologic strata are limiting factors for such slant drilling to occur. There may be situations where NSO stipulations cannot be waived and/or modified and may result ultimately with no potential opportunities to conduct slant drilling. In these instances, the NSO could be construed to be essentially withdrawn or removed from leasing, i.e., DNL.

8. SPANISH PEAKS NATIONAL LANDMARK

46-44, 46-43, 9-2, 10-1, 11-3, 12-1, 37-1, 41-2, 46-45, 47-2

COMMENT:

The Spanish Peaks should be permanently off limits to oil and gas development because of it's outstanding recreational, geologic, and scenic features.

RESPONSE:

Under the preferred alternative the significant natural features of the Landmark (the East and West Peaks and the radiating dikes) will be protected by a Controlled Surface Use (CSU) stipulation. Oil and gas development will be allowed within the boundaries of the Landmark if the significant natural features are not impacted. This is consistent with Forest Service policy direction regarding National Natural Landmarks (FSM 2373.03) and with the Memorandum of Agreement between the Forest Service and the Park Service regarding management of such resources.

9. PIKES PEAK

30-15

COMMENT:

No Surface Occupancy (NSO) parcel on Pikes Peak should be "No Lease" because of impracticality of applying "NSO".

RESPONSE:

A Controlled Surface Use (CSU) stipulation is applied to Pikes Peak. See Appendix A, CSU Stipulation (Alpine).

10. WILDERNESS BILLS

31-1, 46-24, 13-4

COMMENT:
Have we considered changing boundaries as new wilderness bills come out in Congress?

RESPONSE:
A Discretionary No Lease (DNL) has been applied to areas proposed as wilderness in S-1029 and HR 762 contiguous or additional to those Wilderness Study Areas found "suitable" in the Forest Plan. This will remain in effect for those contiguous or new areas until the end of the 102nd Congress. This will provide time for the chairpersons of the Senate Energy and Natural Resources Committee and the House Interior and Insular Affairs and Agriculture Committees to become informed about the decision. If one of those Committee chairpersons requests that it be extended so that hearings can be held or for other purposes, the Forest Service will provide an extension of reasonable duration.

For Wilderness Study Areas, see Table I-1.

Any new proposed wilderness legislation will be addressed on a case-by-case basis.

11. WILDERNESS BILLS

38-8, 49-7, 49-8

COMMENT:
Does not support a management approach which holds hundreds of thousands of acres in limbo from multiple use activities while Congress continues the wilderness debate.

RESPONSE:
See response to comment #10

12. SPANISH PEAKS WSA

14-1, 35-1, 36-3, 45-1, 46-40

COMMENT:
The Spanish Peaks Area should be permanently protected from oil and gas development.

RESPONSE:
See response to comment #8.

13. ROADLESS AREAS

7-2, 11-5, 13-3, 15-3

COMMENT:
All roadless areas should be protected from oil and gas development.

RESPONSE:
On the Pike and San Isabel National Forests the Colorado Wilderness Act of 1980 classified five Wildernesses and designated four Wilderness Study Areas (WSA). The remaining areas considered were released for multiple use management. National Forest System lands in

three study areas (Greenhorn Mountain, Sangre de Cristo, Buffalo Peaks) were recommended for Wilderness designation and thus prohibited from leasing. The Spanish Peaks WSA and portions of other WSA (Buffalo Peaks, Sangre de Cristo) were not recommended for Wilderness. These lands, in addition to the lands released for multiple use management, are to be administered according to the laws generally applicable to the National Forest System.

14. ROADLESS AREAS

32-5, 31-4

COMMENT:

Thought RARE (Roadless Area Review and Evaluation) II was a dead issue. Why were RARE II areas mapped? What was status of Aspen Ridge and Tanner Peak in RARE II?

RESPONSE:

RARE II is a dead issue. All lands inventoried under RARE II and not recommended as suitable for wilderness designation were released for multiple use management.

The only RARE II boundaries shown on the Resource Base Quad maps, for this EIS, were those contiguous to BLM WSA's. They were mapped only for the purpose of considering possible extensions of BLM WSA's onto the National Forest.

Aspen Ridge and Tanner Peak were inventoried under RARE II and were not recommended as suitable for wilderness designation and thus released for multiple resource use activities other than wilderness.

15. MT. TABEQUACHE & SHAVANO PEAK

30-12, 9-1

COMMENT:

Question whether we can protect Mt. Tabequache and Shavano Peak with Standard Lease terms. Should have permanent protection.

RESPONSE:

Mt. Tabequache and Shavano Peak were inventoried as part of the Mt. Antero Roadless Area (RARE II). After evaluation, this area was not recommended as being suitable for wilderness classification and released for multiple resource use activities. It is similar to much of the high country in the Sawatch Range and all areas of alpine are protected through application of an Alpine CSU supplemental stipulation.

16. COLLEGIATE RANGE

10-2, 11-4, 12-2, 19-5, 36-6, 37-2

COMMENT:

The Collegiate Range south of Cottonwood Pass should be permanently off limits to oil and gas development.

RESPONSE:

Much of the area south of Cottonwood Pass was inventoried under RARE II. These roadless areas include Kreutzer-Princeton, Mt. Antero, Chipeta, Starvation Creek and Porphyry Peak.

All of these areas were evaluated and not recommended as being suitable for possible classification as wilderness and subsequently released for multiple use management. All areas of alpine are protected through application of an Alpine CSU supplemental stipulation and Conditions of Approval.

17. SANGRE DE CRISTOS

9-5, 10-5, 11-6, 12-6, 13-6, 30-5, 30-14, 33-4, 36-5, 37-7, 42-6, 45-5, 46-46, 47-5, 46-47

COMMENT:

The Sangre de Cristo Range, including Medano Pass and Hayden Pass should be off limits to oil and gas development.

RESPONSE:

Under the RARE II inventory, 87,300 acres were inventoried as being roadless on the San Isabel National Forest. Of that total, 61,700 comprise the Sangre de Cristo Wilderness Study Area. Leasing on this acreage is not allowed under the Reform Act. An additional 27,500 acres that were identified in S-1029 and HR-762 would have a Discretionary No Lease (DNL) classification. Under the guidelines for identifying roadless areas, they did not allow for the inclusion of roaded sections within the identified boundary. The area not included in the roadless areas is approximately 300 feet on either side of the Hayden Pass and Medano Pass roads. Also see response to comment #10. All areas of alpine are protected through application of an Alpine CSU supplemental stipulation.

18. BLANCA BASIN

14-2, 35-2

COMMENT:

Strongly opposed to oil and gas operations in and around Blanca Basin.

RESPONSE:

An area to the north of Blanca Peak containing approximately 12,000 acres on either side of the Huerfano 4WD road and Lilly Lake Trail has a Discretionary No Lease (DNL) classification. The area immediately to the north of Blanca Peak contains numerous patented mining claims, over which the Forest Service has no control. All areas of alpine are protected through application of an Alpine CSU supplemental stipulation.

19. BUREAU OF LAND MANAGEMENT WILDERNESS STUDY AREAS (BLM WSA's)

9-6, 10-3, 12-3, 13-5, 19-4, 19-9, 30-4, 33-5, 37-3, 41-1, 42-5, 45-25, 46-41, 46-42, 47-4, 27-4

COMMENT:

Extend permanent protection to all Roadless areas contiguous with BLM WSA's. Also no leasing should occur in areas adjacent to established wilderness areas. (should be a buffer zone)

Little Fountain Creek should be Discretionary No Lease (DNL).

RESPONSE:

There are three BLM WSA's abutting National Forest System lands. The Browns Creek WSA is the only WSA that BLM recommended for wilderness designation. The Forest Service, in

consultation with BLM, identified the logical boundary and removed those lands on the National Forest, under the DNL authority, until BLM's legislative process concludes.

Public Law 96-560, Section 110, states that, "Congress does not intend that designation of wilderness areas in...Colorado lead to the creation of...buffer zones around each wilderness area".

20. BUREAU OF LAND MANAGEMENT WILDERNESS STUDY AREAS (BLM WSA's)

38-3, 38-6, 38-7, 39-1, 49-6

COMMENT:

Opposed to Discretionary No Lease (DNL) for National Forest Service lands adjacent to congressionally designated WSA's and BLM WSA's.

RESPONSE:

See response to comment #10.

21. WILD AND SCENIC RIVERS

16-3, 33-7, 36-2, 42-7, 46-27, 47-6, 30-9, 34-1, 46-65, 46-66

COMMENT:

All stream corridors considered for possible designation under Wild & Scenic Rivers Act should be Discretionary No Lease (DNL), including the Cimarron and Huerfano Rivers.

RESPONSE:

The Nationwide Rivers Inventory (NRI) issued by the National Park Service (NPS) (1/82) listed Badger Creek, Cimarron River, and a segment of the South Platte as candidates for Wild & Scenic River determination. They were considered in the Forest Plan, using 1970 guidelines, and only a segment of the South Platte was found eligible. All three will be restudied during the Forest Plan Revision. Badger Creek and the South Platte River are removed from leasing availability. The Cimarron is not because over 70% is already leased and our analysis indicates that additional leasing will have no substantial additional effects. With the No Surface Occupancy (NSO) stipulation applied for riparian protection along the Cimarron, there is no need to remove the Cimarron corridor from leasing.

The segment of the Huerfano River listed in the NRI is not even close to NFS lands.

22. WILD & SCENIC RIVERS

22-3, 38-4, 38-9, 38-10, 39-2, 49-5, 49-9

COMMENT:

Oppose such no lease discretion on lands adjacent to areas being studied for Wild & Scenic River designation. Congress' intent was clear that only those river segments which it had reviewed and determined should be considered by the managing agencies for potential addition to the system should be studied.

RESPONSE:

See response to comment #21.

23. WILD AND SCENIC RIVERS

30-10

COMMENT:

South Platte River and Badger Creek DNL doesn't extend full 1/4 mile from each side. Possible mapping error.

RESPONSE:

Error corrected.

24. WILD AND SCENIC RIVERS - CIMARRON

46-64, 34-2, 34-3, 34-4, 30-11,

COMMENT:

Cimarron River should be off limits to oil and gas development until eligibility determination is made under the new guidelines. Misinterpretation of Wild & Scenic Rivers Act - may be eligible.

RESPONSE:

Over 70% of the Cimarron River is already within oil and gas lease areas, and that disqualifies it for eligibility as a Wild river designation. Oil and gas development can be allowed, with the proper restrictions, under the "Scenic" and "Recreational" designations. The No Surface Occupancy (NSO) stipulation that is applied for protection of the Riparian area along the river will also protect it's qualities for the "Scenic" and "Recreational" designations if it is found to be eligible during the Forest Plan revision.

25. WILD AND SCENIC RIVERS

46-63

COMMENT:

Forest still using guidelines for Wild & Scenic River studies that were thrown out in 1982. Lack of sufficient water is no longer a criteria.

RESPONSE:

When the Forest Plan is revised, the criteria for evaluating rivers in effect at that time will be used.

26. SOUTH PLATTE RIVER

46-56

COMMENT:

Although the South Platte River is already given a No Surface Occupancy (NSO) stipulation to protect it's visual resources, it needs a special stipulation to protect its recreational resources.

RESPONSE:

An area 1/4 mile wide on either side of the South Platte River from Elevenmile Dam to the Forest Boundary at Kassler has a Discretionary No Lease (DNL) classification. This classification is to protect the river corridor pending further studies and analysis on the eligibility and suitability for possible classification of the South Platte River as a wild, scenic or recreational river. In addition to the DNL classification, there is an additional 1/4 mile wide NSO stipulation on either side of the river to protect the site, facilities and users experience in the developed recreation sites and other resources found along the river corridor.

27. RESEARCH NATURAL AREAS

9-3, 11-1, 12-4, 37-4

COMMENT:

All Research Natural Areas (RNA's) should be permanently protected from oil and gas development.

RESPONSE:

See response to comment number 1.

28. CULTURAL RESOURCES

22-4, 38-5, 38-11, 39-3, 49-4, 49-10

COMMENT:

A "No Lease Discretion" for cultural resource areas is unwarranted because by law, full protection of cultural resources is provided under standard lease terms and conditions.

RESPONSE:

Full protection of cultural resources is not always provided under standard lease terms and conditions. The standard lease terms only provide for minimizing adverse impacts. Also, such minimizing is limited to measures that do not require relocation by more than 200 meters, do not require that operations be sited off the leasehold, or do not prohibit new surface- disturbing operations in excess of 60 days. Therefore, conflicts may arise between oil and gas development and preservation of significant cultural resources, especially those exceptional resources that merit consideration for individual management prescriptions in a Forest Plan Revision. The Forest Service has identified sixteen such resources and they are listed in Exhibit III-6. Final management disposition of these lands will be decided in the Forest Plan revision; options include designation as Special Interest Areas or release to oil and gas leasing under standard lease terms and conditions. Given that there are nearly three million acres of land and between 1000 and 2000 known cultural resources on the Pike and San Isabel National Forests and Cimarron and Comanche National Grasslands, the reservation of sixteen resources with a total acreage of approximately 15,500 is minimal.

29. CULTURAL RESOURCES

31-5, 46-26

COMMENT:

Supports Discretionary No Lease (DNL) for cultural resource areas.

RESPONSE:

The Forest Service has identified sixteen total cultural resources areas totaling 15,500 acres that are afforded discretionary no lease status in this EIS. During Forest Plan revision, the Forest will consider each area and develop specific management plans or prescriptions for each area, or determine that the areas should be released for multiple use management.

30. DEVELOPED RECREATION

46-37, 46-54

COMMENT:

The No Surface Occupancy (NSO) 1/4 mile buffer around developed recreation sites should be Discretionary No Lease (DNL) with at least a 1 mile buffer.

RESPONSE:

The 1/4 mile NSO stipulation around all developed recreation sites along with Conditions of Occupancy will protect the site, the facilities and user experience; will prevent the loss of recreation activities in close proximity to the developed site; will prevent the loss of the natural environment that made the site desirable for development; would provide safety to visitors from vehicular traffic and lessen the impacts from noise, dust, night lighting, increased traffic volume and visual pollution.

The effectiveness of the 1/4 mile buffer around all developed sites will be monitored to determine the adequacy of the distance. If the reasons for establishing the 1/4 mile distance is not being achieved, then the distance may be adjusted based on additional NEPA analysis. Generally speaking all roads will be located outside the developed site 1/4 mile buffer zone.

31. DISPERSED RECREATION

46-55

COMMENT:

Appendix B does not mention protection of high-use dispersed recreation areas. The most popular recreation areas on the forest need to be identified by the recreation staff for protection from oil and gas development.

RESPONSE:

Additional areas around developed recreation complexes, i.e., Twin Lakes, Rampart Reservoir, have been included in the No Surface Occupancy (NSO) stipulation for developed sites. This was necessary to protect the environment for the developed as well as the dispersed recreation users. Most the of the other popular dispersed areas are along roads and waterways. These areas require management for the protection of other resources that are consistent with dispersed recreation values. Visual resource analysis did consider the effects to many of the high use areas.

32. COLORADO TRAIL

43-1, 46-57

COMMENT:

The Colorado Trail needs special protection of it's dispersed recreation values. Don't want to see or hear gas or oil wells when hiking on the trail.

RESPONSE:

Approximately 99% of the Colorado Trail on the Pike and San Isabel National Forests is within a No Lease area or falls within one of the supplemental stipulations of No Surface Occupancy (NSO), Controlled Surface Use (CSU) or Timing. These stipulations will control the location of any wells in relation to the Colorado Trail. One of the original objectives in locating the Colorado Trail was to allow the users an opportunity to see management of the National Forests - including such activities as timber sales, grazing and minerals development. These activities will be managed thru the operating plan and the application of appropriate stipulations so as not to diminish the experience objectives of the Colorado Trail.

33. VISUAL QUALITY

38-24, 39-5

COMMENT:

No Surface Occupancy (NSO) along major travel routes is unjustified. Areas which already contain power lines, microwave stations, homes, etc. should not be subject to NSO. Screening and other measures are adequate.

RESPONSE:

The presence of other projects (power lines, microwave stations, homes etc.) that do not comply with current visual quality objectives is not justification to allow noncompliance in new projects to impact these areas as well. Some existing projects precede the visual resource management system and may not be in compliance. In the future, as opportunities develop, these projects will be redesigned to rehabilitate the unacceptable impacts.

The Final EIS does not use NSO to protect visual resources. The Visual Controlled Surface Occupancy (CSU) stipulation, Appendix A of this FEIS, applies to all areas with assigned visual quality objectives of retention, in other areas mitigation allowable under standard stipulations will be used. These controls as necessary in both situations in order for oil and gas developments to comply with Visual Resource Management direction, (FSM 2380 and Visual Resource Management Handbooks.)

34. VISUAL QUALITY

31-6, 46-53

COMMENT:

Doesn't think visual quality is protected on the high peaks.

RESPONSE:

In addition to the indirect protection of visual quality from the application of stipulations used to protect other resources, (soils, wilderness), language has been added to the CSU Stipulation for alpine areas that specifically addresses visual quality. (Appendix A of FEIS)

35. FISH AND WILDLIFE

46-59, 46-60

COMMENT:

Timing stipulations are adequate to protect wildlife during exploration, but are not adequate during the production phase.

RESPONSE:

Oil and gas leasing operations involve several steps. The exploration phase is just one in which appropriate timing stipulations are applied. The production phase is another step which requires another level of environmental analysis and coordination. Critical habitats are just as important here as they are in the exploration phase. We will do as much environmental coordination with the Colorado Division of Wildlife and other interested parties as is needed to ensure critical habitats get the attention they deserve.

36. FISH & WILDLIFE

20-2, 20-3, 20-4, 23-5, 23-7,

COMMENT:

Fish and wildlife resources should be protected with a No Surface Occupancy (NSO) stipulation. Such designation is the only way direct and indirect impacts can be avoided.

RESPONSE:

Fishery resources are protected with a riparian NSO under Alternative III. There is some protection under guidance from the Forest Plan under Alternative I, and little protection under Alternatives II and IV. By protecting riparian, wetland and floodplain areas, we believe that fishery resources will be adequately protected. In addition, stipulations for soil protection would also protect fishery resources.

The critical habitat areas you mention were taken from the Colorado Division of Wildlife's WRIS (Wildlife Resources Information Systems) data base. The narratives for the various species that accompany this data base recommend closure or other restrictions for the affected area (i.e., winter ranges). We have used these recommendations as well as the guidelines in our Forest Land and Management Plan to protect the various critical habitats.

The Lesser Prairie Chicken Natural Area is protected by requirements in the "Articles of Designation" singed in February of 1987. Many other areas used by the chicken will have a seasonal closure during the nesting season.

37. RIPARIAN

48-4, 31-7, 17-5

COMMENT:

Why were riparian resource information mapped on private lands?

RESPONSE:

Riparian areas were only mapped on public land on the Base Stipulation Map (Appendix D of FEIS). Any riparian areas shown on private lands on the resource maps resulted from identification of the riparian areas and have no bearing on this EIS..

38. FISH & WILDLIFE

30-8

COMMENT:

Controlled Surface Use (CSU) stipulation for Waterton Canyon is inadequate for Bighorn Sheep.

RESPONSE:

The CSU stipulation that occurs in Waterton Canyon pertains to the fragile granitic soils found there. This stipulation restricts activities on steep slopes and soils having a high erosion potential. In an indirect way bighorn sheep habitat is protected by this stipulation in that activities that could impact large acreages of bighorn sheep habitat would not be allowed.

39. RUFOUS-CROWNED SPARROW

23-8

COMMENT:

The Rufous-Crowned Sparrow reaches the northern extent of it's breeding range in the canyons of southeast Colorado. It has been known to breed in Carizzo, Cottonwood & Picture Canyons. Habitat should be avoided by oil & gas development.

RESPONSE:

The rufous-crowned sparrow is a common bird throughout most of its range. Although it is at the limit of its range in the canyons of the Comanche National Grassland and therefore low in numbers, special protective measures are unnecessary. We base this on the fact that the bird does not appear to be threatened anywhere in its present range nor are there any particular threats to its habitat.

40. WILDLIFE

42-8, 46-61, 47-7, 23-2

COMMENT:

Areas that are critical habitat for two or more big game species should be given a no lease status.

RESPONSE:

The timing stipulations as they occur in the EIS are all encompassing. For instance, winter ranges and birthing areas are two of the most common areas that will be encountered. Timing in these two categories have the same seasonal restrictions for all big game species that would be found in these areas. Because of this, we feel there is no need for a Discretionary No Lease (DNL) where two species are found on common wintering and birthing areas.

41. PRAIRIE CHICKEN

46-62

COMMENT:

Unleased lands that are crucial to the Prairie Chicken should be given a Discretionary No Lease (DNL) status.

RESPONSE:

The Lesser Prairie Chicken Natural Area is protected by requirements in the "Articles of Designation" singed in February of 1987. This requires a controlled surface use stipulation. Many other areas used by the chicken will have a seasonal closure during the nesting season.

A DNL would be hard to justify as many areas that have prairie chickens already have existing oil and gas leases. The prairie chicken is a State of Colorado listed species. We are continuing to coordinate our activities with the Colorado Division of Wildlife to ensure that existing prairie chicken habitat will not be detrimentally impacted by any activity.

42. LONG-BILLED CURLEW

26-3, 23-6

COMMENT:

Concerned about declining species such as Long-billed Curlew even though they are not on the T&E list. Care should be given to identifying and measuring populations of Grasslands indicator species such as the Long-billed Curlew before leases are granted.

RESPONSE:

The long-billed curlew is an indicator species on the Comanche National Grassland. This bird was very abundant at one time but has decreased in numbers because of grazing and other agricultural practices. We are aware of the declining numbers of this species and this interest is demonstrated in the timing stipulation that curtails oil and gas activity during the nesting season.

43. T&E SPECIES

3-2, 3-3, 26-2, 17-19, 17-10

COMMENT:

Standard Lease Terms may be adequate protection for T&E species for areas smaller than 40 acres, but not larger. Should be DNL. Should make following changes on page D-107: The current federal listing status of Diluvium ladies-tresses is "proposed".

Consult with U.S. Fish & Wildlife Service (USFWS) if lease proposals have potential to affect T&E Species.

RESPONSE:

We feel the standard lease terms and the requirements of the Endangered Species Act provide adequate protection for T&E species and their habitats. The Forest is committed to consulting with the Fish and Wildlife Service through every phase of oil and gas operations. Additional analysis will occur ath the time an Application for Permit to Drill, and a

specific proposal, is received. The USFWS will be involved in all future NEPA analysis when T&E species are involved.

Change to Diluvium ladies-tresses has been made.

44. SPOTTED OWLS, PEREGRINE FALCONS

19-13, 23-4, 23-3

COMMENT:

Recommend Discretionary No Lease (DNL) be extended to Forest boundary all along eastern slope of Wet Mountains to protect Mexican Spotted Owl.

Adobe Peak area should be DNL to protect the Peregrine Falcon.

RESPONSE:

Refer to response #5.

Peregrine falcons were introduced into the Adobe Peak area in recent years. However, because of great-horned owl and possibly golden eagle predation, peregrine falcons no longer occupy this site. Because of the great cost that is required to reintroduce peregrine falcons and the threat of losing young birds to predation, this site was dropped from future reintroduction efforts.

45. BLACK-FOOTED FERRETS

17-9

COMMENT:

Effected environment, Chapter III, should be expanded to include a discussion of Black-footed Ferrets.

RESPONSE:

Even though the black-footed ferret is not discussed extensively in Chapter III, it is a Federally Listed Threatened and Endangered Species and will be protected accordingly.

46. T&E ADDITIONS/CORRECTIONS

8-4, 8-5, 8-6, 8-7, 8-8, 17-15, 17-16, 17-17, 17-18

COMMENT:

In Exhibit D-5, Page D-102, the following additions & correction should be made to the endangered species lists:

a) Black-footed ferret, peregrine falcon, bald eagle, least tern, and piping plover should have designation EK.
b) Texas horned lizard, long-billed curlew, ferruginous hawk and swift fox are not listed as threatened in Kansas.

c) Add the following species to the list:

Kansas Glossy Snake	TK-uncommon resident	GZ13
New Mexico Blind Snake	Tk-uncommon resident	GZ13
Texas Longnose Snake	TK-uncommon resident	GZ13
Western Green Toad	TK-uncommon resident	GZ13

d) The last entry under the status & comments footnotes should be "EK or TK-Engdangered or Threatened-Kansas".

e) The Arkansas River Shiner, migrant loggerhead shrike, black tern, Bairds sparrow, and easter spotted skunk should be included as Federal Category 2 candidate species for the Cimarron N.G.. The spotted skunk should be listed as threatened by the State of Kansas.

f) The Federally threatened greenback cutthroat trout should be added.

g) The gray wolf in Colorado should be listed as "extirpated".

RESPONSE:

Changes have been made. See Chapter III, pages III-5 & 6.

47. ALPINE

7-7, 7-9, 16-2, 18-1, 24-2, 27-2, 33-6, 41-3, 42-4, 46-49, 46-50, 47-3

COMMENT:

Request that there be no leasing in the areas which are at or above timberline to protect the fragile soils and vegetation.

RESPONSE:

Alpine areas which are legally available for leasing are found in a variety of Forest Plan management area prescriptions. Minerals management is generally compatible with Forest Plan direction, unless there are approved management plans or agreements which prohibit or restrict this activity, such as Special Interest Areas or municipal watersheds.

The Controlled Surface Use (CSU) (Alpine) stipulation was developed to minimize disturbance to fragile alpine vegetation and soils and facilitate timely rehabilitation of surface disturbances. Special lease proposal monitoring requirements and conditions of approval provide additional mitigation of potential alpine disturbances.

48. ALPINE

46-52

COMMENT:

Recreation staff needs to do re-evaluation of popular dispersed recreation areas above timberline, such as 14,000' peaks to ensure recreation opportunities are not impacted by oil and gas development.

RESPONSE:

Of the 26 peaks over 14,000 feet within the boundaries of the Pike and San Isabel National Forests, 13 of them are on lands that are unavailable or are within the Discretionary No Lease. All those outside of those areas have an Alpine CSU applied above timberline.

In addition to the indirect protection of visual quality from the application of stipulations used to protect other resources, language has been added to the Controlled Surface Use (CSU) Stipulation for alpine areas that specifically addresses visual quality. (Appendix A FEIS)

49. ALPINE

7-8, 24-1, 24-11, 31-3, 46-48, 46-51, 24-10, 42-3

COMMENT:

All areas above timberline should be treated the same. Doesn't see how areas above timberline can be separated and mapped as either "tundra" or rocks".

RESPONSE:

The Controlled Surface Use (CSU) (Alpine) stipulation, in Appendix A, will apply to all areas above timberline. Mapping for alpine has been changed to include all of the "miscellaneous land type" areas above timberline that were mapped in the DEIS.

50. AIR QUALITY

48-5

COMMENT:

It is our understanding that lease restrictions, standard lease terms, and supplemental stipulations will be implemented to address potentially affected air quality.

RESPONSE:

Mitigation is designed to minimize impacts from oil and gas activity to the air resource. Specific mitigation for oil or gas drilling specifies that the operator shall control blooie line discharge dust by use of water injection or other acceptable method. Air pollution sources such as dust from unpaved roads and cleared areas will be minimized by controlling use or applying surface treatments to hold down dust. Hydrogen sulfide discharges are managed by the BLM.

51. WATER QUALITY

48-3, 48-9, 48-12

COMMENT:

Water quality discussion, page IV-15, should discuss, in detail, provisions made to avoid impacts to water quality. FEIS needs to address how existing and potential production will be factored into the cumulative effects discussion for development on both federal and nonfederal lands, for surface and groundwater.

RESPONSE:

Mitigation is discussed in detail in Appendix A. "Rules and Regulations, Rules of Practice and Procedure and Oil Conservation Act" from the Colorado Department of Natural Resources and the "General Rules and Regulations for Conservation of Crude Oil and Natural Gas" from the State Corporation of Kansas specify in detail, requirements for pollution prevention, protection of water bearing formations, plugging methods and procedures. Companies are required to comply with these regulations and mitigation. We did not feel the need to reiterate all of these regulations in the EIS.

52. SEDIMENTATION

38-28

COMMENT:

Exploration and development activities do not always result in increases in sediment yield. Numerous construction techniques are used to minimize or avoid runoff from roads and pads into streams.

RESPONSE:

Studies by Forest Service Research have shown that mitigation measures can only reduce a maximum of 80% of the erosion with the exception of roads to be obliterated where 95% of the erosion can be mitigated. Factors such as proximity to drainages, slope gradients, vegetation density, etc. dictate if this eroded sediment reaches a stream channel.

53. WATER QUALITY - PIT LINING

6-4, 29-2, 48-13

COMMENT:

On the Grasslands only, the two provisions concerning lining of pits on page B-46 conflict: Change as follows:
-All reserve pits in areas located within 40 feet of groundwater (freshwater), or appropriate greater distance if soils are extremely permeable, will be sealed with synthetic pit liners.
- should require that all well sites not just those near sensitive environmental areas like wetlands, use a closed collection system for drilling fluids.

RESPONSE:

All reserve pits will be made impervious to leaks. Clay can be used to seal pits in areas where synthetic liners are not specifically required. Synthetic liners are required in areas that are located within 40 feet of groundwater (or greater if the soils are extremely permeable). There is no justification to require all pits to use a closed collection system for drilling fluids. See Appendix A, Mitigation.

54. STIPULATIONS

17-7

COMMENT:

The wording in the FEIS should clearly specify that stipulations be an automatic inclusion into a lease.

RESPONSE:

Refer to Appendix A - Mitigation, Supplemental Stipulations.

55. DISCRETIONARY NO LEASE (DNL)

30-13

COMMENT:

The DEIS does not fully implement the DNL authority. "Areas in general where there may be outright conflict with oil & gas development and other uses".

RESPONSE:

Discretionary No Lease (DNL) will be applied to areas where the Forest Supervisor determines oil and gas development is not compatible with other uses prescribed by the Forest Plan.

56. STIPULATION CONSISTENCY

7-5

COMMENT:

The decisions to be made are very confusing. There does not seem to be consistency in stipulations applied to similar ecosystems.

RESPONSE:

All ecosystems were studied to determine the proper protection.

57. MITIGATION

30-1, 15-2

COMMENT:

Mitigation measures for each piece of land (40 acre parcel) should assume full field development.

Draft does not afford real protection. Genuine protection of natural resource values, i.e. wildlife and habitat, recreation, visual and scenic.

RESPONSE:

The analysis and mitigation measures are based on a Reasonable Foreseeable Development (RFD) conforming with the Forest Service Oil and Gas Regulations 228.102(c)(4)..

58. CIMARRON

6-1

COMMENT:

Cimarron should not be grouped with Mountain land because it is already a mature oil and gas development region that has little public use value that would be adversely affected by additional development.

RESPONSE:

The Cimarron National Grassland was analyzed independently of the Mountain lands.

59. SITE SPECIFICITY

7-6, 42-10

COMMENT:

Breaking the Forest up into "zones" to meet site-specificity requirements for NEPA does not consider all eco-zones found on the forest.

RESPONSE:

The Interdisciplinary Team (IDT) analyzed the effects of oil and gas development on a broad array of representative environments found on the Unit. "Leasing site specificity" is based on resource information available at the "leasing specific lands" stage. Refer to the Affected Environment, Level of Detail and Methodology sections in the Introduction to Chapter IV.

60. MINERAL RESOURCES

17-13, 29-1

COMMENT:

Although oil and gas leasing should not affect the development of other mineral resources, a statement to that effect should be included in the environmental consequences, minerals section, of the FEIS.

RESPONSE:

A statement stating that "Oil and gas leasing development should not affect the development of other minerals." has been incorporated in the FEIS.

61. DECISIONS - AVAILABILITY & SPECIFIC LANDS

46-6, 46-8, 46-12, 46-13, 46-15, 46-20

COMMENT:

The DEIS is fatally flawed because the Forest combined the administratively availability" and "leasing specific lands" decisions in the same document in violation of the oil and gas regulations.

Don't believe the DEIS addresses any of the determinations that the specific lands decision" is supposed to encompass.

RESPONSE:

The regulations describe what is required to determine lands administratively available for leasing and leasing decisions for specific lands in 36 CRF Part 228.102. Combining the "Administratively Available" and "Specific Lands" decisions in the same document is not prohibited by the Regulations. See "The Staged Decision Process" in Chapter I.

The FEIS and accompanying maps address all requirements of the administratively available and specific lands decisions.

62. AREAS LARGER THAN 40 ACRES

3-5

COMMENT:

At the time a lease is issued, it might appear that operations could be approved on the lease, but by the time such operations are proposed, the operator may be precluded by a nondiscretionary statute such as the Endangered Species Act. For this reason, should disclose information on areas larger than 40 acres that may ultimately result in the operator being kept off the leasehold by virtue of a federal statute.

RESPONSE:

Maps are designed to aid potential lessees in designing lease parcel requests of a configuration and size to prevent this from happening. See Appendices D and E.

63. NSO & CSU STIPULATIONS

6-2, 6-5

COMMENT:

For the Cimarron National Grassland only, the No Surface Occupancy (NSO) and Controlled Surface Use (CSU) stipulations should not be utilized/enforced on land where there are existing oil and gas facilities, but operator should be required to combine operations and utilize existing facilities as much as possible.

RESPONSE:

Current leases are subject only to the stipulations that are a part of the lease. New stipulations, developed in this document, will apply only if or when current leases expire and are resold.

64. CONCENTRATED RFD (REASONABLY FORESEEABLE DEVELOPMENT)

17-11, 17-12, 32-1, 32-8, 38-17, 38-18, 38-19, 49-12, 49-13, 49-14

COMMENT:

The concentrated RFD overstates the impacts likely from foreseeable oil and gas development and potentially diverts attention from the more likely analysis.

RESPONSE:

The Concentrated RFD was used only for analysis comparison purposes because of the uncertainty of where develop may occur. Decisions are based on the more probable "BLM" RFD.

65. REASONABLY FORESEEABLE DEVELOPMENT (RFD) - POTENTIAL WELL SITES

38-20, 38-21, 46-4

COMMENT:

It is unnecessary for the RFD to display potential well sites. Should make it clear throughout the document that these sites are not probable locations and are used for analysis purposes only.

RESPONSE:

See revised text in Chapters II and IV.

66. REPRESENTATIVE WELL SITES

38-22, 39-4

COMMENT:

The degree of "site-specificity" in your reasonably foreseeable development scenario is unnecessary and indefensible as a NEPA document. Actual well locations chosen at the time of Application for Permit to Drill (APD) will almost certainly be different than predicted in the Reasonably Foreseeable Development (RFD).

RESPONSE:

We concur that actual well locations proposed at time of APD will probably be different than predicted in the RFD, however, it was necessary to select an array of specific well sites to analyze site-specific effects. These specific RFD well sites coupled with the Concentrated RFD analysis provides the full range of effects that can be expected regardless of where the wells may be drilled, thus meets the requirements of NEPA.

67. CONCENTRATED RFD (REASONABLY FORESEEABLE DEVELOPMENT)

46-5

COMMENT:

The concentrated RFD scenario does not give sufficient site-specific analysis that complies with NEPA.

RESPONSE:

The concentrated RFD presents a worst case scenario, which is not required by NEPA. Therefore, we feel that it actually exceeds the analysis requirements of NEPA.

68. SOCIO-ECONOMICS

24-3, 24-4, 5-1

COMMENT:

Alternative III is below cost because of necessary protection of resources. The oil and gas industry will make money off public land. What advantage is this to the public?

RESPONSE:

Table J-6 (H-6 in FEIS) was in error and has been corrected. Alternative III is not a below cost alternative.

69. TWO DECISIONS

24-5, 46-7, 19-11, 38-12, 31-2

COMMENT:

The distinction between the two decisions in the ROD is not clear.

Combining the two decisions "lands availability" and "leasing specific lands" makes the purpose of the DEIS extremely confusing because these two decisions do not logically belong together in a preleasing document.

Land availability decision shows stipulations. What does the specific lands decision do?

RESPONSE:

See response comment #61. The leasing decisions for specific lands enables the Forest Service to decide whether to authorize the BLM to offer for sale proposed lease areas.

70. TRACKING PUBLIC COMMENTS

46-67

COMMENT:
Forest needs to do a better and more accurate job of tracking public comments in the FEIS so that members of the public that comment can be confident that their comments were adequately addressed.

RESPONSE:
The introduction to this chapter describes the process used for tracking public comments.

71. PUBLIC PARTICIPATION

30-2, 19-12

COMMENT:
Recommend public participation at the APD level through public notification.

RESPONSE:
An environmental analysis is required at the APD level with public participation.

72. ALTERNATIVES

17-8

COMMENT:
The FEIS should explain why there is only one alternative between leasing zero acres and leasing the entire 2,229,506 available acres.

RESPONSE:
Refer to Chapter II of this FEIS for a complete discussion on development of alternatives.

73. CATEGORICAL EXCLUSIONS

30-3

COMMENT:
FEIS should state what, if any, categorical exclusions exist in the oil and gas leasing process.

RESPONSE:
Categorical exclusions are not used in the oil and gas leasing process. (See leasing process chart page I-20)

74. LEVEL OF ANALYSIS

38-13

COMMENT:
NEPA...the level of analysis must be commensurate with the decision being made. While Forest Service takes the view that lease issuance constitutes the point at which an irretrievable commitment of resources is made, this does not mean the leasing analysis should

identify exactly where potential well sites and roads may be located. Reasonable parameters can be set with approval of APD which is subject to further NEPA.

RESPONSE:

The Forest Service feels the level of analysis is commensurate with the decisions being made.

75. SITE-SPECIFIC IMPACTS

46-14

COMMENT:

DEIS does not address the potential site-specific impacts and the associated cumulative impacts of leasing specific lands, therefore, does not comply with NEPA. It is crucial that site-specific and cumulative impacts are known before the record of decision that allows oil and gas leasing is signed.

RESPONSE:

The cumulative effects analysis has been revised. (See Cumulative Effects discussion in Chapter IV)

76. EPA (ENVIRONMENTAL PROTECTION AGENCY)

48-15, 48-7, 48-11

COMMENT:

Request that EPA Region VII receive environmental assessments associated with the leasing and Application for Permit to Drill (APD) process on the Cimarron National Grassland. The same information is requested by EPA Regions VIII for activities on the Comanche National Grassland and the Pike and San Isabel National Forests.

RESPONSE:

Environmental assessments will be provided as requested.

77. ANALYSIS - APPLICATION FOR PERMIT TO DRILL (APD) STAGE

38-14, 38-15, 46-9

COMMENT:

It appears that the Forest Service has attempted to address the APD level of decision-making. It is stated in Chapter IV that the analysis assumes that we are at the time of APD and that conditions that will apply when ground-disturbing activities begin are identified". This level of analysis is not necessary to make leasing decisions.

RESPONSE:

These assumptions were made for analysis purposes only and are key elements in addressing site specific effects necessary for making the leasing decisions. See the "Staged Decision Process" discussion in Chapter I.

78. SPECIFIC LANDS DECISION

46-11, 46-16, 46-17, 46-18, 46-19, 48-2, 48-10

COMMENT:

DEIS does not adequately address any of the determinations that the leasing specific lands" decision is supposed to encompass.

The DEIS calls for a review of lease proposals before an actual lease can be issued. This review appears to be the actual "leasing specific lands" decision, minus any formal NEPA documentation or compliance. This is an arbitrary and capricious attempt to skirt the environmental impact analysis of specific land parcels required by NEPA.

Separate NEPA documentation of the "leasing specific lands" decisions is necessary in that it gives the Forest Service a means of not allowing oil and gas leasing if new information comes to light.

RESPONSE:

The FEIS satisfies all three requirements for making the specific lands decisions as identified in 36 CFR 228.102(e).

EIS decisions are subject to continuous monitoring to ensure that adequate resource protection is provided. Review of lease parcels before an actual lease is issued is a step in the monitoring process. See Chapter I, Forest Service Role in Implementation.

79. STIPULATIONS

22-5, 38-23, 38-25, 22-8

COMMENT:

We are opposed to the excessive use of stipulations as outlined in the preferred alternative. Highly restrictive stipulations must be reserved for situations when no other mitigation measures are adequate to protect the resources.

RESPONSE:

We agree that stipulations should only be required where standard lease terms are inadequate. The Forest Service is required to justify the use of stipulations for resource protection. This was done through analysis of the alternatives.

80. STIPULATIONS - CIMARRON

21-1, 6-3, 38-34

COMMENT:

The areas along the Cimarron River which are designated as "No Surface Occupancy" (NSO) have increased to such an extent that existing oil and gas activities could be restricted to a point that further development may not be possible.

Pertaining to the Cimarron National Grasslands only: the Controlled Surface Use (CSU) areas are excessive in application and width.

RESPONSE:

Existing oil and gas activities are subject only to terms of the current leases. Valid existing rights are not affected by the requirements of this EIS.

The Forest Service is required to justify the use of supplemental stipulations for resource protection. The CSU stipulation for the Cimarron is justified through analysis of the alternatives.

81. STIPULATIONS - APPENDIX B

32-2, 38-32

COMMENT:

Appendix B (mitigation) - clarify that conditions of approval (COA's) may be applied. Take all language out that implies that any specific stipulation will apply to all lands. B-40 thru B-50, the imposition of these conditions would constitute excessive and unnecessary mitigation and would render all projects uneconomical.

RESPONSE:

Refer to the Standard Lease Terms, Supplemental Stipulations and Conditions of Approval sections of Appendix A Mitigation.

82. ALTERNATIVES

33-2, 47-1, 46-23, 46-31, 33-3

COMMENT:

The noted lack of site-specific protection measures available in Alternatives II and IV make these alternatives completely unacceptable.

Alternative III doesn't go far enough in protecting special areas.

It is hard to believe that Alternative III did not find a single area on the Forest that should be permanently off-limits to oil and gas leasing under the Discretionary No Lease (DNL) authority.

RESPONSE:

Protection of special areas - see response to comment number 1.

A Discretionary No Lease (DNL) was applied to several areas which may or may not become permanently off limits to oil and gas leasing pending a more comprehensive study of each area.

83. FOREST PLAN AMENDMENT

46-35

COMMENT:

The proposed forest plan amendment in Appendix A, Page 2, of the DEIS states, "the analysis record must show that a no-lease alternative was considered when applying the

No Surface Occupancy (NSO) stipulation". After reading the entire DEIS we were unable to find any such consideration.

RESPONSE:

The No Lease alternative is Alternative IV. No NFS lands, or split-estate lands will be available for future oil and gas leasing. Exploration and development could still occur on existing leased lands subject to standard lease terms and Conditions of Approval (COA's) and applicable supplemental stipulations.

84. NO SURFACE OCCUPANCY (NSO) STIPULATION

30-16, 46-36

COMMENT:

The analysis of a no-lease alternative on each area of the Forest needs to look at what impacts would occur when development is shifted off the NSO parcel to adjacent lands, both public and private. The final EIS must contain this analysis.

RESPONSE:

The projected level of development is not expected to occur on lands which have a No Surface Occupancy (NSO) stipulation, therefore, it is not necessary to consider the effects of shifting development off the NSO parcel to adjacent lands.

85. DISCRETIONARY NO LEASE (DNL) - HOW MUCH?

46-28

COMMENT:

There are numerous discrepancies in the DEIS in regards to exactly which lands and how much total acreage is DNL in Alternative III.

- Page II-26 states 157,773 acres of DNL
- Table II-11, page II-36 shows 198,703 acres of DNL

RESPONSE:

Corrections have been made.

86. EDITORIAL

32-3, 38-27, 46-29, 46-30

COMMENT:

- III-20 Exp. Area last line is wrong
- recommend the groundwater and visual sections of Chapter III be modified remove discussion of potential environmental effects
- Table II-11 does not correspond with Figures II-16, II-17, II-18 and the 1:500,000 scale maps in Appendix F.
- None of the cultural resource areas are shown as DNL as stated in Table II-11 except in Figure II-18 which shows only a portion of these sites as DNL on the Comanche. The 1:500,000 maps currently show no DNL areas on the Comanche.

RESPONSE:

Corrections have been made.

87. EDITORIAL

8-2, 8-3

COMMENT:

The acronym KDGP should be deleted from the acronyms/glossary on page ii-1. There is no such agency as "Kansas Department of Game & Fish".

Change reference to "KDGP" in Figure 1-15,p.1-42, to "KDWP".

RESPONSE:

Corrections have been made.

88. EDITORIAL

17-14, 24-7, 32-4, 32-6, 32-7, 32-9, 32-10, 32-11, 32-12, 32-13 38-30, 38-31

COMMENT:

The following changes should be made:
- page B-1, supplemental stipulations, third sentence - change "may" to "will".
- III-22, III-34 - nasty faces
- Alternative I needs table like Table II-7
- DNL acres differ II-33 & II-26
- III-9 last paragraph should not be in the Affected Environment chapter: delete
- III-13, 5th paragraph should not be in the Affected Environment chapter: delete
- III-17, % use on % acres. Paragraph starting with "approximately 84%" doesn't make sense.
- stratigraphic test well drilled in 1950's - "not seismic", Chapter I?? Appendix?? - need to search for error.
- Format suggestions: combine cumulative effects with effects.
- Chapter IV should be reorganized to eliminate the duplication of text particularly with regard to water, soils, riparian, and aquatic areas.

RESPONSE:

Errors have been corrected and suggested changes taken into consideration in preparation of the FEIS.

89. STIPULATIONS

15-4, 46-33

COMMENT:

The No Surface Occupancy (NSO) stipulation has proven to be worthless to protect resources because in the past when industry has put pressure on federal land managers to grant a waiver, modification, or exemption, the land managers have routinely done so.

RESPONSE:

NSO stipulation would only be waived if it was determined during the monitoring process not to be necessary. Waiver of an NSO stipulation would require a plan amendment with appropriate public notice.

90. OIL AND GAS VS OTHER RESOURCES

22-6, 38-26

COMMENT:

Oil and gas activities must not be targeted for restrictive management where other multiple use activities are allowed to occur.

RESPONSE:

Restrictions, applied through the use of stipulations, are in conformance with management guidelines and prescriptions outlined in the Forest Plan.

91. SITE-SPECIFICITY

49-15, 49-16

COMMENT:

The Forest Service should focus on identifying surface resources and land uses so they can be addressed in lease stipulations on a Forest-wide basis instead of trying to attain "site-specificity" drill site by drill site.

Appropriate opportunity for addressing site-specific issues is during the surface use plan approval process identified at 36 CFR 228.107. Forest Service should make it clear that no surface disturbing activity is lawful until the surface use plan is approved.

RESPONSE:

Focusing on identification of surface resources and land uses was a very time consuming part of preparing this EIS. All surface resources were mapped on 1:24000 scale maps.

Site-specific issues will be addressed when preparing the environmental analysis during the surface use plan approval process.

PART IV - LETTERS FROM STATE AND FEDERAL AGENCIES

Copies of letters from government agencies can be found on the following pages.

FEDERAL AGENCIES

U.S. Department of Housing & Urban Development
USDA Soil Conservation Service
U.S. Public Health Service
USDI Office of Environmental Affairs
Environmental Protection Agency

STATE AGENCIES

Kansas Department of Wildlife & Parks
Colorado Division of Wildlife

U.S. Department of Housing and Urban Development
Denver Regional Office, Region VIII
Executive Tower
1405 Curtis Street
Denver, Colorado 80202-2349

July 19, 1991

Mr. Jack Weissling
Forest Supervisor
USDA Forest Service
1920 Valley Drive
Pueblo, Colorado 81008-1797

Dear Mr. Weissling:

This is in response to your request for comments on the Draft Environmental Impact Statement (DEIS) for the Oil and Gas Leasing Programs on the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, dated July, 1991.

Your DEIS has been reviewed with consideration of the areas of responsibility assigned to the Department of Housing and Urban Development (HUD). This review considered the proposed action's impact on housing and community development. The DEIS indicates that the preferred Alternative III would have no significant effects to community development in the rural communities covered by the DEIS (pages IV-41, IV-42). Based on this situation, we find this DEIS is adequate for our purposes.

If we may be of further assistance, please contact me, or Mr. Howard Kutzer, Regional Environmental Officer, at FTS 564-3102.

Sincerely yours,

Howard S. Kutzer

for Myron G. Eckberg
Environmental Protection Specialist
Office of Operational Support

United States Department of Agriculture
Soil Conservation Service
760 South Broadway
Salina, Kansas
67401

July 26, 1991

Mr. Jack Weissling
Supervisor
USDA Forest Service
1920 Valley Drive
Pueblo, Colorado 81008-1797

Dear Mr. Weissling:

Thank you for the opportunity to review the draft Oil and Gas Leasing Environmental Impact Statement for the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands. At the present time I have no comments to make on the draft. I do appreciate being contacted about the notice and having the opportunity to comment. I look forward to working with you in the future as opportunities arise.

Sincerely,

James N. Habiger

James N. Habiger
State Conservationist

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333
August 23, 1991

91 AUG 26 A10 : 42

Jack Weissling
Forest Supervisor
USDA Forest Service
1920 Valley Drive
Pueblo, Colorado 81008-1797

Dear Mr. Weissling:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for Oil and Gas Leasing, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands. We are responding on behalf of the U.S. Public Health Service.

We have reviewed the Draft EIS for potential adverse impacts on human health. We note that specific drilling activities are not the subject of decision in preparing the Final EIS. This DEIS deals with the impacts of a forest-wide leasing program where some lands are already leased and other acres have future leasing opportunities. Specific drilling activity will not be approved until an Application for Permit to Drill is reviewed, analyzed, and approved for each specific lease parcel. We believe this document has adequately addressed overall potential impacts and mitigation measures. Further analysis on a site-by-site basis of potential impacts when application for ground-disturbing activities are received, and implementation of monitoring and evaluation plans should help ensure that adverse impacts are minimized and mitigation measures are appropriate.

Thank you for the opportunity to review and comment on this document. Please ensure that we are included on your mailing list to receive a copy of the Final EIS, and future EIS's which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

Kenneth W. Holt

Kenneth W. Holt, M.S.E.H.
Special Programs Group (F29)
National Center for Environmental Health
and Injury Control

VI-35

KANSAS DEPARTMENT OF WILDLIFE AND PARKS

OPERATIONS OFFICE
RR 2, BOX 54A
PRATT, KS 67124-9599
(316) 672-5911
Equal Opportunity Employer

JOAN FINNEY, Governor
JACK LACEY, Secretary
JOHN S. C. HERRON, Assistant Secretary

91 AUG 30 A10 : 09

August 27, 1991

Jack Weissling
Forest Supervisor
USDA Forest Service
1920 Valley Drive
Pueblo, CO 81008-1797

Ref:D4.0100
Cimarron NG

Dear Mr. Weissling:

Staff of the Kansas Department of Wildlife and Parks have completed a review of the Draft Oil and Gas Lease EIS covering the Cimarron National Grasslands in Morton County, Kansas. Overall, we concur in the Forest Service's Alternative III as the preferred alternative. Editorially, the following corrections should be made:

1. The acronym KDGP should be deleted from the Acronyms/Glossary of Terms on Page ii-1. There currently is no such agency as "Kansas Department of Game and Fish." The acronym KDWP and definition for this agency is correct as shown on page ii-2.

2. The reference to "KDGP" in Figure I-15 on Page I-42 should be changed to "KDWP."

3. In Exhibit D-5, Page D-102, the following additions and corrections should be made to the threatened and endangered species lists:

   (a) Black-footed Ferret, Peregrine Falcon, Bald Eagle, and Least Tern should also have designation EK. The eagle and falcon are known to occur in Geo. Zones 12 and 13. Piping Plover should also be TK.

   (b) Texas Horned Lizard, Long-billed Curlew, Ferruginous Hawk, and Swift Fox are <u>not</u> currently listed as threatened in Kansas. Delete the TK from each.

(c) The following species should be added to the list. All are known or likely to occur in the Geo. Zones (GZ) indicated:

Arkansas River Shine	EF2, EK-Uncommon during high flows	GZ 13
Checkered Garter Snake	TK-Uncommon resident	GZ 13
Eastern Spotted Skunk	TK Uncommon resident	GZ 12, 13
Flathead Chub	TK-Uncommon during high flows	GZ 13
Kansas Glossy Snake	TK-Uncommon resident	GZ 13
New Mexico Blind Snake	TK-Uncommon resident	GZ 13
Texas Longnose Snake	TK-Uncommon resident	GZ 13
Western Green Toad	TK-Rare, maybe extirpated	GZ 12, 13

(d) The last entry under the Status and Comments footnotes should be "EK or IK - Endangered or Threatened-Kansas."

If you have any questions, feel free to contact me.

Sincerely,

Robert D. Wood, Wildlife Ecologist
Environmental Services Section

RDW:bk
xc: Reg. 3, F&W Supv.

VI-36

United States Department of the Interior

OFFICE OF THE SECRETARY
OFFICE OF ENVIRONMENTAL AFFAIRS
DENVER FEDERAL CENTER, BUILDING 56, ROOM 1015
P.O. BOX 25007 (D-108)
DENVER, COLORADO 80225-0007

TAKE PRIDE IN AMERICA

September 17, 1991

ER 91/697

Jack Weissling
Forest Supervisor
Pike and San Isabel National Forests
Comanche and Cimarron National Grasslands
1920 Valley Drive
Pueblo, Colorado 81008-1797

Dear Mr. Weissling:

The Department of the Interior (DOI) has reviewed the Draft Environmental Impact Statement (DEIS) for Oil and Gas Leasing, Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands and has the following comments.

National Monument, Historic Trail, Natural Landmark, and Wild and Scenic River Resources

Our letter of May 30, 1990, transmitting our comments on the previous Oil and Gas Leasing DEIS, identified the potential for impacts to Great Sand Dunes National Monument, Florrisant Fossil Beds National Monument, two National Natural Landmarks, a section of the South Platte River, and the Santa Fe National Historic Trail.

Page I-49 of this revised DEIS acknowledges these concerns. However, only the South Platte River (page III-20) and the Spanish Peaks National Natural Landmark (NNL) (page III-21) are described in Chapter 3 of the DEIS; none are analyzed in Chapter 4. The final EIS (FEIS) should not only describe all six units of the National Park system in the "affected environment" chapter, but it should also analyze any potential impacts to each area in the "environmental consequences" chapter. In addition, any mitigation measures to be applied as unit specific stipulations should be identified.

Fish and Wildlife Resources

In general, the fish and wildlife discussions in the Affected Environment, Environmental Consequences, and Mitigation sections are well written and informative. The mitigation measures intended to protect fish and wildlife habitat are particularly thorough. We are pleased to note stipulations prohibiting surface occupancy of lease proposals in wetlands, riparian areas,

and floodplains. We also appreciate the timing restrictions designed to protect prairie chickens, raptors, and selected Federal candidate species during breeding seasons. These mitigation measures should be carried over into the FEIS.

A point that requires clarification in the FEIS is whether the No Surface Occupancy Stipulations discussed in Appendix B are automatically included in a new lease (when the resources of concern are present in the lease area) or whether they are added optionally on a case-by-case basis. Although the DEIS wording of the stipulations suggests an automatic inclusion into a lease, the wording in the FEIS should clearly specify that as the intention.

The alternatives evaluated in the DEIS are extremely limited. As there are no regulatory or administrative constraints which do not allow for other variations of Alternative III, the FEIS should explain why there is only one alternative between leasing zero acres or leasing the entire 2,229,506 available acres.

Threatened and Endangered Species

The sections on threatened and endangered species for the grassland geography zones in Chapter III, Affected Environment, should be expanded to include a discussion of black-footed ferrets. Activities associated with oil and gas leasing likely will impact prairie dog colonies; therefore, the possibility of impacting ferrets cannot be discounted. Although no areas of the Pawnee National Grassland are currently under consideration for ferret reintroduction, as recovery proceeds, suitable areas may be identified. If it is determined that individual lease proposals in the future may have the potential to affect threatened or endangered species, Section 7 consultation with the U.S. Fish and Wildlife Service should be initiated.

Land Resources

The reasonably foreseeable development (RFD) scenario, which was provided by the Bureau of Land Management (BLM) and analyzed in the DEIS, was based upon existing knowledge of geologic formations in the study area and technological knowledge of exploratory well spacing. Given that the production potential of the Mountain Districts is extremely low and that exploratory wells would not be so closely located to each other, the DEIS's Concentrated RFD overstates the impacts likely from foreseeable oil and gas development and potentially diverts attention from the more likely impact analyses. The Concentrated RFD is not necessary for an understanding of the potential impacts of drilling exploratory wells in the Mountain District, therefore, we recommend it be eliminated in the FEIS.

VI-37

Mineral Resources

The DEIS mentions that other mineral resources occur in the study area, and that mining has been an important industry. Although oil and gas leasing should not affect the development of other mineral resources, a statement to that effect should be included in the environmental consequences, minerals section, of the FEIS.

Specific Comments

The following changes should be made in the FEIS:

Page B-1

Supplemental Stipulations, Third sentence - change "may" to "will".

Page D-102, Exhibit D-5

The Texas horned lizard, long billed curlew, ferruginous hawk, and swift fox are not listed by the State of Kansas; however, all of these species are Federal Category 2 candidate species. The Arkansas River shiner, migrant loggerhead shrike, black tern, Bairds' sparrow, and eastern spotted skunk should be included as Federal Category 2 candidate species for the Cimarron National Grasslands. The spotted skunk also should be listed as threatened by the State of Kansas.

The following state of Kansas listed threatened species are known or are likely to be found on the Cimarron National Grasslands and should be added to Exhibit D-5: Flathead chub, checkered garter snake, Kansas glossy snake, New Mexico blind snake, Texas longnose snake, and western green toad.

The Federally threatened greenback cutthroat trout should be added to Exhibit D-5.

The gray wolf in Colorado should be listed as 'extirpated' in Exhibit D-5.

Page D-103, Exhibit D-6

The current Federal listing status of Diluvium ladies-tresses is "proposed".

Sincerely,

Barbara M. Schmaltz

for Robert F. Stewart
Regional Environmental Officer

In summary, given the current need and trend toward a higher emphasis on wildlife and recreational values on the subject Forest Service lands, oil and gas related activities should be implemented only where such activities do not conflict with currently prescribed priority wildlife and recreation areas. Where these conflicts arise, e.g. critical wildlife habitats, justification via resource dependency - least damaging alternatives should be required, as should appropriate mitigation.

WRIS (species distribution) maps supplied to Forest Service personnel should be re-evaluated in conjunction with draft EIS surface use maps to reflect the above recommended approach. Lesser Prairie Chicken maps only recently provided to Forest Service personnel should also be integrated as just described.

Please give me a call at 473-2945 if I can be of further assistance.

Sincerely,

Bruce Goforth
Senior Wildlife Biologist

APPROVED BY:
Ronald P. Desilet
Southeast Regional Manager

cc: Steve Norris
S.E. Sr. Biologists
S.E. AWMs
Dave Lovell
Dave Weber
Gary Skiba
Chuck Wagner
Dave Clarkson

P.S. Please see attached copy of comments from Chuck Wagner for detail comments on Lesser Prairie Chickens etc.

RPD/BG/jc

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

SEP 26

Ref: 8WM-EA

Jack Weissling
Forest Supervisor
USDA Forest Service
1920 Valley Drive
Pueblo, Colorado 81008-1797

Re: Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Oil and Gas Leasing Draft Environmental Impact Statement

Dear Mr. Weissling:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Region VII (Kansas City) and Region VIII (Denver) offices of the Environmental Protection Agency (EPA), have reviewed the referenced draft Environmental Impact Statement (DEIS). We offer the following combined Region's comments for your consideration in the preparation of the final Environmental Impact Statement (FEIS).

We understand the purpose of the referenced DEIS is to assist the Pike and San Isabel National Forest, Comanche and Cimarron National Grasslands, in identifying those National Forest System lands for which oil and gas leases could be authorized. In addition, it addresses the provisions of the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (Reform Act) which authorized Forest Service (FS) personnel to determine appropriate stipulations to apply to a lease to protect surface resources. We further understand that this DEIS is prepared to satisfy Stage one, the identification of Lands Available for Leasing, in the proposed FS Staged Decision Process. The remaining three stages, Stage two, Leasing Decisions for Specific Lands; Stage three, Application for Permit to Drill (APD); and Stage four, Amendment to APD will be based on appropriate environmental analysis and disclosure of the probable impacts in accord with NEPA.

The EPA submitted a scoping response in February of 1989 in which we expressed concerns that potentially effected ground water, stream/riparian systems, air quality, and wetlands be adequately protected. It is our understanding that during this Stage one analysis that lease restrictions, standard lease terms, and applicable supplemental stipulations will be implemented to address the above concerns. As the decision process progresses, additional environmental analysis at each Stage will further define potential impacts and additional supplemental stipulations will be applied.

We were somewhat confused by the discussion on pages III-34 and III-35 related to oil and gas production in Morton County, Kansas in 1979 and 1981. The discussion on these two pages does acknowledge that a significant portion, approximately 26 per cent, of the ownership of oil and gas on both the Comanche and Cimerron National Grasslands is in non-federal ownership. The FEIS needs to address how existing and potential production from these outstanding rights will be factored into the cumulative analysis discussion now found in Chapter Four beginning at IV-28. Of particular concern are the potential cumulative impacts associated with both federal and non-federal levels of development related to water quantity and quality on the National Grasslands.

The document is programmatic in nature, and as such does not provide the level of analysis necessary to fully evaluate the environmental impacts of oil and gas leasing on FS lands. Again, we understand that appropriate NEPA documentation will be prepared to address environmental impacts of APDs and amendments to APDs. The EPA is responsible under section 309 of the Clean Air Act to review and comment on NEPA documents. We therefore believe it is important that the EPA review documents in which site specific lease impacts are identified. We request that EPA Region VII receive environmental assessments and other pertinent documents associated with the leasing and APD process on the Cimarron National Grassland. The same type of information is requested by EPA Region VIII for activities on the Comanche National Grassland and the remainder of the Pike and San Isable National Forest.

The DEIS broadly discusses the impact of oil and gas drilling on water quality (page IV-15). We believe that impacts to water quality need to be considered in detail and provisions made to avoid impacts from the initial stages of the leasing activity. This discussion should be greatly expanded to include some study results on the specific impacts that drilling has on surface and ground water. In addition we believe that the FS should require that all well sites, not just those near sensitive environmental areas like wetlands, use a closed collection system for drilling fluids.

While we concur with Alternative 3, NSF Lands Available for Lease with Both Standard and Stipulated Terms, as the preferred alternative, the EPA is recommending a rating of EC-2 for this document. This means that we have environmental concerns with the proposed action which we feel can be addressed with additional information to fully evaluate the environmental impacts of oil and gas leasing on FS lands.

If you have questions related to our comments or if we can be of further assistance, please contact Cathy Tortorici in Kansas City at (913) 551-7435 or FTS 276-7435, or Mike Hammer in Denver at (303) 293-1695 or FTS 330-1695.

Sincerely,

for Robert R. DeSpain, Chief
Environmental Assessment Branch
Water Management Division

cc: C. Tortorici, EPA Region VII
OFA, A-104

VI-39

STATE OF COLORADO
Roy Romer, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER
Perry D. Olson, Director
6060 Broadway
Denver, Colorado 80216
Telephone: (303) 297-1192

REFER TO

For Wildlife · For People

Southeast Regional Office
2126 North Weber
Colorado Springs, Colorado 80907
Telephone: (719) 473-2945

August 30, 1991

Mr. Jack Weissling, Forest Supervisor
USDA Forest Service
1920 Valley Drive
Pueblo, Colorado 81008

Re: Your Letter of July 11, 1991 and New Draft Environmental Impact Statement for Oil and Gas Leasing on the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands.

Dear Mr. Weissling,

The Colorado Division of Wildlife (CDOW) appreciates the opportunity to comment on the latest draft of the document referenced above.

Alternative III of this particular draft appears to provide the best opportunity for site specific investigation and the use of stipulations to avoid negative impacts to wildlife and their habitats.

However, as stated in our letter of 5-31-90 in response to the first draft of this document, the Division feels that relying on stipulations alone will not adequately protect fish and wildlife resources. Wildlife habitats identified as "critical" to species for yearly life cycle needs, e.g. severe winter range, production areas, migration corridors, etc. should be designated as No Surface Occupancy (NSO) areas. Such designation is the only way many direct and indirect impacts to wildlife can be avoided.

A good case in point is the lesser prairie chicken and its lek sites. Lek activities will not continue on lands where pump structures are installed. The result, with drilling, will be greater fragmentation of lesser prairie chicken habitat and the potential loss of another species in Colorado. Unfortunately, biodiversity will be diminished.

In summary, CDOW feels all "critical" wildlife habitat areas, as designated through our WRIS data, should be given a presumption of priority in considering competing uses on USFS lands. Without such a presumption of priority, wildlife and recreation resources, the recognized "best uses" for forest lands along the front range and for the Pike/San Isabel Forests in particular will be compromised.

The Division hopes that you will reconsider the use of NSO to accommodate wildlife interests as just described, and as described in our previous letter. Those lands falling into the "critical" habitat designation represent a very small percent of total forest lands. However, the biological integrity of these lands for sustaining wildlife populations is paramount.

I have enclosed a copy of our May 1990 letter for your convenience. Please call me at 473-2945 ext. 209 if I can be of further assistance.

Sincerely,

Bruce Gofurth
Senior Habitat Biologist

BG/cas

APPROVED BY: _____
Ronald P. Desilet, Regional Manager

xc: Steve Norris
S.E. Senior Biologists
S.E. AWM's
Dave Lovell
Dave Clarkson

Enclosure

VI-40

STATE OF COLORADO
Roy Romer, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER
Perry D. Olson, Director
6060 Broadway
Denver, Colorado 80216
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Southeast Regional Office
2126 North Weber Street
Colorado Springs, CO 80907
Telephone: (719) 473-2945

REFER TO

May 31, 1990

Mr. Jack Weissling, Forest Supervisor
USDA Forest Service
1920 Valley Drive
Pueblo, Colorado 81008

RE: Oil and Gas Leasing Environmental Impact Statement Draft for Pike and San Isabel Isabel National Forests - Comanche and Cimarron National Grasslands.

Dear Mr. Weissling,

The following comments on the above referenced document represent the Colorado Division of Wildlife perspective regarding potential impacts to wildlife resources and to wildlife related recreation in general.

Of the six alternatives explored for oil and gas leasing, Alternative II appears to facilitate the best opportunities for identifying and protecting wildlife interests. This statement is based on the premis that management decisions reflect the current Forest trend to further maximize wildlife and recreational opportunities versus those which are extractive, e.g. timber harvests and oil and gas development.

The Division recognizes the Forest Service charge and need to manage on a Multiple Use basis. However, the Forest Service should also recognize, through Forest Plans, that some resources must be managed with priority to others where concurrent use causes conflict. Designation of these areas by prescription facilitates the avoidance of such conflicts.

The Division's primary concern with the document is that it does not provide for adequate protection of wildlife where competing oil and gas interests are identified. For instance, surface occupancy will be allowed in or near areas identified as critical wildlife habitat, e.g. severe elk winter range and winter concentration areas. To allow surface occupancy will result in direct and indirect habitat losses of at least 4,400 acres for Management Indicator Species (MIS) under Alternatives I and II. How or why such losses are justified is not explained except to say that 110,000 acres of wildlife habitat improvement will take place in comparison. Where? And for what species? Should these improvements be taking place in any event?

Certain areas, e.g. Special Interest areas, Natural areas, Research areas, etc. should be exempted from surface occupancy, and apparently this is the intent of the Forest Service. It is the Division's position that habitats critical to species for continuation of their life cycle also be exempted, e.g. severe winter range, winter concentration areas, calving and fawning areas, leks, production areas, riparian areas, wetlands, playa lakes, migration corridors, etc.

A brief note on the Lesser Prairie Chicken is in order along these lines. In addition to leks being stipulated for No Surface Occupancy (NSO), production areas, those within 2.5 km of the lek, should be designated NSO. Such buffering will also help to alleviate the problem that our officers experience while inventorying for leks due to noisy well pumps.

It is not enough to say that wildlife species impacted by oil and gas activities can use secondary or "marginal" habitat and hopefully survive or prosper at a lesser rate. Nor is the use of special stipulations always a satisfactory answer to wildlife impacts since direct habitat losses are not addressed.

Similar to the protection provided wetlands or federally listed threatened and endangered species, "critical" wildlife habitat areas should enjoy the presumption of priority. If competing uses are proposed, a specific process delineating less damaging alternatives and resource dependancy should be required. Those whose activities will result in impacts to wildlife should document how their project is dependant on the critical wildlife habitat in question and how their project represents the least damaging of alternatives.

At present, this draft recognizes only federally listed threatened and endangered species as deserving full protection from impacts. State listed species should be given the same consideration and protection. Also, the Division should be included in coordination projects, studies and decisions regarding threatened and endangered species. Only the U.S. Fish and Wildlife Service is stipulated for such interaction at this time.

Regarding mitigation, special stipulations will provide an avenue by which to require specific mitigation where fish and wildlife resources are impacted. However special stipulations may not adequately address impacts to critical wildlife habitats or to state or federally listed threatened or endangered species. Avoidance of impacts through NSO may be the best approach. Also, it is not clear how cumulative impacts to wildlife resources will be monitored, evaluated or mitigated. Close coordination with the Division and other resource agencies will be necessary for such purposes once methods are defined.

VI-41

APPENDIX A

APPENDIX A

MITIGATION

INTRODUCTION

Federal agencies are required to include and discuss appropriate measures to mitigate adverse environmental impacts (40 CFR Parts 1502.14 (f), 1502.16 (h), 1508.20). Mitigation includes the following possibilities for dealing with adverse environmental impacts:

* Avoiding the impact altogether by not taking a certain action or parts of an action.

* Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

* Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

* Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

* Compensating for the impact by replacing resources or providing substitute resources or environments.

Mitigation, in the federal oil and gas leasing program, is provided in various intensities at different levels of planning. Mitigation, at the level of the leasing analysis, must be relatively general to encompass all of the possible conditions that may exist at the time of ground disturbance. The opportunities to provide adequate protection at the time of disturbance must be identified and generated at this level of planning. Mitigation that exceeds what is available through the Standard Lease Terms and which is identified now becomes a condition of the lease and restricts the rights that are granted to the purchaser of a lease. These restrictions may affect the lease purchase price as well as the lessees future ability to develop facilities on various, or all, segments of the lease. The restrictions, however, are a known condition at the time of advertisement and purchase.

Mitigation can be refined at two later stages of planning, after the Forest Supervisor makes a decision relating to this analysis. The first of those opportunities is when an actual lease parcel is identified. At that time any knowledge about the parcel, or resources it affects, that is not now available can be used to refine or change the lease restrictions. Those changes will have to be disclosed through an environmental analysis and decision document. The changes recognized at this stage will be identified prior to lease advertisement so they, too, will become known conditions of the lease purchase.

The last formal opportunity where refinement can, and will, occur is at the time that an Application for Permit to Drill (APD) and Surface Use Plan of Operations is provided to the government by the lessee or their representative. At that time a specific plan is provided that displays proposed road and drill locations, and all of the desired facilities. This information allows the Forest Service to

analyze and document site specific effects of the proposed development prior to making a decision.

Many types of mitigation can be identified and required at the time of APD. The only restriction is that the mitigation cannot "unduly hinder or preclude the lessees opportunity to exercise valid existing rights". This makes it important that the government correctly identify the rights that it wishes to confer prior to sale of a lease. Those rights, and mitigation that may limit them, are identified through the application of Standard Lease Terms and necessary additional stipulations prior to advertisement. Once a lease has been sold the government can apply any mitigation requirements that still allow the lessee to exercise the rights they were granted in the lease.

Mitigation measures may be waived or modified by the authorized officer if they are proven unnecessary at the time a site specific analysis is completed for the APD. This could occur because the resource to be protected is absent or more effective mitigation has been identified and will be used. All substantial modifications or waivers will be displayed in a decision document at the time the Surface Use Plan analysis is completed.

In this appendix we will discuss the mitigation provided by both the Standard Lease Terms and supplemental stipulations. We will also briefly discuss some of the standard types of mitigation, termed conditions of approval, that are used at the time of APD. It is important to remember that the lease terms and stipulations build the framework for the application of conditions at the time of APD.

Standard Lease Terms, stipulations, and conditions of approval will be applied to all ground disturbing activities occurring within a lease parcel. These activities include, but are not limited to, prospecting, exploration drilling, and production.

STANDARD LEASE TERMS

Standard Lease Terms apply to all leases and all management alternatives in this EIS. They are attached as Exhibit A-1. They require that the "Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Standard Lease Terms are commonly considered to be adequate to mitigate most adverse environmental impacts (40 CFR Part 1505.2 (c) and Part 1508.20).

The standard terms also apply all non-discretionary statutes, and reasonable measures required by the Authorizing Officer to minimize adverse impacts to other resources and users. The Conditions of Approval (COA's) shown later in this Appendix apply to all four management alternatives.

Under Standard Lease Terms mitigation may include moving the site of developments up to 200 meters, timing restrictions of up to 60 days, facility design changes, and interim and final reclamation efforts. Many other protection measures can be applied and negotiated under standard terms. It must be demonstrated that Standard Lease Terms are insufficient in order to apply supplemental stipulations.

SUPPLEMENTAL STIPULATIONS

When there are resource values, uses, or user conflicts identified that cannot be managed or accommodated by the Standard Lease Terms or on other lands, a lease stipulation may be necessary. The leasing analysis must show that less restrictive stipulations were considered and determined to be insufficient. Once this determination has been made, the appropriate stipulations will be attached to all leases on available lands with resource values, uses, or user conflicts that cannot be accommodated by less restrictive mitigation. Stipulations may be applied to all, or part, of a lease parcel as required for resource protection. Standard Lease Terms and conditions of approval will apply to all lease parcels, or all parts of lease parcels which do **not** require resource protection by stipulation. Stipulations will display the need for lease stipulations and establish guidelines for granting waivers, exceptions, or modifications. Substantial modification or waiver after lease issuance is subject to public review for at least a 30-day period in accordance with Section 5120.f of the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

Stipulations may be necessary if the authority to control the activity on the lease does not already exist under laws, regulations, or orders. It is important to recognize that the Authorized Forest Officer has the authority to modify the siting and design of facilities, control the rate of development and timing of activities, as well as require other mitigation under Sections 2 and 6 of the Standard Lease Terms (BLM Form 3100-11) and 43 CFR 3101.1-2.

The following guidance is provided in order to assist in the determination of needed stipulations. They are displayed from the most to the least restrictive.

No Surface Occupancy Stipulation Guidance

No Surface Occupancy (NSO) is the most restrictive stipulation available and is intended for use only when Standard Lease Terms and other, less restrictive, stipulations are determined insufficient to adequately protect the public interest. The analysis record must show that a no-lease alternative was considered when applying the NSO stipulation.

Timing Limitation Stipulation Guidance

The Timing Limitation (often called seasonal) Stipulation prohibits fluid mineral exploration and development activities for time periods less than yearlong. When using this stipulation, assure that date(s) and location(s) are as specific as possible. A timing stipulation is not necessary if the time limitation involves the prohibition of new surface disturbing operations for periods of less than 60 days (43 CFR 3101.1-2).

Controlled Surface Use Stipulation Guidance

The Controlled Surface Use (CSU) Stipulation is intended to be used when oil and gas activities are allowed on all, or portions, of the lease area year-round but, because of special values or resource concerns, lease activities must be strictly controlled. The CSU Stipulation is used to identify constraints on surface use or operations which may otherwise exceed the mitigation provided by Section 6 of the Standard Lease Terms and the regulations and operating orders. The CSU Stipulation is less restrictive than the NSO or Timing Limitation stipulations, which prohibit all

activity on all, or portions, of a lease for all, or portions, of a year. The CSU Stipulation should not be used in lieu of an NSO or Timing Limitation stipulation but should be limited to areas where restrictions or controls are necessary for specific, rather than all, activity.

The stipulation should explicitly describe what activity is to be restricted or controlled, or what operation constraints are required, and must identify the applicable area and the reason for the requirement. The legal subdivision, distance, location, or geographic feature, and resource value of concern must be identified in the stipulation and be tied to a land use plan and/or NEPA document.

Stipulations for Use on the Unit

Table A-1 displays the stipulations that follow it which are described in detail. These stipulations may be applied on both federal surface and split-estate lands where necessary.

Supplemental Stipulation Descriptions

This section describes the stipulations that may be attached to leases based on the Record of Decision.

These stipulations would be placed on available lands with resource values, uses, or user conflicts that, as determined by this Leasing Analysis, cannot be accommodated by less restrictive mitigation.

These stipulations are applicable under Alternative III of this leasing analysis. Several stipulations, or parts of them, also apply under Alternative I, Current Forest Plan Direction. Those that apply under Alternative I include the NSO's for Soils, Municipal Watersheds, and Ski Areas; CSU for National Natural Landmark, watersheds over sediment thresholds, and RNA's and Special Areas with management plans.

The Stipulation Base Map in Appendix D depicts general areas on the Unit where these stipulations may be necessary. The Resource Base Quad Maps and their overlays, represented in Appendix E, identify the resource values being protected by the stipulations.

Table A-1
Limitations or Prohibition of Surface Activity
In Areas with Resource Sensitivity

Limitation/Prohibition	Use/Resource to be Protected
NSO Stipulation	Cultural Resources Municipal Watersheds Recreation Riparian, Wetlands, Floodplains Soils
Timing Stipulation	Wildlife (Critical Winter Range) Wildlife (Management Indicator Species)
CSU Stipulation	Alpine Soils Special Interest Areas (National Natural Landmarks) Visual Resources Water
Lease Notices	Research Natural Areas and Special Interest Areas Special Uses Special Use - Ski Areas Threatened and Endangered Species Vegetation (Timber Sales)
Standard Lease Terms	Air Cultural Resources Range Recreation Soils Special Uses Vegetation Visual Resources Water Wildlife

Serial No. _____

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

The Santa Fe National Historic Trail, to include ruts or rut zones or swales or vegetation changes designated as the major routes of the Trail and a 300 foot buffer area on each side of the Trail. The Trail (single or multiple ruts or swales) varies in width from approximately 50 feet to over 300 feet. Thus the total NSO zone may be 450 feet or more in width for some portions of the Trail.

On the lands described below:

The locations of the major routes of the Santa Fe National Historic Trail are available through the Cultural Resources Management records section maintained at the Forest Supervisor's Office in Pueblo. They include the major routes and branches of the Cimarron Cutoff on the Cimarron National Grassland, the major routes and branch of the Mountain Branch, and the Aubrey Cutoff, the Granada-Ft. Union Military Road, and the Las Animas-Trinidad New State Road, all on the Comanche National Grassland.

For the purpose of:

Protecting the physical manifestations and immediate environment of the Trail, including inherent interpretive, educational, and recreational values for the segment potentially impacted.

The following exceptions are noted:

1. Temporary ground disturbances (less then six weeks duration) for the purpose of constructing underground utility lines, collection systems, underground salt water pipelines, and other underground support facilities are permissible. Upon completion of installation, the ground and vegetation should be restored to its previous condition.

2. Locate roads outside the designated trail routes and buffer unless: (a) The trail has been destroyed by post-trail era use or erosion and is not visible as ruts, rut zones, or swales; and (b) alternative routes have been reviewed and rejected as being more environmentally damaging.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2920, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

Cultural

No Surface Occupancy is being used to protect the Santa Fe National Historic Trail and its features. The Trail consists of 1200 miles of ruts and other remnants of the original 1821-1880 route from Old Franklin, Missouri, to Santa Fe, New Mexico. The Trail was added to the National Trails System in 1987 through amendment to the National Trails System Act (P.L. 100-35). National Historic Trails are managed by the USDI Park Service for identification and protection of historic routes and remnants for public use and enjoyment. The Park Service has prepared a Management and Use Plan for the Santa Fe Trail which includes identification of major routes, side branches, and sites. Those specific areas on the Cimarron and Comanche National Grasslands are the Cimarron Cutoff, the Mountain Branch, the Aubrey Cutoff, and the Granada-Ft. Union Wagon Road. The Forest Service, in cooperation wit the National Park Service, is developing the Trail for public recreation use within the guidelines provided in the Management and Use Plan.

The following guidelines would be implemented:

> For ruts or rut zones, or vegetation changes, or shallow swales designated as the main route of the Trail, a No Surface Occupancy Zone has been established for the Trail and a 300 foot buffer areas on either side. Oil and gas wells, roads, collection points or other surface disturbances will not be permitted within the Zone. It may be feasible to tunnel under visible remnants of the Trail to construct pipelines, utility lines etc.

Serial No. _____

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

All lands identified to be managed for the purpose of conserving and protecting the water supply of the following communities:

Town of Cascade	Cooperative Agreement, 4/28/1923
Cities of Colorado Springs & Manitou Springs	Act 2/27/1913 Cooperative Agreement, 10/9/1914 Special Regulations, 10/9/1914
City of Colorado Springs	Cooperative Agreement, 1/9/1924 Act 4/10/1890 Act 4/24/1896 Act 5/01/1902
City of Manitou Springs	Cooperative Agreement, 5/1/1923
City of Trinidad	Cooperative Agreement, 1/16/1914
Town of Palmer Lake	Cooperative Agreement, 2/06/1917
City of Florence	Cooperative Agreement, 6/05/1939

For the purpose of:

Conserving and protecting the water supply of said community.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2920, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Conditions under which stipulation would be waived.

Use of said lands will only be permitted with the approval of proper community authorities, except for the purpose specifically allowed in the specific act and/or cooperative agreement which established the municipal watershed.

Form #/Date

Municipal Watersheds

Municipal watersheds are managed to maintain water production and quality in order to provide potable water for use in population centers. Special management requirements are identified for all watersheds based on the enabling articles. Some watersheds on the Unit were legislatively designated, others established through cooperative agreements or other administrative tool.

All development in the watersheds is based on the existing agreements and negotiations with the communities served.

Serial No. _____

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

All developed recreation sites as identified in RIM including a 1/4 mile buffer around each site. Locate roads and drill sites outside developed recreation site buffer zones unless alternative routes have been reviewed and rejected as being more environmentally damaging.

For the purpose of:

To protect the investment of facilities within the site, to protect the recreation experience and safety of the visitors, and to protect the natural environment that initially made the site desirable for development.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2920, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

Recreation

The NSO stipulation will be applied to leases for tracts in and around identified developed recreation sites. [See Exhibit A-2 for a listing of these sites.] NSO will be used to meet the goals of the Forest Plan for developed recreation opportunities and experiences.

The developed recreation sites are facilities constructed for public enjoyment that and include, but are not limited to, campgrounds, picnic areas, trailheads, designated play and sport areas, boat ramps, interpretive sites, fishing docks, and complexes formed by combinations of the above.

Serial No._____

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

Wetlands, Riparian Areas and Floodplains of any defined drainage or location containing these specific ecosystem types. Access roads may be allowed in these areas only if alternative roads have been reviewed by the appropriate personnel, and have been rejected as being more environmentally damaging. When road locations must occur in these areas, streams will be crossed at right angles and access across other areas will be held to a minimum. Streams will not be paralleled by roads through these areas.

On the lands described below:
Information on the location of these areas can be found on 1:24,000 scale maps located at the Forest Supervisors Office. Additional site specific information may be required at the APD stage.

For the purpose of:

The management of wetlands and floodplains are subject to Executive Orders 11990 and 11988, respectively. The purpose of the EO's are to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and floodplains and to avoid direct or indirect support of new construction in wetlands wherever there is a practical alternative.

Also, it is recognized that there is a direct relationship between impacts on such areas and effects on water quality and aquatic ecosystems. There is a high risk of irreversible and irretrievable impacts on the latter with operation and developments in wetlands, riparian areas and floodplains.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950, 2820 and 2526.

Form #/Date

Riparian, Water, Fisheries

Where Standard Lease Terms are not adequate to relocate oil and gas activity outside of riparian areas, floodplains areas and wetlands, the NSO (riparian) stipulation will be applied.

Riparian areas, floodplain areas and wetlands are not mapped at the planning scale, but must be considered a part of all lease units. When specific APD's are being evaluated, wetlands and floodplains must be covered by the requisite stipulation. No Surface Occupancy must correspond to an area along the edges of all streams, lakes and other bodies of water. The actual distance for riparian areas shall correspond to at least the recognizable area dominated by riparian vegetation and soil conditions. The area of the floodplain is the 100-year floodplain. The stipulation will ensure that new development is not permitted without a detailed analysis of the activities to be exempted from executive order requirements.

Ephemeral streams on the Grasslands meet the executive order criteria for defining wetlands and floodplains and are subject to the mitigation measures described herein.

All waterfowl and fisheries resources will be evaluated to determine the need for permanent or temporary fencing to promote riparian vegetation establishment. Other areas may need fencing to restore the riparian community. Protection of riparian areas is required due to the high risk of irreversible and irretrievable impacts to the water quality and associated ecosystems from oil and gas operations and developments in wetlands, riparian areas and floodplains.

Wetlands and floodplains must be mapped for a lease report in accordance with FSM 2526 and 2527 direction. The areas subject to an NSO stipulation include the width of a riparian area and include the area calculated for conveyance of a 100 year recurrence interval flood. The specific description must be reflected or referenced on the face of the stipulation form.

Serial No. _____

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description)

Areas identified with **both** of the following characteristics:

1. Slopes steeper than 60 percent.
2. High (severe) geologic hazard.

Exception Criteria:

This stipulation will not be applied on lands within lease areas where neither of the above limiting characteristics are found to exist. Modification of this stipulation may occur as long as resource values are protected.

For the purpose of:

1. Preventing mass movements of earth such as landslides.
2. Maintaining or improving water quality to meet Federal or State standards.
3. Preventing significant or permanent impairment to soil productivity.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104)

Form #/Date

Soils

The NSO stipulation is applied to leases in areas of high geologic hazard (mass movement) on slopes steeper than 60 percent for the purpose of:

(1) Preventing mass movement of earth materials.

(2) Maintaining or improving water quality to meet federal and state standards.

(3) Preventing significant or permanent impairment of soil productivity.

Soil criteria used for no surface occupancy include *both* of these characteristics: 1) slopes steeper than 60 percent and, 2) high geologic hazard. Areas inferred to be high geologic hazards include landslides, avalanches, debris flows or slides, rockslides, rockfalling, slumping or talus accumulation. Some till is mapped with landslide deposits, because distinguishing these two deposits from one another is difficult. Areas mapped as susceptible to landslides and related activity will be carefully studied before any development begins.

The map showing suitability for NSO as it relates to soils should be viewed as displaying areas of generality. The delineated areas of NSO means that the vast majority of that area has severe limitations such as slopes steeper than 60 percent, and high geologic hazards. However, there are inclusions small parcels of land which do not have the limitations described above but are surrounded by them. These areas can not be practically separated at the scale of mapping, but they would be open to surface occupancy if industry can demonstrate, to the satisfaction of the Forest Service, that all concerns can be mitigated. Surface occupancy or use may be subject to other special stipulations where such controls are deemed necessary to protect resource values.

Serial No. _____

TIMING LIMITATION STIPULATION
(CRITICAL WINTER RANGE)

No surface use is allowed during the following time period(s); this stipulation does not apply to operation and maintenance of production facilities.

1. Exploration, drilling, and development activity will not be allowed during the period from December 1 to April 15.

2. New oil and gas roads on public lands will be closed to the public from December 1 to April 15.

On the lands described below:

Critical Winter Ranges for big game and turkey

For the purpose of:

These areas are critical mule deer, pronghorn antelope, big horn sheep, elk, and turkey winter ranges. These key concentration areas support and sustain a large percentage of the total winter populations. They are extremely important for animal survival during winters of harsh weather conditions. Disturbances and habitat losses may place unnecessary stress on the wintering wildlife herds and cause an increase in mortality.

Conditions under which this stipulation would be waived.

1. Winter conditions which would not concentrate wildlife on the critical winter ranges, and

2. The duration of the operation would not exceed two weeks.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Form #/Date

Wildlife
Critical Winter Range

The Forest Plan indicates that habitat will be maintained for viable population levels of all existing wildlife species within the Forest. The emphasis for habitat maintenance and development will be on present and potential habitat for sensitive, threatened and/or endangered species, Management indicator species (MIS), and critical wildlife winter ranges production areas.

Timing stipulations were identified to mitigate potential significant effects which could occur as a result of oil and gas leasing exploration and development activities on the big game critical winter range, habitat for management indicator species. The following table shows when activities will be allowed or prohibited.

TABLE A-2
SEASONAL OPERATING RESTRICTIONS
TO RESOURCE DEVELOPMENT ACTIVITIES

	Seasonal Restrictions											
SPECIES	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Deer/Elk					1	←	—	—	15			
Bighorn Sheep					1	←	—	—	15			
Mountain Goat					1	←	—	—	15			
Pronghorn					1	←	—	—	15			
Turkey					1	←	—	—	15			

Serial No. _____

TIMING STIPULATION
(Management Indicator Species)

No surface use is allowed during the following time period(s): this stipulation does not apply to operation and maintenance of producing wells:

Seasonal Wildlife Stipulation for Management Indicator Species

No surface use is allowed during the periods listed for the purposes below.

Elk calving, Bighorn Sheep lambing, Pronghorn and Deer fawning and Goat kidding areas:
April 15 to July 1
Prairie Chicken Dancing grounds and nesting areas:
March 1 to June 1
Critical Raptor nesting areas:
March 1 to July 31
Bald Eagle and Turkey Winter Habitat:
November 15 to April 15
Curlew, and Mountain Plover Nesting, Resting, Staging areas:
March 1 to July 1
Abert's squirrel winter habitat:

For the purpose of:

These areas have been identified by the CDOW and Kansas Department of Wildlife and Parks. Disturbance during the reproductive season may reduce herd productivity. For nesting species, surface disturbance and associated human activity could disrupt breeding and/or cause nest abandonment. Winter habitat for the Bald Eagles and turkey are important for roosting, perching or feeding. Human disturbance would produce increased stress, leading to poor physical condition, winter mortality and/or reduced reproduction.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Form #/Date

Wildlife
Management Indicator Species

The Forest Plan indicates that habitat will be maintained for viable population levels of all existing wildlife species within the Forest. The emphasis for habitat maintenance and development will be on present and potential habitat for sensitive, threatened and/or endangered species, MIS, and critical big-game winter ranges/big-game production areas.

Timing stipulations were identified to mitigate potential significant effects which could occur as a result of oil and gas leasing exploration and development activities on the big game critical winter range, habitat for management indicator species. The following table shows when activities will be allowed or prohibited.

TABLE A-3
SEASONAL OPERATING RESTRICTIONS
TO RESOURCE DEVELOPMENT ACTIVITIES

	Seasonal Restrictions											
SPECIES	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Prarie Chicken Leks								1 ←			→ 1	
Bald Eagle/Turkey				15 ←							→ 15	
Mule Deer/ Elk Migration				1 ←							→ 1	
BIRTHING AREAS												
Elk									15 ←			→ 1
Mule Deer									15 ←			→ 1
Mountain Goat									15 ←			→ 1
Pronghorn									15 ←			→ 1
NESTING AREAS												
Prarie Chicken								1 ←			→ 15	
Raptor								1 ←				→ 31
Curlew								1 ←				→ 1
Mtn Plover								1 ←				→ 1

Serial No._____

CONTROLLED SURFACE USE STIPULATION

Surface occupancy or use is subject to the following special operating constraints.

Ground disturbing activities will be relocated beyond 200 meters to suitable soil types and/or stable slope conditions where such controls are necessary to protect resource values on the lands described below:

1. Slopes steeper than 60 percent.

2. Fragile soils with High (severe) erosion potential on slopes of 40 percent or greater.

3. Fragile soils with High (severe) erosion potential, soil depth to bedrock is less than 20 inches, and slopes of 35 percent or greater.

Exception Criteria

This stipulation will not be applied on lands within lease areas where neither of the above limiting characteristics are found to exist. Modification of this stipulation may occur as long as resource values are protected.

For the purpose of:

1. Preventing significant or permanent impairment of soil productivity.
2. Protecting off-site areas by preventing impacts from accelerated soil erosion.
3. Maintaining or improving water quality to meet Federal or State standards.
4. Preventing detrimental impacts such as gully erosion, streambank failure, soil compaction, and severe rutting which could cause long-term damage or permanent impairment to soil productivity.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101, FS Oil & Gas Regulations, 36 CRF, Sec. 228.104.)

Form #/Date

Soils

Soil criteria used for justification of the CSU stipulation include any of the following characteristics: 1) slopes steeper than 60 percent; 2) High (severe) erosion potential on slopes of 40 percent or greater; and 3) High (severe) erosion potential on shallow (less than 20 inches) soils and slopes of 35 percent or greater. Associated with these areas are a low reclamation potential and high probability for loss of soil productivity.

Ground disturbing activities will be relocated beyond 200 meters to suitable soil types and/or stable slope conditions, where such controls are necessary, for the purpose of:

(1) Maintaining or improving water quality to meet federal and state standards.

(2) Protecting off-site areas by preventing impacts from accelerated soil erosion.

(3) Preventing significant or permanent impairment of soil productivity.

(4) Selecting the best site for development in order to minimize impacts to soil and water resources.

Inclusions within the mapped areas cannot be practically separated ath the scale of mapping. Slope gradients will be carefully studied and monitored on-the-ground prior to the approval of any ground disturbing activities.

Serial No. _____

CONTROLLED SURFACE USE STIPULATION
(for Alpine Ecosystems)

Surface occupancy or use is subject to the following special operating constraints.

Access will be limited to existing roads or point access (helispots, etc.) Point access must be on flat, stable landforms, of minimal size, as close to the well pad as safety will allow. **Well configuration** - There will be no reserve pit excavation in alpine areas. Waste materials must be temporarily stored in tanks and disposed of in pre-approved areas outside the alpine zone. There will be no on-site camp facilities for crews. On-site equipment and supply storage will be kept to a minimum. Surface leveling will also be kept to a minimum by storing as much equipment as possible on racks or in sheds with minimal surface contact. Surface disturbance will be limited to 1 acre per lease-hold, or 1 acre per 500 acres, whichever is more restrictive. Site clearing and improvements may require relocation further than 200 meters to find naturally flat (generally less than 5%) microsites with acceptable site conditions for disturbance and subsequent reclamation.

As much as feasible, facilities should be situated so that they do not protrude above ridgelines as viewed from below and do not unduly impact visual quality near the Continental Divide Trail. Topography and subalpine vegetation should be used for screening to the extent possible to meet adopted visual quality objectives.

On the lands described below:

Land areas above timberline, mapped as alpine on the Resource Base Quad Maps.

For the purpose of:

1. Preventing significant or permanent impairment of soil productivity.
2. Maintaining or improving water quality to meet Federal or State standards.
3. Minimizing the potential for significant or cumulatively significant impacts in alpine ecosystems, per 40 CFR 1508.27(b)(7).
4. Minimizing visual quality impacts.

This stipulation is not subject to exception but may be modified or waived if the qualified botanist or ecologist who performs the lease proposal monitoring and/or the pre-disturbance resource survey at APD determines that the stipulation as stated will not adequately protect surface resources; or specified alternative constraints would adequately protect surface resources. Substantial modification, or waiver, of this stipulation would require additional environmental analysis and another decision. .

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (See BLM Manual 1624 and 3101 or FS Manual 1950 and 2820, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

Alpine

This Controlled Surface Use (CSU) stipulation will be applied to leases within alpine areas not protected by the more restrictive No Surface Occupancy and Timing stipulations, or the Controlled Surface Use Stipulation for the Spanish Peaks National Natural Landmark. This CSU stipulation is specified to minimize disturbance to fragile alpine ecosystems, to prevent accelerated soil erosion by water or wind to maintain soil productivity and facilitate revegetation, and to minimize visual impacts.

Surface disturbance will be revegetated to approximate the pre-disturbance condition. Revegetation will be artificially induced as soon as possible after well abandonment or non-use. Revegetation species and specific erosion control measures will be determined during the site specific environmental analysis phase.

Serial No. _____

CONTROLLED SURFACE USE STIPULATION
Spanish Peaks National Natural Landmark

Surface occupancy or use is subject to the following special operating constraints.
In all areas of the National Natural Landmark, *except* the alpine areas (above timberline) of the East and West Peaks, and the radiating dikes. Production activity, including surface disturbances, will be limited to the minimum necessary for normal service and maintenance. Companies will be required to submit for approval by the District Ranger, a plan that outlines the minimum activity required for normal operation.

Within the boundaries of the Landmark oil and gas development will **avoid** all geological features that contribute to the landmark designation: these are the alpine (above timberline) portions of the East and West Spanish Peaks *and* the volcanic dikes projecting from the bases of the peaks. The dike formations also are protected by a 200 foot no disturbance buffer zone on both sides to prevent erosion and to protect the physical integrity of the dikes.

On the lands described below:

Within the boundaries of the Spanish Peaks National Natural Landmark, including all Forest Service System lands within T30S, R67W; T30S, R68W; T31S, R67W; T31S, R68W; all section T31S, R69W, Sections 1, 2, 11, 12, 13, and 14.

For the purpose of:

Protecting the significant and contributing geological features of the Spanish Peaks Natural Landmark and to protect the physical integrity of the landmark as a whole. To implement the National Natural Landmark protection measures as specified in the continuing Memorandum of Agreement between the National Park Service and the Forest Service regarding such areas (FSM 1531.31b. Memorandum of Agreement of Designation of Natural Landmarks in National Forests).

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

National Natural Landmarks

The Spanish Peaks area has been nationally recognized for its geological significance and has been identified as a National Natural Landmark. This was implemented through the Memorandum of Agreement between the National Park Service and the Forest Service (FSM 1531.31b. Memorandum of Agreement of Designation of Natural Landmarks in National Forests).

Multiple-use management is allowed in National Natural Landmarks as long as the natural features that drove the recognition are protected. The CSU is needed to protect the physical integrity of the significant and contributing geological features of the Spanish Peaks Natural Landmark.

Serial No._____

CONTROLLED SURFACE USE STIPULATION

Surface occupancy or use is subject to the following special operating constraints.

When necessary to meet VQO's, site clearings, collection facilities, structures, utilities and pipelines will be relocated more than 200 meters. At the time of APD a visual site analysis will be completed to determine if vegetation, topography, and on-site controls are sufficient to mitigate visual impacts. If so, the site will be excepted, and not require relocation.

On the lands described below:

Lands with the following visual resource classification, FG1A, FG1B, and MG1A, that have retention identified as the quality objective. Federal and State Highways, nationally designated trails, major water features, recreation complexes, and high use Forest Service Roads are examples. Visual Quality Maps are on file in the Supervisor's Office, Pueblo, Colorado.

For the purpose of:

1. Protecting the natural, cultural and historical scenic values of these areas.

2. Preventing the placement of collection facilities, well sites or exploration activity within these areas that do not meet Visual Resource Management guidelines.

3. Providing Forest and Grassland visitors with quality experiences.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Form #/Date

Visual Resource

The CSU stipulation is used to prevent visual disturbances from drilling operations, treatment, storage and collection facilities and exploration on areas of high scenic and recreation value. Use of the CSU stipulation will be limited to foreground and middleground viewing distance zones of primary and secondary viewpoints, in areas with a visual quality objective of retention.

CSU stipulation allows the Forest Service the flexibility to relocate activity farther than the allowable 200 meters, allowable under Standard Lease Terms, if necessary to mitigate visual impacts.

When development is visible from more than one viewpoint, primary consideration will be given to the viewpoint closest to the development.

Serial No. _____

CONTROLLED SURFACE USE STIPULATION

Surface use or occupancy is subject to the following special operating constraints. Ground disturbing activities will be allowed in watersheds that have been identified as being over sediment thresholds or within 10 percent of exceeding sediment thresholds, but only after enough disturbed acres in the watershed are rehabilitated so that the new activities will not result in sediment threshold limits being exceeded. At the time of the APD, a site-specific analysis must be done for the streams in these areas to determine the existing biological and physical conditions. If these conditions are found to be impaired, ground-disturbing activities may have to be curtailed until the conditions can be improved.

On the lands described below:

In watersheds that have been identified as being over sediment threshold:

Trail Creek 6-3
Thirtynine Mile Mtn. 8-2
Twin Creek 8-4
Jackson Creek 15-3
Stark/Gove Creek 15-4
Beaver Creek 17-2
Fourmile Creek 21-1
Link Creek 25-1
Kaufman Ridged 98-5

In watersheds within 10% of exceeding sediment threshold.

Badger Creek
S. Platte R. from Elevenmile to confluence w/ N. Fk. S. Platte R.
Bailey 9-2
Rampart 17-3
Spruce Grove 23-2
Hackett Gulch 25-3
No. Fork Purgatoire River 97-1
West Creek 6-1
Spinney Mtn. 8-1
Elevenmile 8-3
Elk Creek 11-2
East Beaver Creek 21-3
Pulver Gulch 25-2
Newlin Creek 87-2

For the purpose of:

Meeting the objectives of the Clean Water Act of 1977 & Federal Water Pollution Control Act of 1972 to restore and maintain the physical, chemical, and biological integrity of the nation's water.

Form #/Date

Water

At the time of the APD, a site-specific analysis must be done to determine the existing biological and physical conditions of the streams that could be impacted. If these conditions are found to be impaired, ground-disturbing activities cannot occur until the conditions can be improved. Activities may be allowed to proceed if they are mitigated and enough disturbed acres in the watershed are rehabilitated, so new activities will not result in sediment thresholds being exceeded.

This stipulation is applied to watersheds in areas which potentially would produce effects as identified and described in the Affected Environment Chapter of this EIS. Stipulations are applied to meet the objective of the Clean Water and Federal Water Pollution Control Acts to restore and maintain the physical, chemical, and biological integrity of the nation's water. They are also necessary to meet Forest Plan goals for maintaining or improving water quality, to conserve water resources and to protect environmental quality. Less restrictive stipulations could result in impacts that would further exceed threshold sediment yield values. Maintaining or improving the water quality also benefits the aquatic life found in the Forest's streams.

All of these impact areas are made relatively more important by the possible cumulative effects of oil and gas development. In many areas, notably those which have been identified as not meeting water quality standards, surface use must be controlled by application of the CSU stipulation. All areas of concern should be monitored for project-specific impacts on water quality.

LEASE NOTICES

Lease Notices are attached to leases to transmit information at the time of lease issuance to assist the lessee in submitting acceptable plans of operation, or to assist in administration of leases. Lease Notices are attached to leases in the same manner as stipulations, however, there is an important distinction between Lease Notices and Stipulations. Lease Notices do not involve new restrictions or requirements. Any requirements contained in a Lease Notice must be fully supported in either a law, regulation, standard lease term, or onshore oil and gas order. A Lease Notice is not signed by the lessee. Guidance in the use of Lease Notices is found in BLM Manual 3101 and 43 CFR 3101.1-3.

A Lease Notice should contain the following elements: (1) the resource/use/value and the lands affected, if applicable; (2) the reason(s); (3) the effect on lease operations or what may be required; and (4) a reference to the lease term, regulation, law or order from which enforcement authority is derived.

If a situation or condition is known to exist that could constrain lease operations, there should be full disclosure at the time of lease issuance via a Lease Notice. If a lessee may be prevented from extracting oil and gas through a prohibition mandated by a specific non-discretionary statute, such as the Endangered Species Act, then a stipulation may be used even though a Lease Notice would be sufficient. It is at the discretion of the Authorized Forest Officer whether a situation is sufficiently sensitive to warrant the use of a lease stipulation.

Serial No._____

LEASE NOTICE

Activities on Research and Special Interest Areas

Oil and gas operations will be limited based on the goals and management requirements for RNA's. Until the following areas are withdrawn a DNL is applied:

Hurricane Canyon RNA	Pikes Peak R.D.	520 acres
Saddle Mountain RNA	South Park R.D.	480 acres
Hoosier Ridge RNA	South Park R.D.	695 acres
Campo RNA	Comanche NG	35 acres
Cimarron RNA	Cimarron NG	310 acres
Windy Ridge Bristlecone Pine Scenic Area	South Park R.D.	150 acres
Queen's Canyon Geologic Area	Pikes Peak R.D.	1130 acres

Management plans call for a CSU on:

Lesser Prairie Chicken Zoological Area	9212 acres
Southeastern Colorado Branch Experimental Sta.	3920 acres

Until management plans are implemented the following will be covered by DNL:

Mt. Bross Botanical Area	105 acres
West Hoosier Ridge Botanical Area	54 acres
Iron Mountain Botanical Area	100 acres
Lost Lake Botanical Area	160 acres
Lost Park Botanical Area	160 acres
Spout Lake Botanical Area	120 acres
Droney Gulch Botanical Area	20 acres
Carrizo Frasera Botanical Area	400 acres

For the purpose of:

Protecting unique ecosystems, threatened and endangered plant and animal species, and the integrity of research activities within the above listed Areas.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

Research Natural and Special Interest Areas

Research Natural and Special Interest Areas are established to provide emphasis for research, study, observations, monitoring and educational activities that are nondestructive and nonmanipulative, that maintain unmodified conditions, or ensure the protection of species of interest.

All designated RNA's are identified in the Forest Plan as candidates for formal withdrawal. They are identified as DNL areas until the withdrawals are completed.

The Lesser Prairie Chicken Zoological Area has presently existing gas and oil leases and also has divided minerals ownership patterns. The enabling documents for it and the Queen's Canyon Geologic Area call for a CSU stipulation to be applied within the areas.

Management plans for the other existing and proposed Botanical Areas have not been prepared. These lands will be discretionarily removed from leasing until their management plans have been completed.

Serial No._____

LEASE NOTICE
(Leases Containing an Electronic Communication Site)

The _____ Communication Site is located within a portion of the lease area.

In accordance with Section 6 of the Standard Lease Terms, the lessee shall coordinate with the Forest Service and the permit holder(s) to minimize potential user conflicts. The following Lease Notice measures will apply.

1. Drilling operations will be located so as not to cause structural damage, either directly or indirectly, to the structures authorized by special use permit.

2. Drilling rigs will be located out of microwave paths or at a location agreed to by the permit holder(s), Lessee and the Forest Service, that will not interfere with electronic transmission or reception.

LEASE NOTICE - Special Uses

Serial No._____

LEASE NOTICE
(Other Occupancies Authorized by Special Use)

A special use authorization issued to _____ for a _____use dated _____ occupying _____ acres and/or _____ miles is located _____, which is within your lease parcel.

In accordance with Section 6 of the Standard Lease Terms, exploration and development activities must occur as to avoid damage to the improvements or interference with this authorized use.

Form #/Date

SPECIAL USES

Special uses are valid uses which have been granted to permittees for communication facilities, water or energy pipelines, recreation uses, and other uses. A Lease Notice will identify these potentially conflicting uses for consideration in development of Surface Use Plans of Operation at the APD stage.

Serial No. _____

NO SURFACE OCCUPANCY STIPULATION

No leasing is allowed on the lands described below: (legal subdivision or other description)

All lands allocated to Management Prescription 1B-1 (Ski Area Management) in the Forest Land and Resource Management Plan are to be withdrawn from mineral entry. Locate roads outside of ski area permit boundary unless alternative routes have been reviewed and rejected as being more environmentally damaging.

For the purpose of:

Protecting the investment of facilities within the site, the use authorized by permit, safety of the users, and the natural environment that initially made the site desirable for a ski area.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2920, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

Special Uses (Ski Areas)

The management of ski area permits identifies that these areas should be withdrawn from mineral entry. It also calls for management to enhance visual quality, diversity, and recreation opportunities and to provide for a healthy forest cover in existing winter sports site.

The DNL shall be in place until the withdrawal is completed.

Serial No._____

LEASE NOTICE
Threatened and Endangered Species

Oil and gas operations will be governed by the Endangered Species Act on all know locations of T&E species.

On all known locations of T&E species and in consultation with the US Fish and Wildlife Service and the Colorado Natural Areas Program, a mitigation plan will be prepared and approved prior to any ground disturbing activity.

For the purpose of:

Meet legal requirements for the protection of threatened and endangered species.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820, FS Oil & Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

Threatened and Endangered Species

The legal requirements for the protection of threatened and endangered species requires adequate mitigation which may include avoidance, substitution of habitat, or other costly mitigation action.

Known and potential locations and associated habitats of federal and state T&E wildlife and fish species are described in Chapter III of this EIS. Known habitat locations of federal and state T&E plants, sensitive plant associations, and plants of special concern are also identified in Chapter III. Resource Base Quad Maps are on file in the Forest Supervisor's Office of the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands.

A Lease Notice will be attached to new leases where site-specific surveys show the presence of these T&E wildlife and fish species in other areas within the Grasslands. This Lease Notice will stipulate that proposals for gas and oil operations within identified T&E species habitat areas will require consultation with the US Fish and Wildlife Service and the Colorado Natural Areas Program.

Serial No. _____

LEASE NOTICE
(Leases Within Active or Planned Timber Sale Areas)

Active Timber Sales Under 2400-3(T) or 2400-6(T) Contract:

In accordance with Section 6 of the Standard Lease Terms, the Lessee shall coordinate with the Forest Service and Timber Sale Purchaser to minimize potential user conflicts. The following Lease Notice measures will apply, unless waived in writing by the Authorized Forest Officer in the site specific NEPA decision document at the APD phase.

1. Standing timber to be affected by lessees operations, and slash created by lessees operations, shall be disposed of as agreed to by Forest Service and Lessee (FSM 2464; Standard Provisions of 2400-3(T) or 2400-6(T), Timber Sale Contract).

2. Lessee shall submit an operating plan which will mitigate potential conflict with Purchaser's operations to the satisfaction of the Forest Service. lessees operating plan shall address public safety and Forest Service Officer's safety during performance of administrative duties.

3. Lessee shall perform or pay for road maintenance work, commensurate with lessees use, on roads controlled by Forest Service and used by Lessee in connection with lease. Road maintenance specifications and required deposits shall be those stated in the timber sale contract provisions, unless Forest Service specifies otherwise. (FSM 7732.22; Standard Provision 8 of 2400-3(T) Timber Sale Contract; Standard Provision BT5.4 of 2400-6(T) Timber Sale Contract).

Planned Timber Sales:

In accordance with Section 6 of the Standard Lease Terms, the Lessee and Forest Service shall perform on-the-ground coordination to minimize potential conflicts with timber sales planned under 2400-3(T) or 2400-6(T) contracts.

Form #/ Date

Vegetation (Timber)

In order to protect timber purchaser and lessee rights and minimize potential conflicts, lessee shall coordinate with the Forest Service and timber sale purchaser for all activities. The following lists are multi-year schedules for timber activity on the Unit. These schedules may be changed. If changes occur, lessee will be notified.

This program is displayed by Exhibits A-3 and A-4.

CONDITIONS OF APPROVAL

A Condition of Approval (COA) is an assembly of the provisions or requirements under which an Application for a Permit to Drill (APD) is approved. The mitigation measures listed in this appendix represent the post-lease environmental protection to which the Forest Service is committed as a result of the analysis in this EIS.

Some or all of these COA's may apply to some or all oil and gas development activities and associated rights-of-way for all four management alternatives. **The Authorized Officer will choose among these measures at the APD stage to mitigate environmental impacts identified in the site specific analysis. The selection of COA's will be made in the decision document analyzing the effects of the lessee proposal for ground disturbing activity.**

Note that there is no commitment to the specific wording of a COA. The Authorized Officer is not limited to the COA's shown here. New COA's may be developed based on new information available at the APD stage, as long as the new COA's conform with the limitations of the granted lease rights and are consistent with this EIS and subsequent amendments. COA's are not attached to APD approval documents if they are not applicable on the lease in question or they duplicate mitigation already incorporated in the operator's submittal.

The COA's shown in this appendix apply to all four management alternatives, and will apply to the alternative chosen in the Record of Decision.

Standard COA's for Use on the Unit

Pre-activity Inventories

When ground disturbing activities are proposed in the following areas inventories may be required to determine appropriate mitigation. The inventories shall be completed prior to approval of operating plans.

Aquatic biota and riparian areas.

Known or realistically potential habitat for threatened or endangered species.

Sensitive species' habitat such as bighorn sheep lambing areas, elk calving areas, raptors, etc.

Areas of identified unstable slopes may require a geotechnical survey.

Cultural resource surveys. Guidance is provided in: "Handbook for Cultural Resources Inventory/ Mitigation" (Colorado State Office Release 8-13), dated 1990. A notice to lessees for Cultural Resource Surveys, NTL-85-1-CO, will be attached to all leases issued by Colorado State BLM.

Vegetation. Appropriate survey method will be determined at APD.

Mapped alpine areas. A qualified botanist/ecologist will conduct the vegetation survey and provide site-specific re-vegetation and monitoring requirements for the reclamation plan.

Mitigation Plans

The following mitigation plans will be required at prior to ground disturbing activities.

A Soil and Water Mitigation Plan shall be prepared for all ground disturbing projects. It is described as follows:

(1) *Prior* to construction activities, a detailed Erosion Control and Water Quality Monitoring Plan, hereafter called Erosion Control Plan, will be developed by the proponent which includes site-specific location of all mitigation measures. The Plan will be approved by the Forest Service before implementation begins. The Erosion Control Plan will be jointly administered by the Forest Service and the proponent.

(2) The erosion control plan will contain specific measures or best management practices (BMP's) for minimizing or eliminating the nature and degree of specific impacts which may occur from oil and gas leasing activities. The mitigation measures are designed to be practical for on-the-ground implementation. They are not tied to site-specific locations at this time, due to the current broad scope of this project. There are numerous temporary and permanent erosion-control measures available, but mitigation that works well in certain locations may not be acceptable in other areas. BMP's include such measures as soil stabilization practice, re-vegetation, slope stabilization, velocity controls, sediment barriers, retention ponds etc.

Soil stabilization and re-vegetation practices include seeding, mulching, timing of construction activity and fertilization. Slope stabilization practices include netting, surface roughing, mulching, retaining walls, rip rapping. Velocity control practices include slope drains, spreaders, energy dissipaters, check dams, drop structures, diversion berms. Sediment barriers include straw bales, filter fence, inlet protection, siltation berms and siltation traps.

These specific mitigation measures that are identified as part of the erosion control plan will be included in a contract. Monitoring will be required to ensure that the specific mitigation measures are in place and are effective.

(3) The erosion control plan is developed to address adverse impacts to the soil resource incurred through implementation of oil land gas development, and to protect water quality and aquatic life as identified in Chapter IV of this EIS.

(4) Mitigation is required by the Forest Service, for impacts on National Forest System lands. The erosion control plan will outline the Forest Service's authority and responsibility and the proponents authority and responsibility for implementing the mitigation plan, and for monitoring construction activities and mitigation measures.

Cultural resources discovered during the survey will have to be evaluated for significance according to the criteria for National Register eligibility. If determined eligible, the cultural resource should be avoided. A mitigation program will be designed and implemented for all significant cultural properties that cannot be avoided.

All companies will have a spill prevention control and countermeasure plan (SPCC plan), Federal Register, Volume 38, No. 237 - Part II, Oil Pollution Prevention. Monitoring techniques, frequency and methodologies will be developed and included in activity plans. The monitoring level will be determined after an evaluation of the resource and potential impacts.

General Conditions for all Site-Disturbing Activities

Well pads, roads, and facilities will be located to minimize visual impacts.

All operations will be conducted in a manner that avoids jeopardizing protected fisheries, invertebrates, wildlife, plants, and their habitats in compliance with the Endangered Species Act of 1973, and its implementing regulations.

If historic or archaeological materials, cave systems, or paleontological resources are uncovered during construction, the operator shall immediately stop any work that might further disturb such materials and contact the Forest Service. The operator shall immediately bring to the attention of the Authorized Forest Officer any and all antiquities or other objects of historical, paleontological, or scientific interest, including, but not limited to, prehistoric or historic ruins or artifacts discovered as a result of operations. The operator and the Authorized Forest Officer shall consult and determine the best option for avoiding or mitigating site damage.

All merchantable timber harvested from site clearings shall be purchased by the operator at the appraised price, as determined by the Forest Service.

Fire precautions required of timber sale purchasers will be required of lessees. Refer to timber sale contract provisions FS-2400-6 (T), section BT 7.0 and special provision R2-CT 7.2.

Linear-type facilities such as roads, power lines, and pipelines shall use the same route unless otherwise approved by the Authorized Forest Officer. Surface disturbance will be minimized.

Activities may be curtailed during periods when the soil is saturated.

Trash and garbage from all leasing operations must be contained in a closed receptacle and hauled to an approved county landfill. EPA listed nonexempt waste must be contained in a closed receptacle and recycled or disposed of at approved sites.

Operators shall remind all personnel in the area associated with the project that the removal, injury, defacement, or alteration of any object of scenic, archaeological, historical, or scientific interest is a federal crime and may be punishable by fine and/or jail terms.

Raptor nests will be protected from all development activities.

All known populations of sensitive fish, wildlife and plants, and identified high priority remnant vegetation associations will be protected from surface disturbing activities. The area of protection will include the actual location of the populations or occurrences of important associated vegetation and shall be determined in consultation and coordination with the Colorado Natural Areas Program (CNAP).

Those populations/occurrences, which analysis determines needs protection shall be protected by: (1) requiring relocation or rerouting of proposed well sites, pipelines, roads, other surface facilities, etc., or (2) applying other protective mitigation (i.e., fencing). Forest Service will require operator to effectively mitigate potential impacts to important populations/occurrences.

Actions in all riparian types will be managed to maintain: (1) vegetation and soil conditions that sustain over 80% of capable ground cover of plants and litter; and (2) stable stream channels and favorable water quality and aquatic habitat.

Land vehicles in stream channels prohibited except at designated crossings.

An area specific waste management plan will be required at the time of the APD.

Use filter strips along lakes, wetlands and streams to trap sediment before it reaches water bodies and impairs channel stability or aquatic habitat. Maintain over 80% of capable ground cover of plants and litter in filter strips. Design filter strip width, considering types of actions, vegetation, soils, and topography, to have over an 80% chance of trapping all sand size sediment.

Ensure that all activities maintain instream flows needed to protect channel stability, aquatic habitat, and riparian vegetation.

Road Construction and Operations

Existing roads will be used to the extent possible. Additional roads, if needed, shall be minimized and approved by the Forest Service prior to construction. Upon determination of an impending field development, a transportation plan will be prepared by the proponent to reduce unnecessary access roads. Roads will be constructed and maintained to Forest Service road standards unless otherwise approved.[2]

Locate and design roads and drainage structures to prevent road or slope failure and minimize impacts to water quality. Locate service and refueling areas on ridges or benches upslope from floodplains and terraces, prevent spills offsite.

Achieve over 80% of potential ground cover of plants and litter on cuts and fill slopes before onset of seasonal runoff.

Roads will be located outside of riparian areas unless alternative routes have been reviewed and rejected as being more environmentally damaging. Cross streams perpendicular to channels on as gentle grades and slopes as possible. Install all crossings in manner that maintains stable channels and favorable water quality and aquatic habitat.

Where feasible, locate new facilities outside of the 100 year floodplain.

All new roads on the mountains shall be closed with a lockable gate to prevent general use of the road. Use of closed road segments will be restricted authorized agents of: 1) the operator and/or the subcontractor(s), 2) the Forest Service, 3) other agencies with a legitimate need (CDOW, other law enforcement agencies, etc.). Unauthorized use or failure to lock gates during specified time frames by the operator or its subcontractors will be considered a violation of the terms of the APD or associated grants. This will apply to all roads on public lands.

The operator shall regularly maintain all roads used for access to the lease operation. This shall include installation of additional surfacing and surface drainage control structures not foreseen during construction.

Air pollution sources such as dust from unpaved roads and cleared areas will be minimized.

Cattle guards heavy enough to handle proposed road traffic will be installed and maintained as required.

Improvement to existing access will be minimized, limited to a 12-foot running surface, with minimum disturbance of surrounding soil and vegetation. Surfacing material will not be placed on the access road or location without prior Forest Service approval.

The operator may be required to construct waterbars on abandoned roads and pipeline routes. The waterbars shall be constructed to drain freely to the natural ground level and to prevent siltation and clogging. No waterbars will drain directly into a stream without first flowing through a sediment trap.

Traffic will be limited to roads and drill pads.

Roads on Grasslands will not be closed during operations.

Drill Pad Development

In planning for well sites, tank batteries, sump, reserve and mud pits, and pumping stations, the operator shall select locations that involve the least disruption to scenic values and other surface resources. This may include:

Construction techniques and design practices, including selection of material, camouflage techniques, and rehabilitation practices that will preserve scenic aesthetic qualities.

Shape and grade drill sites to maintain the natural integrity of the area. Tier the site rather than one large level clearing.

Concentrations of development clearings should reflect the the character of natural openings in the area.

Slope the site away from any viewpoints if bright or contrasting soils exist.

Minimize vegetation removal. Lop and scatter slash to a depth no more than 18 inches or windrow.

Scallop horizontal and vertical edges of vegetation surrounding sites.

Use fencing with a non-reflective finish.

Silt barriers for pads within 200 feet of live water.

Avoid, where possible, development in the foreground zone.

Paint equipment being used to minimize contrast. The color selected shall have a flat, non-reflective finish. The Munsell soil color chart provides good examples. The following guidelines should be used:

HUE 10R - 10YR
VALUE 2.5 - 5
CHROMA 0 - 6

Avoid, where possible, areas that will allow the drill rig to be silhouetted above the surrounding or background landscape to prevent "skynighting".

Maintain, where possible, a minimum distance of 1/4 mile from natural features, such as rock outcrops, peaks, cliffs, waterfalls, etc.

Pads will not be constructed in riparian areas or floodplains. Pads will be constructed in a manner that minimizes impacts to the areas.

Pads will be constructed with runoff controls.

Steep slopes shall be avoided where possible; the site shall be located on the most level location obtainable that will accommodate the intended use.

Pits

Excavations used for the permanent impoundment of usable water should be sloped at a 3:1 grade to establish safe access for humans, livestock, and wildlife. Pits should not be constructed in either riparian or aquatic ecosystems.

Pits shall not be constructed in alpine, riparian or floodplain areas. In addition, pits shall not be constructed in a manner that results in materials seeping or being transported overground to these areas.

A minimum of two feet of free board will be maintained between the maximum fluid level and the top of the berm. These pits will be designed to exclude all surface runoff. The pits will be constructed in cut portion of well pad site.

Final written certification is required that there are no hazardous chemicals on the RCRA list left in the drilling fluids within the mud pit. If the operator cannot provide certification, the drilling fluids and pit liner must be disposed of at a federally approved hazardous materials site.

Mud, separation pits, and other containments used during the exploration or operation of the lease for the storage of oil and other hazardous materials shall be adequately fenced, posted, and covered. Additional protective measures may be needed to minimize hazards and prevent access to humans, livestock, waterfowl, and other wildlife. The need and type of protective requirement will be determined on a case-by-case basis. The pits should be allowed to dry before backfilling and rehabilitating. Reserve pits should be closed as soon as practical or within 12 months after cessation of drilling operations. Pit liquids should have free oil removed and be sampled for total dissolved solids (TDS) prior to pit closure. Pit liquids with TDS content greater than 3000 ppm should be removed from the reserve pits as soon as possible or within 1 to 2 months after discontinuing the drilling operations.

All pits, cellars, rat holes, and other bore holes unnecessary for further lease operations, excluding the reserve pit, will be backfilled immediately after the drilling rig is released to conform with surrounding terrain. Pits, cellars and/or bore holes that remain on location must be fenced as specified for the reserve pit.

Semi-closed or closed mud systems may be required if conditions warrant. Produced water will be injected, contained in a lined pit, or hauled to a federally approved disposal facility.

All reserve pits will be made impervious to leaks. Clay can be used to seal pits in areas where synthetic liners are not specifically required.

Synthetic pit liners will be used in areas located within 40 feet of ground water (or greater if soils are extremely permeable).

Pit liners must be approved by the Forest Service, be impermeable and resistant to weather, sunlight, hydrocarbons, aqueous acids, alkalies, salt, fungi, or other substances likely to be contained in the drilling fluids or produced water.

The liner will be underlain by a suitable bedding material, and other measures will be taken as needed to protect the integrity of the liner.

A leak detection system will be installed to monitor lined reserve pits. This system must be installed in order to detect liner leakage. The leak detection plan must be submitted to and approved by the Authorized Forest Officer during APD approval. This plan must include the system design including line installation, monitoring plan, and the individual responsible for the required monitoring.

If air or gas drilling, the operator shall control the blooie line discharge dust by use of water injection or other acceptable methods. The blooie line discharge shall be a minimum of 100 feet from the blow out preventer and be directed into the blooie pit so that the cuttings and waste are contained in the pit.

Pipelines

Where possible utilize existing corridors.

Linear openings should have a turn or angle every 1/4 mile where practical.

Scallop horizontal and vertical edges of corridors.

Pipeline and transmission corridors should parallel contours on slopes greater than 20%.

Alignment, siting, and reclamation of pipelines and flow-lines should be designed to conform to adjacent terrain and to prevent or minimize vehicular travel. If maintenance is necessary in problem areas, consider use of an all terrain vehicle (ATV) or snowcat etc., in lieu of regular truck. Relocation of portions of the line may be necessary to reduce the impact to surface resources.

Pipelines shall be constructed outside of riparian areas except when crossing perpendicular to stream riparian areas. Construction in riparian areas will be conducted in a manner that minimizes impacts to riparian areas at the discretion of the Authorized Forest Officer.

For associated pipeline rights of way, except rights of way expressly authorizing a road after construction of the facility is complete, the right of way holder shall not use the right of way as a road for any purpose other than routine maintenance. Necessary routine maintenance will be determined through consultation with the Authorized Forest Officer.

Pipeline routes will be graded to conform to the adjacent terrain, waterbarred, and reseeded in accordance with the Reclamation Plan.

Pipeline construction shall not block, dam, or change the natural course of any drainage. Suspended pipelines will provide adequate clearance for runoff.

Pipeline trenches shall be compacted during backfilling. These trenches will be maintained in order to correct settlement and prevent erosion. Waterbars and other erosion control devices will be repaired as necessary.

Crossing of pipelines owned by other companies shall be in accordance with an agreement secured with that company.

Existing telephone, telegraph, power lines, pipelines, roads, trails, fences, ditches, and like improvements shall be protected during construction, operation, maintenance, and termination of an oil and gas facility. Damage caused by such activities shall be properly repaired to condition which is satisfactory to the Authorized Forest Officer.

When clearing is necessary, disturbance will be kept to a minimum. Bladed materials shall be placed back into the cleared route upon completion of construction.

Pumping stations shall be kept in a neat and well-maintained condition.

Production

Where electrical power lines are constructed in association with oil and gas development the operator will apply "Suggested Practices for Raptor Protection on Power Lines" and ensure power lines are properly grounded to prevent electrocution of raptors.

The BLM manages the venting or flaring of hydrocarbon gases associated with hydrogen sulfide (H_2S, sour gas) from Federal leases. Waste disposal and the appropriate equipment and action for hazardous geologic conditions, such as H_2S gas and high pressures, are considerations dealt with in the APD approval process prior to drilling.

Compaction and construction of the berms surrounding tank batteries will be done prior to storage of fluids and designed to prevent lateral movement of fluids through the construction materials. The berms must be constructed to hold at minimum 120 percent of the storage capacity of the largest tank within the berm. All loading lines will be placed inside the berm.

All improvements, including fences, gates, cattle guards, roads, trails, pipelines, bridges, water developments, and control structures will be maintained in a serviceable and safe condition.

Livestock, sewage systems, and petroleum facilities will be located a minimum of 100 feet from all wells. Design all well casings and collars for the lowest practical contamination risk.

Any release of production water on or across the land requires prior approval by the Forest Service. A NPDES permit will be required from the state for point discharge.

Small amounts of oil field produced water which do not meet water quality standards will be disposed of in accordance with Notice To Lessee-2B and/or Environmental Protection Agency (EPA) guidelines.

If the well or production facility is located within one half mile of residences, appropriate noise mitigation will be required to ensure federal, state, and local noise standards are adhered to during production.

Within 60 days of completion of construction, the holder shall provide the Authorized Forest Officer an as-built survey of facilities as constructed.

Reclamation

Prior to abandonment of the facilities the lessee shall contact the Authorized Forest Officer to arrange a joint inspection of the area. The inspection will be held to agree on an acceptable

abandonment and rehabilitation plan. The Authorized Forest Officer must approve the plan in writing prior to the holder beginning any abandonment and/or rehabilitation activities. The plan may include removal of surfacing material from the road, recontouring, replacement of topsoil, seeding, mulching, and planting.

Well drilling equipment and debris will be removed and the site and service roads will be rehabilitated as soon after completion of project as possible. Seasonal weather should be considered for optimum results.

After reshaping the site, soil material should be distributed to a uniform depth to allow the establishment of desirable vegetation. The disturbed areas shall be scarified prior to replacement of surface soil material.

Lessee must establish a diverse, effective and permanent vegetation cover of the same seasonal variety native to the area of disturbed land and capable of self-regeneration and plant succession at least equal in extent of cover to the natural vegetation of the area. Introduced species may be used where desirable and necessary to achieve goals of the approved reclamation plan. Undesirable weedy species such as kuchia, cheatgrass, and other noxious weeds will not be included unless otherwise directed by the Authorized Forest Officer. The operator will continue revegetation efforts using any and all cultural methods available until this standard is met.

Immediately after seeding, the stockpiled trees and slash will be lopped and scattered evenly over the disturbed areas. The access will be blocked to prevent vehicular access. Logging slash will also be used to construct filter windrows below all fill slopes.

Seed certification tags from seed used in reclamation will be submitted to the Authorized Forest Officer .

Noxious weeds which may be introduced due to soil disturbance and reclamation will be treated by biological, mechanical or chemical methods to be approved by the Authorized Forest Officer. Should chemical methods be approved, the lessee must submit a Pesticide Use Proposal to the Authorized Forest Officer 60 days prior to the planned application date.

Mulching of the seedbed following seeding may be required under certain conditions (i.e., expected severe erosion), as determined by the surface owner/manager.

Tree planting will be required on disturbed acres which are suitable for timber production. The standard will be to achieve minimum stocking per Chapter 70 of FSH 2409.26b, within 5 years after non-use. Aspen transplanting and portable irrigation or ripping may be required on localized areas to promote aspen regeneration. If aspen regeneration fails, conifer seedlings adapted to the sites will be planted.

Reclamation of riparian areas will be conducted in a manner that restores the impacted area to its original condition, in terms of soils, vegetation and hydrologic conditions. Stream and lake fishery habitat will also be restored to pre-project conditions, based on monitoring of the system. Stream habitat reclamation may include instream habitat improvement, erosion control and species replenishment if deemed appropriate by the Authorized Forest Officer.

If a producing well is developed, the reserve pit and that portion of the location and access road not needed for production or production facilities will be recontoured to appropriate conformation (one which allows lease operations and avoids steep cut and fill slopes) as soon as possible. All of the topsoil stockpiled will be evenly disturbed over these recontoured areas. Brush cleared prior to construction of the well site shall be scattered back over the recontoured area.

Reserve pit fluids will be allowed to evaporate through the entire summer season (June-August) after drilling is completed, unless an alternate method of disposal is approved. After the fluids disappear, the reserve pit muds will be allowed to dry sufficiently to allow backfilling. The backfilling of the reserve pit will be done so that the muds and associated solids will be confined to the pit and not squeezed out and incorporated in the surface materials. There will be a minimum of three feet of cover (overburden) on the pit. Lined pits will be effectively folded over and effectively capped. When the work is complete, the pit area will support the weight of heavy equipment without sinking.

Reserve pits will be closed as soon as practical or within 12 months after cessation of drilling operations. Pit liquids should have free oil removed and be sampled for total dissolved solids prior to pit closure. Pit liquids with a TDS content greater than 3000 ppm should be removed from the reserve pits as soon as possible or within 1-2 months after discontinuing the drilling operations.

Cut and fill slopes shall be reduced and graded to conform the site to the adjacent terrain. The disturbed sites will be prepared to provide a seedbed for reestablishment of desirable vegetation and reshaped to blend with the natural contour. Such practices may include contouring, terracing, gouging, scarifying, mulching, fertilizing, seeding, and planting.

Reclamation and abandonment of pipelines and flow-lines may involve; replacing fill in the original cuts, reducing and grading cut and fill slopes to conform to the adjacent terrain, replacing surface soil material, waterbarring, and revegetating in accordance with rehabilitation practices specified by the Forest Service.

Surface buildings, supporting facilities, and other structures, which are not required for present or future operations, shall be removed upon termination of use.

SPLIT-ESTATE MINERAL RESOURCES

The Bureau of Land Management identified stipulations for those split-estate lands under their jurisdiction which are included in this analysis. These lands are not within the jurisdiction of the Forest Supervisor. The stipulations applied on the specifically identified lands are as follows:

Bureau of Land Management Stipulations

Stipulations utilized within the Oklahoma Resource Area (ORA) include both mandatory and optional stipulations.[3] A mandatory stipulation is one which addresses protection of a resource which the BLM is required by law, regulation, or policy to protect, and which the BLM feels Standard Lease Terms would not offer sufficient protection. Mandatory stipulations include:

ORA-1, Floodplain Protection Stipulation

"All or portions of the lands under this lease lie in and or adjacent to a major watercourse and are subject to periodic flooding. Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the Bureau of Land Management."

This stipulation is a result of Executive Order (E.O.) 11988 Floodplain Management of May 24, 1977.

ORA-2, Wetland/Riparian Stipulation

"All or portions of the lands under this lease contain wetland and/or riparian areas. Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the Bureau of Land Management. Impacts or disturbance to wetlands and riparian habitats which occur on this lease, must be avoided, minimized or compensated. The mitigation goal will be no net loss of in-kind wetlands. Such mitigation will be developed during the application for permit to drill process in cooperation with appropriate state and federal agencies."

The wetland/riparian stipulation is mandated by E.O. 11990 "Protection of Wetlands" of May 24, 1977.

Optional stipulations protect a resource value or other land use which would be potentially impacted by normal oil and gas lease operations. These stipulations are optional in the sense that they are not mandated by law or regulation. They will be used only when the value of the resource warrants protection. These optional stipulations include:

ORA-3, Season of Use Stipulation

"Surface occupancy of this lease will not be allowed from date, through date, without the specific approval in writing, from the Authorized Officer of the Bureau of Land Management."

This stipulation restricts the time that the lessee can be on the lease for a period of more than 60 days. Most season of use restrictions involve wildlife seasonal use requirements or recreation use conflicts with drilling activities.

ORA-4, No Surface Occupancy

"Surface occupancy of this lease will not be allowed."

This stipulation prohibits surface use to protect a resource or use that is not compatible with oil and gas development. The tract could be leased for inclusion in a drilling unit and may be drilled directionally from an off-site location where occupancy is allowed.

Lease Notices

A Lease Notice provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders.

A Lease Notice also addresses special items the lessee should consider when planning operations, but does not impose new or additional restrictions. A lease notice is not binding or enforceable, it provides the potential lessee with additional information. Lease Notices attached to leases should not be confused with NTL's, Notices to Lessees.

Lease Notices (LN) would be applied under the proposed RMP, and include:

LN-1, Special Status Species

According to preliminary information all or portions of the lease area could contain Federal and/or state-listed threatened or endangered species and/or other special status species and/or habitats utilized by these groups of species. Any proposed surface disturbing activity may require an inventory and consultation with the U.S. Fish and Wildlife Service, the state wildlife agency and/or the BLM. The consultation could take up to 180 days to complete. Surface occupancy could be

restricted or not allowed as a result of the consultation. Appropriate modifications to the imposed restrictions will be made for the maintenance and operations of producing oil and gas wells.

LN-2, Black-footed Ferret in Kansas

"If black-footed ferrets occur anywhere in the wild in Kansas, they are presumed to be associated with prairie dogs. All or portions of this lease area lie within a county of Kansas where prairie dog town have occurred in the past. Therefore, if a prairie dog town of eighty acres or more is found to occur on or near this lease, a black-footed ferret survey may be required before permitting surface disturbing activity which may impact the prairie dog town."

LN-2 will be applied to leases issued in the counties which last reported the presence of prairie dog towns. These counties are:

> Barber, Barton, Cheyenne, Clark, Clay, Comanche, Decatur, Edwards, Ellis, Ellsworth, Finney, Ford, Gove, Graham, Grant, Gray, Greeley, Hamilton, Harper, Harvey, Haskell, Hodgeman, Jewell, Kearny, Kingman, Kiowa, Lane, Lincoln, Logan, McPherson, Meade, Mitchell, Morton, Ness, Norton, Osborne, Ottawa, Pawnee, Phillips, Pratt, Rawlins, Reno, Rice, Rooks, Rush, Russell, Saline, Scott, Seward, Sheridan, Sherman, Smith, Stafford, Stanton, Stevens, Sumner, Thomas, Trego, Wallace, and Wichita.

Conditions of Approval

Additional BLM requirements to protect a resource or value that does not affect the lessees rights or restrict location on the lease can be imposed as a condition of approval of the APD.

One such condition utilized to protect migratory birds is as follows:

"All open pits and tanks being used in conjunction with the development of this lease will be netted or otherwise covered no later than four days after final drilling depth is achieved and until such time as they are removed and/or filled and reclaimed. The recommended coverings include hard covers or a screen material of small enough mesh size so as to prevent the entry and the death of migratory birds. The U.S. Fish and Wildlife Service, Division of Law Enforcement, has prepared materials which provide more detailed guidelines for covering oil field pits and tanks."

Note: The granting of four working days for completion of covering or netting pits and/or tanks in no way limits your responsibility should migratory birds be discovered dead in tanks or pits with the four day period or during the actual drilling phase.

Morton & Stevens Counties, Kansas
Analysis of Split-Estate Tracts for USFS
(Including Reverted Tracts)

The split-estate tracts within Morton and Stevens counties where no surface resource values or special conditions exist to warrant additional protective measures would be leased with Standard Lease Terms and conditions. The majority of these tracts occur in croplands, improved pasture lands and native grasslands. Typically, these are uplands with no surface water, riparian vegetation or other unique or special habitat features. In all cases LN-2 applies to split-estate in these counties.

The split-estate tracts described below are those tracts which would require other than Standard Lease Terms and conditions should oil and gas leasing occur.

Specific protective measures, stipulations, are identified for each tract and are required under existing BLM policy as well as identified by the proposed Kansas RMP.

Morton County

Tract 1

T32S, R39W, Sec. 28, N1/2N1/2, S1/2NE1/4, SW1/4NW1/4 & NW1/4SW1/4
Approximately 320 acres

This tract is located 8 miles north and 3 miles east of Rolla, Kansas. The Cimarron River courses through this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM stipulations ORA-1 and ORA-2 and BLM lease notice LN-1 would apply.

Tract 2

T32S, R39W, Sec. 29, NE1/4, E1/2W1/2
Approximately 320 acres

This tract is located 8 miles north and 2.5 miles east of Rolla, Kansas. The Cimarron River courses through this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM stipulations ORA-1 and ORA-2 and BLM lease notice LN-1 would apply.

Tract 3

T32S, R40W, Sec. 25, S1/2 & SE1/4NE1/4
Approximately 360 acres

This tract is located 7 miles north of Rolla, Kansas. The Cimarron River courses through this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM stipulations ORA-1 and ORA-2 and BLM lease notice LN-1 would apply.

Tract 4

T32S, R40W, Sec. 35, N1/2NE1/4, SW1/4NE1/4, SE1/4NW1/4, NE1/4SW1/4 & part of the S1/2SW1/4
Approximately 250 acres

This tract is located 7 miles north and 1 mile west of Rolla, Kansas. The Cimarron River courses through this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM stipulations ORA-1 and ORA-2 and BLM lease notice LN-1 would apply.

Stevens County

Tract 1

T31S, R38W, Sec. 10, SE1/4SE1/4
Approximately 40 acres

This tract is located 12 miles north and 5 miles west of Hugoton, Kansas. The Cimarron River crosses the southeast corner of this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner. The KDWP has requested that no surface disturbing activities be allowed on this tract based on the tract's size and public values as wildlife habitat. The surface estate of this tract was deeded to the KDWP by the BLM for wildlife habitat purposes.

Should this tract (or portions) become available for lease BLM stipulations ORA-1 and ORA-2 and BLM lease notice LN-1 would apply.

Tract 2

T31S, R38W, Sec. 15, W1/2NE1/4
Approximately 80 acres

This tract is located 12 miles north and 5 miles west of Hugoton, Kansas. The Cimarron River crosses this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state listed endangered Arkansas River Shiner. The KDWP has requested that no surface disturbing activities be allowed on this tract based on the tract's size and public values as wildlife habitat. The surface estate of this tract was deeded to the KDWP by the BLM for wildlife habitat purposes.

Should this tract (or portions) become available for lease BLm stipulations ORA-1, ORA-2 and ORA-4 and BLM lease notice LN-1 would apply.

Tract 3

T31S, R38W, Sec. 21, SW1/4NE1/4 and NW1/4SE1/4
Approximately 80 acres

This tract is located 10 miles north and 6 miles west of Hugoton, Kansas. The KDWP has requested that no surface disturbing activities be allowed on this tract based on the tract's size and public values as wildlife habitat. The surface estate of this tract was deeded to the KDWP by the BLm for wildlife habitat purposes.

Should this tract (or portions) become available for lease BLM stipulation ORA-4 would apply.

Tract 4

T31S, R38W, Sec. 21, SE1/4SW1/4
Approximately 40 acres

This tract is located 10 miles north and 6 miles west of Hugoton, Kansas. The Cimarron River is adjacent to this tract. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM lease notice LN-1 would apply.

Tract 5

T31S. R38W, Sec 29, SE1/4SW1/4
Approximately 40 acres

This tract is located 9 miles north and 8 miles west of Hugoton, Kansas. The Cimarron River crosses this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM stipulations ORA-1, ORA-2 and BLM lease notice LN-1 would apply.

Tract 6

T31S, R38W, Sec. 30, SW1/4SE1/4
Approximately 40 acres

This tract is located 9 miles north and 8.5 miles west of Hugoton, Kansas. The Cimarron River is adjacent to this tract. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM lease notice LN-1 would apply.

Tract 7

T31S, R38W, Sec. 31, SE1/4NE1/4
Approximately 40 acres

This tract is located 9 miles north and 8 miles west of Hugoton, Kansas. The Cimarron River is adjacent to this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner.

Should this tract (or portions) become available for lease BLM stipulations ORA-1, ORA-2 and BLM lease notice LN-1 would apply.

Tract 8

T32S, R38W, Sec. 6, Lot 1 and SE1/4NE1/4
Approximately 81.49 acres

This tract is located 8 miles north and 8 miles west of Hugoton, Kansas. The KDWP has requested that no surface disturbing activities be allowed on this tract based on the tract's size and public values as wildlife habitat. The surface estate of this tract was deeded to the KDWP by the BLM for wildlife habitat purposes.

Should this tract (or portions) become available for lease BLM stipulation ORA-4 would apply.

Tract 9

T32S, R39W, Sec. 13, NW1/4SE1/4
Approximately 40 acres

This tract is located 5 miles north and 9 miles west of Hugoton, Kansas. The Cimarron River is adjacent to this tract creating wetland and floodplain concerns. The KDWP has designated the main stem of the Cimarron River as critical habitat for the state-listed endangered Arkansas River Shiner. The KDWP has requested that no surface disturbing activities be allowed on this tract based on the tract's size and public values as wildlife habitat. The surface estate of this tract was deeded to the KDWP by the BLM for wildlife habitat purposes.

Should this tract (or portions) become available for lease BLM stipulations ORA-1, ORA-2 and ORA-4 and BLm lease notice LN-1 would apply.

EXHIBIT A-1
STANDARD LEASE TERMS

STANDARD LEASE TERMS AND CONDITIONS

The standard terms and conditions for oil and gas leasing are part of all federal leases regardless of other considerations. These terms and conditions will automatically apply to all alternatives.

"Sec. 6. Conduct of Operations- Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee."

"Prior to disturbing the surface of the lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent to impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historical or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects."

The "lease rights granted," as used in this section have also been partially defined in the Code of Federal Regulations, part 3101.1-2, shown below.

A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific, nondiscretionary statutes; and such reasonable measures as may be required by the Authorized Officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface-disturbing operations for a period in excess of 60 days in any lease year.

The lease form is shown as Figure B-1.

4. (a) Undersigned certifies that (1) offeror is a citizen of the United States; an association of such citizens; a municipality; or a corporation organized under the laws of the United States or of any State or Territory thereof; (2) all parties holding an interest in the offer are in compliance with 43 CFR 3100 and the leasing authorities; (3) offeror's chargeable interests, direct and indirect in either public domain or acquired lands do not exceed 246,080 acres in Federal oil and gas leases in the same State, of which not more than 200,000 acres are held under option, or 300,000 acres in leases and 200,000 acres in options in either leasing District in Alaska; (4) offeror is not considered a minor under the laws of the State in which the lands covered by this offer are located; (5) offeror is in compliance with qualifications concerning Federal coal lease holdings provided in sec. 2(a)(2)(A) of the Mineral Leasing Act; (6) offeror is in compliance with reclamation requirements for all Federal oil and gas lease holdings as required by sec. 17(g) of the Mineral Leasing Act; and (7) offeror is not in violation of sec. 41 of the Act.

(b) Undersigned agrees that signature to this offer constitutes acceptance of this lease, including all terms, conditions, and stipulations of which offeror has been given notice, and any amendment or separate lease that may include any land described in this offer open to leasing at the time this offer was filed but omitted for any reason from this lease. The offeror further agrees that this offer cannot be withdrawn, either in whole or in part, unless the withdrawal is received by the proper BLM State Office before this lease, an amendment to this lease, or a separate lease, whichever covers the land described in the withdrawal, has been signed on behalf of the United States.

This offer will be rejected and will afford offeror no priority if it is not properly completed and executed in accordance with the regulations, or if it is not accompanied by the required payments. 18 U.S.C. Sec. 1001 makes it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Duly executed this _____ day of _____, 19 ____. _____

(Signature of Lessee or Attorney-in-fact)

LEASE TERMS

Sec. 1. Rentals—Rentals shall be paid to proper office of lessor in advance of each lease year. Annual rental rates per acre or fraction thereof are:

(a) Noncompetitive lease, $1.50 for the first 5 years; thereafter $2.00;
(b) Competitive lease, $1.50; for primary term; thereafter $2.00;
(c) Other, see attachment, or
as specified in regulations at the time this lease is issued.

If this lease or a portion thereof is committed to an approved cooperative or unit plan which includes a well capable of producing leased resources, and the plan contains a provision for allocation of production, royalties shall be paid on the production allocated to this lease. However, annual rentals shall continue to be due at the rate specified in (a), (b), or (c) for those lands not within a participating area.

Failure to pay annual rental, if due, on or before the anniversary date of this lease (or next official working day if office is closed) shall automatically terminate this lease by operation of law. Rentals may be waived, reduced, or suspended by the Secretary upon a sufficient showing by lessee.

Sec. 2. Royalties—Royalties shall be paid to proper office of lessor. Royalties shall be computed in accordance with regulations on production removed or sold. Royalty rates are:

(a) Noncompetitive lease, 12½%;
(b) Competitive lease, 12½%;
(c) Other, see attachment; or
as specified in regulations at the time this lease is issued.

Lessor reserves the right to specify whether royalty is to be paid in value or in kind, and the right to establish reasonable minimum values on products after giving lessee notice and an opportunity to be heard. When paid in value, royalties shall be due and payable on the last day of the month following the month in which production occurred. When paid in kind, production shall be delivered, unless otherwise agreed to by lessor, in merchantable condition on the premises where produced without cost to lessor. Lessee shall not be required to hold such production in storage beyond the last day of the month following the month in which production occurred, nor shall lessee be held liable for loss or destruction of royalty oil or other products in storage from causes beyond the reasonable control of lessee.

Minimum royalty in lieu of rental of not less than the rental which otherwise would be required for that lease year shall be payable at the end of each lease year beginning on or after a discovery in paying quantities. This minimum royalty may be waived, suspended, or reduced, and the above royalty rates may be reduced, for all or portions of this lease if the Secretary determines that such action is necessary to encourage the greatest ultimate recovery of the leased resources, or is otherwise justified.

An interest charge shall be assessed on late royalty payments or underpayments in accordance with the Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA) (30 U.S.C. 1701). Lessee shall be liable for royalty payments on oil and gas lost or wasted from a lease site when such loss or waste is due to negligence on the part of the operator, or due to the failure to comply with any rule, regulation, order, or citation issued under FOGRMA or the leasing authority.

Sec. 3. Bonds—A bond shall be filed and maintained for lease operations as required under regulations.

Sec. 4. Diligence, rate of development, unitization, and drainage—Lessee shall exercise reasonable diligence in developing and producing, and shall prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessee shall drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by lessor.

Sec. 5. Documents, evidence, and inspection—Lessee shall file with proper office of lessor, not later than 30 days after effective date thereof, any contract or evidence of other arrangement for sale or disposal of production. At such times and in such form as lessor may prescribe, lessee shall furnish detailed statements showing amounts and quality of all products removed and sold, proceeds therefrom, and amount used for production purposes or unavoidably lost. Lessee may be required to provide plats and schematic diagrams showing development work and improvements, and reports with respect to parties in interest, expenditures, and depreciation costs. In the form prescribed by lessor, lessee shall keep a daily drilling record, a log, information on well surveys and tests, and a record of subsurface investigations and furnish copies to lessor when required. Lessee shall keep open at all reasonable times for inspection by any authorized officer of lessor, the leased premises and all wells, improvements, machinery, and fixtures thereon, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or in the leased lands. Lessee shall maintain copies of all contracts, sales agreements, accounting records, and documentation such as billings, invoices, or similar documentation that supports costs claimed as manufacturing, preparation, and/or transportation costs. All such records shall be maintained in lessee's accounting offices for future audit by lessor. Lessee shall maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor.

During existence of this lease, information obtained under this section shall be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 6. Conduct of operations—Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.

Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects.

Sec. 7. Mining operations—To the extent that impacts from mining operations would be substantially different or greater than those associated with normal drilling operations, lessor reserves the right to deny approval of such operations.

Sec. 8. Extraction of helium—Lessor reserves the option of extracting or having extracted helium from gas production in a manner specified and by means provided by lessor at no expense or loss to lessee or owner of the gas. Lessee shall include in any contract of sale of gas the provisions of this section.

Sec. 9. Damages to property—Lessee shall pay lessor for damage to lessor's improvements, and shall save and hold lessor harmless from all claims for damage or harm to persons or property as a result of lease operations.

Sec. 10. Protection of diverse interests and equal opportunity—Lessee shall: pay when due all taxes legally assessed and levied under laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; and take measures necessary to protect the health and safety of the public.

Lessor reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly. If lessee operates a pipeline, or owns controlling interest in a pipeline or a company operating a pipeline, which may be operated accessible to oil derived from these leased lands, lessee shall comply with section 28 of the Mineral Leasing Act of 1920.

Lessee shall comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessee nor lessee's subcontractors shall maintain segregated facilities.

Sec. 11. Transfer of lease interests and relinquishment of lease—As required by regulations, lessee shall file with lessor any assignment or other transfer of an interest in this lease. Lessee may relinquish this lease or any legal subdivision by filing in the proper office a written relinquishment, which shall be effective as of the date of filing, subject to the continued obligation of the lessee and surety to pay all accrued rentals and royalties.

Sec. 12. Delivery of premises—At such time as all or portions of this lease are returned to lessor, lessee shall place affected wells in condition for suspension or abandonment, reclaim the land as specified by lessor and, within a reasonable period of time, remove equipment and improvements not deemed necessary by lessor for preservation of producible wells.

Sec. 13. Proceedings in case of default—If lessee fails to comply with any provisions of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease shall be subject to cancellation unless or until the leasehold contains a well capable of production of oil or gas in paying quantities, or the lease is committed to an approved cooperative or unit plan or communitization agreement which contains a well capable of production of unitized substances in paying quantities. This provision shall not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver shall not prevent later cancellation for the same default occurring at any other time. Lessee shall be subject to applicable provisions and penalties of FOGRMA (30 U.S.C. 1701).

Sec. 14. Heirs and successors-in-interest—Each obligation of this lease shall extend to and be binding upon, and every benefit hereof shall inure to the heirs, executors, administrators, successors, beneficiaries, or assignees of the respective parties hereto.

Form 3100-11
(June 1988)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Serial No.

OFFER TO LEASE AND LEASE FOR OIL AND GAS

The undersigned *(reverse)* offers to lease all or any of the lands in Item 2 that are available for lease pursuant to the Mineral Leasing Act of 1920, as amended and supplemented (30 U.S.C. 181 et seq.), the Mineral Leasing Act for Acquired Lands of 1947, as amended (30 U.S.C. 351-359), the Attorney General's Opinion of April 2, 1941 (40 Op. Atty. Gen. 41), or the

READ INSTRUCTIONS BEFORE COMPLETING

1. Name
   Street
   City, State, Zip Code

2. This application/offer/lease is for: *(Check only One)* ☐ PUBLIC DOMAIN LANDS ☐ ACQUIRED LANDS (percent U.S. interest _____)
   Surface managing agency if other than BLM: _____ Unit/Project _____
   Legal description of land requested: *Parcel No.: _____ *Sale Date (m/d/y): ____ / ____ / ____
   *SEE ITEM 2 IN INSTRUCTIONS BELOW PRIOR TO COMPLETING PARCEL NUMBER AND SALE DATE.

T.	R.	Meridian	State	County

Amount remitted: Filing fee $ _____ Rental fee $ _____ Total acres applied for _____
Total $ _____

DO NOT WRITE BELOW THIS LINE

3. Land included in lease:

T.	R.	Meridian	State	County

Total acres in lease _____
Rental retained $ _____

This lease is issued granting the exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas *(except helium)* in the lands described in Item 3 together with the right to build and maintain necessary improvements thereupon for the term indicated below, subject to renewal or extension in accordance with the appropriate leasing authority. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this lease, the Secretary of the Interior's regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated when not inconsistent with lease rights granted or specific provisions of this lease.

NOTE: This lease is issued to the high bidder pursuant to his/her duly executed bid or nomination form submitted under 43 CFR 3120 and is subject to the provisions of that bid or nomination and those specified on this form.

Type and primary term of lease:

☐ Noncompetitive lease (ten years)

☐ Competitive lease (five years)

☐ Other _____

THE UNITED STATES OF AMERICA

by _____
(Signing Officer)

_____ _____
(Title) (Date)

EFFECTIVE DATE OF LEASE _____

EXHIBIT A-2
DEVELOPED RECREATION SITES ON THE UNIT

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
Comanche								
	Carrizo	Picnic	MOD	35	5	160	33S/50W	
	Picture Canyon	Documentary	MOD	15	1	160	35S/47W	
	Vogel Canyon	Documentary	MOD	15	1	160	26S/54W	
Cimarron								
	Cimarron Rec Area		HIGH			160	33S/41W	
	Cimarron	Camp		70				
	Cimarron	Picnic		30				
	Cimarron	Picnic Gp		70				
	Atwood Ponds	Fish Site		50				
	Mallard Ponds	Fish Site	HIGH	30	5	160	33S/41W	
	Point of Rocks Ponds	Fish Site	HIGH	50	10	160	34S/42W	
	Wilburton Ponds	Fish Site	HIGH	25	5	160	33S/41W	
	Cimarron River	Obser	HIGH	20	2	160	33S/42W	
	Middle Springs	Obser	HIGH	35	5	160	34S/42W	
	Point of Rocks	Obser	HIGH	25	2	160	34S/42W	
	Cimarron River	Picnic	HIGH	30	3	160	34S/42W	
	Conastoga	Trailhead	HIGH	25	2	160	33S/40W	
	Murphy	Trailhead	HIGH	25	2	160	34S/43W	
Leadville								
	Twin Lakes Complex		LOW			2200	11S/80W	
	Dexter Point	Boat		60	3			
	Dexter	Camp		130	2			
	Lakeview	Camp		295	13			
	White Star	Camp		320	9			
	Cabin Cove	Camp Gp		100	2			
	Interlaken	Doc		0	11			
	Twin Lakes Hist Dist	Doc		0	17			
	Big Mac	Fish Site		40	3			
	Deception Point	Fish Site		75	3			
	Moache	Fish Site		35	1			
	Mountain View	Fish Site		35	3			
	Praying Angel	Fish Site		35	1			
	Red Rooster	Fish Site		75	3			
	Sunnyside	Fish Site		100	3			
	Whistlers Point	Fish Site		40	3			

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
Leadville								
	Twin Lakes							
	Sure Pretty	Obser		75	1			
	Mount Elbert	Picnic		45	3			
	Turquoise Lake Complex		LOW			1830	09S/80W	
	Matchless	Boat		300	6			
	Tabor	Boat		100	4			
	Baby Doe	Camp		250	13			
	Belle of Colorado	Camp		95	6			
	Father Dyer	Camp		140	5			
	May Queen	Camp		170	6			
	Molly Brown	Camp		245	28			
	Silver Dollar	Camp		225	14			
	Tabor Self Contained	Camp		100	5			
	Printerboy	Camp Gp		125	10			
	Abe Lee	Fish Site		60	2			
	Boustead Tunnel	Obser		50	1			
	Lady of the Lake	Picnic		25	1			
	Maid of Erin	Picnic		45	4			
	Elbert Creek	Camp	LOW	85	12	120	10S/81W	
	Halfmoon	Camp	LOW	120	14	120	10S/81W	
	Parry Peak	Camp	LOW	130	10	160	11S/81W	
	Twin Peaks	Camp	LOW	185	9	160	11S/81W	
	Crystal Lake	Fish Site	LOW	50	5	160	10S/80W	
	Vicksburg Mining Camp	Doc	LOW	20	3	160	12S/80W	
	Winfield Mining Camp	Doc	LOW	30	3	160	12S/81W	
	Independence Pass	Inter Mi	LOW	112	7	160	11S/82W	
	Lake Creek Avalanche	Obser	LOW	20	1	160	11S/82W	
	Emerald Lake	Picnic	LOW	50	8	120	10S/81W	
	Black Cloud	Trailhd	LOW	30	1	160	11S/81W	
	Colo Trail-Bear Lake	Trailhd	LOW	50	1	160	09S/81W	
	Colo Trail-Mt. Elbert	Trailhd	LOW	100	1	160	11S/81W	
	Colo Trail-Timberline	Trailhd	LOW	30	1	160	09S/81W	
	High Lakes	Trailhd	LOW	50	1	160	09S/81W	
	Lake Fork	Trailhd	LOW	100	1	160	13S/81W	
	Missouri Gulch	Trailhd	LOW	125	1	160	12S/81W	
	Mt. Elbert-Mt. Massive	Trailhd	LOW	100	1	160	10S/81W	

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
Leadville								
	Pine Creek	Trailhd	LOW	50	1	160	12S/79W	
	Tennessee Pass	Trailhd	LOW	150	1	160	08S/80W	
Salida								
	Cottonwood Lake Complex		LOW			430	14S/80W	
	Cottonwood Lake	Boat		50	1			
	Cottonwood Lake	Camp		140	14			
	Cottonwood Lake	Fish Site		100	1			
	Cottonwood Lake	Picnic		95	5			
	Chalk Creek Complex		LOW			590	15S/79W	
	Boot Leg	Camp	LOW	30	5			
	Cascade	Camp		115	8			
	Chalk Lake	Camp		105	4			
	Mt. Princeton	Camp		85	5			
	Chalk Lake	Fish Site		125	2			
	Agnes Vail Falls	Trailhd	LOW	25	1	160	15S/79W	
	Chalk Creek	Trailhd	LOW	30	1	160	15S/79W	
	Angel of Shavano	Camp	LOW	85	10	160	50N/07E	
	Coaldale	Camp	LOW	55	4	160	47N/10E	
	Collegiate Peaks	Camp	LOW	225	11	160	14S/80W	
	Garfield	Camp	LOW	55	5	160	50N/06E	
	Hayden Creek	Camp	LOW	55	4	160	47N/10E	
	Iron City	Camp	LOW	85	21	160	15S/80W	
	Monarch Park	Camp	LOW	190	17	160	49N/06E	
	North Fork Reservoir	Camp	LOW	40	3	160	50N/06E	
	O'Haver Lake	Camp	LOW	145	11	160	48N/07E	
	Angel of Shavano	Camp Gp	LOW	100	5	40	50N/07E	
	North Fork Reservoir	Fish Site	LOW	30	1	160	50N/06E	
	O'Haver Lake	Fish Site	LOW	120	2	40	48N/07E	
	Monarch Pass	Info	LOW	20	1	80	49N/06E	
	Monarch Aerial Tramway	Obser	LOW	24	1	80	49N/06E	
	Angel of Shavano	Trailhd	LOW	30	1	40	50N/07E	
	Avalanche	Trailhd	LOW	100	2	160	14S/80W	
	Bear Creek	Trailhd	LOW	35	1	160	49N/09E	
	Big Cottonwood	Trailhd	LOW	25	1	160	47N/11E	
	Browns Creek	Trailhd	LOW	30	1	160	51N/07E	

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
Salida								
	Denny Creek	Trailhd	LOW	75	1	160	14S/80W	
	Fooses Creek	Trailhd	LOW	40	1	160	50N/07E	
	North Cottonwood	Trailhd	LOW	60	2	160	13S/79W	
	Poplar Gulch	Trailhd	LOW	30	1	160	15S/80W	
	Ptarmigan Lake	Trailhd	LOW	30	1	160	14S/80W	
	Shirley Site	Trailhd	LOW	35	1	160	48N/08E	
San Carlos								
	Lake Isabel Complex		LOW			470	24S/69W	
	Lake Isabel	Boat		30	1			
	Lake Isabel Cisneros	Camp		75	10			
	Lake Isabel Southside	Camp		40	1			
	Lake Isabel St.Charles	Camp		75	10			
	Lake Isabel - East	Fish Site		60	2			
	Lake Isabel - North	Fish Site		300	10			
	Lake Isabel	Picnic		225	40			
	Cisneros	Trailhd		50	2			
	Alvarado	Camp	MOD	235	20	120	44N/73W	
	Bear Lake	Camp	MOD	70	5	160	31S/69W	
	Blue Lake	Camp	MOD	75	8	120	31S/69W	
	Cuchara	Camp	MOD	75	13	450	31S/69W	
	Davenport	Camp	MOD	60	6	160	23S/69W	
	Lake Creek	Camp	MOD	55	4	160	46N/12E	
	Oak Creek	Camp	MOD	30	5	40	20S/70W	
	Ophir	Camp	LOW	155	14	160	23S/69W	
	Purgatoire	Camp	MOD	115	9	160	32S/69W	
	Oak Creek	Camp Gp	MOD	100	9	120	20S/70W	
	Balman Reservoir	Fish Site	MOD	100	2	160	46N/11E	
	Blue Lake	Fish Site	MOD	30	1	40	31S/69W	
	Farley Flower Overlook	Obser	MOD	30	1	160	31S/69W	
	Spring Creek	Picnic	MOD	45	6	160	31S/69W	
	Alvarado	Trailhd	MOD	75	2	40	44N/73W	
	Bartlett	Trailhd	LOW	40	2	160	25S/68W	
	Brush Creek	Trailhd	MOD	50	2	160	46N/12E	
	Cordova Pass	Trailhd	MOD	30	2	160	31S/68W	
	Florence	Trailhd	MOD	20	1	160	T22/69W	

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
San Carlos								
	Gibson Creek	Trailhd	MOD	50	2	160	45N/12E	
	Grape Creek	Trailhd	MOD	100	4	160	24S/72W	
	Greenhorn Mtn	Trailhd	LOW	50	1	160	24S/69W	
	Horn Creek	Trailhd	MOD	50	2	160	23S/73W	
	Music Pass	Trailhd	MOD	75	2	160	43N/72S	
	North Fork	Trailhd	MOD	50	1	160	32S/69W	
Pikes Peak								
	Rampart Reservoir Complex		HIGH			1100	12S/68W	RN
	Dikeside	Boat		300	10			
	Meadow Ridge	Camp		95	8			
	Thunder Ridge	Camp		105	11			
	Wildcat Wayside	Info		45	2			
	BPW Nature Trail	Inter Mi		50	5			
	Peak View	Obser		40	1			
	Boatmans	Picnic		60	3			
	Promontory	Picnic		170	15			
	Manitou Park Complex		LOW			820	11S/69W	R
	Colorado	Camp		405	25			
	Painted Rocks	Camp		95	4			
	South Meadows	Camp		320	23			
	Pike Community	Camp Gp		350	5			
	Redrocks	Camp Gp		90	9			
	Manitou Lake	Picnic		210	21			
	Pikes Peak Complex		LOW			950	14S/68W	RN
	Pikes Peak	Doc		50	8			
	Bottomless Pit	Obser		25	1			
	Elk Park	Obser		50	1			
	Pikes Peak	Obser		24	1			
	Ridge Crest	Obser		40	1			
	Glen Cove	Picnic		35	3			
	Halfway	Picnic		110	10			
	The Crags	Camp	LOW	85	7	160	13S/69W	RN
	Trail Creek	Camp	LOW	35	1	160	11S/70W	RN
	Wildhorn	Camp	LOW	45	4	160	11S/70W	RN
	Wye	Camp	LOW	105	8	160	15S/68W	RN
	Cascade	Obser	HIGH	12	1	160	13S/68W	RN

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
Pikes Peak								
	Springdale	Camp Gp	HIGH	50	5	160	12S/68W	RN
	Eagles Nest	Picnic	LOW	25	1	160	14S/68W	RN
	Barr	Trailhd	LOW	125	4	160	14S/68W	RN
	Crags	Trailhd	LOW	50	1	160	13S/69W	RN
	Horsethief Park	Trailhd	LOW	12	1	160	14S/69W	RN
	No.Cheyenne Canyon	Trailhd	LOW	12	1	160	14S/67W	RN
	Rainbow Gulch	Trailhd	HIGH	50	1	160	12S/68W	RN
	Rosemont Reservoir	Trailhd	LOW	150	1	160	15S/68W	RN
	St. Mary's Falls	Trailhd	LOW	50	1	160	15S/67W	RN
	St. Peter's Dome	Trailhd	LOW	35	1	160	15S/67W	RN
	Waldo Canyon	Trailhd	HIGH	120	1	160	13S/68W	RN
	Rampart Range	Play/Sport	LOW	50	3	160	13S/67W	RN
	St. Peter's Dome	Play/Sport	LOW	75	3	160	15S/67W	RN
South Par								
	Jefferson Creek Complex		MOD			850	07S/76W	RN
	Jefferson Lake	Boat		120	2			
	Aspen	Camp		60	5			
	Jefferson Creek	Camp		85	28			
	Lodgepole	Camp		175	15			
	Jefferson Lake	Fish		200	2			
	Beaver Ponds	Picnic		20	1			
	Jefferson Boundary	Picnic		20	1			
	Jefferson Lake	Picnic		175	18			
	Elevenmile Canyon Complex		LOW			1540	13S/72W	RN
	Blue Mountain	Camp		105	8			
	Cove	Camp		25	2			
	Riverside	Camp		95	6			
	Spillway	Camp		120	12			
	Springer Gulch	Camp		75	6			
	Wagon Tongue	Camp		35	3			
	Elevenmile	Picnic		75	4			
	Idlewilde	Picnic		25	2			
	Messenger Gulch	Picnic		10	1			
	O'Brien Gulch	Picnic		10	1			
	Beaver Creek	Camp	MOD	15	1	160	09S/77W	RN
	Buffalo Springs	Camp	MOD	85	9	160	12S/77W	RN

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
South Park								
	Fourmile	Camp	MOD	70	6	160	10S/78W	RN
	Happy Meadows	Camp	LOW	30	2	160	12S/71W	RN
	Horseshoe	Camp	MOD	95	14	160	10S/78W	RN
	Kite Lake	Camp	LOW	35	3	160	08S/78W	RN
	Lost Park	Camp	LOW	50	4	120	09S/73W	RN
	Michigan Creek	Camp	MOD	65	6	160	07S/76W	RN
	Round Mountain	Camp	LOW	80	12	160	12S/72W	RN
	Selkirk	Camp	MOD	75	2	160	08S/77W	RN
	Spruce Grove	Camp	LOW	140	12	160	10S/72W	RN
	Weston Pass	Camp	MOD	70	6	160	11S/78W	RN
	South Park Office	Inter Ad	LOW	20	1	40	09S/77W	R
	Wilkerson Pass	Inter Ad	LOW	250	3	160	12S/73W	RN
	Hoosier Pass	Obser	MOD	70	1	160	08S/78W	RN
	Windy Ridge	Obser	LOW	30	1	160	08S/78W	RN
	Limber Grove	Trailhd	LOW	35	1	160	10S/78W	RN
	Lost Park	Trailhd	LOW	40	1	40	09S/73W	RN
	Platte River	Trailhd	LOW	35	1	160	12S/81W	RN
	Rich Creek	Trailhd	MOD	50	1	160	11S/78W	RN
	Salt Creek	Trailhd	MOD	30	1	160	12S/78W	RN
	Twin Eagles	Trailhd	LOW	50	2	160	10S/72W	RN
	Ute Creek	Trailhd	LOW	50	1	160	10S/73W	RN
South Platte								
	Buffalo Creek Complex		LOW			1410	08S/71W	RN
	Baldy	Camp		40	4			
	Buffalo	Camp		205	18			
	Green Mountain	Camp		30	4			
	Tramway	Camp		30	3			
	Wigwam	Camp		50	4			
	Meadows	Camp Grp		300	50			
	Buffalo Creek	Picnic		20	2			
	Big Turkey	Camp	LOW	50	4	160	11S/70W	RN
	Burning Bear	Camp	LOW	65	6	160	06S/74W	RN
	Burning Bear	Trailhd		50	2			
	Deer Creek	Camp	LOW	65	5	420	06S/73W	R
	Meridian	Camp		90	16			
	Deer Creek	Trailhd		100	2			

RANGER DISTRICT	SITE NAME	SITE KIND	MINERAL POTENTIAL	CAP (PAOT)	DEV ACRES	NSO ACRES	TOWNSHIP & RANGE	ROS CLASS
South Platte								
	Devils Head	Camp	LOW	110	10	260	09S/69W	RN
	Cabin Ridge	Picnic	LOW	25	4			
	Devils Head	Picnic		50	4			
	Cabin Ridge	Trailhd	LOW	85	1	160	09S/69W	
	Devils Head	Trailhd	LOW	25	1			
	Flat Rocks	Camp	HIGH	100	8	160	08S/69W	RN
	Flat Rocks	Trailhd	HIGH	60	1			
	Geneva Park	Camp	LOW	130	4	260	06S/75W	RN
	Duck Creek	Picnic		25	2			
	Goose Creek	Camp	LOW	50	4	280	10S/71W	RN
	Goose Creek	Trailhd		250	2			
	Hall Valley	Camp	LOW	45	4	230	06S/75W	RN
	Handcart	Camp		50	5			
	Indian Creek	Camp	HIGH	50	4	260	08S/69W	RN
	Indian Creek	Info		60	1			
	Jackson Creek	Camp	LOW	45	3	160	09S/69W	RN
	Kelsey	Camp	LOW	85	7	160	08S/70W	RN
	Kenosha Pass	Camp	LOW	125	11	160	07S/75W	RN
	Kenosha Pass	Trailhd	LOW	50	1			
	Lone Rock	Camp	LOW	95	5	160	09S/70W	R
	Molly Gulch	Camp	LOW	75	7	160	10S/71W	RN
	Top of the World	Camp	LOW	35	9	160	08S/70W	RN
	Whiteside	Camp	LOW	25	2	280	06S/74W	RN
	Geneva Cre ek	Picnic		25	2			
	Bailey	Camp Grp	LOW	50	2	160	07S/73W	R
	Bridge Crossing	Picnic	LOW	25	1	240	09S/70W	R
	Platte River	Picnic		50	4			
	Scraggy View	Picnic	LOW	15	1	160	08S/70W	R
	Topaz Point	Picnic	LOW	25	2	160	09S/69W	RN
	Willow Bend	Picnic	LOW	25	2	160	08S/70W	R
	Abyss	Trailhd	LOW	150	1	160	05S/74W	RN
	Gibson Lake	Trailhd	LOW	20	1	160	06S/75W	RN
	Lower Wigwam	Trailhd	LOW	35	1	160	09S/71W	RN
	Rolling Creek	Trailhd	LOW	35	1	160	08S/71W	RN
	Sunset Point	Trailhd	LOW	65	1	160	08S.69W	RN
	Wigwam	Trailhd	LOW	125	1	160	09S/70W	RN

Exhibit A-3
Active Timber Sales

MAP #	DISTRICT	TIMBER SALE NAME	LEGAL DESCRIPTION	SALE AREA	PLANNED TERMINATION
1	Salida	Mineral Basin	T15S, R81W, Sec. 11, 12, 13 T15S, R80W, Sec. 7	306 Acres	7/20/91
2	Salida	Ptarmigan	T14S, R80W, Sec. 29, 30, 31	274 Acres	8/17/91
3	Salida	Herring	T15S, R76W, Sec. 19, 20, 29, 30 T15S, R77W, Sec. 25	465 Acres	12/31/91
4	Salida	Jones Mt.	T14S, R81W, Sec. 23-26, 35, 36	455 Acres	9/12/90
5	Salida	Sands	T51N, R7E, Sec. 25, 26, 35	574 Acres	12/31/91
6	Salida	Kreutzer	T15S, R81W, Sec. 12	40 Acres	9/30/92
7	San Carlos	Little Froze II	T23S, R70W, Sec. 11-15; T23S, R69W, Sec. 6, 7	430 Acres	12/31/93
8	San Carlos	Snowslide II	T24S, R69W, Sec. 11-14	328 Acres (Net)	12/31/91
9	Pikes Peak	Davis Gulch	T11S, R70W, Sec. 26, 34, 35 T12S, R70W, Sec. 2, 3, 4	672 Acres	8/25/91
10	Pikes Peak	Plum Creek	T10S, R68W, Sec. 20, 21, 28, 29	267 Acres	6/30/91
11	Pikes Peak	Border Salvage	T12S, R70W, Sec. 13	111 Acres	9/30/91
12	Pikes Peak	Manchester Salvage	T12S, R69W, Sec. 7; T12S, R70W, Sec. 12 & 13	106 Acres	9/30/91
13	South Park	No Name Resale	T9S, R73W, Sec. 4, 5, 8, 9	485 Acres	9/30/91
14	South Park	Hourglass	T9S, R73W, Sec. 10, 11, 15, 16	354 Acres	3/31/92
15	South Park	South Northfork	T8S, R73W, Sec. 33, 34, 35, 36 T9S, R73W, Sec. 2 & 3	459 Acres	9/30/91

MAP #	DISTRICT	TIMBER SALE NAME	LEGAL DESCRIPTION	SALE AREA	PLANNED TERMINATION
16	South Park	Michigan Creek	T7S, R76W, Sec. 16-18, 20-30, 32,33	510 Acres	3/31/92
17	South Park	Crooked Creek	T8S, R77W, Sec. 35; T9S, R77W, Sec. 2-4, 10, 15, 16	384 Acres	9/30/93
18	South Park	Puma Heartbreak	T12S, R72W, Sec. 31, 32 & 33	600 Acres	7/31/91
19	So. Platte	Sugar Creek	T9S, R69W, Sec 7, 18-21 T9S, R70W, Sec. 1, 12, 13	997 Acres	12/31/91
20	So. Platte	Dakan Mountain	T9S, R68W, Sec. 19, 30, 31 T9S, R69W, Sec. 24-26, 35 & 36 T10S, R69W, Sec. 1	317 Acres	6/30/91
21	So. Platte	Brush Creek (D)	T9S, R70W, Sec. 4-9	911 Acres	9/30/90
22	So. Platte	Noddles	T8S, R69W, Sec. 29-32	204 Acres	9/30/91
23	So. Platte	Dake	T7S, R75W, Sec. 10, 11, 14, 15	132 Acres	12/31/91
24	So. Platte	Sheeprock II	T10S, R71W, Sec. 5 & 8	39 Acres	12/31/91
25	So. Platte	Meridian II	T6S, R73W, Sec. 22	13 Acres	9/30/91
26	So. Platte	Buffalo Baldy	T8S, R71W, Sec. 1-3 & 9-12	918 Acres	12/31/92
27	So. Platte	Hoosier Creek III	T7S, R75W, Sec. 21	36 Acres	12/31/91

Active sales per December, 1990 Automated Timber Sales Accounting System "Transfer of Earned Timber Sale Receipts"

NOTE: Active sale status will change through the course of the planning period. Whenever post-leasing activity is proposed on lease parcels with merchantable size timber, the District Minerals Staff must coordinate with the District Forester and/or the Forest ATSA Data Base Coordinator to determine if active sales exist on the lease parcel.

Exhibit A-4
Planned Timber Sales

MAP #	DISTRICT	TIMBER SALE NAME	LEGAL DESCRIPTION	SALE AREA	PLANNED SALE YR
1	Salida	Eddy Creek	T15S, R78W, Sec. 31 T15S, R79W, Sec. 36	210	1991
2	Salida	Kaufman Ridge	T14S, R76W, Sec. 6 T13S, R76W, Sec. 31 T13S, R77W, Sec. 36	120	1991
3	Salida	Ouray	T48N, R7E, Sec. 19-20	150	1994
4	Salida	Beaver Creek	T48N, R7E, Sec. 13, 14	100	1992
5	Salida	Monarch Park	T49N, R6E, Sec. 17	30	1993
6	Salida	Starvation	T48N, R7E, Sec. 31, 32	100	1993
7	Salida	Ptarmigan	T14S, R80W, Sec. 30, 31	60	1995
8	San Carlos	East Williams II	T23S, R70W, Sec. 36; T23S, R69W, Sec. 31; T24S, R69W, Sec. 6	400	1992
9	San Carlos	Little Saint	T24S, R69W, Sec. 13, 24	500	1995
10	Pikes Peak	Rule Ridge Salvage	T11S, R69W, Sec. 32, 33; T12S, R69W, Sec. 4-8	600	1991
11	Pikes Peak	Trout Creek	T11S, R69W, Sec. 3,4, 9 & 10	350	1993
12	Pikes Peak	signal Butte Salvg	T11S, R70W, Sec. 23,26-27,33-34 T12S, R70W, Sec. 4, 5 & 8	200	1992
13	Pikes Peak	Painted Rocks	T11S, R69W, Sec. 9,10, 15 & 16	350	1993
14	South Park	Schoolmarm Re-sale	T10S, R73W, Sec. 30-32; T10S, R74W, Sec. 25, 36; T11S, R73W, Sec. 6	255	1991

MAP #	DISTRICT	TIMBER SALE NAME	LEGAL DESCRIPTION	SALE AREA	PLANNED SALE YR
15	South Park	Jones Hill	T12S, R78W, Sec. 1, 2, 12; T12S, R77W, Sec. 3-7; T11s, R77W, Sec. 31, 32	403	1991
16	South Park	Pulver Salvage	T12S, R72W, Sec. 18, 19 T12S, R73W, Sec. 11-14	375	1992
17	South Park	39 Mile Mountain	T14S, R73W, Sec. 3-10	960	1992
18	South Park	Badger Salvage	T11S, R73W, Sec. 9-10, 15, 16, 21, 28	350	1993
19	South Park	Wagon Tongue Salvg	T13S, R71W, Sec. 5-8	500	1994
20	South Park	Caylor I, II Salvg	T13S, R72W, Sec. 3-5	500	1991 & 1995
21	So. Platte	Sheepnose	T10S, R70W, Sec. 20 & 21	350	1992
22	So. Platte	Pits	T8S, R70W, Sec. 1,2,10,11,15	418	1992
23	So. Platte	Hunter	T10S, R70W, Sec. 17 & 20	397	1993
24	So. Platte	Schoonover	T10S, R70W, Sec. 8-9, 16-17	559	1993
25	So. Platte	Stoney Pass	T9S, R71W, Sec. 3, 10	250	1994
26	So. Platte	Payne Gulch	T7S, R73W, Sec. 25-26, 35-36	350	1994
27	So. Platte	Dake-Hoosier	T7S, R75W, Sec. 9, 16-17, 21-22	200	1995
28	So. Platte	Bergen Rock	T9S, R68W, Sec. 6	400	1996
29	So. Platte	Shinglemill II	T8S, R71W, Sec. 13-14, 24	500	1994

Planned timber sales per September, 1990 Pike and San Isabel NF 5 Year Timber Sale Action Plan

NOTE: The 5 Year Timber Sale Action Plan is subject to annual updates. Whenever post-leasing activity is proposed on lease parcels with merchantable size timber and/or acres suitable for timber production, the District Minerals Staff must coordinate with the District Forester and/or R2RIS Data Base Coordinator to determine if planned sales exist within the lease parcel, per the current 5 Year Timber Sale Action Plan at that time.

NOTES

[1] "Standard Lease Terms and Conditions" Sec.6. Conduct of Operation.

[2] "Oil and Gas, Surface Operating Standards for Oil and Gas Exploration and Development," BLM/FS Rocky Mountain Regional Coordination Committee (RMRCC), January 1989.

[3] Letter dated March 26, 1991, from Tulsa District Manager Jim Sims to Forest Supervisor Jack Weissling.

APPENDIX B

APPENDIX B

ANTICIPATED ACTIVITY

INTRODUCTION

The Forest Service Rules and Regulations for Oil and Gas Leasing, 36 CFR 228.102 (c)(3), state that the Forest Service will *Project the type/amount of post-leasing activity that is reasonably foreseeable as a consequence of conducting a leasing program consistent with that described in the proposal and for each alternative.* In (c)(4) they further direct the Forest Service to *Analyze the reasonable foreseeable impacts of post-leasing activity projected under paragraph (c)(3) of this section.*[1]

This appendix deals with the development of reasonable foreseeable post-leasing activity. For the purposes of this document we will refer to this projected post-leasing development as Reasonably Foreseeable Development, or RFD. RFD is a projection based on historical and existing oil and gas activities, leasing patterns and industry interest, previous exploration, potential for fluid mineral occurrence, U.S. Geological Survey estimates, and professional judgment.[2]

The Bureau of Land Management staff is considered to be the experts in the oil and gas leasing program because they manage all federal subsurface minerals. The BLM, through interagency agreement has provided, or worked with Forest Service staff to develop, the RFD figures for the Unit. The Forest Service specialists took that information and extrapolated it to develop on the ground activities from which effects could be projected. The process for development of those activities is disclosed. Also included are the projected activities that are not related to oil and gas leasing and development that will allow for the disclosure of anticipated cumulative effects.

For analysis purposes we have identified a second RFD on the mountain districts of the Unit. The RFD provided to us by the BLM for the mountains was very dispersed and results in minimal impacts. In order to be able to disclose effects that would result if actual post-leasing activity were to occur in a more concentrated manner, or on more sensitive lands, a "Concentrated RFD" was created for use in the analysis. This Concentrated RFD will allow the Forest Supervisor to identify a range of anticipated effects to base a decision on and is further defined and explained later in this Appendix.

DETERMINATION OF RFD

The Colorado State BLM Office developed the RFD for the Pike and San Isabel National Forests and Comanche National Grasslands. A copy of their evaluation and projection is attached as Exhibit B-1 of this appendix. The Cimarron National Grassland is in the State of Kansas under jurisdiction of the Oklahoma BLM Office. RFD was developed by the Forest Service minerals staff on the Cimarron and approved by the BLM Oklahoma Office. The analysis and BLM concurrence are attached as Exhibit B-2.

Different RFD figures were developed for the Unit that reflect the different levels of anticipated development.

RFD Well Numbers

The BLM provided RFD on the Pike and San Isabel National Forests is one well every four years over the next 15 years for a total of 4 wells.

The BLM provided RFD on the Comanche is a total of 3 wells per year over the next 15 years for a total of 45 wells.

The BLM approved RFD on the Cimarron is 11 wells per year over the next 15 years for a total of 165 wells.[3]

Levels of Development

Oil and gas development consists of two levels of ground disturbing activity: exploration and production. Exploratory wells are drilled to try to find oil and gas minerals. Activities in support of exploratory drilling are generally temporary in nature with drilling completed, on average, within 3 weeks. Exploratory wells are often referred to as "wildcat" wells.

A wildcat well is a well drilled in unproved territory. Only by drilling a wildcat well will the oil company know if the subsurface area contains oil or gas. Nationally, about one in 16 wildcat wells produces significant amounts of oil or gas.[4]

A discovery well is a wildcat well that yields commercial quantities of oil or gas. When a discovery well becomes a producing well, additional development wells will be drilled to confirm the discovery, establish the extent of the field, and efficiently drain the reservoir. The procedures for drilling production wells are about the same as for wildcats.[5] The BLM identified the anticipated levels of development as follows:

Table B-1
Anticipated Levels of Development

Area	Exploratory	Production
Mountains	100%	
Comanche Grassland[6]	42%	58%
Cimarron Grassland	19%	81%

PROBABLE LOCATIONS OF DEVELOPMENT

The Forest Service conducted an evaluation of the potential for mineral resources as a part of the Forest Planning efforts. It identified the existence of locatable and leasable mineral deposits on the Unit. The "potential levels," determined as high, medium, and low, were based on current information and may change, depending on the mineral economy, technological advances, and further exploration. The potential maps were reviewed by the BLM for this analysis.

The potential was established based on the following:

Table B-2
Mineral Potential Levels

Potential Rating	Geology & Structure	Mineral Occurrence	Economic Value	Activity Level
High	favorable	known	valuable	field activity
Moderate	favorable	known	unknown or uneconomic	occasional
Low	unfavorable	unknown	uneconomic	little or none

Mapping of potential on the Mountains and the Grasslands are found in Appendix K of this EIS. Additional information on mineral occurrences, production, and geologic environment is found in the Mineral Potential Report for the Pike and San Isabel National Forests in Appendix H of the Forest Plan.

RFD Drilling Using Mineral Potential

In order to assess the effects of RFD activities the Forest Service "placed" wells to use in the analysis. In this way the site specific effects of drilling and its associated developments could be analyzed. The BLM provided expertise to identify probable locations where the RFD wells might be drilled based on information from the RFD analysis, the potential maps, and current activity analysis.

The Forest Service identified actual RFD well sites, for analysis purposes, on the Mountain Districts because there were only 4 wells. These wells will be analyzed as if a Surface Use Plan of Operations had been received. The combined RFD on the Grasslands is over 200 wells so general areas where development is expected were identified. Wells are grouped based on the soil/land type they are expected to occur on.

MOUNTAINS

Well Distribution

The four RFD wells were placed on currently leased lands. Two of the wells are on lands with high mineral potential in the Rampart Range. One is located east of South Park on moderate potential lands. The fourth well is located on moderate potential lands in the northeastern section of the Wet Mountains. A map of the Mountain well locations is displayed in Chapter II.

Acres Disturbed

Well 1	Pad 4.13 + Roads 0.15 = 4.28 ac	= 4 ac disturbed
Well 2	Pad 4.51 + Roads 0.82 = 5.33 ac	= 5 ac disturbed
Well 3	Pad 3.41 + Roads 1.31 = 4.72 ac	= 5 ac disturbed
Well 4	Pad 3.41 + Roads 0.16 = 3.57 ac	= 4 ac disturbed
		18 total disturbed acres

GRASSLANDS

The Cimarron and Comanche are composed of 4 major landforms characterized by sandy lands, hard lands, canyon lands, and riparian areas. The distribution of RFD wells by major landform or soil/land type is as follow:

Cimarron

Sandy Lands	61%
Hard Lands	35%
Canyon Lands	0%
Riparian	4%

Alternatives I,II and IV

WELL DISTRIBUTION

Table B-3
Expected Well Distribution - Cimarron NG

	Major soil/land type		
	Sandy Lands	Hard Lands	Riparian
Number of wells	101	57	7

Acres Disturbed

Statistical analysis indicates that 95% of the wells already existing on the Cimarron disturbed less than 2.39 acres and the average disturbance was 2.0 acres.[7] For the purpose of the analysis the team will use 2.39 acres disturbed per well on the Cimarron. Total effects will be rounded to the nearest whole acre. The following table indicates the total acres disturbed by major soil/land type on the Cimarron:

Table B-4
Disturbed Acres - Cimarron NG

	Major Soil/land type		
	Sandy Lands	Hard Lands	Riparian
Disturbed acres	241	136	17

The distribution of RFD wells by major soil/land type is as follows:

Comanche

Sandy Lands	67%
Hard Lands	29%
Canyon Lands	2%
Riparian	2%

Alternatives II and IV

WELL DISTRIBUTION

Table B-5
Expected Well Distribution - Comanche NG

	Major Soil/land type			
	Sandy Lands	Hard Lands	Canyon Lands	Riparian
Number of wells	30	13	1	1

Acres Disturbed

Statistical analysis indicated that 95% of the wells already existing on the Comanche disturbed less than 1.81 acres and the average disturbance was 1.41 acres.[8] For the purpose of the analysis the team will use 1.81 acres disturbed per well on the Comanche, total effects will be rounded to the nearest whole acre. The following table indicates the total acres disturbed by major soil/land type on the Comanche:

Table B-6
Disturbed Acres - Comanche NG

	Major Soil/land type			
	Sandy Lands	Hard Lands	Canyon Lands	Riparian
Disturbed acres	54	23	2	2

SITE DEVELOPMENT

The RFD, to this point, has included only the number and types of wells and where they might be located. We must now describe what the wells will look like and what activities may be expected.

Access and Clearing

For each well a road and pad must be cleared and developed. The road will vary based on location, length, topography, and resource protection needs. A well pad is generally 300 feet by 300 feet and will include a contained pond, or reserve pit. The pad is occupied by a drilling rig, walkways, storage facilities, and living quarters, if needed. Haul trucks may be used, or a well drilled to provide the water necessary for drilling.

In the study of historical activity on the Grasslands it was determined that the development needs for both exploratory and producing wells are very similar. A statistical analysis was completed that demonstrates that similarity.[8] Standard values for the clearing will be used on both the Cimarron and Comanche. Those values are 2.39 and 1.81 acres.

With no historical data on the Mountains, the well sites were located and road access identified by an engineer. The actual acres disturbed was calculated for each well.

Facilities

EXPLORATORY WELL

Once a site has been identified and a Surface Plan of Operations approved the location must then be prepared for the drilling rig. Land is leveled, earthen pits are excavated and lined with plastic to serve as reserve pits, the drilling rig is then brought in and "rigged up." A substructure, which supports the drilling mast is assembled. Stairways, walkways, guardrails, storage facilities, living quarters, and auxiliary equipment including a water well or water supply line is installed.

The primary drilling machine, mounted within the mast, is the rotary rig. Rotary drilling involves rotating the drill bit, which is attached to a long string of drill pipe. Most rotary drill rigs utilize a fluid circulating system. The fluid, called "drilling mud", is pumped down the inside of the drill pipe and

out through the bit at the bottom of the hole. The drilling mud carries the fragments of broken rock back to the surface.

PRODUCTION

If the "wildcat" well accesses oil or gas resources then a lessee is likely to ask for the improvements necessary to develop the field. The level of development that would occur cannot be accurately predicted. However, a standard level of development is described below.

The time needed to drill a production well to a total depth of 4,200 feet would normally be one to three weeks. The greatest amount of human, vehicular, and equipment activity and accompanying noise, etc., would occur during drilling activities.

Gas

Surface facilities would include the drill rig, mud pumps, reserve pit, generators, pipe racks and tool house. Natural gas appears to be the most likely product that would come from wells in the analysis area. Once the well was drilled the surface area required for a flowing gas well is usually a 20' by 20' fenced area together with an access road and turnaround area. A "Christmas tree" to control gas flow, metering and treatment facilities, and compressor equipment would be installed on the well.

In some instances water in association with the gas may enter the well and choke off the gas flow. A pump would then be needed to remove the column of water, and would be installed on the existing site. Flowlines are installed to transport the gas from the wellhead to a collector pipeline system which would carry the gas to the gas plant. An electrical system is needed to supply electricity to the facilities. Flowlines, collector lines and powerline cables are buried, whenever possible, within the roadways to minimize surface disturbance.

Oil

Development of an oil producer is very similar to the natural gas producer described. Oil wells, at some time during production, will have a pump and the surface facilities would include storage tanks for the oil. Additional traffic would occur to drain the storage tanks and remove the oil by truck.

MAINTENANCE & OPERATIONS

During production little activity would occur at the well site except for periodic maintenance and daily to weekly visits to assure the well is operating properly. The maintenance traffic is pickup unless service with a workover rig is needed.

Normal operations for oil wells include transport by truck on a daily to monthly basis, depending on production rates. Pipeline (oil or saltwater) leaks or spills may occur at unpredictable intervals on the Mountains. All disturbed areas will be reclaimed to Forest Service standards. The estimated life of a typical field, is 15 to 25 years.

ABANDONMENT & RECLAMATION

Wells are plugged and abandoned upon depletion of the resource. Truck mounted equipment is used to plug formerly producing wells, all surface equipment is removed, and the site is restored. Specific plugging and abandonment requirements vary based on the rock formations, subsurface water conditions, and the specific well site.

The surface will be reshaped to allow revegetation and restore the landform as near as possible to its original contour. Stockpiled topsoil will be replaced and the site will be revegetated. Fencing may be provided to insure the revegetation is successful.

Reclamation activities will occur within one growing season of disturbance on abandoned wells, roads and 50 percent of each production well pad. Reclamation success will likely vary by soil type.

Roads on the Mountains developed for exploration or production will be closed to public use.

Abandonment Rates

For analysis purposes the following abandonment rates will be used.

Mountains	All wells are exploratory and will be abandoned within one year of drilling
Cimarron and Comanche	Exploratory wells will be abandoned within one year of drilling. Abandonment of producers will be in the 20th year after drilling

Reclamation Rates

All reclamation activities will be completed within five years of initiation. Exploratory wells will be fully reclaimed as soon as they are abandoned.

Production wells are reclaimed in stages. Once the well is in a maintenance stage the improvements needed for drilling are removed and the available areas of the pad are reclaimed. This averages out to approximately 50% of the pad acres disturbed for development. Once production is completed and the well is abandoned the rest of the pad, and the road segments accessing it, are reclaimed.

The following information was developed in the specialist report for vegetation. Computations can be found there.

PRODUCTION WELL RECLAMATION

Cimarron

The pad size to be used in the analysis on the Cimarron is 1.97 acres. When the well goes to a maintenance stage .99 acres will be reclaimed immediately. The remaining .99 acre pad and .42 acre road will not be reclaimed until the well is abandoned.

Comanche

The pad size to be used in the analysis on the Comanche is 1.49 acres. When the well goes to a maintenance stage .75 acres will be reclaimed immediately. The remaining .75 acre pad and .32 acre road will not be reclaimed until the well is abandoned.

EXPLORATORY RECLAMATION

Mountains

The first 3 wells and roads drilled would be reclaimed at the end of the planning period. The last well would not because, based on BLM RFD, it would not be drilled until late in the planning period. For analysis purposes we will use well 4 as the unreclaimed well.

Table B-7
Anticipated Reclamation - Mountains

	Acres		
Well No	Disturbed Acres	Reclaimed Alt 4	Unreclaimed Alt 4
1	4	4	0
2	5	5	0
3	5	5	0
4	4	0	4
Total	18	14	4

Grasslands

CIMARRON ALTERNATIVES I,II AND IV

RFD Wells by major soil/land type:

Table B-8
RFD Wells by Soil/Ecosystem - Cimarron NG

	Number of Wells		
Soil/land type	Total	Exploratory	Production
Sandy Lands	101	19	82
Hard Lands	57	11	46
Riparian	7	1	6

Abandonment and reclamation for RFD

For each dry well 2.39 acres will be disturbed and reclaimed.

For each producing well .99 acres will be reclaimed within 5 years of development.

Unreclaimed acres will remain at the end of the planning period. The following identifies the amount of reclaimed and unreclaimed acres, by soil/land type, at the end of the planning period:

Table B-9
Reclamation Figures - Cimarron NG

	Acres		
Soil/land type	Disturbed	Reclaimed	Unreclaimed
Sandy Lands	241	84	157
Hard Lands	136	48	88
Riparian	17	6	11
Total	394	138	256

COMANCHE ALTERNATIVES II AND IV

Table B-10
RFD Wells by Soil/Ecosystem - Comanche NG

	Number of Wells		
Soil/land type	Total	Exploratory	Production
Sandy Lands	30	13	17
Hard Lands	13	5	8
Canyon Lands	1	0	1
Riparian	1	0	1

Abandonment and Reclamation for RFD

For each dry well 1.81 acres will be disturbed and reclaimed.

For each producing well .75 acres will be reclaimed within 5 years of development.

Unreclaimed acres will remain at the end of the planning period. The following identifies the amount of reclaimed and unreclaimed acres, by soil/land type, at the end of the planning period:

Table B-11
Reclamation Figures - Comanche NG

	Acres		
Soil/land type	Disturbed	Reclaimed	Unreclaimed
Sandy Lands	54	24	30
Hard Lands	23	11	12
Canyon Lands	2	1	1
Riparian	2	1	1
Total	81	37	44

CONCENTRATED RFD

The Forest Service interdisciplinary team developed a "Concentrated RFD" for the Mountains. The rate and level of activity is the same as provided by the BLM but the locations have been concentrated to increase the possible effects. The low level of the BLM provided RFD and potential effects were considered to be extremely limited. The team relocated the four RFD wells to locations that they felt, based on professional judgement, would be most sensitive, in order to analyze their effects. This will provide a range of possible effects from the post-leasing activity. These wells are identified on a map found in Chapter II.

Alternatives II and IV

Table B-12
Concentrated RFD Well Locations

Well No.	Legal Description
1C	T9S, R69W, Sec 22, NWNW
2C	T9S, R69W, Sec 22, SWNE
3C	T9S, R69W, Sec 23, NWSE
4C	T9S, R69W, Sec 26, NWSW

ACRES DISTURBED

The acres disturbed by these wells was determined in the same manner as for the BLM provided RFD wells. The acres disturbed are as follows:

Well 1C	Pad 5.50 + Roads 7.07 = 12.57 acres =	13 acres disturbed
Well 2C	Pad 5.50 + Roads 5.71 = 11.21 acres =	11 acres disturbed
Well 3C	Pad 8.34 + Roads 2.29 = 10.63 acres =	11 acres disturbed
Well 4C	Pad 8.34 + Roads 0.89 = 9.23 acres =	9 acres disturbed
		44 total acres

Table B-13
Reclamation of Concentrated RFD

	Acres		
Well	Disturbed	Reclaimed	Unreclaimed
1C	13	0	13
2C	11	0	11
3C	11	0	11
4C	9	0	9
Total	44	0	44

Under Alternatives II and IV, (Standard-lease terms apply), analysis of the soils and vegetation on the Concentrated RFD wells indicate that none of the well sites would be reclaimed at the end of the planning period.

EFFECTS OF ALTERNATIVES ON RFD

The actual number of RFD wells projected on the entire unit are not affected by the alternatives because the amount of available acres is not limiting. Under the No Leasing Alternative, Alternative IV, there will be no impacts to currently unleased lands, but impacts will occur from development on existing leases. The substantial number of currently leased acres provides an adequate land base to allow for the anticipated development.

The alternatives will, however, affect the distribution of the wells and their potential effects. Several well locations have stipulations that apply under some alternatives that will not allow occupancy on the original site. These wells have been relocated, by the specialists based on the identified stipulations, to the nearest location that can be occupied. The following table briefly displays the effects of alternatives on the well locations:

Table B-14
Effects of Alternatives - Unit

Alternative	Total Number of Wells Relocated by Alternative	
	BLM RFD	Concentrated RFD
I	2	6
II	0	0
III	9	13
IV	0	0

The Mountain Concentrated RFD wells are relocated as are the Comanche RFD wells originally located in riparian and canyon land ecosystems. The Cimarron riparian wells will only be relocated under Alternative III. Alternatives I and III require supplemental stipulations that move wells from sensitive resource areas.

Mountains

The Mountain RFD wells, jointly developed with the BLM, do not need to be moved by any of the alternatives. Stipulations that apply in Alternatives I and III do not prevent occupancy of the well site. All of the concentrated RFD well locations have stipulations that apply under some alternatives that will not allow occupancy on the original site. These wells have been relocated to the nearest location that can be occupied. That location is mapped in Chapter II.

RELOCATED CONCENTRATED RFD

The locations of the relocated concentrated RFD wells can be found on a map in Chapter II. Legal descriptions of relocated concentrated RFD wells are as follows:

Alternatives I and III

Table B-15
Locations of Relocated Concentrated RFD Wells

Well No.	Legal Description
1R	T9S, R69W, Sec 21, SWSE
2R	T9S, R69W, Sec 22, NESW
3R	T9S, R69W, Sec 14, SWSE
4R	T9S, R69W, Sec 26, SWSE

Acres Disturbed

Well 1R	Pad 6.64 + Roads 1.31 = 7.95 ac	= 8 ac disturbed
Well 2R	Pad 3.97 + Roads 4.92 = 8.89 ac	= 9 ac disturbed
Well 3R	Pad 4.91 + Roads 2.61 = 7.52 ac	= 8 ac disturbed
Well 4R	Pad 3.39 + Roads 0.44 = 3.83 ac	= 4 ac disturbed
		29 total disturbed acres

This relocation, required by stipulations in Alternatives I and III, results in 15 acres less disturbance than Alternatives II and IV for the Mountain concentrated RFD.

Alternatives I and III

Table B-16
Reclamation Figures - Mountains

	Acres		
Well	Disturbed	Reclaimed	Unreclaimed
1R	8	8	0
2R	9	9	0
3R	8	8	0
4R	4	0	4
Total	29	25	4

Again, three of the four wells drilled would be reclaimed at the end of the planning period. For analysis purposes we will use well 4R as the unreclaimed well.

Grasslands

ACRES DISTURBED

In Alternatives I and III, all wells in the Riparian and Canyon Lands on the Comanche have to be moved. This results in an increase of one well on the hard lands and one well on the sandy lands. On the Cimarron, (Alternative III only), it results in an increase of six wells on sandy lands and one well on hard lands. The resultant Acres Disturbed are as follows:

Table B-17
Acres Disturbed - Grasslands

	Major Soil/land type			
Disturbed Acres	Sandy Lands	Hard Lands	Canyon Lands	Riparian
Cimarron	256	138	0	0
Comanche	56	25	0	0

This reflects an increase of 17 acres of disturbed sandy lands, 4 acres of disturbed hard lands; and a reduction of 19 acres of disturbed riparian, and 2 acres of disturbed canyon lands.

RECLAMATION

The following figures were developed in the same manner as reclamation for the RFD wells.

Cimarron Alternative III

Table B-18
RFD Wells by Soil/Land Type - Cimarron NG

	Number of Wells		
Soil/land type	Total	Exploratory	Production
Sandy Lands	107	20	87
Hard Lands	58	11	47

Table B-19
Reclamation Figures - Cimarron NG

	Acres		
Soil/land type	Disturbed	Reclaimed	Unreclaimed
Sandy Lands	256	90	166
Hard Lands	138	48	90
Total	394	138	256

Comanche Alternatives I and III

Table B-20
RFD Wells by Soil/Land Type - Comanche NG

	Number of Wells		
Soil/land type	Total	Exploratory	Production
Sandy Lands	31	13	18
Hard Lands	14	6	8

Table B-21
Reclamation Figures - Comanche NG

	Acres		
Soil/land type	Disturbed	Reclaimed	Unreclaimed
Sandy Lands	56	25	31
Hard Lands	25	12	13
Total	81	37	44

CUMULATIVE EFFECTS

The cumulative effects analysis will be based on the BLM RFD scenario on the Unit.

Oil and Gas Post-Leasing Activity

FORESEEABLE ACTIVITY RELATING TO EXISTING WELLS

The analysis must include an analysis of cumulative effects. In order to do that some trends must be identified for the oil and gas development activities which are already underway within the planning area. The BLM provided RFD incorporates current leasing activity but does not deal with what is likely to happen to already existing wells. The following identifies the level of activity, disturbance, and abandonment that can be expected during the planning period.

Existing Well Disturbance

Mountains

None

Comanche

26 wells with 28 total unreclaimed acres:
26 wells x 1.06 unreclaimed acre/well pad = 28 unreclaimed acres

All 28 unreclaimed acres are on sandy lands

Cimarron

280 wells with 392 total unreclaimed acres:
280 wells x 1.40 unreclaimed acre/well pad = 392 unreclaimed acres

Total unreclaimed acres by major soil/land type (all alternatives):

Sandy Lands:	255 acres (65% x 392 unreclaimed acres)
Hard Lands:	137 acres (35% x 392 unreclaimed acres)
Total	392 acres

Non-Oil and Gas Activities

The quantifiable effects of past and most current ground disturbing activities are reflected in the Forest Plan sediment yields discussed in the Cumulative Effects section of Chapter IV.

This section will concentrate on the other types of activities, and their locations, occurring within the planning area during the planning period. In this way we will disclose the cumulative effects

of post-leasing and other management activities combined with anticipated natural occurrences. These activities will not vary by leasing alternative.

All necessary reclamation activities would be completed within 5 years of disturbance on the BLM RFD well sites.

BLM RFD

Mountains

Disturbed Acres

Recreation:

Recreation Development 92 acres.

Wildfires:

Berry Fire in 1989 affected a total of 1,000 acres near Well 3 (Monument Work Center), including 600 acres of ponderosa pine and 100 acres of Gambel oak.

Reclamation Acres

1,000 acres will be reclaimed early in the planning period.

Comanche

Disturbed Acres

Prescribed Fire

3,000 acres affected by prescribed fire. 200 acres per year are planned on hard lands.

Reclamation Acres

2,000 acres will be reclaimed during the planning period. The 1,000 acres to be burned in years 11 through 15 will not be reclaimed (recovered) until after the planning period.

1,000 acres will be unreclaimed at the end of the planning period.

Cimarron

Disturbed Acres

Recreation

Recreation Development 32 Acres.

Wildfires on sandy lands

1,500 acres will be disturbed during the planning period (100 acres/year).

Prescribed fire

6,000 acres will be disturbed during the planning period (400 acres/year) on the following major soil types:

Sandy Lands:	3,000 acres
Hard Lands:	3,000 acres
Total	6,000 acres

Reclamation Acres

Wildfires on sandy lands

1,000 acres will be reclaimed during the planning period. The 500 acres to be burned in years 11 through 15 will not be reclaimed until after the planning period.

500 acres will be unreclaimed at the end of the planning period.

Prescribed fire

4,000 acres will be reclaimed during the planning period.

Sandy Lands:	2,000 acres
Hard Lands:	2,000 acres
Total	4,000 acres reclaimed

The 2,000 acres to be burned in years 11 through 15 will not be reclaimed (recovered) until after the planning period.

Sandy Lands:	1,000 acres
Hard Lands:	1,000 acres
Total	2,000 acres unreclaimed

Cumulative Effects of All Activities

BLM RFD

Table B-22
Total Affected Acres - Mountains

	Acres		
Well Location	Disturbed	Reclaimed	Unreclaimed
1	4	4	0
2	5	5	0
3	97	97	0
4	704	700	4
Total	810	806	4

Table B-23
Total Affected Acres - Comanche NG

	Acres		
Soil/land type	Disturbed	Reclaimed	Unreclaimed
Sandy Lands	82	24	58
Hard Lands	3023	2011	1012
Canyon Lands	2	1	1
Riparian	2	1	1
Totals	3109	2037	1072

Table B-24
Total Affected Acres - Cimarron NG

	Acres		
Soil/land type	Disturbed	Reclaimed	Unreclaimed
Sandy Lands	5014	3178	1836
Hard Lands	3271	2051	1220
Riparian	33	6	27
Totals	8318	5235	3083

REASONABLE FORESEEABLE DEVELOPMENT ACTIVITY WITHIN THE PIKE AND SAN ISABEL NATIONAL FOREST AND THE COMANCHE NATIONAL GRASSLAND

INTRODUCTION

Forest lands administered by the Pike and San Isabel National Forest (PSINF) are situated within parts of the Denver basin, Park basins, Uinta-Piceance-Eagle basins, Albuquerque-Santa Fe-San Luis Rift basins, Raton basin-Sierra Grande uplift, Las Animas arch, and Anadarko basin U. S. Geological Survey petroleum resource assessment provinces. Of those seven, only the Anadarko basin province contains PSINF administered lands that have high potential for the occurrence and development of oil and gas, while the Park basins, Las Animas arch, and Raton basin-Sierra Grande uplift provinces contain a moderate potential for occurrence and development.

The Anadarko basin province is the only province that contains producing oil and gas wells on PSINF lands. The eastern portion of the Comanche National Grasslands (CNG) lies adjacent to the western margin of the Greenwood Topeka trend (Beams, 1982). The trend is named for the Greenwood field and its primary gas producer, the Pennsylvanian Topeka Formation. Several small oil and gas fields are located within the boundaries of the grasslands.

Oil and Gas Activity

Historical Background

A review of the historical and active well database (Hotline, 1991) failed to identify any exploratory oil and gas drilling on either the Pike or San Isabel national forests. There was one stratigraphic test drilled within the Pike National Forest by Shell Oil Company during 1955 in the NW1/4NW1/4, Section 32, T. 11 S., R. 67 W. with a total depth of 569 feet.

Oil and gas exploration and development within the CNG has been predominately within Baca County. Otero and Las Animas counties have had minor exploratory drilling with no discoveries reported. Eleven wells have been drilled and completed as dry holes in Otero County, including one well completed on CNG. No shows were reported. Drilling activity in the Las Animas County portion of the CNG has been slight. Six wells were drilled and completed as dry holes with no shows reported. Of those six, two were drilled on CNG. The last well drilled within the boundary of the CNL in Las Animas County was in 1975.

A total of 117 wells were reported drilled in the Baca County portion of the CNG. Of those, approximately 34 percent (%) or 43 wells were reported as completed for production. Wells drilled on

CNG in Baca county accounts for 57 or 49 % of the 117 wells, while only 28 % of the 200 wells drilled in Baca County for the same period. Figure 1 illustrates drilling activity for Baca County for the period 1950 through 1990 and shows that drilling averaged approximately five wells per year.

There are six formally designated oil and gas fields that occur either wholly or partly within the CNG: 1.) Vilas, 2.) Flank Northwest, 3.) Prairie Dog, 4.) Campo, 5.) Rooster, and 6.) Fortuna. Of the six the Vilas, Prairie Dog, and Campo contain wells that were drilled on federal lands. Field status, reservoir(s), and production history are illustrated in Table 1.

Present Activity

The only field being actively developed and produce on PSINF managed lands is the Campo field. At present the field has 24 wells capable of production and one P&A's oil well, of which 4 oil wells, one water disposal well, and the P&A'd well are located on federal lands. Oxy U. S. A., Inc. reached total depth in their Comanche Federal B #1 well in the Lansing Formation on February 6, 1991, selectively perforated the Lansing, and at last report was preparing to test the well for production. The Lansing reservoir of the Campo field is an anticlinal trap with well defined oil/water contact and is therefore of limited size.

A remote wildcat is being planned by Murfin Drilling company for the CNG in Otero County (Western Oil World, 1991). The well location is reported to be in NE$^{1/4}$SE$^{1/4}$, Section 8, T. 25 S., R. 54 W., and is scheduled to be drilled to a depth of approximately 6,100 feet to test the Pennsylvanian Morrow Formation (Dwights, 1991).

Reasonable Foreseeable Development Activity (RFD)

The RFD will be discussed for the Pike and San Isabel National Forests and the Comanche National Grasslands. To date the only production from the CNG has been from the Pennsylvanian Topeka, Lansing, Kansas City, Marmaton, and Cherokee formations. Any drilling activity outside of the high potential area or Pennsylvanian play in Baca County is expected to be exploratory and concentrated in the moderate potential areas, such as Las Animas and Otero counties, as well as along the easter margin of South Park basin.

Drilling activity projections are based on historical trends for the Baca County portion of the CNG and drilling frequency, or lack of, for the remainder of the PSINF. Descriptive statistics, linear least squared regression, and trend analysis were conducted for Baca County for the period or 1950 to 1990, and represents the period of time of exploratory and development drilling to delineate all of the oil and gas fields in the county. The results of these analyses are illustrated in Figure 2, which compares the drilling history with a linear regression plot, and the forecast that was

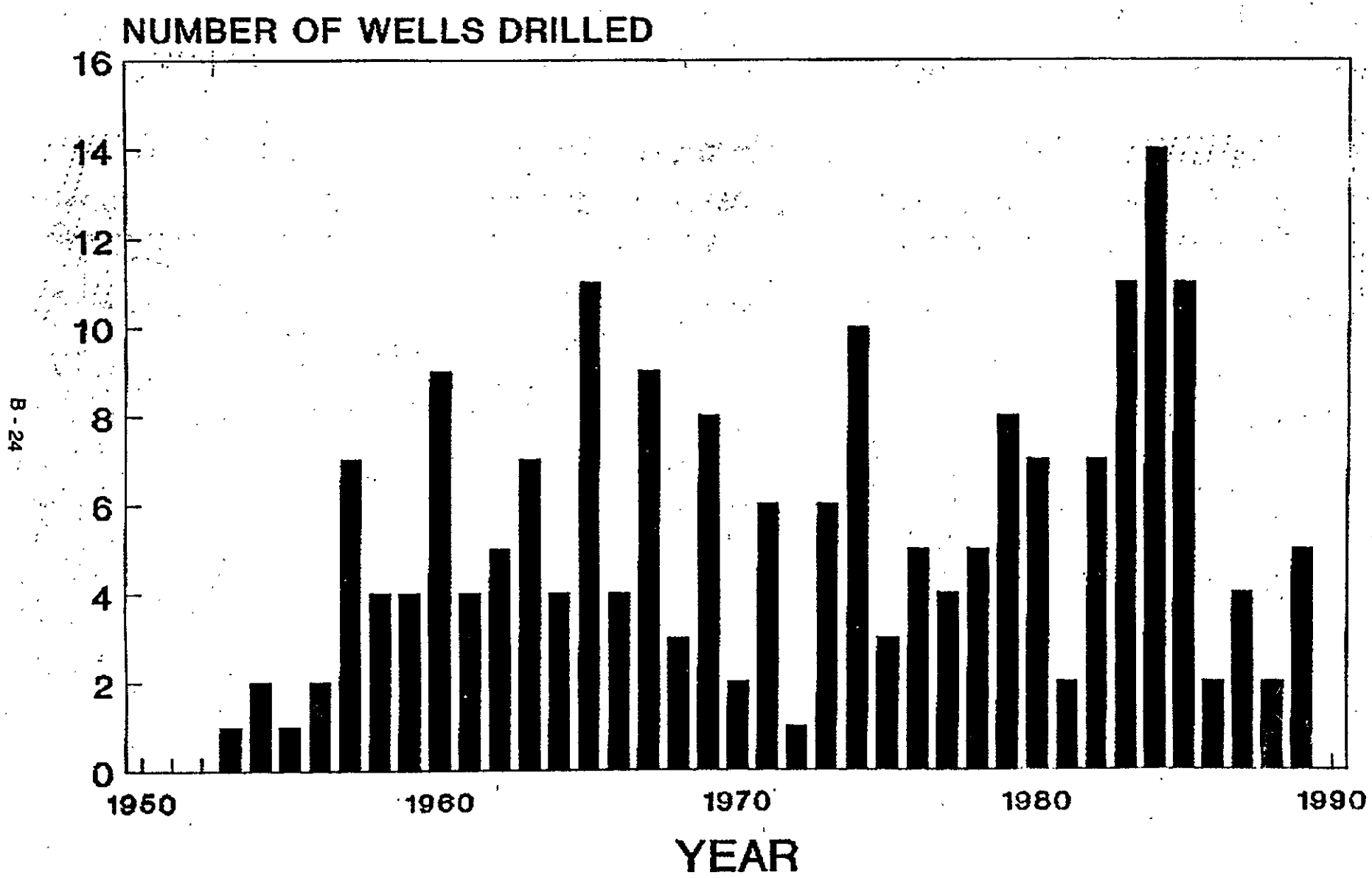

Figure 1. Drilling history-Baca County.

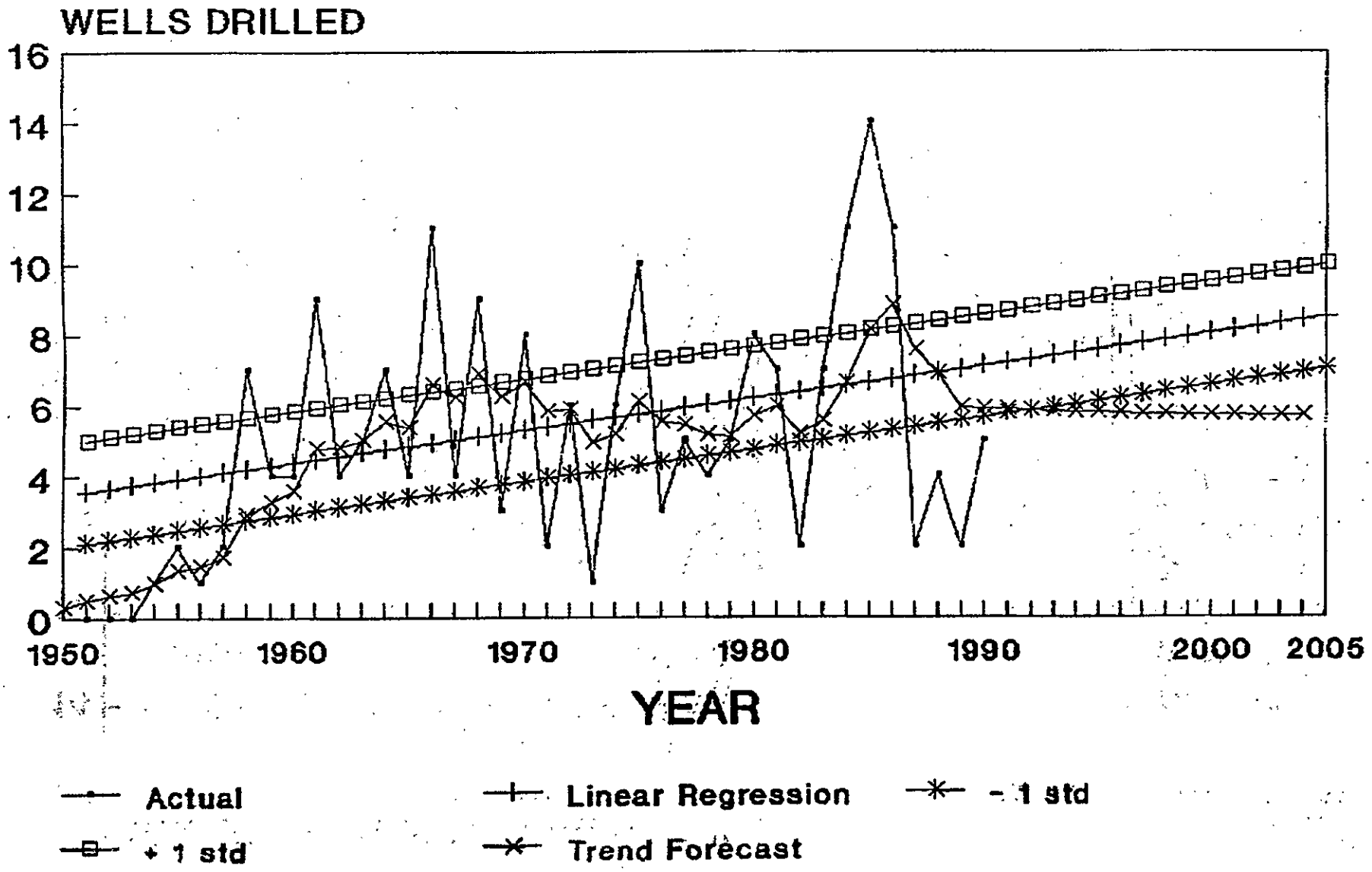

Figure 2. Drilling activity forecast.

developed using a trend comparison model described by Gradner (1988). Descriptive statistics of the historical data base resulted with an average of 5 wells per year with a standard deviation (STD) of 3.44. The suggests, based on past activity, that from 2 to 8 wells may be expected to be drilled within Baca County. This projection does not take into account any potential for increased activity.

Linear regression of the drilling history resulted with and average of 8 wells per year for Baca County, with an average range (+ and - 1 STD) of approximately 6 to 10 per year. Figure 3 illustrates the annual frequency of wells drilled. As can be seen the most frequent number of wells drilled during the period of 1950 to 1990 is 4, with a range 2 to 7. Trend forecasting (Figure 2), based on the mean squared error method (Gradner, 1988), projected approximately 5 to 6 wells per year.

The forecast based on linear regression is the most optimistic of the methods and takes into account a steady growth of activity and was selected as the basis of forecasting drilling activity within the Baca County portion of the CNG. Of the 8 wells per year forecast for Baca County, 23 % or 2 wells are expected to be drilled on the CNG. An additional 1 well per year is projected for the CNL within Otero and Las Animas counties. It is not expected that there will be any wildcat wells drilled on either the Pike San Isabel national forests, however a projection of 1 well every four years does not seem unreasonable. This is based on geophysical surveys conducted recently along the eastern margin of the South Park basin.

K. G. Witherbee
Geologist
4/26/91

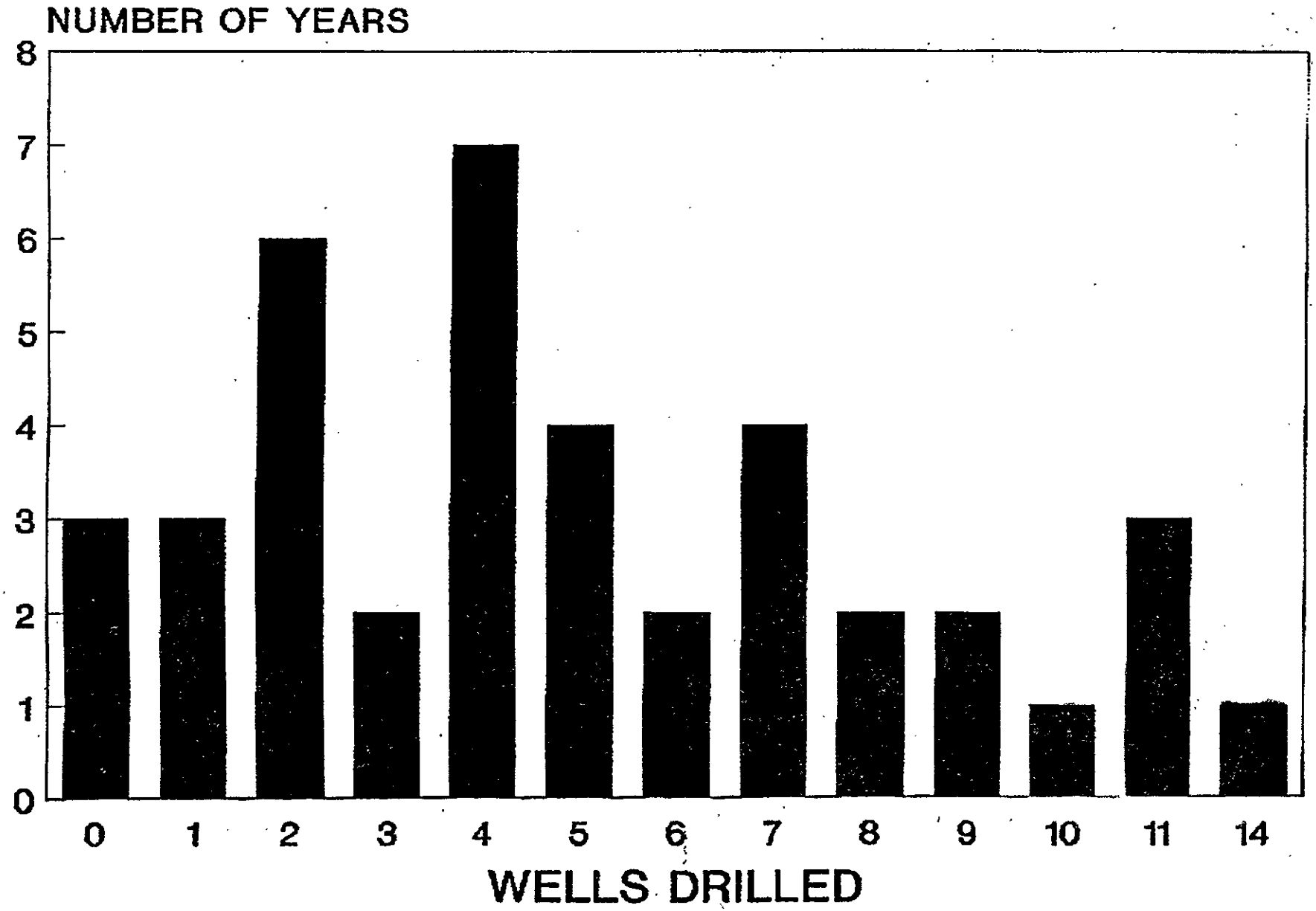

Figure 3. Frequency graph-Baca County.

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United States Department of Agriculture | Forest Service | Cimarron National Grassland | P.O. Box J, 242 Highway 56 E., Elkhart, KS 67950

Reply to: 2820 Date: March 1, 1991

Subject: Reasonably Foreseeable Development Analysis Assumptions, Cimarron National Grassland

To: Forest Supervisor

The first well drilling venture in Morton County occurred in 1929. This site was located in the SE 1/4 of Section 22-T34S-R43W (currently Cimarron National Grassland surface) it was a dry hole. First production occurred on April 2, 1930. There were very few wells drilled on surfaces currently administered by the Cimarron National Grasslands until the 1950's; based on conversations with long time industry representatives, local citizens and historical accounts stated within "Cornerstone of Kansas" Morton County's Historical book (pages attached).

Based on the Cimarron District's well inventory files, there have been approximately 450 oil and gas wells drilled on grassland surface. As previously stated very few wells (estimate 20 wells) were drilled prior to 1950. Subsequently, approximately 430 wells were drilled from 1950 through 1990 on the Cimarron National Grassland.

This represents a 40 year time period and an average of eleven (11) wells drilled per year. The eleven (11) well average, establishes a good analysis trend, reflecting the mini boom/bust periods, the energy industry has incurred over a forty year period of time during varying economical and political situations.

Utilizing the eleven well average, there would be approximately 165 wells drilled on the Cimarron National Grassland within the next 15 years.

JOE HARTMAN
District Ranger

RJB:db

MEMBERS OF THE STATE LINE CLUB . . . Shown in 1950 at a birthday party (left to right) Rachel Lawless, Marie Roberts, Ella Ebenhaus, Mrs. William Zimmett, Helen McCormick, Mrs. Ben Linder, Leona Hardwick, Bessie Shrauner, Josephine Randolph, Myrtle Munyon, Mrs. Derrington (Mildred Sweet's mother), Ada Gore and Lenora Ferguson.

MORTON COUNTY OIL BOOMS

By Bob Posey

Certified Petroleum Geologist — No. 2808

What was the biggest factor contributing to the change in economic conditions of Morton County?

Everyone would agree that it was the discovery of oil and gas. Approximately 54 years ago, Fred Casper and Jim Heinz worked out one of the first drilling deal for Morton County in the SE/4 Sec. 22-34s-43w; about 4 miles west and 4 miles north of Elkhart.

About that same time John Brown, with the help of Cleal Winters, an experienced oil man from Wichita, leased thousands of acres of land for oil and gas in eastern Colorado and Morton County. Mr. Brown turned the greater part of these leases to the Argus Gas Company, Hugoton, Kansas.

That venture in 1929, just might have changed the whole economic picture of the area a quarter of a century earlier had the promoters come a mile farther west or gone 1,000 feet deeper. Drilling stopped 3,500 feet.

It was dry. But, the most fanciful dreams of these pre-depression era drillers certainly never conjured up anything to compare with what has happened in the county. The 1929 location northwest of Elkhart today is within sight of the Interstate oil field which was opened up in 1954.

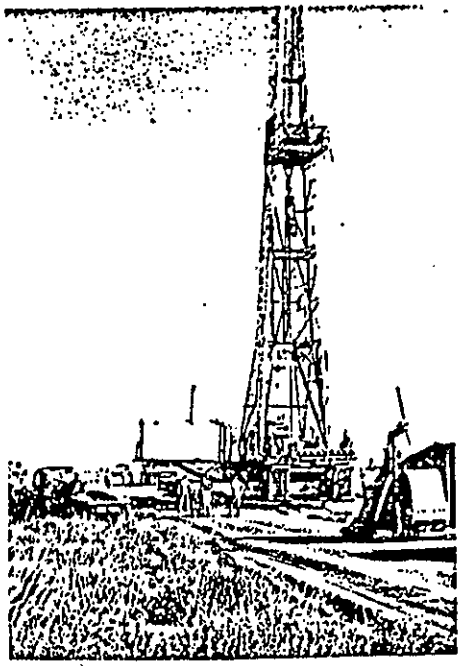
The first commercial production pay was along the extreme east side of Morton County which lies in the vast Hugoton gas field embayment. Gas production from the shallow Case Group of Permian formations began early in the 1930's.

Morton County's Hugoton gas production generally is from 2,200 to 2,400 feet deep.

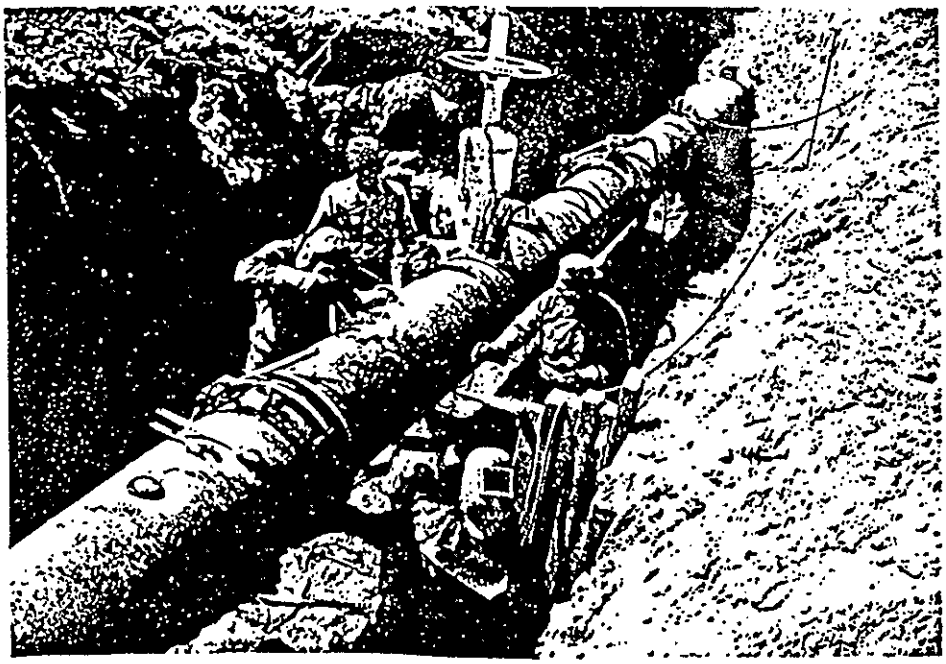
Morton County consists of approximately 729 square miles, of which 558 are oil and gas productive. Geologically, Morton County is located just west of the center of the Hugoton Embayment of the prolific Anadarko Basin.

According to my well records, the first significant drilling boom commenced March 5, 1930. Argus Pipeline Company drilled 22 gas wells east of Rolla extending the Hugoton Gas Field into Morton County. The gas pay was encountered at 2500-2900 feet. There were only 35 Hugoton gas wells at the end of 1944, and development continued until approximately 300 Hugoton wells produce at present. Until the

Wind power pumping salt water off Red Cave Gas Wells in Interstate Oil Field.



Moving drilling rig - Interstate Oil Field (1956).



PEPL welder, Gene Brown, welding on line.

1970's, this was a portion of the largest Gas Field in the world - THE HUGOTON GAS FIELD.

April 2, 1930, Hydraulic spudded the #1 State in section 22-34S-43W, northwest of Elkhart; which recorded gas shows that later lead to the discovery of the Red Cave Gas Field by Anadarko Production Company in 1960. The gas pay zone was encountered at 1200-1250.

In 1948, Stanolind (Amoco) discovered the Richfield Field just northeast of the original county seat. Panhandle Eastern and Vickers added other pays in 1956 and 1957 respectively.

March 1951, Cities Service discovered the prolific Greenwood Field which produces from 17 separate porous limestone beds encountered at 2600-3400 feet. Panhandle Eastern, Cities Service, and Colorado Interstate basically developed this 260 well field, which is the second largest gas field in Kansas with reserves expected to be in excess of one trillion cubic feet of gas. The Boehm (Morrow) Field was discovered by Cities Service by drilling of a test whose farm name was the Greenwood B-1 and the Greenwood Field was discovered by a well called the Boehm A-1.

April 1954, Stanolind discovered the prolific Interstate Oil Field which is located northwest of Elkhart. Huber, Panhandle Eastern, Musgrove, and Cities Service developed the Interstate Field, which has produced 24,165,553 barrels of oil as of December 1984. Anadarko Production Company operates the secondary recovery operation, which has produced 17 of the 24 million barrels of oil.

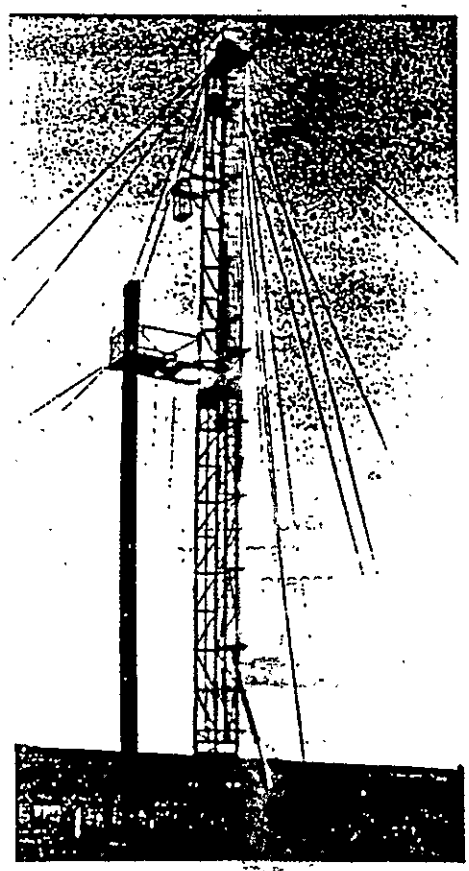
July 1954, Huber discovered the Sparks Gas Field on a Superior farmout with Carter and Skelly support. Colorado Interstate Gas Company provides the marketing facilities for this tremendous gas field.

July 1955, the Taloga Field, located northeast of Elkhart, was discovered by Colorado Oil and Gas. Panhandle Eastern and Carter added other pays later. Panhandle Eastern gathers the gas.

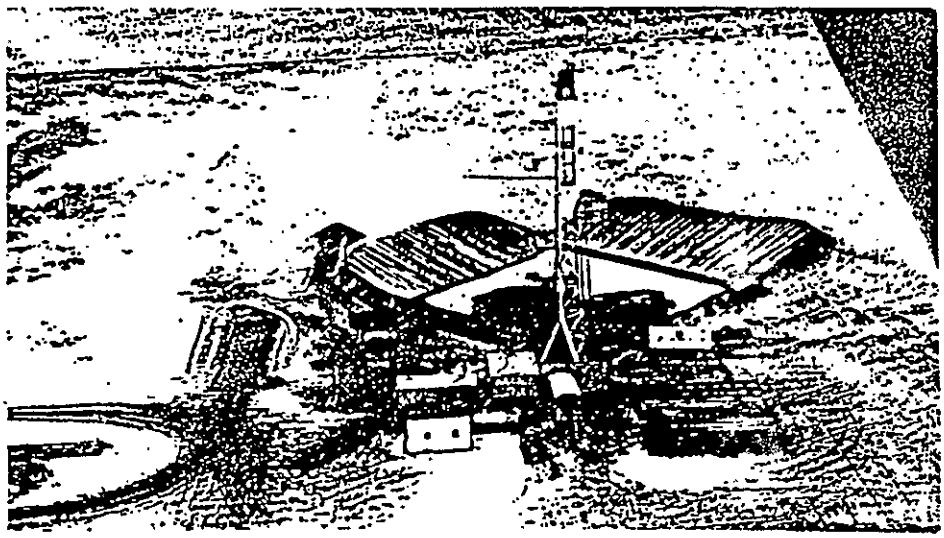
April 1955, Panhandle Eastern spudded the Jones #1-11, which was the discovery well for the Elkhart Field. Anadarko Production Company developed the field and the Elkhart West Field.

April 1957, Panhandle Eastern discovered the Patsy Field. Production: 4.8 billion cubic feet of gas.

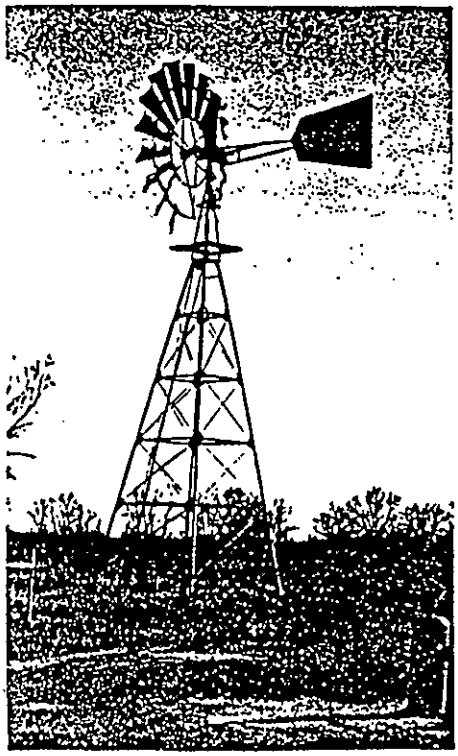
March 1959, Cities Service spudded the Wilburton Gas and Oil Field discovery well. The oil field has produced in excess of 10 million barrels of oil.



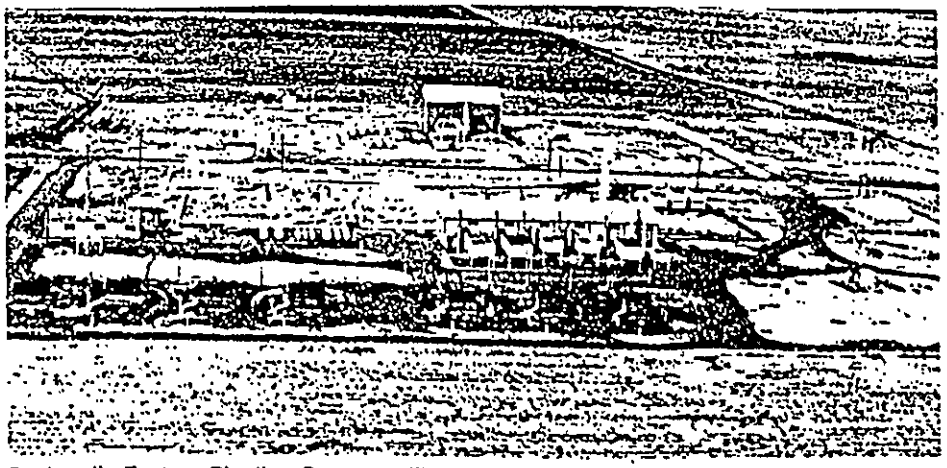
Oil field pulling unit.



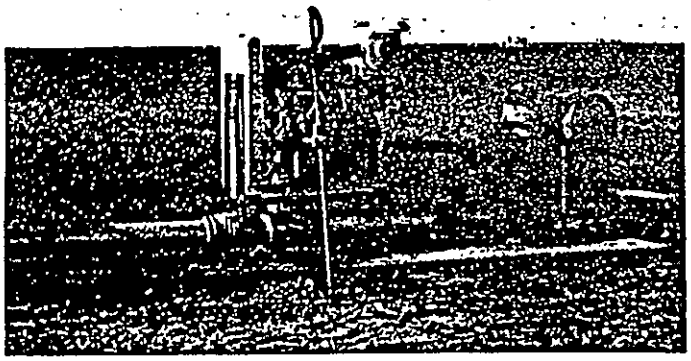
Drilling Rig.



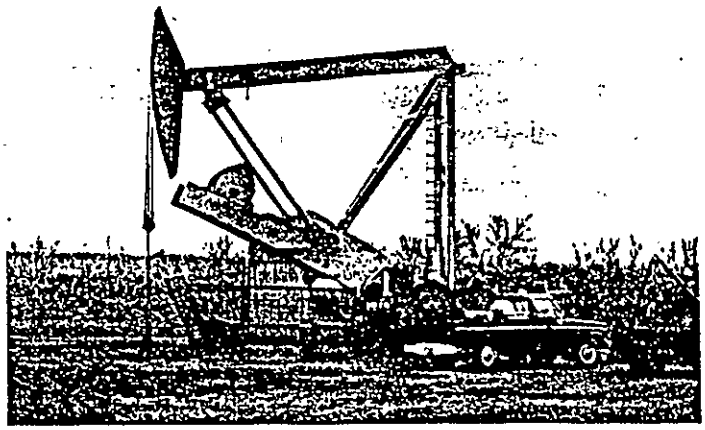
Interstate Red Cave #2 Pumping salt water off gas well.



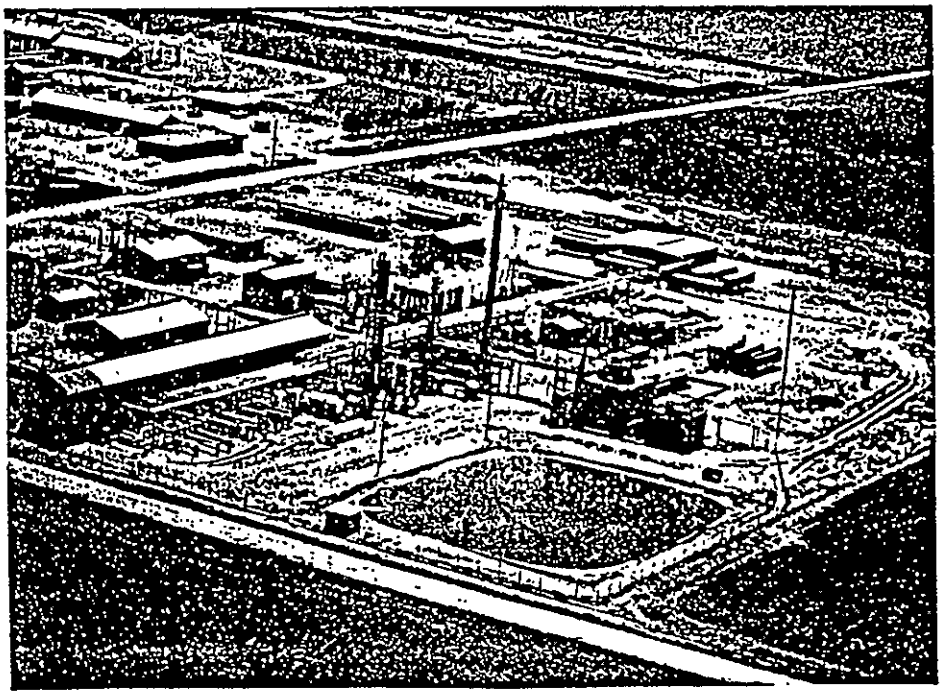
Panhandle Eastern Pipeline Company Elkhart Station.



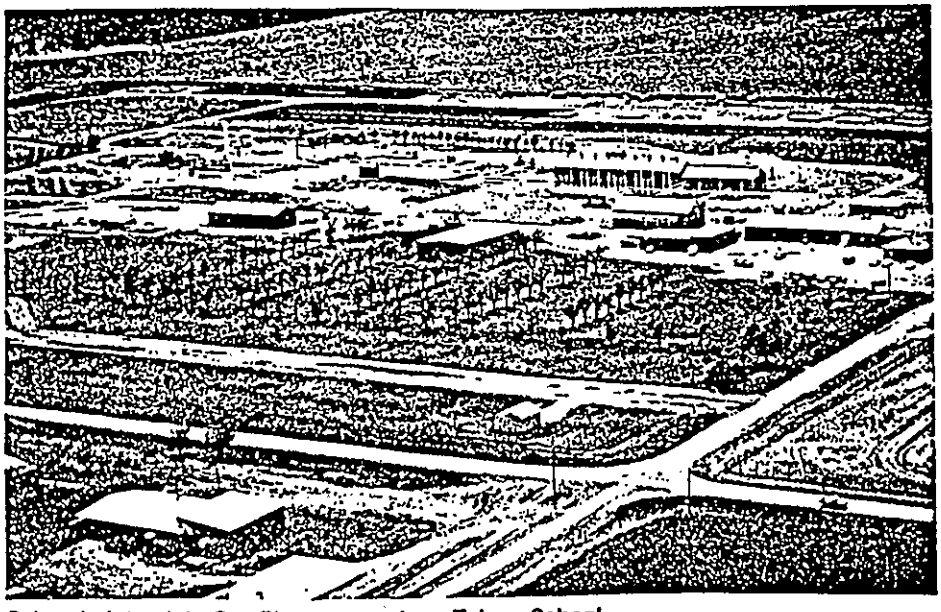
Irrigation Well & Pump



Interstate Oil Field.



Helium Plant.



Colorado Interstate Gas Plant across from Taloga Schoo'

This field lead to the extension of Wilburton North and Wilburton Northwest Fields.

November 1959, Pan American (Amoco) discovered the Kinsler Field which produces from the Council Grove, Marmaton, Morrow, and St. Louis. Amoco has recently developed the Council Grove on their hugh acreage block in the northeast portion of Morton County. Production: 76 billion cubic feet of gas.

February 1962, Thomas & Brewer confirmed the Berryman Field on a Panhandle Eastern farmout. Anadarko Production Company and Cities Service Oil developed the remainder of the field. Ladd Petroleum at the present has the secondary phase. Production: 3,596,117 barrels of oil.

November 1963, Anadarko Production Company discovered the prolific Cimarron Valley Field which was produced 2.8 million barrels of oil. This lead to the discovery of the Santa Fe Trail Field in 1978. It has produced a million barrels of oil and 8.2 billion cubic feet of gas.

June 1978, Cities Service discovered the Winter Gas Field, which lead to the prolific Winter North Oil Field in 1980. This field has already produced 706,902 barrels of oil.

These are some of the more prolific oil and gas discoveries. The oil and gas industry have invested billions of dollars in Morton County and have had a major impact on the economical growth of this county.

Today it is a different story in this region where a little over 50 years ago thousands of acres of land could be purchased for a few dollars an acre, or for paying delinquent taxes. The man or woman who used to "drag a washtub on a chain picking up cowchips for fuel in the cook stove", has now been provided a comfortable living with their investment of time and ownership in Morton County.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
9522-H E. 47TH PLACE
TULSA, OKLAHOMA 74145

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
KS RMP
1610 (047)

Your Reference 2820

MAR 26 1991

Mr. Jack Weissling
Forest Supervisor
Pike & San Isabel National Forest
Comanche & Cimarron National
Grasslands
1920 Valley Drive
Pueblo, CO 81008-1797

Dear Mr. Weissling:

This is in response to your letter of March 18, 1991, concerning the oil and gas leasing environmental impact statement (EIS) currently being prepared for the Forest.

We have completed a review of the revised Reasonable Foreseeable Development (RFD) scenario prepared for the Cimarron National Grassland. We concur with the estimates derived by use of a forty-year historical average which encompasses the most active period of oil and gas activity in Morton County. The estimate of 165 wells for the life of the planning effort is reasonable and entirely within the scope of what an RFD is meant to portray.

The BLM split estate tracts within Morton and Stevens Counties which are to be included in your Forest Plan EIS have been evaluated and analyzed for required BLM oil and gas leasing stipulations. Enclosed is a copy of the description of our stipulations from our Kansas planning document, the tract site descriptions by county as well as site specific stipulations.

Additionally, we agree that it is important that we finalize the Memorandum of Understanding (MOU) for oil and gas operations on the Cimarron NG as well as for the split estate tracts within Morton and Stevens Counties. With this goal in mind Brian Mills of my staff will be working directly with personnel from the Cimarron NG to produce a multi-facetted MOU beneficial to both agencies.

We look forward to the continued cooperation between our offices.

Sincerely,

Jim Sims
District Manager

1 Enclosure

cc:
Cimarron National Grasslands (w/encl)
Box J
Elkhart, KS 67950

NOTES

[1] USDA, Forest Service; Final Rule, Oil and Gas Resources, 36 CFR Parts 228 and 261; Federal Register, Vol. 55, No. 55; March 21, 1990.

[2] USDI, BLM, Colorado O&G Leasing & Development, Final Environmental Impact Statement, January, 1991.

[3] Letter of March 26, 1991, from USDI, BLM, Tulsa, Oklahoma.

[4] USDI, BLM, Colorado O&G Leasing & Development, Final Environmental Impact Statement, January, 1991.

[5] ibid.

[6] Comanche exploratory/production percents verified via telephone by Kermit Witherbee, BLM Geologist, on May 1, 1991. Clarification of Witherbee's April 12, 1991 BLM Evaluation of RFD (Exhibit C-1).

[7] USDA, Forest Service; Smith, Eugene L; Oil and Gas Leasing Transportation System Report, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands; Pueblo, Colorado, April 10, 1991.

[8] ibid.

[9] ibid.

APPENDIX C

APPENDIX C

MAPS OF LEASING STATUS

The following maps display the specific land parcelling that is known to the Forest Supervisor and BLM at this time. Those lands are:

Pending Lease Requests	Lands for which industry has approached the BLM about leasing. These lands are currently unencumbered by any oil and gas rights. The lands, if determined to be available for leasing, could be authorized for leasing by the Deciding Officer in the record of decision.
Leased Lands	These lands are currently leased, generally with standard lease terms. When these leases expire the deciding officer may choose to authorize the BLM to readvertise the parcels. The conditions that are selected in the Leasing Availability decision will be applied at that time. The Forest Service will respond to proposals for leasing in the manner described in Chapter I. The identification of conditions at this time **does not** affect the existing lease conditions.
Split-Estate Lands	These are lands that the BLM has requested be included in the analysis. The Forest Service Deciding Officer has no authority to make any decisions regarding these lands. A separate decision document will be signed by the BLM Authorized Officer relating to these lands.
All Other Lands	These lands are within the analysis area but are as yet unidentified in terms of proposed lease parcelling. When specific parcels are identified in the future the Forest Service will implement the Record of Decision in the manner described in Chapter 1.

Figure C-1
Leasing Status

PIKE AND SAN ISABEL NATIONAL FOREST

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

R.77W. R.76W. R.75W. R.74W.

T.6S. T.7S. T.8S. T.9S. T.10S. T 11S. T.12S. T.13S T.14S. T.15S.

T.8S. T.9S. T.10S. T.11S. T.12S. T.13S. T.14S. T.15S. T.51N.

R.3E. R.4E. R.5E. R.6E. R.7E. R.8E. R.9E. R.10E. R.11E. R.12E.

LEGEND

- LEASED LAND
- SPLIT ESTATE
- LEASE PENDING

NORTH PORTION

COLORADO

PIKE AND SAN ISABEL NATIONAL FOREST

Figure C-2
Leasing Status

C-4

R.7E. R.8E. R.9E. R.10E. R.11E.

T.50N. T.49N. T.48N T.47N. T.46N. T.45N. T.44N. T.43N. T.42N. T.41N. T.40 N. T.39N.

T.17S. T.18S. T.19S. T.20S. T.21S. T.22S. T.23S. T.24S. T.25S. T.26S. T.27S. T.28S T.29S T.30S. T.31S T.32S

Salida (7080)
Maysville
Poncha Springs (7465)
Poncha Pass
Cleora
Wellsville
Howard
Simmons Pk 12051
Burned Timber Mtn 11880
Alder (6536)
Coaldale
Cotopaxi
Texas Creek
Parkdale
Canon City (5332)
Penrose
Florence (5186)
Rockvale
Portland
Hobson
Horseshoe Mtn
Curley Pk 9623
Bushnell Pk 13105
Bonanza
Oakstaff Mtn 12072
Villa Grove
Nipple Mtn
Hillside
Gem Mtn 8685
Buck Mtn 8679
Wetmore (6081)
Adobe Pk 10188
Greenwood
Bear Pk 9577
De Weese Res
Cottonwood Peak 13573
Electric Peak 13621
Mineral Hot Springs
Mt Owen 13397
Westcliffe (7666)
Silver Cliff
Querida
Rosita
Wixson Mtn 11121
Fairview
Valley View
Goodpasture
Saguache
Gibson Pk 12816
Rito Alto Pk 12715
Horn Peak 13450
Antelope Creek
Moffat
Crestone
Crestone Peak 14294
San Isabel
Froze Gr
Muddy
Colorado
Rye
Greenhorn
Middle Knob
LUIS MARIA BACA GRANT NO 4
Greenhorn Mtn 12349
Center
Hooper (7560)
GREAT SAND DUNES NAT MONUMENT
Gardner
Badito Cone 8835
Red Wing
Farisita
Huerfano
Ansel
Dunul
Sevenmile Plaza
Mosca
Torres
Sheep Mtn
Slide Mtn 12340
Iron Mtn
N La Veta Pass
Silver Mtn 10522
Black Hills
Veta Pass
Mt Mestas
Mt Lindsey 14042
Blanca Pk
Little Bear Peak 14037
Buck Mtn 10440
Russell
Sierra
Middle Creek
La Veta (7013)
Codo
Mortimer
Goemmer Butte
Three Bridges
Blanca
Fort Garland (7930)
Harrison Pk 11598
Cucharas
Spanish Pk
E Spanish Pk 12659
Cucharas Pass
COSTILLA

FOREST BOUNDARY
SAN ISABEL NATIONAL FOREST
WET MOUNTAIN VALLEY
SANGRE DE CRISTO RANGE
9TH GUIDE MERIDIAN WEST
6TH PRINCIPAL MERIDIAN
NEW MEXICO
COLORADO

LEGEND

- LEASED LAND
- SPLIT ESTATE
- LEASE PENDING

LEGEND

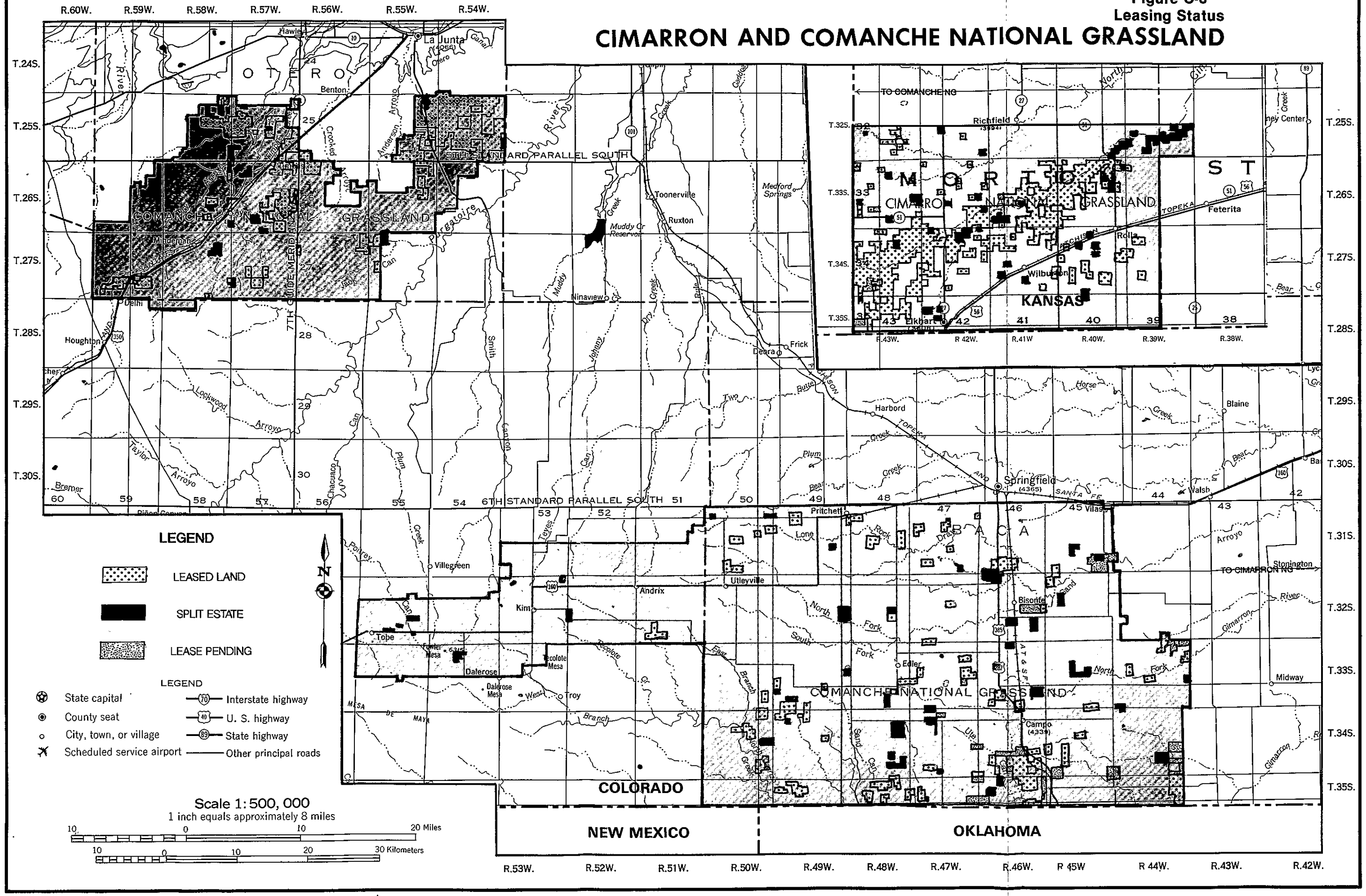
- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles
10 0 10 20 Miles
10 0 10 20 30 Kilometers

SOUTH PORTION

Figure C-3
Leasing Status

CIMARRON AND COMANCHE NATIONAL GRASSLAND



LEGEND

- LEASED LAND
- SPLIT ESTATE
- LEASE PENDING

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500,000
1 inch equals approximately 8 miles

10 0 10 20 Miles
10 0 10 20 30 Kilometers

APPENDIX D

APPENDIX D

STIPULATION BASE MAP

The Stipulation Base Map is designed to display the conditions that may be applied to leases on those lands being studied based on management alternatives. This map is at a scale of 1:126,720.

Standard lease terms and stipulations, No Surface Occupancy, Timing Limitations, and Controlled Surface Use are color coded on the base map and relate to the most restrictive stipulation that would be applied to any piece of land given the most protective scenario. Areas smaller than 40 acres which may require restrictive stipulations were not mapped. Lands which may be discretionally removed for leasing for a portion or the duration of the planning period are also identified. The scale of the base map is so small that there are many areas of inclusions that were impossible to map. It is provided for general information only.

The Stipulation Base Map was developed from the working maps and Primary Base Series (PBS) quads used by the Interdisciplinary Team in their impact analysis and which will be used in project implementation.

The PBS are some 270 in number and include 6 mylar overlays displaying resource information on each. The sheer volume of the information makes it impossible to freely distribute to the public. The quads from which the Stipulation Base Map was developed will be made available for public review at the following locations:

The Pike and San Isabel, Cimarron and Comanche Forest Supervisor's Office
1920 Valley Drive
Pueblo, Colorado (719) 545-8737

The Bureau of Land Management, Colorado State Office
2850 Youngfield Street
Lakewood, CO 80215 (303) 236-1756

Quads for each sub-unit will be located at the following offices:

Leadville Ranger District
2015 N. Poplar
Leadville, CO 80461 (719) 486-0749

So Platte Ranger District
11177 W. Eighth Ave.
Lakewood, CO 80225 (303) 236-7386

So Park Ranger District
PO Box 219
Fairplay, CO 80440 (719) 836-2031

Salida Ranger District

325 W. Rainbow Blvd.
Salida, CO 81201 (719) 539-3591

San Carlos Ranger District
326 Dozier St.
Canon City, CO 81212 (719) 275-4119

Pikes Peak Ranger District
601 S. Weber St.
Colorado Springs, CO 80903

Cimarron National Grassland
242 Hwy 50 East
Elkhart, KS 67950 (316) 697-4621

Comanche National Grassland
27162 Hwy 287
Springfield, CO 81073 (719) 523-6591

BASE MAPS SAVED IN SEPARATE FILE DUE TO FILE SIZE. PLEASE SEE SOUTH PORTION.PDF, NORTH PORTION.PDF, AND APPENDIX D.PDF IN "OIL AND GAS EIS" FOLDER FOR THESE IMAGES.

APPENDIX E

APPENDIX E

RESOURCE MAPS

Resource maps in this appendix are small scale duplicates, in a gross sense, of the Resource Base Quad Maps and their mylar Overlays used in the analysis. These duplicates are visual aids intended to display the location of specific resources that are related to the stipulations identified in Appendix F.

These small resource-identifying maps were developed from the working maps used by the Interdisciplinary Team. The resource maps give the reader an understanding of the resource values that were analyzed.

Figure E-1
Resource Map

PIKE AND SAN ISABEL NATIONAL FOREST

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500,000
1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

R.77W. R.76W. R.75W. R.74W.

T.6S. T.7S. T.8S. T.9S. T.10S. T 11S. T.12S. T.13S T.14S. T.15S.

T.8S. T.9S. T.10S. T.11S. T.12S. T.13S. T.14S. T.15S. T.51N.

R.3E. R.4E. R.5E. R.6E. R.7E. R.8E. R.9E. R.10E. R.11E. R.12E.

LEGEND

- MUNICIPAL WATERSHED
- STEEP SLOPE AND/OR SEVERE EROSION POTENTIAL
- MASS GEOLOGICAL WASTING
- EXCEEDS AND WITHIN 10% SEDIMENT THRESHOLD

NORTH PORTION

COLORADO

Figure E-2
Resource Map

PIKE AND SAN ISABEL NATIONAL FOREST

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500,000
1 inch equals approximately 8 miles
10 0 10 20 Miles
10 0 10 20 30 Kilometers

R.77W. R.76W. R.75W. R.74W.

T.6S. T.7S. T.8S. T.9S. T.10S. T 11S. T.12S. T.13S T.14S. T.15S.

T.8S. T.9S. T.10S. T.11S. T.12S. T.13S. T.14S. T.15S. T.51N.

R.3E. R.4E. R.5E. R.6E. R.7E. R.8E. R.9E. R.10E. R.11E. R.12E.

LEGEND

DEVELOPED RECREATION SITES

VISUAL QUALITY RETENTION ZONES

NORTH PORTION

COLORADO

Figure E-3
Resource Map

PIKE AND SAN ISABEL NATIONAL FOREST

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

R.77W. R.76W. R.75W. R.74W.

T.6S. T.7S. T.8S. T.9S. T.10S. T.11S. T.12S. T.13S. T.14S. T.15S. T.51N.

R.3E. R.4E. R.5E. R.6E. R.7E. R.8E. R.9E. R.10E. R.11E. R.12E.

LEGEND

BIG GAME AND INDICATOR SPECIES CRITICAL HABITAT

T & E SPECIES

SPECIAL INTEREST OR RESEARCH NATURAL AREA

NORTH PORTION

COLORADO

Figure E-4
Resource Map

PIKE AND SAN ISABEL NATIONAL FOREST

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500,000
1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

R.77W. R.76W. R.75W. R.74W.

T.6S. T.7S. T.8S. T.9S. T.10S. T 11S. T.12S. T.13S T.14S. T.15S.

T.8S. T.9S. T.10S. T.11S. T.12S. T.13S. T.14S. T.15S. T.51N.

R.3E. R.4E. R.5E. R.6E. R.7E. R.8E. R.9E. R.10E. R.11E. R.12E.

LEGEND

FISHERIES

CULTURAL

ALPINE ZONE
(OUTSIDE WILDERNESS AREAS)

NORTH PORTION

COLORADO

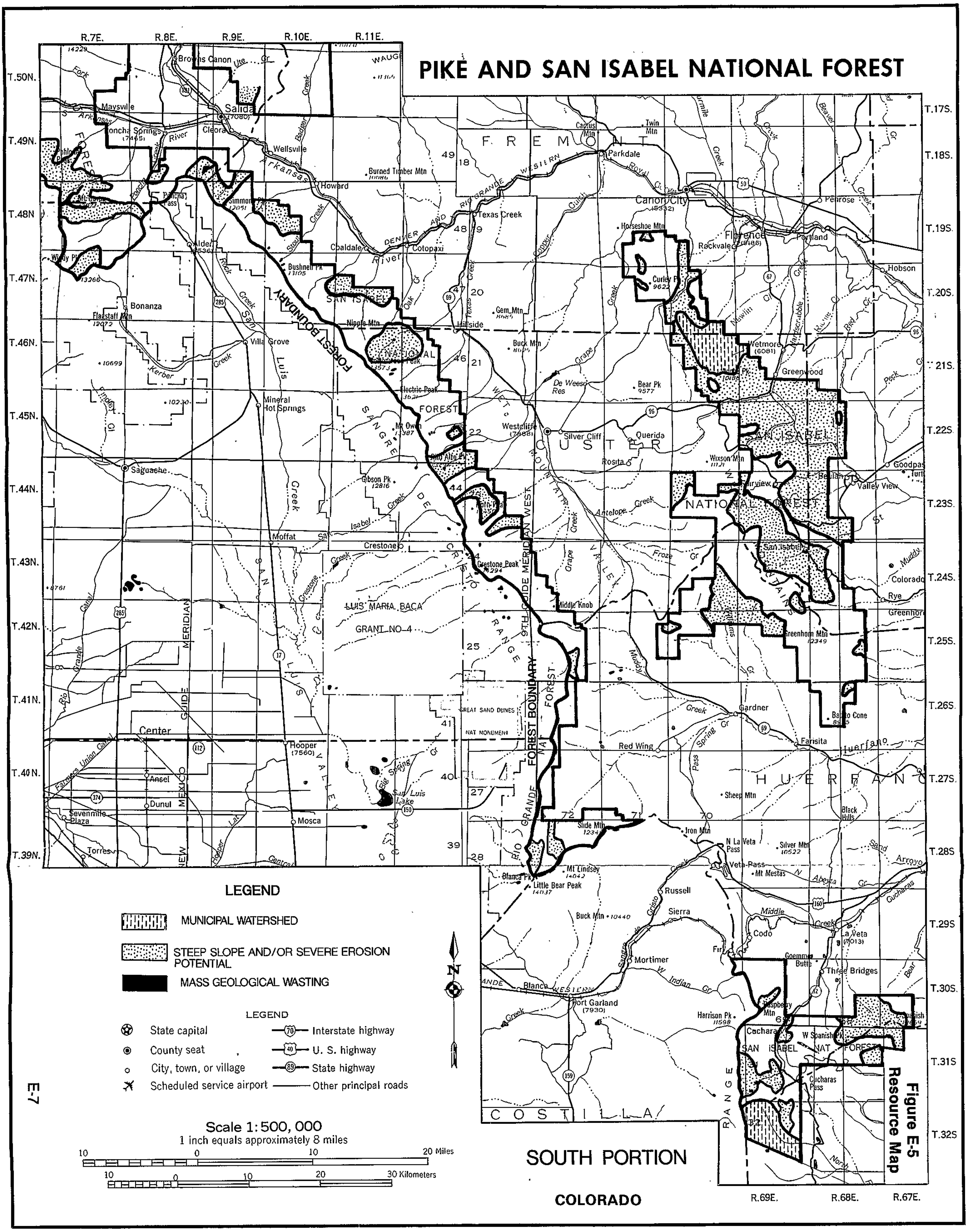


Figure E-5
Resource Map

PIKE AND SAN ISABEL NATIONAL FOREST

Figure E-6
Resource Map

R.7E. R.8E. R.9E. R.10E. R.11E.

T.50N. T.49N. T.48N T.47N. T.46N. T.45N. T.44N. T.43N. T.42N. T.41N. T.40N. T.39N.

T.17S. T.18S. T.19S. T.20S T.21S. T.22S. T.23S. T.24S. T.25S. T.26S. T.27S. T.28S T.29S T.30S. T.31S. T.32S

R.69E. R.68E. R.67E.

Browns Canon Ute Cr
Maysville
Salida
Poncha Springs
Cleora
Wellsville
Arkansas River
Burned Timber Mtn
Howard
Simmons Pk
Texas Creek
Alder
Coaldale
Cotopaxi
Bushnell Pk
Bonanza
Villa Grove
Nipple Mtn
Hillside
Gem Mtn
Buck Mtn
Cottonwood Peak
Electric Peak
Mineral Hot Springs
Mt Owen
Westcliffe
Silver Cliff
Querida
Rito Alto Pk
Saguache
Gibson Pk
Horn Pk
Moffat
Crestone
Crestone Peak
Middle Knob
LUIS MARIA BACA GRANT NO 4
Center
Hooper
Ansel
Dunul
Sevenmile Plaza
Mosca
Torres
Sun Luis Lake
Great Sand Dunes Nat Monument
Gardner
Red Wing
Farisita
Huerfano
Sheep Mtn
Slide Mtn
Iron Mtn
N La Veta Pass
Silver Mtn
La Veta Pass
Mt Mestas
Mt Lindsey
Little Bear Peak
Blanca Pk
Buck Mtn
Russell
Sierra
Mortimer
Fir
Codo
La Veta
Gnemmer Butte
Three Bridges
Fort Garland
Harrison Pk
Raspberry Mtn
Cucharas
W Spanish Pk
Cucharas Pass
Parkdale
Twin Mtn
Cactus Mtn
Canon City
Penrose
Horseshoe Mtn
Florence
Portland
Rockvale
Curley Pk
Hobson
Wetmore
Adobe Pk
Greenwood
De Weese Res
Bear Pk
Wixson Mtn
Rosita
Fairview
Bellah
Valley View
Goodpas
Antelope Creek
San Pablo
Muddy
Colorado
Rye
Greenhorn
Greenhorn Mtn
Williams Cr
Beaver Cr
Newlin Gl
Red Cr
Peck Gr
Froze Gr
Spring Gr
Pass Creek
Kerber Creek
Finley Gl
Camel Gr
Rio Grande
Farmers Union Canal
Hooper Lat
Central
Saguache Creek
Crestone Creek
Isabel Creek
Grape Creek
Oak Gr
Stout Creek
Rock Creek
Badger Creek
Copper Gulch
Texas Creek
Deer Creek
Indian Cr
Middle Creek
Sand Arroyo
Cucharas
Abeyta Gr
Huerfano
Apishapa
Williams Cr
North Fork
Arkansas River
Rio Grande Western
Denver and Rio Grande Western
Colorado and Southern
Rio Grande Southern
Forest Boundary
Pike National Forest
San Isabel National Forest
Wet Mountains
Sangre de Cristo Range
Guide Meridian
Sixth Principal Meridian
New Mexico
Colorado

LEGEND

VISUAL QUALITY RETENTION ZONES

DEVELOPED RECREATION SITES

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

N

SOUTH PORTION

COLORADO

PIKE AND SAN ISABEL NATIONAL FOREST

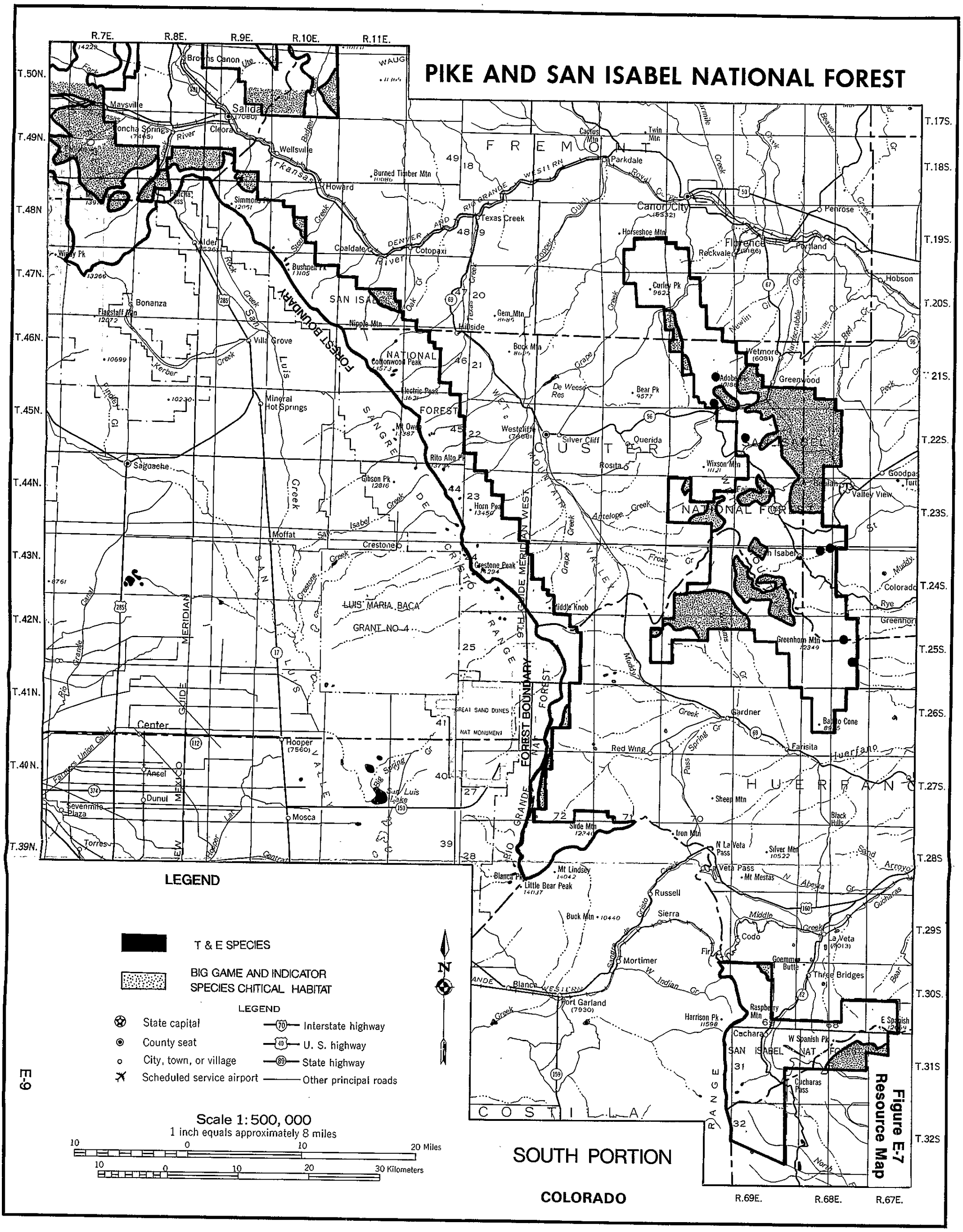


Figure E-7
Resource Map

PIKE AND SAN ISABEL NATIONAL FOREST

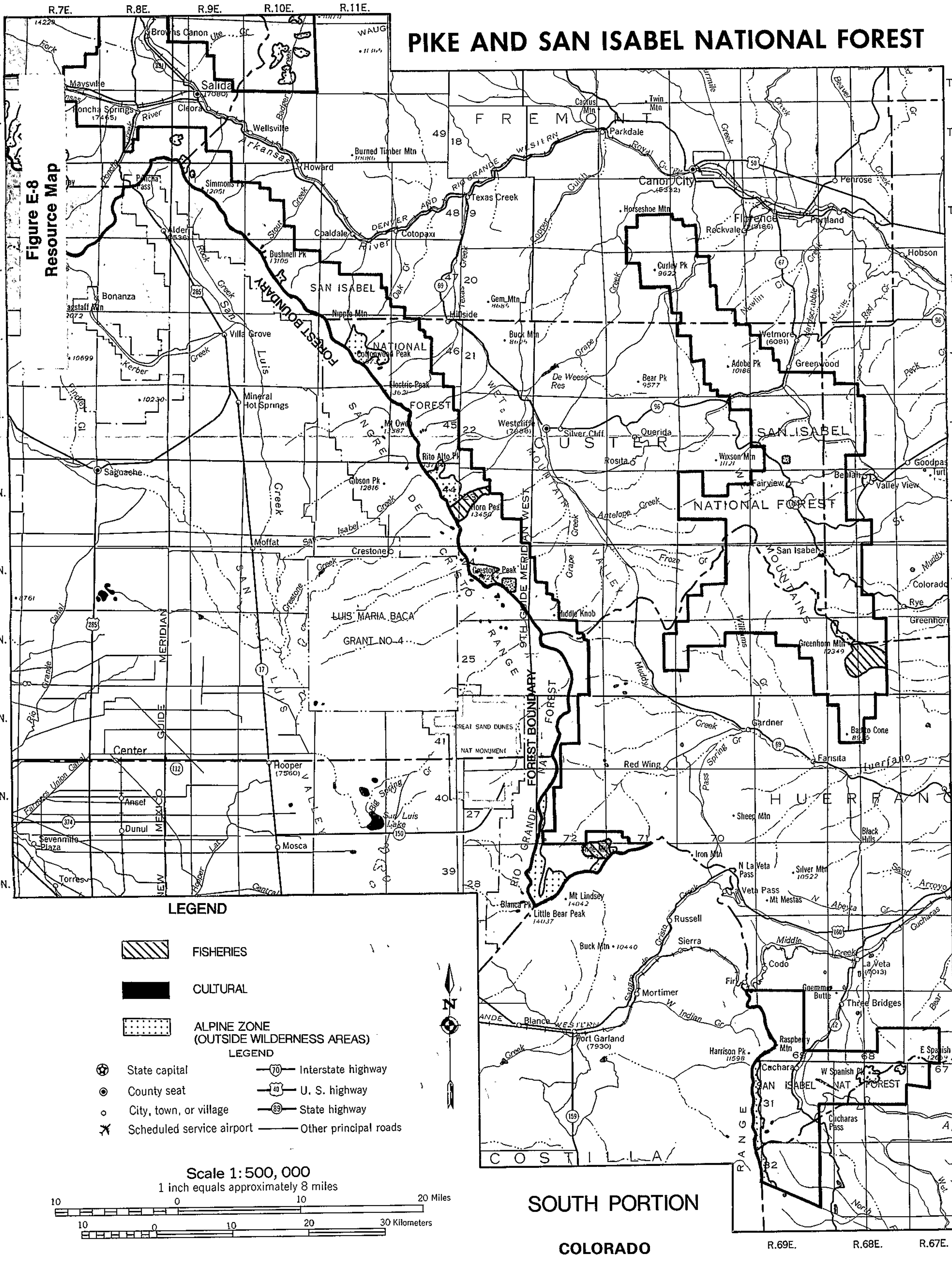


Figure E-8 Resource Map

Figure E-9
Resource Map

CIMARRON AND COMANCHE NATIONAL GRASSLAND

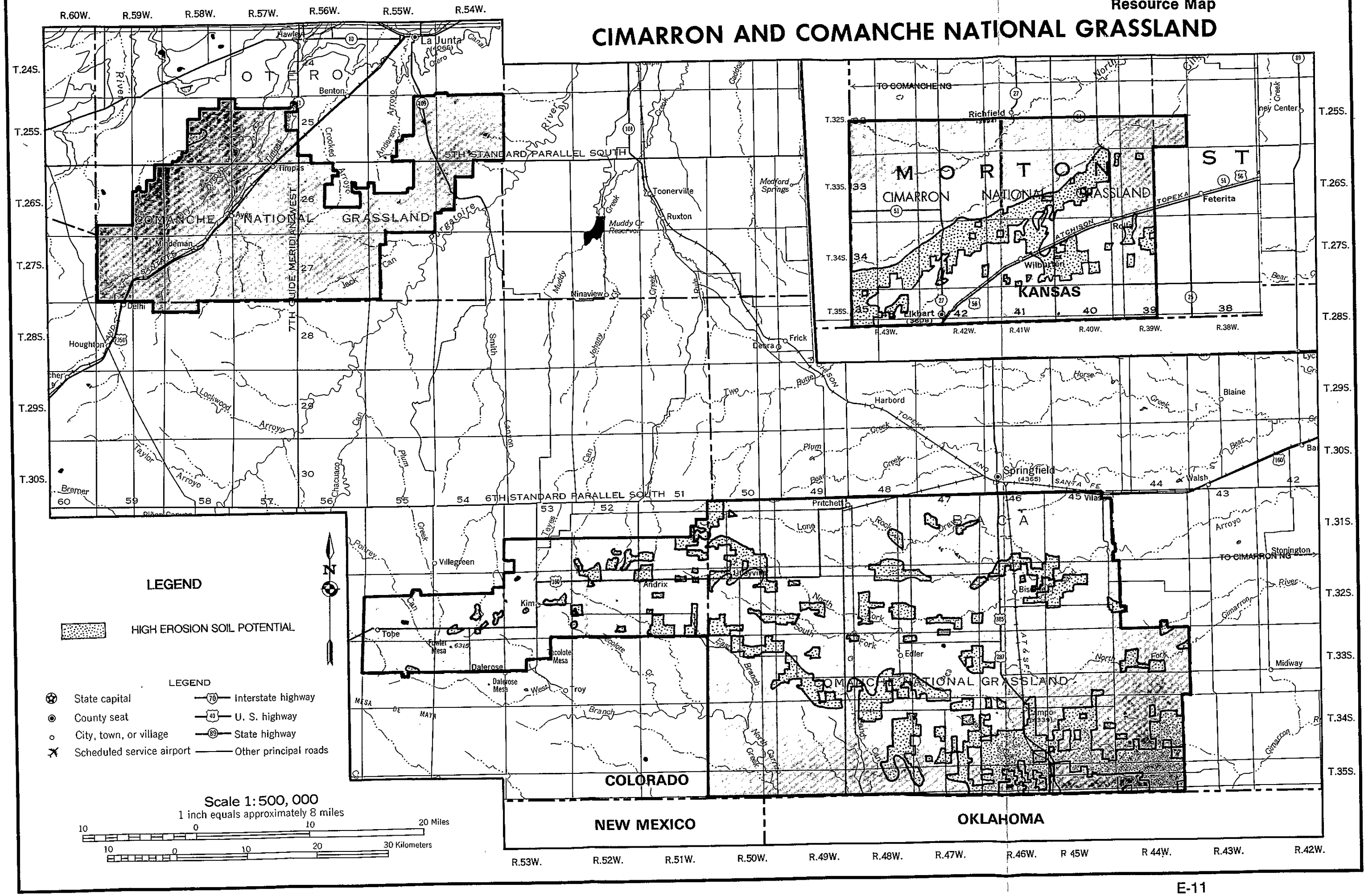
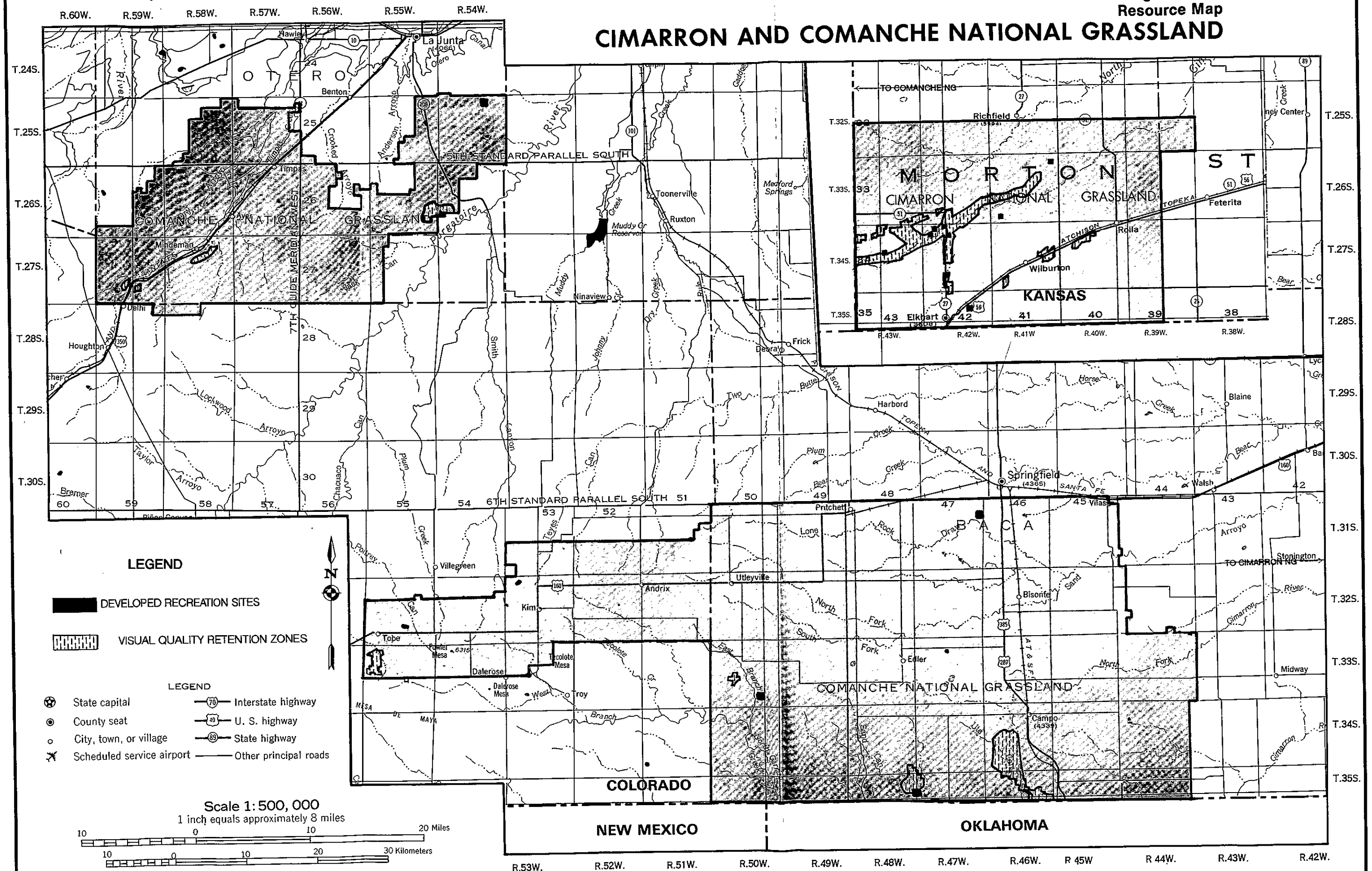


Figure E-10
Resource Map

CIMARRON AND COMANCHE NATIONAL GRASSLAND



LEGEND

DEVELOPED RECREATION SITES

VISUAL QUALITY RETENTION ZONES

LEGEND

State capital	Interstate highway
County seat	U. S. highway
City, town, or village	State highway
Scheduled service airport	Other principal roads

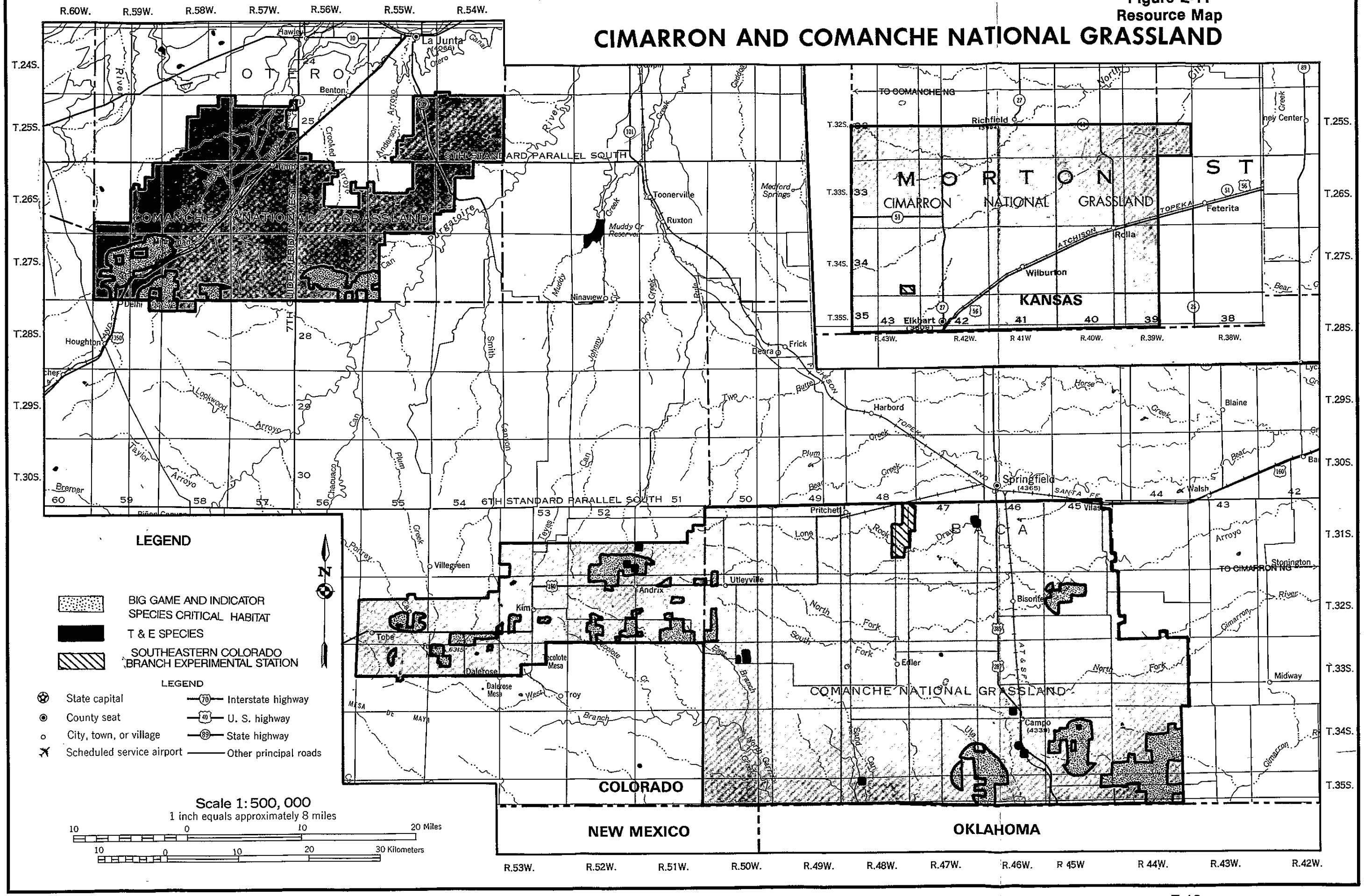
Scale 1:500, 000
1 inch equals approximately 8 miles

10 0 10 20 Miles

10 0 10 20 30 Kilometers

Figure E-11
Resource Map

CIMARRON AND COMANCHE NATIONAL GRASSLAND



LEGEND

- BIG GAME AND INDICATOR SPECIES CRITICAL HABITAT
- T & E SPECIES
- SOUTHEASTERN COLORADO BRANCH EXPERIMENTAL STATION

LEGEND

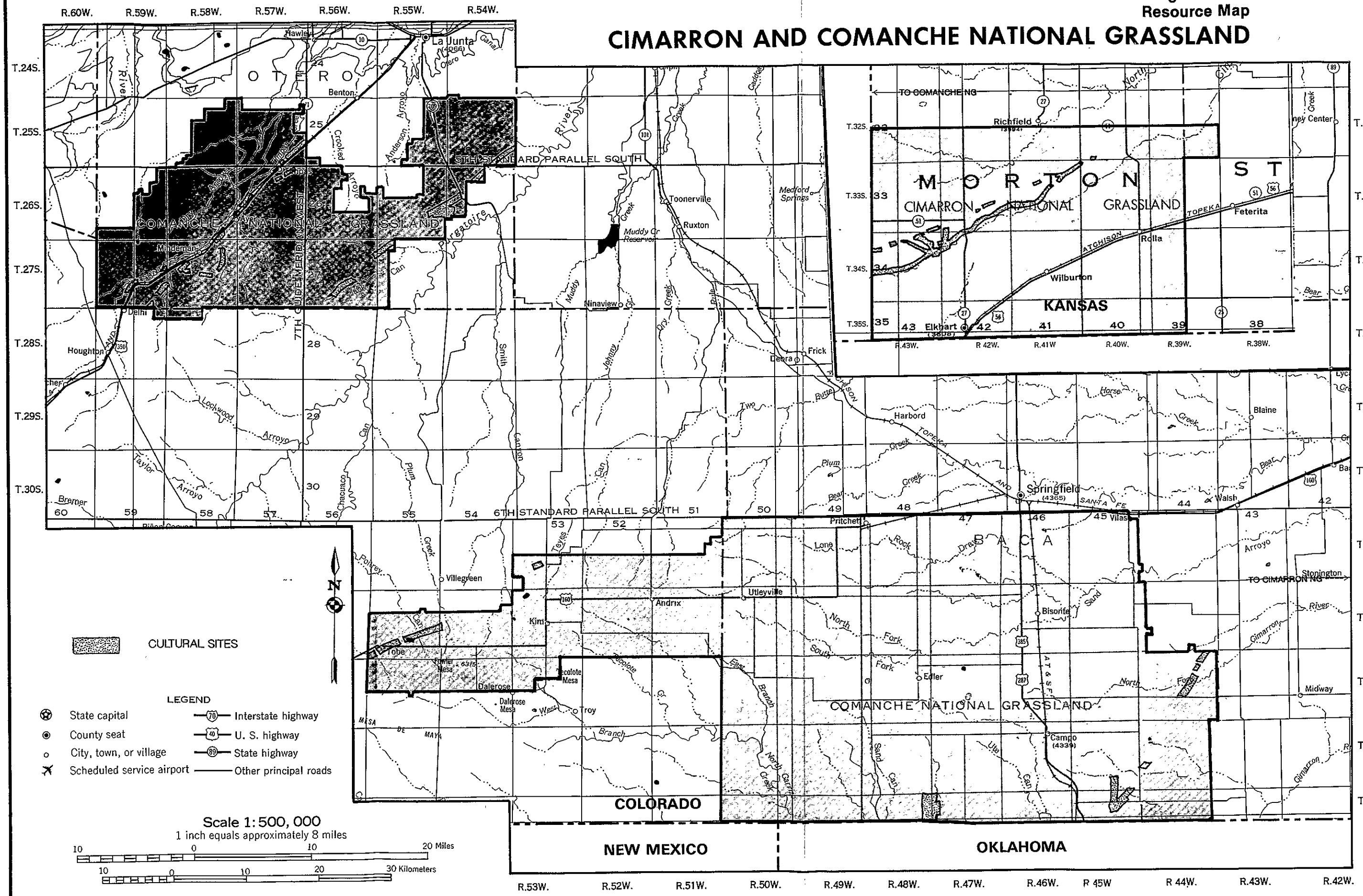
State capital	Interstate highway
County seat	U. S. highway
City, town, or village	State highway
Scheduled service airport	Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles

10 0 10 20 Miles
10 0 10 20 30 Kilometers

Figure E-12
Resource Map

CIMARRON AND COMANCHE NATIONAL GRASSLAND



APPENDIX F

APPENDIX F

CONTENT SUMMARY OF ADMINISTRATIVE RECORD FOR OIL AND GAS LEASING FEIS

Materials in the analysis file were organized into an administrative record. The administrative record consists of reports, studies, letters and notes amassed from the beginning of the public participation process through the planning and public participation for this FEIS. Eleven Volumes make up the administrative record.

GENERAL CONTENTS

Volumes of the Administrative Record include but are not limited to:

Laws and Policy,
Forest Plan, FEIS,
Cooperating Agency Involvement,
Public Involvement,
Specialist Reports,
DEIS,
DEIS Comments, and
FEIS And Record of Decision

PAGINATION

Explanation of the Pagination of the Administrative Record:

Each volume is page numbered with the lowest number (page 1) at the beginning of the document and the highest page number at the end of the book. The information is in chronological order with the oldest information on top. Each book (topic) within each volume starts with page 1. The only exception to this would be if a book required more than one binder to file all the information under that topic, in that case the pages would be numbered consecutively through all of the binders for that one book (topic).

OTHER REFERENCES

Many reference materials used in compiling the EIS are too large to include in the administrative record are available for review at the Supervisor's Office in Pueblo. A full list of these references can be found in the Administrative record, a sample list follows:

USGS Water Resources Data - Colorado, Years 1961-1990 ,
Compilation of Records of Surface Waters of the U.S. through September 1950, Parts 6-B and 7,
Compilation of Records of Surface Waters of the U.S., 10/50 - 9/60,
Land Ownership Management System,
Forest Land Uses Report
Draft Soil Resource Inventory,
Resource Inventory Maps by Discipline,
Resource Base Quad Maps,
BLM Split-Estate Maps,
BLM O&G Mineral Potential Maps,
Region 2 O&G Mineral Potential Maps,
Wilderness & Wilderness Study Area Maps,
Region 2 Resource Information System computer runs to determine vegetationenvironment by zone,
Cumulative Effects Analysis information (miscellaneous resource management plans, records and maps

APPENDIX G

APPENDIX G

MONITORING AND EVALUATION

Monitoring and evaluation will occur at the lease proposal stage and the APD stage. At the lease proposal stage, the leasing analysis decisions made on the basis of this EIS will be monitored, as illustrated in the implementation exercise in Chapter I. Site specific monitoring requirements will be determined at the APD stage, when actual location of ground disturbing activities is known.

Impacts of implementation of the selected alternative will be evaluated on a periodic basis. The purposes of monitoring and evaluation will be:

- To determine if approved operations for oil and gas exploration or development activities fulfill the purpose and need for which they were designed, or if modification of the operations is needed.

- To determine if the implemented alternative is responsive to public issues.

- To discover unanticipated and/or unpredictable effects from approved oil and gas activities and require necessary corrective actions.

- To determine if mitigation measures are effective.

- To ensure that leasing decisions are being implemented as scheduled.

- To provide continuing evaluation of consistency with state and local plans and programs.

Oil and gas resource exploration and development activities will be allowed on NFS lands only under the authority of a surface management plan which has been approved by the Forest Service. A review of detailed plans for operation is conducted by a Forest Service employee in conjunction with a BLM Minerals Specialist on the site location. A thorough review of proposed activities and the potential for impacts on existing resources is conducted. Monitoring of operations for impacts to surface resources is carried out by Forest Service staff to ensure compliance of approved activities in accordance with the plan of operations. Infractions of non-compliance are brought to the attention of the operator and the BLM. Corrective action is required within a reasonable time-frame.

Monitoring plans will be required and prepared for specific surface resources in the analysis area described in this EIS. These monitoring plans will be used to monitor implementation of management activities which impact surface resources and the human environment.

AIR

At the time of APD, Forest personnel must determine if the area is in a class I, II or III area as described in 42 U.S.C. 7475 (d)(2)(B) and (C) and section 2580.5. The effects of the post-leasing activity on air quality will be determined to ensure that these activities comply with all substantive

and procedural requirements of Federal, State, Interstate, or local air regulatory authorities (42 U.S.C. 7418 (a)).

Specific mitigation requirements will be defined at the APD stage. Monitoring will be done by the appropriate Forest or BLM personnel at each well site to verify that the specific mitigation was accomplished.

VEGETATION

Monitoring oil and gas lease applications and post-leasing activities will determine:

- Whether acres suitable for timber production are affected by oil and gas development.

- Whether the lease parcel contains an active or planned timber sale

- Whether the reclamation plan specifies appropriate site-specific reforestation, when tree planting is a requirement on suitable acres.

- Whether 5 year reforestation (after non-use) is occurring on cleared acres suitable for timber production.

- Whether lease proposals will occur in alpine areas.

- Whether APD's will be submitted for alpine parcels.

Monitoring of 5-year ground cover vegetation recovery will be addressed by the Soil Scientist.

Acres Suitable for Timber Production (Mountains Only)

At the time of APD, the District Minerals Staff will provide the District R2RIS Coordinator with site-specific information about forested lands potentially affected by oil and gas development. The District R2RIS Coordinator will then query the data base to determine which sites on the leasehold are suitable for timber production, per the current Forest Supplement to section 42 (Timber Component) of FSH 6609.21 (Total Resource Information Handbook). The Forest Minerals Specialist or the BLM will inform the lessee about which forested sites are suitable for timber production and therefore subject to the 5-year reforestation standard. Conditions of Approval at the APD phase will include site-specific tree planting specifications.

At the time of lease proposal, the District Minerals Staff will coordinate with the District/Zone Timber Staff to determine if active or planned timber sales would be affected by the lease proposal. If so, the Lease Notice for Timber Sales will be attached to the lease.

Reclamation Plan

At the APD phase, the District Forester, Forest Silviculturist or Forest Ecologist will review the tree planting specifications of the reclamation plan and make recommendations for approval or specify modifications.

Five Year Reforestation

Monitoring will be carried out in accordance with Page IV-6 of Chapter IV of the Forest Plan, and Chapter 70 (Reforestation Examinations) of FSH 2409.26b, with the following exceptions applicable to oil and gas activities:

- The 5-year reforestation period will begin immediately after non-use, not immediately after final harvest. The 5-year reforestation standard will be applied on acres suitable for timber production.

- Reliance on natural regeneration within 5 years will not be emphasized. Scalping and conifer planting will often be required to adequately re-stock abandoned clearings within 5 years. Oil and gas clearings will be seeded for erosion control and ground cover vegetation might out-compete newly germinated natural conifer seedlings for moisture and nutrients.

- Aspen transplanting and portable irrigation may be required on localized areas which have experienced enough root damage to inhibit aspen suckering. Ripping may be required on localized areas which have experienced soil compaction, as this could promote aspen suckering.[1] If aspen regeneration fails in localized areas, conifer seedlings adapted to the sites will be planted.

Alpine Areas

The District Ranger shall notify the Forest Supervisor if a lease proposal occurs above timberline and/or in a mapped alpine area. A qualified botanist/ecologist approved by the Forest Service authorizing official will monitor the alpine lease proposal and make recommendations regarding NEPA adequacy, whether the parcel can be occupied without irreversible and irretrievable damages to surface resources, and whether the Controlled Surface Use (Alpine) stipulation will provide adequate protection of surface resources on the given parcel. These recommendations will determine if additional NEPA analysis is necessary before the Forest Service authorizing official authorizes the BLM to advertise the lease.

The District Ranger shall notify the Forest Supervisor if an APD is submitted for a lease above timberline and/or in a mapped alpine area. A qualified botanist/ecologist approved by the Forest Service authorizing official will perform the pre-disturbance vegetation survey and prepare or provide feedback to the reclamation plan, including site specific monitoring requirements. Forest personnel will monitor each alpine lease to determine if the supplemental stipulation and site specific mitigation are effective.

THREATENED AND ENDANGERED SPECIES

At the time of a lease proposal, forest personnel will determine if there are any threatened and endangered species known to occur in the lease area. Information as to the distribution of these species will be coordinated with the U.S. Fish and Wildlife Service and appropriate State and local agencies. If they are present in the lease area, the lease notice for threatened and endangered species, together with all applicable requirements, will be attached to the lease. Forest personnel will monitor each lease to determine if these requirements are being followed.

RIPARIAN RESOURCES

Forest personnel will determine if riparian areas, wetlands and floodplains are present in the lease area at the time of a lease proposal. Specific riparian area, wetland and floodplain boundaries may need to be determined by a site-specific analysis of the lease area. The No Surface Occupancy (Riparian/Wetland/Floodplain) stipulation will be attached to the lease.

At the time of the APD, forest personnel will determine if access roads to well sites could impact riparian areas, wetlands, and floodplains. Site specific mitigation will be determined. Forest personnel will monitor every well during the construction phase to verify that the specific mitigation has been accomplished.

FISHERY RESOURCES

At the time of APD, forest personnel will determine potential impacts from the specific well locations to the fishery resource. If the fishery resource could be impacted, analysis of existing populations of fish as well as fish habitat surveys will be done by the appropriate forest personnel. Appropriate mitigation techniques would then be developed. Coordination with proper governmental and public personnel will be an important part of this analysis.

Forest personnel will monitor every well during the implementation phase in order to verify that the required mitigation has been accomplished.

RECREATION

At the time of the lease proposal, forest personnel will determine if there are developed recreation sites in the lease area. If there are, the No Surface Occupancy (Recreation) stipulation will be attached to the lease. The Forest Service will monitor implementation of the lease to maintain the recreational quality available on public lands and to ensure that the opportunities for various recreation experiences are not adversely impacted as a result of oil and gas exploration and development activities. Monitoring and evaluation of oil and gas leasing activities will assist in achieving the goals, objectives and requirements of the Forest Plan and the direction outlined in this EIS as well as responding to the issues and needs of the recreation users. The effectiveness of the 1/4 mile buffer around all developed sites will be monitored by appropriate forest personnel to determine if this distance is providing adequate protection of the recreation experience of users.

VISUAL RESOURCES

Monitoring of oil and gas development impacts on visual resources will be conducted to ensure compliance with Forest Plan direction (Forest Plan, Chapter IV, pages 4, 5) and the Visual Management System.[2] [3] Monitoring will be conducted to prevent unacceptable impacts to visual quality and resulting loss of recreation opportunities; to make recommendations on new or refined mitigation techniques; and to evaluate validity of visual quality mapping and recommend any necessary changes.

At the lease proposal phase, appropriate forest personnel will evaluate the lease in order to establish a baseline inventory.

At the APD phase, appropriate forest personnel will determine the effects of the oil and gas development on the visual resource. The effects will take into account road designs, terrain modifications, clearing shapes and the introduction of structures and reclamation techniques. Site-specific recommendations will be determined at this time in order to incorporate mitigation techniques into the operating plan. Forest personnel will monitor every well to verify that the specific mitigation measures have been accomplished. Forest personnel will monitor the success of prescribed mitigation methods during development and reclamation and biannually afterwards. Mitigation techniques will then be modified as necessary. The Forest Landscape Architect will monitor the general Forest/Grassland environment to note changes in the characteristic landscape or a decline in visual quality. This level of monitoring will be used to ensure prescribed VQOs are met.

Monitoring will be considered complete when the disturbance is reclaimed and restoration meets Forest Plan requirement.

The tools used to monitor visual resource impacts will be photographic inventories and existing visual inventory mapping.

CULTURAL, PALEONTOLOGICAL AND CAVE RESOURCES

During the APD phase, appropriate forest personnel will implement a cultural, paleontological, and caves resources monitoring program to investigate possible effects on these resources. The program will include the following:

- Monitoring of new ground disturbances to determine whether unknown cultural or paleontological resources are being disturbed by this activity.

- Monitoring of the Santa Fe National Historic Trail and other sensitive cultural resources with educational and recreational values to insure implemented supplemental stipulations and other protective measures are effective. Change in the protective measures will be made as needed.

- Monitoring of known archeological and paleontological sites in the vicinity of oil and gas development to deter possible surface collecting, looting, and vandalism.

RESEARCH NATURAL AREAS AND SPECIAL AREAS

At the lease proposal phase, forest personnel will determine if Research Natural Areas and/or Special Interest Areas are within the lease parcel. If they are within the lease parcel, the Lease Notice (Research/Special Interest Areas) will be attached to the lease. Some of these areas allow for oil & gas development with appropriate mitigation. Forest personnel will monitor each well site to verify that the prescribed mitigation has been accomplished. Appropriate forest personnel will evaluate the effectiveness of prescribed mitigating measures and determine whether to adjust the measures to the extent possible under lease regulations.

WILDLIFE

At the time of the lease proposal, forest personnel will determine if there is any critical winter range in the lease parcel. Forest personnel will also determine what management indicator species are present in the lease parcel. Timing stipulations for the appropriate management indicator species

and critical winter range will be attached to the lease. Forest personnel will monitor every well to ensure that the timing stipulations are being complied with.

At the APD phase, appropriate forest personnel will determine whether:

- optimum wildlife habitat, as determined by optimum structural stage diversity, is being maintained for all vegetation types over time.

- wildlife population goals, as represented by goals for indicator and special emphasis species, are being achieved and maintained over time.

Forest personnel will determine if additional mitigation will be necessary to minimize the impacts on wildlife. All wells will be monitored to verify that the specific mitigation has been accomplished. Monitoring will be carried out in accordance with the FLMP (Chapter IV, pages 5-6).

RANGE RESOURCES

At the APD phase, forest personnel will determine if wells will affect the range resource. If specific mitigation is needed in addition to the mitigation outlined in the conditions of approval, it will be determined at this time. Forest personnel will monitor all wells in order to verify that the mitigation was accomplished. Monitoring will also focus on vegetation trends, forage utilization and amount of actual use (livestock numbers, periods of grazing and range condition).

WATERSHED RESOURCES

At the lease proposal phase, appropriate forest personnel will determine if there are watersheds that are currently exceeding sediment thresholds or are within 10% of exceeding sediment thresholds. If these areas are found in the lease parcel, the Conditional Surface Use (Water) stipulation will be attached to the lease notice. At the APD stage, appropriate forest personnel will determine the potential sediment yield from the oil and gas development in order to ensure that sediment thresholds will not be exceeded. Site specific mitigation will be determined at this time. This mitigation will be made a part of the required Erosion Control and Water Quality Monitoring Plan. Forest personnel will monitor every new well site to ensure that *all* required mitigation measures are correctly designed and in place.

Effectiveness monitoring will be done at fewer of the well sites. The amount of effectiveness monitoring will be determined at the APD phase. The purpose of this type of monitoring will be too assess the effectiveness of the mitigation measures in controlling sediment movement and preventing water pollution from the other waste materials associated with oil and gas exploration activities. If the required mitigation measures are found to be inadequate, different measures will be required. If all else fails, the activities will be stopped until the problem can be corrected.

Monitoring of the ground water quality may be required where large production facilities occur. In Kansas, the Forest Service will work cooperatively with the groundwater management district and the U. S. Geological Survey to incorporate the monitoring into their ongoing programs. Monitoring of the groundwater in Colorado will be done in conjunction with the Colorado Sate Health Department and U. S. Geological Survey.

All companies are required to have a Spill Prevention Control and Countermeasure Plan, as identified in the Federal Register, Volume 38, No. 237 - Part II, Oil Pollution Prevention. Forest personnel will verify that such a plan exists before any ground disturbing activity will be allowed.

SOILS

At the lease proposal phase, appropriate forest personnel will determine if the lease parcel has areas with:

- slopes steeper than 60%,
- fragile soils with high (severe) erosion potential on slopes of 40% or greater
- fragile soils with high (severe) erosion potential, soil depth to bedrock is less than 20 inches, and slopes of 35% or greater.

If these areas are found, the Conditional Surface Use (Soils) stipulation will be attached to the lease proposal.

At the APD stage, wells that would occupy identified unstable slopes would require a geotechnical survey. Appropriate forest personnel would determine the site specific mitigation necessary to meet the Forest Plan direction of maintaining soil productivity, minimizing man-caused soil erosion and maintaining the integrity of associated ecosystems. This mitigation would be made part of the required Erosion Control and Water Quality Monitoring Plan. Forest personnel will monitor all wells to verify that the required mitigation is in place. Appropriate forest personnel will monitor some of the wells before, during, and after ground disturbing activities to assess the effectiveness of the prescribed mitigation. The mitigation will be adjusted if necessary, based on the results of the effectiveness monitoring. The number of wells to be monitored will be determined at the APD phase. Primary impacts which could significantly change soil properties include accelerated erosion and detrimental compaction and/or rutting caused by equipment.

TRANSPORTATION SYSTEM

At the APD phase, forest personnel will determine if mitigation in addition to that presented in Appendix A of this EIS will be needed. Forest personnel will monitor all new road construction to verify that the required road design and mitigation was accomplished. Forest Service personnel will periodically monitor roads to ensure that they are being adequately maintained.

OIL AND GAS RESOURCES

The Forest Service will monitor the exploration and development of oil and gas operations on NFS lands for compliance of lease terms and stipulations for all leases and permits to ensure that the lessee does not violate the Forest Plan direction or conditions of approval outlined in this EIS. On-site inspections will be conducted as necessary for assessment of compliance with lease terms, including road use of leases or permits, or unauthorized uses of NFS lands.

The Forest Service will notify the appropriate BLM official requesting corrective action in cases of misuse, unauthorized use, or any other breach of lease or permit terms affecting NFS land management. If the violation or improper use is one which is eminently likely to endanger public health or safety, life or property, or to cause irreparable damage to resources, the Forest Service will directly contact the responsible lessee and also the BLM.

The Forest Service will monitor to ensure that hazardous waste dumping does not occur on NFS lands, and hazardous materials produced or brought onto the Forest are properly disposed.

NOTES

[1] Personal communication with Wayne Shepperd, Silviculturist, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. February, 1991.

[2] USDA Forest Service, National Forest Landscape Management, Volume 1; Agriculture Handbook No. 434, 1973, 76 pp. (A.R. Vol. III, pp. 1-79).

[3] USDA Forest Service National Forest Landscape Management, Volume 2, Agriculture Handbook No. 462, 1974, 45 pp. (A.R. Vol. III, pp. 80-127).

APPENDIX H

APPENDIX H

SOCIO-ECONOMIC AND COST EFFICIENCY ANALYSIS[1]

SOCIAL RESOURCE UNITS

Social Resource Units (SRU's) were delineated and used as a framework for assessing the social and cultural relationships that people have with the land environment. Social Resource Units were defined by natural topographic boundaries such as drainage basins, mountain valleys and by settlement patterns and cultural and social lifestyles. The Forest lies within three SRU's: the Front Range, Arkansas, and Southern Plains [Figure H-1].

The Forest was further subdivided into Human Resource Units (HRU). A HRU is defined as a geographic area of land characterized by particular patterns of cultural lifestyles, economic conditions and topography. This concept is used in order to characterize the unique relationship that residents of a distinctive area have with each other and with the land on or near the National Forests and Grasslands. From the HRU's, the dependency of local and adjacent communities on the Forest and Grassland natural resources can be determined.

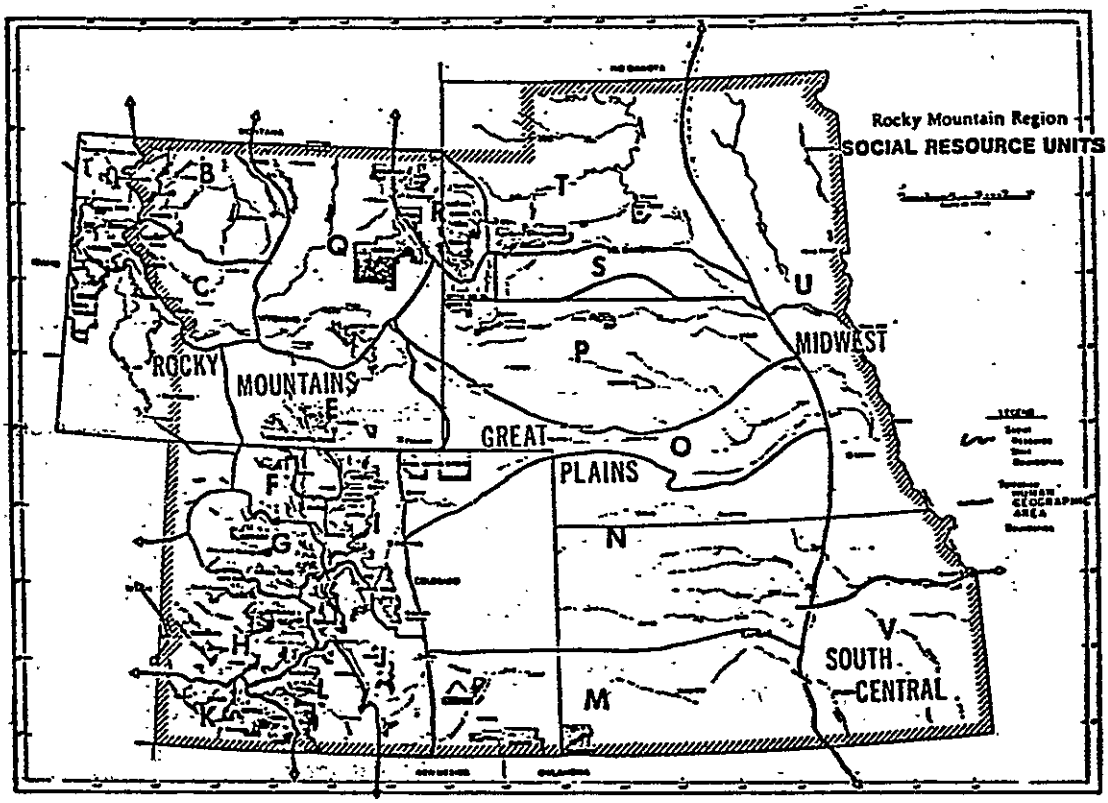
The Forest is comprised of nine HRU's (Leadville, Salida, South Park, South Platte, Pikes Peak, Sangre de Cristo-Wet Mountains, Spanish Peaks, Comanche, and Cimarron) [Figure H-2] falling within the Front, Arkansas, and Southern Plains SRU's. The following describes the characteristics of the Social Units on the Forest. Additional information is found in the Forest Plan FEIS, Chapter III.

Front Range Social Resource Unit

The Front Range SRU consists of the South Platte and Pikes Peak HRU's. The Front Range can be described as a strip roughly 40 miles wide that stretches from Ft. Collins in the north, through Greeley, Boulder, Denver and Colorado Springs to Pueblo in the South. The majority of this social unit to the west consists of mountains with intermittent lowlands, and plains to the eastern boundary.

The population boom occurring along the Front Range Urban Corridor has had significant impacts upon the nearby Forest lands. The Denver SMSA is the hub for the state and the Rocky Mountain Great Plains region and a national technological commercial center. The diversity of job opportunities linked with favorable climatic conditions in the urban centers of Denver and Colorado Springs creates ideal residential and recreational environments.

Figure H-1
SRU General Locations



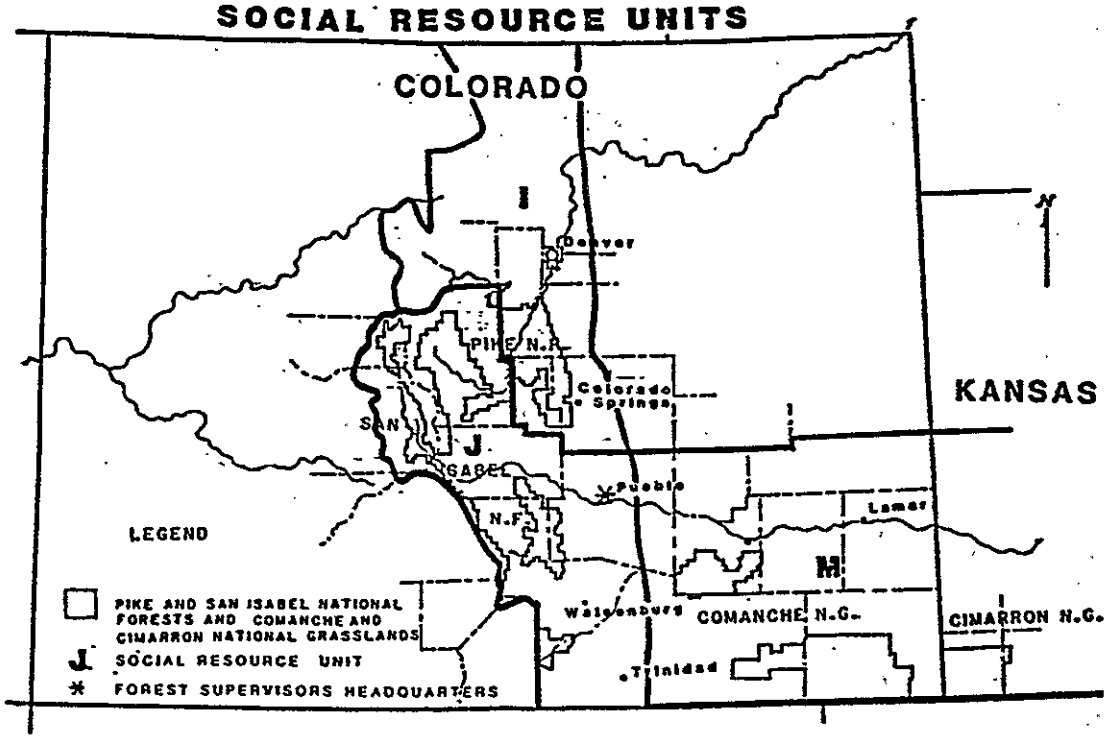
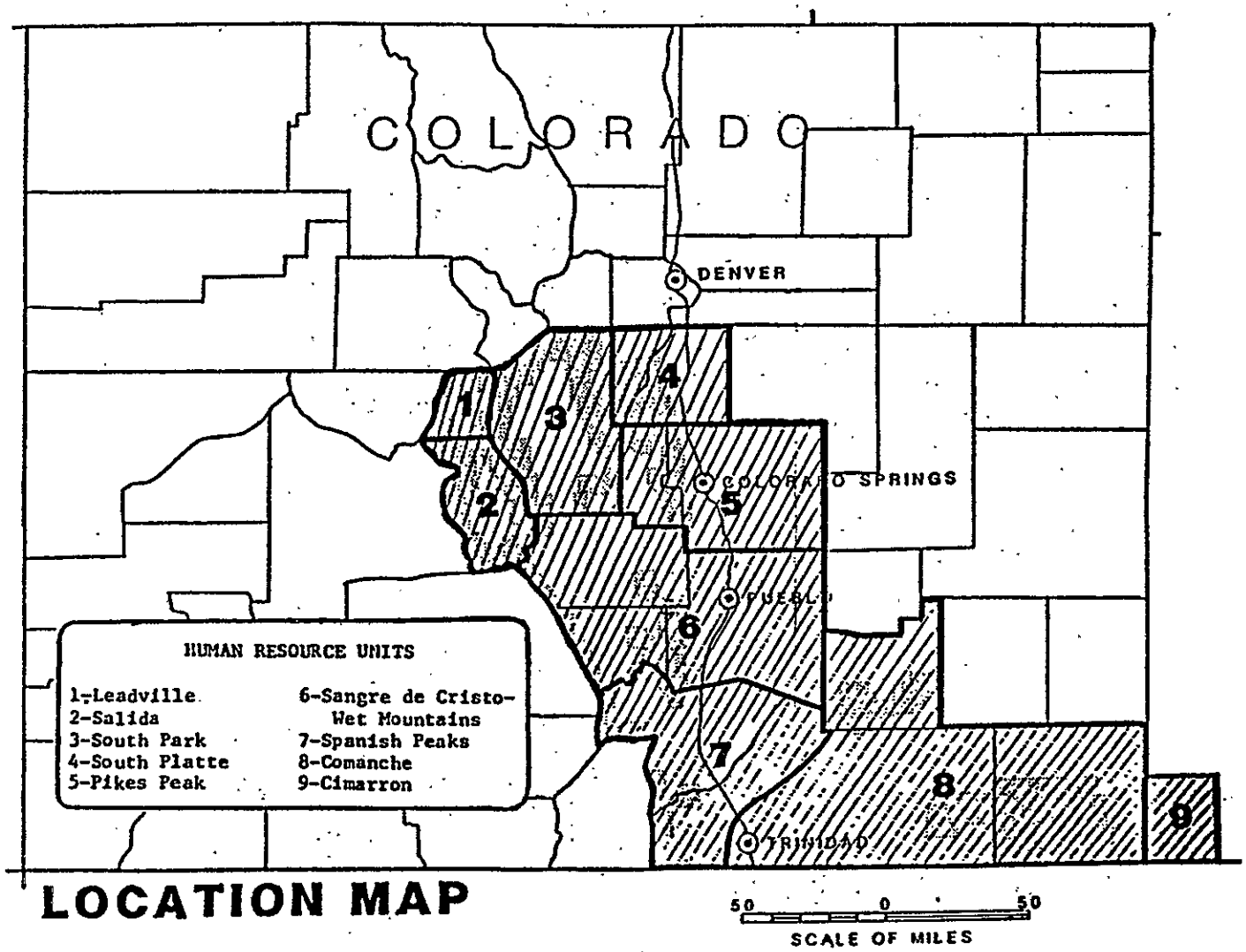


Figure H-2
HRU General Locations



SOUTH PLATTE HRU
(Douglas and Jefferson Counties)

The esthetics of the area are important to the Forest users and the people in the HRU. Tourism also plays an important part of the local economy of this HRU. The area is of high recreational value because of the mountains and the many attractions for tourists. Travel and tourism expenditures in the HRU were about $150 million in 1984.

Recreation on National Forest land is particularly important in this HRU since the Forests are so very accessible to a large population. A very high percentage of the recreation use occurs on the weekends. The South Platte River provides a high quality, gold-medal trout fishery in the area downstream of Deckers before the confluence with the North Fork of the South Platte River. Fishing activity in this area is very heavy. There are also river stretches that are used extensively for tubing, rafting, and kayaking. User conflicts are common on these heavily used resources. Public involvement programs have shown that people desire more law enforcement activity in the Forests because of vandalism, littering and traffic congestion.

Douglas County's 1980 population was 25,153 and there were 371,753 people in Jefferson County at that time for a total population in the HRU of 396,906. Population for 1988 estimates showed the population of the HRU to be 469,223. Projections show that figure increasing to 605,257 by the year 2000 and to 711,735 by 2010. In 1980, 6.2 percent of the population in Douglas County was over 62 years of age and 7.7 percent of the population in Jefferson County was in this age group. By 1988 those figures were 5.7 percent and 10.2 percent, respectively. Ethnic distribution data shows that in Douglas County, 2.4 percent of the population are Hispanic, 0.4 percent are Black and 96.5 percent are White. In Jefferson County, 5.2 percent are Hispanic, 0.5 percent are Black, 1.0 percent are Asian and 93 percent are White.

Leading sources of household income in Douglas County are technology and communications, services, and construction. In Jefferson County, the leading sources of household income are manufacturing, services, retail trade and government. In 1986, there were over 230,000 people employed in this HRU. Most of them were employed in the services, retail trade and manufacturing sectors. There were also a significant number of people employed by the government sector in Jefferson County since the Denver Federal Center is located there.

PIKES PEAK HRU
(El Paso and Teller Counties)

The quality environment as a result of the amenable climate, the beautiful topographic features, and pleasant esthetics generates a steady flow of tourists annually. The visual resources of the Pikes Peak Region, particularly the National Forest environment, are of major importance to the residents of this region because tourism is such a large part of the Pikes Peak region's economy. The nearby Forest areas are valued for their beauty and serenity as well as major get-aways from the weekly work routine in Colorado Springs. Thus, Forests are heavily used for year-round recreation opportunities by HRU residents as well as adjacent communities.

The Pikes Peak region is one of the most popular tourist attractions in the state of Colorado. Tourism expenditures in 1984 in this HRU totaled about $410 million. Tourist visits are heavy at Pikes Peak, the Garden of the Gods, the Air Force Academy and many other attractions in the area. The legendary mining centers of Cripple Creek and Victor with their wealth of educational and historical information receive many visitors throughout the summer and fall.

The National Forests are important watersheds for the developed area of the region. Several cities including portions of Colorado Springs, Cascade, Manitou Springs, Cripple Creek and Victor depend on the Forest watershed for their water supply.

The Pikes Peak region has experienced rapid population growth in the last two decades. In 1980, the total population of El Paso and Teller Counties was 317,458. The 1988 estimate of county population was 396,200 for El Paso County and 11,349 for Teller County for a total of 407,549. Projections show the population of this HRU increasing to 523,917 by 2000 and to 626, 281 by 2010.

In 1988, 9.5 percent of the population was over 62 year of age. This was an increase from 8.6 percent in 1980. In El Paso County, 7.7 percent of the population are Hispanic, 6.2 percent are Black, 1.6 percent are Asian and 83.9 percent are White. In Teller County, 1.5 percent are Hispanic and 98 percent are White.

Military and government jobs dominate the employment situation in this region. Leading sources of household income are high-tech industry and the military in El Paso County and mining and tourism in Teller County. The government is the largest job sector in El Paso County with over 58,000 people employed (1986 data). Other major employment sectors are services, retail trade and manufacturing. Total employment is about 217,000 in El Paso County and 4,000 in Teller County. A large number of military retirees make up part of the civilian labor force.

Arkansas Social Resource Unit

This Social Unit includes the Leadville, Salida, South Park, Sangre de Cristo - Wet Mountain, and Spanish Peaks HRU's. It begins in the west at the headwaters of the Arkansas River above Leadville, at Tennessee Pass. It follows the Arkansas River south and east to the eastern boundary of Pueblo County. Also included in this Social Unit are the South Park valley area which lies south of Kenosha Pass and east of the Arkansas River, and the Spanish Peaks Region.

LEADVILLE HRU
(Lake County)

Recreation is also very important in this region. The National Forests are used by local residents and many visitors from the Front Range and out-of-state for hiking, camping, fishing, picnicking and general sightseeing. Turquoise Lake, about four miles west of Leadville, receives a great deal of use in the summer. Winter sports in the county include downhill skiing, cross-county skiing and snowmobiling.

In 1980, the population of Lake County was 8,830. Population estimates for 1988 show the population of 6,012 which is a 32 percent decline since 1980. This was largely due to reductions in the mining workforce. Projections show the population continuing to decline to 4,321 in the year 2000 and 2,591 in 2010.

In 1980, 5.3 percent of the population was over 62 years of age. By 1988, that had increased by 9.9 percent. This change is due to many of the younger age groups leaving due to reduced employment opportunities in the county. Data on the ethnic characteristics of the population show that 23.5 percent of the population are Hispanic, about 0.7 percent are Indian and 75.3 percent are White.

Mining activities have been and are still important to this region's economy. In recent ears, however, with the scaling back of molybdenum mining operations, tourism has increased in importance. Much of the tourism is related to the mining history of the region. Tourism and travel expenditures in Lake County were about $4.8 million in 1984. Leading sources of household income in Lake County are mining, government and tourism. Total employment in the county is about 2,600. Major employment sectors are mining, government, services and retail trade. In the last few years, due to the housing shortages in communities around ski areas, many people live in Leadville and commute to work in the ski areas in Summit and Eagle counties.

SALIDA HRU
(Chaffee County)

With 68 percent of the land in the county in National Forest, there are many opportunities for outdoor recreational activities. There are jeep roads, ghost towns, campgrounds, river rafting, kayaking, cross-country skiing, downhill skiing at Monarch Ski area, hiking trails, fishing and natural hot springs. The scenic quality of the area, enhanced by the Collegiate Peaks, attracts a large number of tourists and generates a significant portion of the economy in the area. Tourism and travel expenditures in Chaffee County in 1984 were $24.9 million. Many of the tourists to this area are from the Front Range.

Generally, local residents feel that mineral development is important for jobs and production of energy, but that those activities should only be allowed with controls that would ensure protection of the area's aesthetic qualities. The National Forests are also used by local residents for fuelwood gathering and for grazing of domestic livestock.

The county's 1988 population was estimated at 12,276. This was a 7.2 percent decrease from the 1980 census county of 13,227. Projections show a population of 14,144 by 2000 and 15,486 by 2010. In 1980, 14.1 percent of the population was over 62 years of age. That figure had increased to 17.6 percent by 1988. The scenic quality, good climate and abundant recreational opportunities have been the reasons for increased migration of elderly population into the area. In Chaffee County, 9.7 percent of the population are Hispanics, 0.7 percent are Black and 89 percent are White.

Services, retail trade and government provide the majority of employment opportunities in Chaffee County. Leading sources of household income in the county are recreation, tourism, mining and agriculture. The majority of the employment in the county is in services, retail trade and government. Total 1986 employment was 6,044. Many of the government workers are employed at the Buena Vista Correctional Facility.

SOUTH PARK HRU
(Park County)

Agriculture and ranching have been of major importance to the South Park area with the production of hay, cattle and sheep. However, the amount of land devoted to those activities continues to decline. These losses have been fueled by the loss of agricultural water rights because of residential developments and increased domestic use of water.

Approximately 60 percent of the land in Park County is government-owned. Of the total public land in the County, 47 percent is NFS land. This large public land base provides many outdoor recreational opportunities. Land uses on public land include wildlife management, grazing, timber

harvesting, mining, watershed conservation and recreation. Land uses on private lands include seasonal home development, mining, recreation, grazing and agricultural operations.

Tourism is an important element of the economy in South Park. In 1984, tourism and travel expenditures amounted to $9.4 million in Park County. This region offers a wide variety of outdoor recreation opportunities to residents and tourists. Large lakes and reservoirs attract sportsmen for boating, fishing, swimming, camping and water skiing. Forest visitors who are camping, picnicking, sightseeing and experiencing other outdoor recreation activities create jobs in government and in small businesses. The local economy of communities near the National Forests area also affected by direct purchasing of goods and services.

There are three large water supply reservoirs located in Park County that provide water to the metro Denver area. These are Spinney Mountain, Antero, and Eleven Mile Canyon reservoirs. In addition, there are several smaller reservoirs including Tarryall, Jefferson and Montgomery reservoirs. All of these reservoirs are popular for fishing and other water-based outdoor recreation. State recreation areas are developed at Antero, Eleven Mile and Tarryall reservoirs.

Park County is quite sparsely populated with a 1988 estimated population of 6,058. This figure is up from the 1980 census of 5,333 and the 1970 census county of 2,185. The Bailey/Platte Canyon area has experienced accelerated population growth due to its proximity to the Denver metropolitan area. Population projections for the county show a year 2000 population of 8,578 and a year 2010 population of 10,901. Currently about 8.8 percent of the population is at least 62 years of age. That figure is up from 8.0 percent in 1980. Data on ethnic characteristics of the county shows 2.3 percent are Hispanic and 96.5 percent are White.

Government, services, retail trade and construction are the sectors that provide the most employment in Park County. Total 1986 employment was 2,090 people. The peak period of employment is in the summer because of the seasonal nature of agriculture, construction and tourism.

SANGRE DE CRISTO-WET MOUNTAIN HRU (Custer, Fremont and Pueblo Counties)

Management of NFS lands for recreation uses and watershed is very important to this HRU. Several communities near the Forest depend on relatively relatively small drainages within the forest for all or part of their water supply for domestic or irrigation purposes. Recreation use of the Forest areas is very high in portions of this HRU. Fishing pressure on some lakes, such as Lake Isabel, is, on a per acre basis, some of the heaviest in Colorado.

Tourism is important throughout the region. Total 1984 travel and tourism expenditures in the HRU were about $50 million. The Pueblo Reservoir is a very large recreation area in the HRU with facilities for boating, fishing, camping and picnicking. It has 5,700 acres of water surface and 60 miles of shoreline.
Custer County is a quite sparsely populated rural, agricultural and tourist oriented county. About one-third of the county's population lives in the two communities of Westcliffe and Silver Cliff. Hay and cattle ranches are the predominant occupations of the long time residents. Tourism provides most of the non-farm employment. Leading sources of household income in Custer County are agriculture, tourism, real estate and retirement. Tourism and travel expenditures in the county were about $1.6 million in 1984.

Pueblo County has a varied economic base. Colorado Fuel and Iron Corporation (CF&I) still has some employment in the area. Agriculture is important in the county as are government and

services. Leading sources of household income in Pueblo County are from manufacturing and public administration.

The 1980 population of the HRU was 156, 176: 1,528 in Custer County, 28,676 in Fremont County, and 125,972 in Pueblo County. As of July 1988, the estimated population of the HRU was 164,600. Projections for the year 2000 and 2010 show slight population increases to 170,656 and 171,581, respectively.

In 1980, 15.9 percent of the total population in Custer County was over 62 years of age. Corresponding figures for Fremont County are 20.7 percent and 14.3 percent for Pueblo County. By 1988, these figures were 13.9 percent for Custer County, 22.4 percent for Fremont County and 16.3 percent for Pueblo County. These figures are very high ranging to almost twice as high as averages seen in the more populated portions of the state.

The ethnic characteristics for the HRU show that 27.9 percent of the population of the HRU are Hispanic, 1.7 percent are Black, 0.5 percent are Indian and 69.6 percent are White.

Farming is the major occupation in Custer County. Services and government are the main employment sectors in the rest of the HRU. Many of the service jobs in Custer and Fremont Counties are related to tourism. A large portion of the government jobs in the Fremont County are with the Colorado Department of Corrections. Government jobs in Pueblo include those at the Colorado State Hospital and those at the Pueblo Army Depot. In addition to services and government, retail trade is a strong employment sector in Pueblo County.

Total 1986 employment for the HRU was 62,584; 755 for Custer County, 11,940 for Fremont County, and 49,889 for Pueblo County.

SPANISH PEAKS HRU
(Huerfano and Part of Las Animas County)

Tourism has been steadily growing over the years and significant numbers of elderly have moved into the area to enjoy its scenic qualities and reasonable cost-of-living. There are many lakes and reservoirs that provide opportunities for fishing, camping, swimming and boating. Horseback riding is also a popular activity in the Unit. Tourism/travel expenditures in this HRU were about $24.8 million in 1984.

In 1980, there were 6,440 people in Huerfano County. By July 1988, that had increased to 6,964. In 1980, there were 14,897 people in Las Animas County. The 1988 population estimate for Las Animas County was 14,319. It is assumed that 90 percent of the population of Las Animas County is included in this HRU, even though only about 37 percent of the land area in the county is included in the HRU. In 1980, Spanish Americans made-up 44 percent of the total population of the Unit. Less than 1 percent were Blacks and other races and 55 percent were White.

Population projections show the population in Huerfano County dropping to 6,513 in the year 2000 and to 6,110 by 2010. Las Animas County projects a drop in population of 12,243 for the year 2000 to 10,148 by 2010. The 1980 population of the unit was 19,928. Population projections for the Unit are for 17,532 people in the year 2000 and for 15,243 by 2010. Population decreases in the HRU are due to the lack of employment opportunities.

In 1980, persons 62 years old and over accounted for 22 percent of the population in Huerfano County and for 21.2 percent of the population in Las Animas County. In 1988, those figures were

20.6 percent for Huerfano County and 21.7 percent for Las Animas County. These figures support the trend that this area has been very popular for in-migration of elderly.

Ranching, livestock and hay production are the primary agricultural activities in the HRU. Leading sources of household income in Huerfano County are government, services and retail trade. Leading sources of household income in Las Animas County are railroads, government, mining and agriculture.

In 1986, there were over 2,600 people employed in Huerfano County. The largest employment sectors were services, retail trade and government. At the same time, there were over 5,000 people employed in Las Animas County. The majority of those people worked in the government and services sectors. there were also a sizeable number of people working in farming and ranching throughout the Unit.

Southern Plains Social Resource Unit

The Southern Plains Social Unit consists of the Comanche and Cimarron National Grasslands in southeastern Colorado and southwestern Kansas, respectively. The Cimarron Grassland is the largest block of public land in Kansas.

COMANCHE HRU
(Baca, Otero, and Part of Las Animas County)

Federal agricultural programs in the area provide an economic base on which the area depends. Agriculture and livestock raising in the main way of life and the leading source of household income in this HRU. The agriculture depends on water and the water yield in the Unit is very unpredictable. Precipitation varies from 6 to 17 inches. Many livestock operations are dependent on grazing on the National Grasslands. Fruits and vegetables are grown along the lower Arkansas River and other areas. The region produces the famous Rocky Ford cantaloupe.

The Grasslands provide good wildlife habitat and hunting and birdwatching are popular activities. The area receives hunting for big and small game, waterfowl and upland game birds. Tourism and travel expenditures in this HRU were about $16 million in 1984.

Population in Baca County was 5,419 in 1980. Although this HRU contains about 63 percent of the total land in Las Animas County, it is estimated that it only includes about 10 percent of the county's population. The portion of the Las Animas population in this HRU in 1980 was 1,499. The 1980 population of Otero County was 22,567 and the total 1980 population of this HRU was 29,485. In 1988, the HRU had a population of 27,635. Population projections show these figures decreasing to 23,454 in the year 2000 and to 19,218 by 2010.

The percentage of the population over 62 years of age in 1980 was 17 percent for Baca County, 21.2 percent for Las Animas County and 17.5 percent for Otero County. By 1988, those figures increased to 21.8 percent, 21.7 percent and 18.6 percent, respectively. There is a significantly higher proportion of senior citizens in this region than in many of the other more highly populated areas of the state.

In Baca County, six percent of the population are Hispanic, one percent are Indian and 92.9 percent are White. In Las Animas County, 43.4 percent are Hispanic, 0.5 percent are Indian and 55.5 percent are White. In Otero County, 32.9 percent are Hispanic, 0.5 are Asian and

65.9 percent are White.

There were 2,361 people employed in Baca County in 1986. Farming was the occupation for over 900 people. Other main employment sectors were government, retail trade and services. Farming is also the main occupation for the eastern portion of Las Animas county. The largest employment sector in Otero County is the services sector followed by government, retail trade, and agriculture. Total 1986 employment in Otero County was 10,224. Total employment for the HRU is about 13,100.

CIMARRON HRU
(Morton & a Small Part of Stevens County)

The area is principally a ranching and farming region characterized by large farms. Most of the wheat and grain sorghum produced in the HRU are marketed locally. Agriculture, along with oil and gas production industries, are the main activities in the HRU. Agriculture and livestock raising which are the principal occupations of the region are affected by several climatic factors. Unpredictable and low amounts of precipitation are the main limiting factors in crop production in the HRU. This affects the forage which is a key resource on the Cimarron Grasslands and which influences the local economy. Oil and gas development has been a significant economic factor in the region by providing local employment. Protection and management of the Grasslands for sustained cattle grazing are important to the residents of the HRU.

Recreation is an important activity on the Grasslands. The Grasslands are used for bird-watching, picnicking, and small game hunting for quail, pheasant, cottontail rabbits and waterfowl. For sightseeing, the Grasslands include evidence of the Santa Fe Trail and various Indian artifacts. Local residents are the heaviest recreation users of the Grasslands.

The 1980 population of Morton County was 3,454 people. The July 1988 population estimate showed the population increasing slightly to 3,500 people. Projections show continued slow growth to 3,542 in the year 2000 and 3,730 in 2010.

Total employment in Morton County in 1987 was 1970 people. The largest employment was in government followed by employment in farming, retail trade, and services.

ECONOMIC IMPACTS

IMPLAN Analysis

IMPLAN models the economic effects of monetary expenditures within a defined economic community. Inputs or expenditures are entered as dollar values and are allocated to, or originate from sectors which are generally the same as the Standard Industrial Codes (SIC) of the U.S. Commerce Department. Each sector number is tied to a unique industrial activity or function allowing for detailed computer modeling. The model then applies a set of mathematical functions to the input, simulating the economic process, and generates output. The output for this study represents the total income and total number of employed persons created by expenditures due to oil and gas leasing within the area.

To facilitate this analysis the study area was divided into three primary geographic areas which have similar oil and gas development potential and will experience similar impacts from oil and gas activities. The three areas are Urban, Rural, and Grasslands. The Rural area is comprised of the mountainous lands within the Pike and San Isabel National Forests, and includes Lake, Park, Chaffee, and part of Fremont counties within Colorado. The Urban area is made up of the Denver Metro area and the Front Range areas within the Pike and San Isabel National Forests. Huerfano, Custer, Pueblo, Jefferson, Douglas, Teller, El Paso, and part of Fremont counties make up this area. All lands within the Comanche and Cimarron National Grasslands are included in the Grasslands area and include Morton County, Kansas, and Baca, Las Animas, and Otero Counties in Colorado.

The Rural area is sparsely populated and has seen very little oil and gas activity. The primary geologic basin where most future oil and gas activity probably would occur would be the South Park Basin, in Park County, Colorado. The oil and gas service industry is nearly non-existent in this area and most services would, therefore, come from the Denver Metro area and Wyoming.

The Urban area supports a number of large cities and urban areas. The Denver Metro area is home to many large and small oil companies and to oil service companies including seismic and drilling contractors. It is assumed that all necessary services would be provided from within this area.

The Grasslands area, especially that part within Morton County, Kansas, is heavily developed in terms of the oil and gas industry. Thousands of wells have been drilled in this area, from the early nineteen hundreds to the present. Service centers are well established in this area and would adequately service the oil and gas activities proposed. Drilling and seismic contractors would probably come from within the area and Oklahoma and Texas. Lands within the Comanche Grasslands in Colorado are less developed than those on the Cimarron Grasslands in Kansas, with well densities decreasing as you go west.

The oil and gas activities which could impact the local economies have been further subdivided into three phases: exploration, drilling and production. The lands within this EIS study area, if leased to oil and gas companies, would be developed by a number of different companies with a variety of operational strategies. This development would begin at different times and would occur at different intensities depending on the area of the lease and the lessee. A specific lease or lease area will generally be impacted by the three phases of activities identified above. These activities would typically occur in the order they are listed in. However, because of the number of different leases and companies involved in the study area, each of the geographic areas would at any one time, be impacted by activities from all three categories. Therefore, expenditures in the exploration and drilling categories were applied uniformly, on an annual basis, throughout the 15-year study period. Production expenditures increase each year, and are cumulative because each year new producing wells would be found, yet none would be abandoned.

Cost Efficiency

The main criterion used in assessing efficiency is Present Net Value (PNV) analysis, which is defined as the value of discounted benefits less discounted costs. In the preparation of the Forest Management Plan and FEIS, the PNV analysis included all outputs, such as timber, grazing and recreation, to which monetary values were assigned. That analysis demonstrated the relative efficiency of the Forest Management Plan which in turn guides the current analysis of alternative oil and gas leasing programs on the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands.

Given that the efficiency of the Forest Management Plan has already been addressed, a more limited analysis, termed a cost efficiency analysis, is undertaken for the assessment of the oil and gas leasing alternatives. The focus of this analysis is an evaluation of the costs and revenues to the Federal government for each of the four alternatives. Only costs and revenues directly linked to oil and gas leasing are considered in this analysis. For instance, estimates of additional administration costs associated with issuing exploration permits, annual lease rentals and royalties paid on production are included, whereas Federal income taxes to be paid on employee earnings in the oil and gas industry are not included. Furthermore, proponent costs such as field exploration costs are also ignored. To the extent that they are identified and quantified, changes in Federal costs or revenues resulting from impacts on other outputs on the National Forests or Grasslands, termed "opportunity costs", are also considered.

The current analysis consists of two measures of efficiency: (1) a PNV analysis (discounted revenues less discounted costs) and (2) revenue-cost ratios (discounted revenues divided by discounted costs). As all monetary values are expressed in constant 1989 dollar terms, with no allowance for either real change or inflation, a four (4.0) percent discount rate is used throughout this analysis. Furthermore, producing wells are assumed to have a 15-year productive life. Since the alternatives assume that new wells will begin production throughout the 15-year analysis period, some of future revenue stream, as well as associated Forest Service administrative costs, will extend beyond the year 2004. Consequently, their analysis also examines the cost efficiency of leasing over a 30-year time period extending to 2019. The resulting PNV and revenue-cost ratio analysis are then ranked in terms of the alternative which would yield the highest returns.

REVENUES ACCRUING TO THE TREASURY

Revenues accruing to the Federal Treasury that could potentially be affected by the oil and gas leasing alternatives include: lease bonus bids, annual rentals, royalties based on annual production, grazing fees, timber sale revenues and user fees at developed recreation facilities.

LEASE BONUS BIDS

Lease bonus bids are one-time premiums paid to the Federal government for the right to explore and develop a given lease being offered for such purposes. The premium is established by competitive bid. The bonus generally reflects the industry's appraisal of the mineral potential of a given lease, as well as the outlook for energy prices. The more well-defined a tracts' mineral potential, as established by a higher than average success rate for wells in the surrounding region or other indicators, the higher the likely bonus payments. Bonus bids vary greatly, even within a relatively limited geographic area.

For this analysis, bonus bid revenues are estimated as a function of bonus bids received per acre in 1988 and 1989 plus the assumed frequency, number and size of leases expected to be offered on the Cimarron and Comanche National Grasslands and the National Forests. The rates reflect differences in mineral development potentials throughout the region, and uncertainty arising from the relative lack of exploration history on the Comanche National Grassland and the Forests. The bonus bid values in 1989 dollars, are: $400/acre for the Cimarron National Grassland; $25/acre for the Comanche National Grassland; and $10/acre for the National Forests.

The following assumptions are used with respect to the other factors that affect the timing and amount of bonus bid revenues:

- Average tract size for leased parcels is 160 acres on the Grasslands and 900 acres on the National Forests;

- Leasing is assumed to occur at a uniform rate over the period of analysis; and

- All lands available for leasing are to be leased during the course of that period.

Table H-1 summarizes the leasing profile resulting from these assumptions. These assumptions imply annual rates of leasing comparable to or exceeding recent activity levels in these areas under all but Alternative IV. For instance, during calendar year 1988, 41 tracts on the Cimarron National Grassland and four tracts on the Pike and San Isabel National Forests were leased using the competitive bid process.

Table H-1
Comparison of Leasing Profiles by Alternative

	Alt. I	Alt. II	Alt. III	Alt. IV
Total Acres Leased	2,125,938	2,125,938	2,125,938	0
Ave. Acres Leased Per Year	106,297	106,297	106,297	0
Ave. # of Tracts Leased Per Year:				
Grasslands	123	123	123	0
Forests	103	103	96	0
Total Tracts Leased	3,382	3,382	3,282	0

Due to the variability of the bonus bids, the competitive nature in which they are established, and uncertainties associated with both the success rate and the future price on energy resources, these values are established solely for the current analysis and are thought to be reasonably conservative. They should not be interpreted as an indication of what actual bonus bids may be in the future nor should they be used as the basis for developing any bid for a future offering.

ANNUAL RENTALS

Annual rentals are the annual payments to the Federal Government for an active lease. Oil and gas leases are generally for five-year terms, although a lease can be held indefinitely by a producing well. The current annual rental rate is $1.50 per acre. This value is used and held constant over the entire analysis period. Revenues are estimated as a function of the number of wells drilled, the success rate and abandonment assumptions under each alternative.

ROYALTIES

Royalties are a direct function of the royalty rate and value of production achieved from a producing well. The current royalty rate for Federal oil and gas leases is 12 percent of the value of production. This rate is maintained over the entire analysis period.

Energy prices are extremely volatile and future prices uncertain. Values established for this analysis are based on average wellhead prices received over the three-year period 1986, 1987 and

1988. Adjusted to 1989 dollar terms, the values are: $16.27 per barrel of crude oil and $2.10 per 1,000 cubic feet of natural gas. Because real energy prices have been near historic lows during that period, the results derived using these values are probably conservative.

Average per well oil and gas production is the other primary determinant of royalties to be received. Production characteristics vary by field and individual well. Average production assumptions based on statistics for annual production volume and the number of producing wells in selected counties in Colorado and Kansas are used in this analysis. The average annual production assumptions used in this analysis are:

- 30,000 Mcf of gas and 800 barrels of crude for wells on the National Forests

- 45,000 Mcf and 5,000 barrels of crude on "high" mineral potential portions of the Grasslands

- 25,000 Mcf and 1,500 barrels of crude on "moderate" mineral potential portions of the Grasslands

Since the mix of wells between these areas varies by alternative, some variation occurs in the average production per well across the alternatives.

Producing wells typically experience diminishing production over time. Thus, it is assumed that a well will produce approximately one-half of its eventual cumulative life-of-well production within the first three years. After that time, production is assumed to remain constant over the 12-year residual productive life.

GRAZING FEES

Grazing fees are paid by farmers and ranchers who have seasonal grazing allotments on Federal lands. Each grazing allotment entitles the lease holder to graze a specified number of cattle or sheep for a defined time period, which varies based on the ranges productive capacity. Combining the number of animals and the duration yield a measure termed animal-unit-months (AUM's), which is the standardized basis for the fees. The current fee (1989) is $2.10 per AUM. This value is maintained for this analysis.

TIMBER SALE REVENUES

Timber sale revenues are payments made to the Federal government for the right to harvest timber on public lands. As with the bonus payments, the payments are competitively established at auction for specific advertised tracts. However, unlike the oil and gas leases, minimum bids are established for timber sales.

The potential impact on the timber sale revenues from oil and gas leasing would arise in a situation where the latter would reduce or impede a future timber sale, which in turn would reduce revenues to the Federal Treasury; an opportunity cost. However, as discussed in other sections, no impacts on timber harvest are projected as a result of the alternatives. Therefore, there would be no impact on timber sale revenues to the Federal Treasury.

RECREATION USER FEES

Recreation user fees are collected by the Forest Service from users of many developed campgrounds. In fiscal year 1988, such fees were charged at 59 of the 93 developed campgrounds managed by the Forest Service in the study area. In some instances, the Forest Service also collects recreation fees from downhill ski areas that are operating some or all of their facilities on public lands under a special use permit. As is true for grazing and timber sales, the proposed oil and gas leasing alternatives could impose an opportunity cost to the Federal Treasury, if such activities interfered with revenue-producing recreational pursuits on the National Grasslands or Forests. Some potential for adverse impact relative to the enjoyment or quality of experience and possibly the level of recreation use of a particular developed recreation area is acknowledged. However, the net impact on use and resulting fees cannot be quantified. In many instances the impact is likely to be in the form of re-directing the recreation use to another location, not an actual loss or reduction of use. Therefore, the revenue projections include no allowances for changes in recreation user fee receipts.

INCREMENTAL COSTS TO THE FOREST SERVICE

Three categories of costs are addressed in the cost efficiency analysis; operation and maintenance, general administration, and capital investments. As with the revenues, the emphasis is on those costs that are directly linked to the oil and gas leasing program.

OPERATION AND MAINTENANCE

Operation and Maintenance (O & M) costs are the recurring labor and non-labor costs required to implement and administer the program on-site and at the local district level. In other words, the O & M costs are directly associated with the industry's exploration, development, production and reclamation activities. For example, the Forest Service is required to conduct an on-site inspection of all wells to insure compliance with various stipulations and regulations. The staff time and associated costs fall under the heading of operation and maintenance costs. For this analysis, the projected O & M costs reflect recent experience and budgets of the Forest Service associated with oil and gas leasing programs in the study area.

The major component of O & M costs are payroll and staff-related expenses. O & M costs are less sensitive to the number of producing wells than are revenues. Costs respond more in an incremental fashion to major changes in the levels of leasing, exploration, development and reclamation activity. Also, as the Forest Service's budget is Congressionally established, increased staffing does not necessarily result from increased demand. For this analysis, the following incremental staffing needs and costs are assumed. The staffing estimates are in addition to the current staffs assigned to Minerals and Leasing activities. The estimated annual cost per full-time employee (FTE) includes allowances to cover associated expenses, such as motor vehicles. In addition to the above expenses, a second allowance of 13.2 percent of the subtotal is included for overhead and other Forest-level administrative expenses. Finally, annual expenditures of $106,300 which represent the average project budget for Minerals and Leasing on the Pike and San Isabel National Forests and the Comanche and Cimarron National Grasslands are also included.

GENERAL ADMINISTRATION

General Administration (GA) costs also encompass recurring labor and non-labor costs associated with the development and administration of the program. However, the GA costs are not specifically linked with on-the-ground activities, but rather are tied to the administration of the

overall program. Most of these costs occur at the Forest and Regional level. Among the functions considered to be GA in nature are the collection, reporting and disbursing of royalty receipts; coordination of leasing programs and output targets among the Forests and staff; and budget formulation for the district operations. These costs are not easily attributable to discrete activities and programs of a particular Forest. For this analysis, they are assumed to be equal to the projected O & M costs.

CAPITAL INVESTMENTS

Capital investments are expenditures associated with improvements or items which have an expected life of more than one year. Examples of such expenditures include construction costs for new roads, Forest Service vehicles, or additional data processing capacity. No specific requirements for major capital investments from Federal sources resulting from oil and gas leasing have been identified. However, as some capital investment is required on a periodic basis, such as replacement of motor vehicles, an allowance for such costs is factored into the O & M cost components for this analysis.

OTHER COSTS

Payments to State and Local Governments are made to help finance public education and road maintenance in the counties where the National Forest lands are located. By law, 25 percent of the revenues collected by the Forest Service are returned to state and/or local governments for these purposes. These "revenue-sharing"-type disbursements do not represent costs in the same manner that outlays for motor vehicles are costs, but they do reduce the effective net revenue to the Federal Treasury. At the same time, they can be viewed as providing a benefit at the local level, that may not be captured in an analysis that considers only the net effects on the Federal Treasury. The PNV and revenue-cost ratios presented in this analysis have the payments subtracted from the estimated revenues.

PRESENT NET VALUE AND DISCOUNTED REVENUE-COST RATIOS

Annual estimates of the incremental revenues and costs associated with each of the alternatives are derived based on the factors and assumptions outlined above. Annual revenues are projected to increase over time, primarily as a function of the number of producing wells. Figure H-3 provides a simplified illustration of this pattern, showing the increasing level and changing composition of the revenue stream over time.

As shown, the typical revenue stream combines one-time and recurrent revenues. This results in a revenue stream punctuated by periodic receipts coinciding with the bonus bids received from the initial leasing. Subsequently, the Treasury would receive annual rentals based on the land area leased. Finally, royalty payments would accrue as new wells come into production, resulting in a cumulative increase over time.

Conversely, Forest Service costs are significantly less sensitive to the number of wells or even minor changes in the rate of leasing on a given Forest. Rather, the management costs are relatively fixed and adjust in a more discrete or incremental fashion.

Revenues

Revenues to accrue to the Federal Treasury are estimated on an annual basis. The generalized pattern parallels that shown in Figure H-3 although there is a substantial variation over time and between alternatives. Table H-2 compares the alternatives from three different perspectives: (1) the estimated revenue, by major source, for the year 2000; (2) total revenues for the years 1995, 2000 and 2004; and, (3) the combined revenues summed over the period 1990 to 2004. The total payments to be made to state and/or local governments, representing 25 percent of the Forest Service's receipts, are also shown.

DISCOUNTED REVENUES

The discounted value (DV) of the annual revenues streams is derived using a four percent discount rate. The DV of a series of monetary values yields its equivalent lump-sum value in today's (1989) terms. Because of the time-value of money, absolute amounts to be received in the future have a lower value than the same absolute amount received today. Consequently, the further in the future a sum is to be received (or spent) the less its present value.

Two separate DV's are derived for this analysis: (1) the value of the total revenue stream between 1990 and 2004, and (2) the value of the total revenue stream between 1990 and 2019, when the last of the new producing wells started in 2004 are assumed to reach the end of their productive life. Table H-3 presents these results.

Table H-3
Discounted Values of Revenues - At a 4.0% Discount Rate

	Alt. I	Alt. II	Alt. III	Alt. IV
A. 1990-2004	$70,815.3	$93,116.3	$76,569.5	$7,030.9
B. 1990 - 2019	$74,138.8	$99,127.7	$82,495.9	$9,210.8

Note: All values in 1989 constant dollars (x 1,000) and rounded to the first-place decimal. Net of the 25% of revenues returned to the state and local governments for schools and roads.

As shown, the discounted value of revenues over the 15-year analysis period varies from $7 million under Alternative IV to $93.1 million under Alternative II. Table H-3 also demonstrates the effect of discounting, as doubling the period to 30 years to account for the eventual production from all wells started during the initial 15 years, results in only a limited increase in the total discounted revenue.

Figure H-3
Generic Yearly Revenue Stream

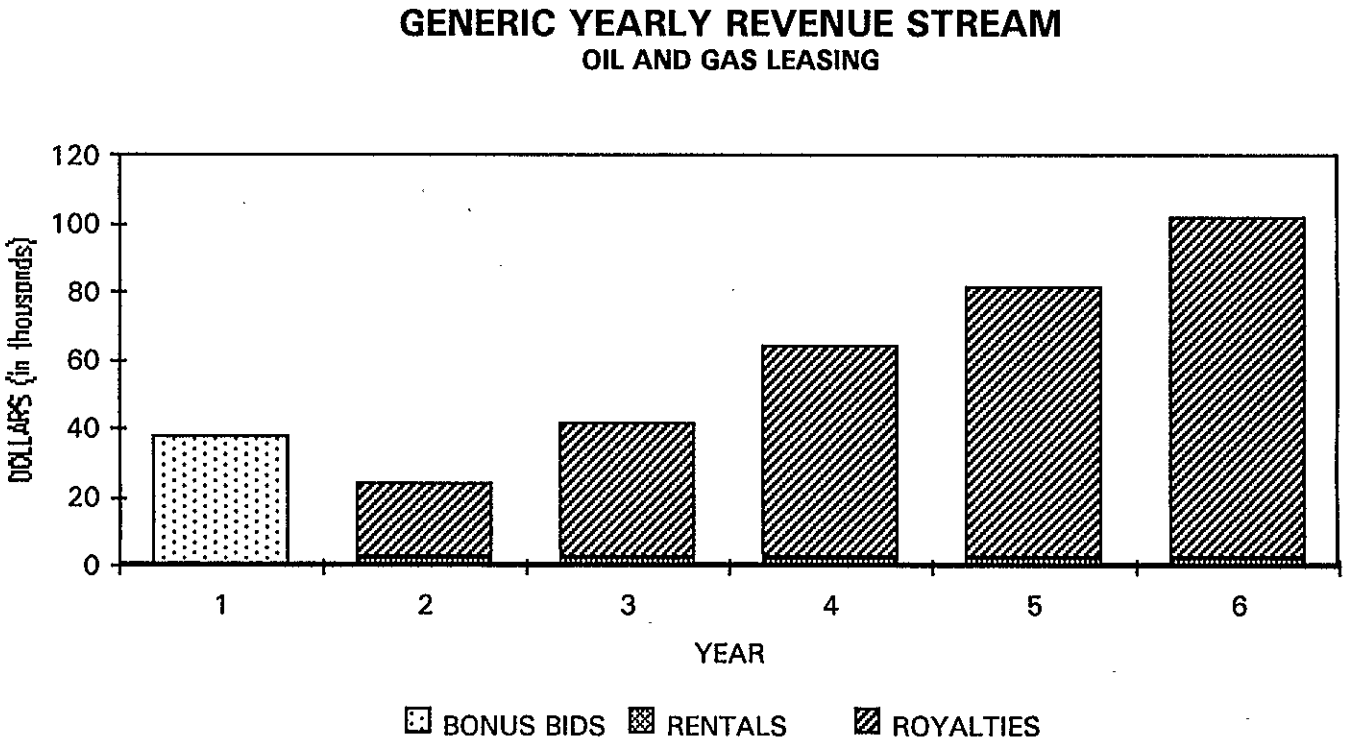


Table H-2
Summary of Receipts to the Federal Treasury

	Alt. I	Alt. II	Alt. III	Alt. IV
A. Federal Receipts - Year 2000				
Add:				
Bonus Bids	$4,087.2	$5,109.0	$4,087.2	0
Rentals	831.6	831.6	831.6	0
Royalties	1,348.3	1,348.3	1,348.3	7.3
Subtotal	6,267.1	7,288.9	6,267.1	7.3
Less:				
Payments to State*1				
Local Government	$1,566.8	$1,822.2	$1,566.8	$1.8
Grazing Fees	.1	.1	.1	0
Timber Sales	0	0	0	
Recreation Fees	0	0	0	
TOTAL REVENUE	$4,700.2	$5,466.6	$4,700.2	5.5
B. Annual Revenues - 1995, 2000, and 2004*2				
1995	$5,826.5	$6,848.3	$5,826.5	$27.3
2000	6,267.1	7,288.9	6,267.1	7.3
2005	2,172.7	2,172.7	2,172.7	14.6
C. Total Revenue: 1990 to 2004*2	$66,385.9	$77,881.2	$66,385.9	$166.9
D. Total Payments to State and Local Governments: 1990 to 2004	$22,128.6	$25,960.4	$22,128.6	$55.6

*1 All values in 1989 constant dollars (x1,000) and rounded to first-place decimal.

*2 All revenues net of the 25 percent payments to state and local governments.

Alternative II has the largest revenue because it has no special stipulations applied to new leases. Alternatives I and III have comparable revenue streams because they both use special stipulations to protect the environment. Alternative IV has the lowest revenue since no new leases are sold. Over the 15-year period, the total revenue accruing to the Federal Treasury, net the payments made to the local governments, range from $77.9 million under Alternative II to $166,900 under the Alternative IV.

Costs

Future O & M and administrative costs to the Federal government associated with the leasing alternatives are estimated on an annual basis. Table H-4 below compares the alternatives from two perspectives: (1) estimated average annual expenditures, and (2) the total expenditures over the period 1990 to 2004.

Similar projected expenditures would occur under Alternatives I, II and III because they are based on comparable levels of activity. Alternative IV would require the lowest outlays. Over the course of the 15-year period, the total expenditure required by the Forest Service to implement and administer the oil and gas leasing program, not including the transfer payments made to local governments, range from $4.17 million under Alternative I to $1.59 million under Alternative IV. The transfer payments are not considered a direct cost to the Forest Service associated with the management program.

Table H-4
Summary of Federal Expenditures

	Alt. I	Alt. II	Alt. III	Alt. IV
A. Average Annual Federal Expenditures	$278.2	$278.2	$278.2	$106.3
B. Total Expenditures: 1990 to 2004	$4,172.4	$4,172.4	$4,172.4	$1,593.8

Note: All values in 1989 constant dollars (x 1,000) and rounded to first-place decimal.

DISCOUNTED COSTS

As with the revenues, the discounted value of the projected expenditures is derived using a four percent discount rate. Two sets of discounted costs are derived for this analysis; (1) for expenditures between 1990 and 2004 and (2) the value of the total expenditures between 1990 and 2019, when the last of the new producing wells started in 2004 are assumed to reach the end of the life-of-well. Table H-5 below presents these results.

Table H-5
Discounted Value of Costs - At a 4.0% Discount Rate

	Alt. I	Alt. II	Alt. III	Alt. IV
A. 1990-2004	$3,092.7	$3,092.7	$3,092.7	$1,181.3
B. 1990 - 2019	$4,312.3	$4,312.3	$4,312.3	$1,647.2

Note: All values in 1989 constant dollars (x 1,000) and rounded to the first-place decimal.

Less variation occurs in the discounted value of expenditures, compared to that of revenues. For the initial 15-year period, 1990 to 2004, the discounted value of expenditures range from a high of $3.09 million for Alternatives I, II and III to a low of $1.18 million under Alternative IV. Extending the period of consideration to 30 years, increased the discounted costs by about 40 percent over the initial costs.

Table H-6 below combines the discounted revenues and costs to yield measures of the overall cost efficiency of the alternatives. Two different measures are presented; (1) the Present Net Value, defined as the difference between discounted revenues and costs, and (2) the ratio of discounted revenues and costs.

Table H-6
Present Net Value and Net Revenue/Cost Ratio

	Alt. I	Alt. II	Alt. III	Alt. IV
A. Present Net Value				
Revenue	$70,815.3	$93,116.3	$76,569.5	$7,030.9
Cost	3,092.7	3,092.7	3,092.7	1,181.3
NET	$67,722.6	$90,023.6	$73,476.8	$5,849.6
B. Revenue/Cost Ratio	22.9	30.1	24.8	6.0

Note: All values in 1989 constant dollars (x 1,000) and rounded to first-place decimal. Revenues are net of the payments made to state and local governments. Discounted revenues and costs are for the period 1990 to 2004.

Any of the alternatives is supportable from a cost efficiency perspective. However, if the objective is to maximize the benefits from oil and gas leasing, then Alternative II would yield the most favorable results.

COST EFFICIENCY RANKS

Table H-7 displays the rankings of the alternatives, based on the results in Table H-6. Rankings are from 1 to 4 in descending order, with 1 representing the most favorable alternative from a cost efficiency perspective. The ranking for PNV is based on the highest absolute net return to the Federal Treasury. The revenue/cost ration ranking reflects the most favorable percentage margin of revenues to costs. Again, the ranking shows Alternative II to be the most favorable.

Table H-7
Cost Efficiency Ranking of Alternatives

	Alt. I	Alt. II	Alt. III	Alt. IV
Rank Order	3	1	2	4

NOTES

[1] Greystone Development Consultants, Inc.; Socioeconomic and Cost Efficiency Analysis to Support the Oil and Gas Leasing EIS for the Pike/San Isabel National Forests and the Cimarron/ Comanche National Grasslands. Englewood, CO November 1989.

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APPENDIX I

APPENDIX I

MINERAL POTENTIAL MAPS

This Appendix discloses the mineral potential for all lands on the Unit. The potential was jointly developed by the Forest Service and Bureau of Land Management. It is based on the probability of undiscovered mineral resources, the anticipated type of mineral, and extent of the expected deposit. The indicies are high, moderate and low potential. Those potentials have been mapped and their definitions are as follows:

High Potential - Describes geologic environment that is highly favorable for discovering oil and gas resources. The area is on or near a producing field and evidence exists that the geologic conditions of reservoir, source, and trap necessary for the accumulation of oil and gas are present.

Moderate Potential - Refers to environment that is favorable for the occurrence of undiscovered oil and gas resources, however one of the geologic conditions necessary for the accumulation of oil or gas may be absent.

Low Potential - Refers to an environment that is not favorable for the accumulation of oil and gas as indicated by geologic, geochemical, and geophysical characteristics. Evidence exists that one of the geologic conditions necessary for the accumulation of oil or gas is absent.

Figure I-1
Oil and Gas Mineral Potential

PIKE AND SAN ISABEL NATIONAL FOREST

LEGEND

- State capital
- County seat
- City, town, or village
- Scheduled service airport
- Interstate highway
- U. S. highway
- State highway
- Other principal roads

Scale 1:500,000
1 inch equals approximately 8 miles
10 0 10 20 Miles
10 0 10 20 30 Kilometers

R.77W. R.76W. R.75W. R.74W.

T.6S. T.7S. T.8S. T.9S. T.10S. T.11S. T.12S. T.13S. T.14S. T.15S. T.51N.

R.3E. R.4E. R.5E. R.6E. R.7E. R.8E. R.9E. R.10E. R.11E. R.12E.

LEGEND

H HIGH MINERAL POTENTIAL
M MODERATE MINERAL POTENTIAL
L LOW MINERAL POTENTIAL

NORTH PORTION

COLORADO

PIKE AND SAN ISABEL NATIONAL FOREST

Figure I-2
Oil and Gas Mineral Potential

R.7E. R.8E. R.9E. R.10E. R.11E.

T.50N. T.49N. T.48N T.47N. T.46N. T.45N. T.44N. T.43N. T.42N. T.41N. T.40 N. T.39N.

T.17S. T.18S. T.19S. T.20S. T.21S. T.22S T.23S. T.24S. T.25S. T.26S. T.27S. T.28S T.29S T.30S. T.31S T.32S

Browns Canon
Ute Cr
Maysville
Salida
(7080)
Poncha Springs
(7465)
Cleora
Wellsville
Howard
Burned Timber Mtn
Texas Creek
Cotopaxi
Coaldale
Alder
Bushnell Pk
13105
Bonanza
Villa Grove
Nipple Mtn
Gem Mtn
Hillside
Buck Mtn
Cottonwood Peak
Electric Peak
Mineral
Hot Springs
Saguache
Moffat
Crestone
Crestone Peak
Horn Pea
Gibson Pk
12816
LUIS MARIA BACA
GRANT NO 4
Center
Hooper
(7560)
Ansel
Dunul
Sevenmile
Plaza
Mosca
Torres
Sand Dunes
Great Sand Dunes
Nat Monument
Big Spring
Sand Luis
Lake
Canon City
(5332)
Florence
(5186)
Rockvale
Penrose
Portland
Parkdale
Cactus
Mtn
Twin
Mtn
Horseshoe Mtn
Curley Pk
9622
Hobson
Wetmore
(6081)
Adobe Pk
10188
Greenwood
Bear Pk
9577
De Weese
Res
Westcliffe
(7668)
Silver Cliff
Querida
Rosita
Wixson Mtn
Fairview
Valley View
Goodpas
San Isabel
Colorado
Rye
Greenhorn Mtn
12349
Middle Knob
Gardner
Badito Cone
Farisita
Red Wing
Huerfano
Sheep Mtn
Slide Mtn
12340
Iron Mtn
Black
Hills
N La Veta
Pass
Silver Mtn
10522
Veta Pass
Mt Mestas
Mt Lindsey
14042
Little Bear Peak
14037
Blanca Pk
Buck Mtn 10440
Russell
Sierra
Codo
La Veta
(7013)
Goemmer
Butte
Three Bridges
Mortimer
Fir
Blanca
Fort Garland
(7930)
Harrison Pk
11598
Raspberry
Mtn
E Spanish
Peak
W Spanish Pk
Cucharas
Cucharas
Pass
Antelope Creek
Grape Creek Valley
Muddy Cr
Sand Arroyo
Middle Creek
Indian Cr
Gardner Creek
Red Wing Creek
Pass Spring Cr
Badito Cr
Huerfano
Cucharas
Beaver Cr
Turkey Creek
Hardscrabble Cr
Newlin Gulch
Copper Gulch
Texas Creek
Oak Cr
Rock Creek
Stour Creek
Badger Creek
Ute Cr
Kerber Creek
Findley Gulch
Saguache Creek
Carnero Creek
Crestone Creek
Isabel Creek
Willow Creek
Grape Creek
Rio Grande Canal
Farmers Union Canal
Cooper Lake
Central Main Canal
Arkansas River
Royal Gorge
Rio Grande Western
Denver and
Rio Grande Western
Colorado and Southern
Atchison Topeka and Santa Fe
Forest Boundary
San Isabel Nat Forest
Sangre de Cristo Mountains
Wet Mountain Valley
Huerfano Valley
Sangre de Cristo Range
Guide Meridian
New Mexico
Principal Meridian
Sixth Principal Meridian
Waugh
Fremont
Custer
Huerfano
Costilla
Saguache
Alamosa
Rio Grande
Pueblo
Chaffee
Fremont
Custer
Las Animas
Baca
Prowers
Bent
Otero
Crowley
Kiowa
Lincoln
Elbert
El Paso
Pueblo
Fremont
Custer
Huerfano
Las Animas
Baca
Prowers
Bent
Otero
Crowley
Kiowa
Lincoln
Elbert
El Paso
Pueblo

LEGEND

M	MODERATE MINERAL POTENTIAL
L	LOW MINERAL POTENTIAL

LEGEND

State capital	Interstate highway
County seat	U. S. highway
City, town, or village	State highway
Scheduled service airport	Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles
10 0 10 20 Miles
10 0 10 20 30 Kilometers

N

SOUTH PORTION

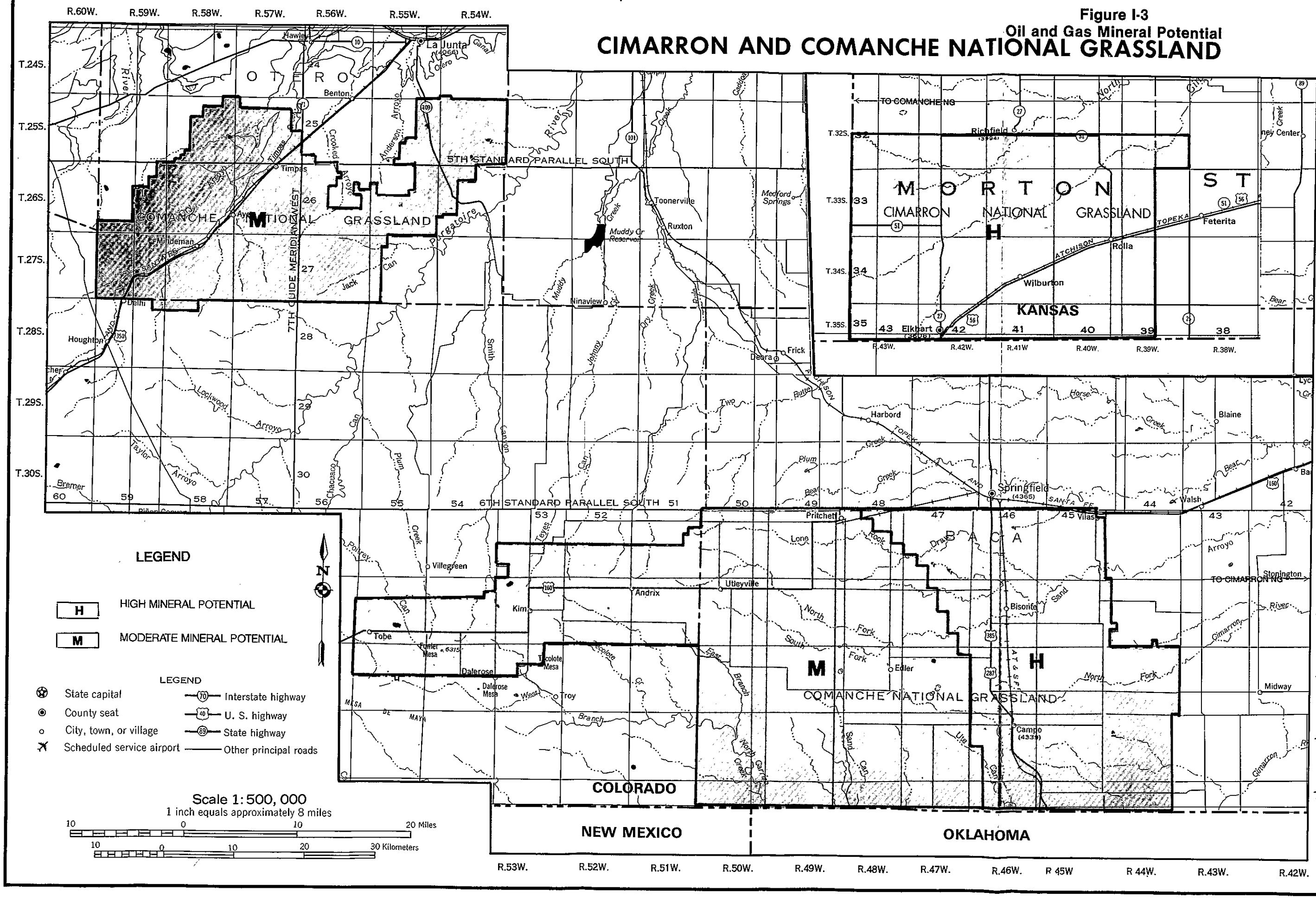
COLORADO

R.69E. R.68E. R.67E.

I-4

Figure I-3
Oil and Gas Mineral Potential

CIMARRON AND COMANCHE NATIONAL GRASSLAND



LEGEND

H	HIGH MINERAL POTENTIAL
M	MODERATE MINERAL POTENTIAL

LEGEND

State capital	Interstate highway
County seat	U. S. highway
City, town, or village	State highway
Scheduled service airport	Other principal roads

Scale 1:500, 000
1 inch equals approximately 8 miles
10 0 10 20 Miles
10 0 10 20 30 Kilometers

ACRONYMS/GLOSSARY

ACRONYMS/GLOSSARY OF TERMS

ACRONYMS

4WD/4x4	Four-wheel Drive
AIRFA	American Indian Religious Freedom Act
AMP	Allotment Management Plan
APD	Application for Permit to Drill
ATV	All Terrain Vehicle
AUM	Animal Unit Month
BEA	Bureau of Economic Analysis
Bg	Background
BLM	Bureau of Land Management
BO	Barrels of Oil
BR	Bureau of Reclamation
CDOW	Colorado Division of Wildlife
CFR	Code of Federal Regulations
CEQ	Council on Environmental Quality
CNAP	Colorado Natural Areas Program
COA	Condition of Approval
COGCC	Colorado Oil and Gas Conservation Commission
CSU	Controlled Surface Use
CWA	Clean Water Act
D&RG	Denver and Rio Grand (Railroad)
DAU	Data Analysis Unit
DEIS	Draft Environmental Impact Statement
DNL	Discretionary No Lease
DO	District Ranger's Office, USFS
DOD	Department of Defense
DOE	Department of Energy
DSP&P	Denver, South Park and Pacific (Railroad)
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
EVC	Existing Visual Condition
Fg	Foreground
FLPMA	Federal Land Policy and Management Act
FLRMP	Forest Land and Resource Management Plan
FLUR	Forest Land Use Report
FOOGLRA	Federal Onshore Oil and Gas Leasing Reform Act of 1987
Forest Plan	Forest Land and Resource Management Plan
FPA	Further Planning Area
FR	Federal Register
FDR	Forest Development Road
FPA	Further Planning Area
GZ	Geographic Zone
HRU	Human Resource Units
IDT	Interdisciplinary Team
IHICS	Integrated Habitat Inventory and Classification System

KDGP	Kansas Department of Game and Parks
KDWP	Kansas Department of Wildlife and Parks
Kg/ha	Kilograms per hectare
LRMP	Land and Resource Management Plan
Mcf	Thousand Cubic Feet
Mg	Middleground
MM	Maximum Modification
NEPA	National Environmental Policy Act
NF	National Forest
NFMA	National Forest Management Act
NFS	National Forest System
NG	National Grassland
NNL	Natural National Landmark
NOI	Notice of Intent
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
NTL	Notice to Lessee(s)
NWI	National Wetlands Inventory
NWPS	National Wilderness Preservation System
O&G	Oil and Gas
OHV	Off-highway Vehicles
ORA	Oklahoma Resource Area
P	Primitive; Preservation
PA	Plan Amendment
PAOT	People At One Time
PL	Public Law
POD	Potential of Development
R	Rural; Retention
R2RIS	Region 2 Resource Information System
Reform Act	same as FOOGLRA
RFD	Reasonably Foreseeable Development
RMP	Resource Management Plan
RN	Roaded Natural
RNA	Research Natural Area
RO	Regional Office, USFS
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	Right of Way
RVD	Recreation Visitor Day
SAOT	Skiers at One Time
SCS	Soil Conservation Service
SMSA	(Denver) Standard Metropolitan Statistical Area
SO	Supervisor's Office, USFS
SPCC	Spill Prevention Control and Countermeasures (Plan)
SPM	Semiprimitive Motorized
SPN	Semiprimitive Nonmotorized
spp.	Species
SRMA	Special Recreation Management Area
SRU	Social Resource Units
SSF	Soil Surface Factor
SUPO	Surface Use Plan of Operation
T&E	Threatened and Endangered
TDS	Total Dissolved Soils

TE&S	Threatened, Endangered and Sensitive (Species)
TSP	Total Suspended Particulates
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USLE	Universal Soil Loss Equation
VAC	Visual Absorption Capability
VQO	Visual Quality Objective
VRM	Visual Resource Management
WRIS	Wildlife Resource Information System
WSA	Wilderness Study Area

GLOSSARY

A complete and definitive glossary of terminology used in this EIS is found in the Wildland Planning Glossary, C.F. Schwarz, E.C. Thor, and G.H. Elsner, a publication of the USDA Forest Service, Gen. Tech. Report PSW, 13/1979. Forest Plan FEIS Appendix B contains a glossary of terms that is also useful for further definition of information in this EIS.

- A -

Abandonment. Termination of operations for production from a well. Permanent abandonment involves plugging the well and removal of installations. Conclusively abandoned unpatented oil placer mining claims are subject to conversion into a noncompetitive oil and gas lease pursuant to the Federal Oil and Gas Royalty Management Act of 1982 (30 U.S.C. 188(f)).

Acre Foot. The amount of water it would take to cover an acre of land to a depth of one foot.

Affected Environment. Surface or subsurface resources (including social and economic elements) within or adjacent to a geographic area which could potentially be affected by oil and gas activities. The environment of the area to be affected or created by the alternatives under consideration. (40 CFR 1502.15)

Air Quality Classes. Classifications established under the Prevention of Significant Deterioration portion of the Clean Air Act which limit the amount of air pollution considered significant within an area. Class I applies to areas where almost any change in air quality would be significant; Class II applies to areas where the deterioration normally accompanying moderate well-controlled growth would be permitted; and Class III applies to areas where industrial deterioration would generally be allowed.

Allotment Management Plan (AMP). The plan for long-term use and development of a range allotment.

Alluvial Soil. A soil developing from recently deposited alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

Alluvium. Clay, silt, sand, gravel, or other rock materials transported by flowing water. Deposited in comparatively recent geologic time as sorted or semi-sorted sediment in riverbeds, estuaries, floodplains, lakes and shores, and in fans at the base of mountain slopes.

Analysis Area. A delineated area of land subject to analysis of (1) responses to proposed management practices in the production, enhancement, or maintenance of forest and rangeland outputs and environmental quality objectives, and (2) economic and social impacts.

Animal Unit Month (AUM). The amount of forage necessary to sustain one cow and one calf or its equivalent for one month.

Anticline. A fold, generally convex upward, whose core contains the stratigraphically older rocks.

Application. A written request, petition, or offer to lease lands for the purpose of oil and gas exploration and/or the right of extraction.

Application for Permit to Drill (APD). An application to drill a well submitted by a lessee or operator to the BLM. The APD consists of a Drilling Plan that discusses downhole specifications and procedures (reviewed by the BLM) and a Surface Use Plan of Operations (SUPO) that examines surface uses, including access roads, wellsite layout, cut/fill diagrams, reclamation procedures, production facility locations, etc. (reviewed by the FS). The approved APD is a contract between the operator and the federal government and cannot be changed or modified unless authorized by the BLM and FS.

Aquatic Ecosystem. All organisms in a water based community plus the associated environmental factors.

Area of Critical Environmental Concern (ACEC). An area established through the planning process as provided in FLPMA where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values; or to fish and wildlife resources or other natural systems or processes; or to protect life and afford safety from natural hazards.

Authorized Forest Officer. The Forest Service employee delegated the authority to perform a duty described in these rules. Generally, a Regional Forester, Forest Supervisor, District Ranger, or Minerals Staff Officer, depending on the scope and level of the duty to be performed.

Available Lands. Any lands subject to oil and gas leasing under the Mineral Leasing Act.

Availability for Oil and Gas Leasing. Availability of NFS lands for oil and gas leasing refers to lands which have not been formally withdrawn from oil and gas leasing activities. The existing Forest Land and Resource Management Plan provided the primary basis for the identification of NFS lands available for consideration for oil and gas leasing. All NFS lands will be subject to determination of compatibility of oil and gas leasing activities with the affected resources as well as the human environment before the Forest Service consents to leasing.

- B -

Background. One of the distance zones of a landscape being viewed. Extends from middleground to infinity. Texture is seen as groups or patterns of trees.

Basin. (a) A depressed area with no surface outlet. (b) A low in the Earth's crust of tectonic origin in which sediments have accumulated.

Basal Area. The cross-sectional area of a stand of trees measured at breast height. The area is expressed in square feet per acre.

Benthos. All animals and plants living on or in the bottom of standing or running water environments.

Big Game. Larger species of wildlife that are hunted, such as elk, deer, bighorn sheep, and pronghorn antelope.

Big Game Winter Range. The area available to and used by big game (large mammals normally managed for sport hunting) through the winter season.

Browse. That part of the current leaf and twig growth of shrubs, woody vines and trees available for animal consumption.

- C -

Candidate Species. Any species not yet officially listed but which are undergoing a status review or are proposed for listing according to Federal Register notices published by the Secretary of the Interior or the Secretary of Commerce.

Carrying Capacity.

In Range Management - The maximum stocking rate possible without inducing damage to vegetation or related resources.

In Wildlife Management - The maximum number of individual animals that can survive the greatest period of stress each year on a given land area.

In Recreation - The maximum human use an area can sustain on a long-term basis without unacceptable physical (ecological) deterioration or psychological crowding.

Cirque (geology). Semicircular, concave, bowl-like areas that have steep faces primarily resulting from glacial ice and snow abrasion.

Clearcutting. The harvest of all trees in a localized area, generally to encourage regeneration of a new, even-aged stand or to meet other specified non-timber resource objectives.

Climatic (Weather) Conditions. Fog, clouds, or precipitation which may affect visibility and contrast.

Color. Color enables a viewer to differentiate between similar objects. Colors may change as distance increases from the viewed object

Commercial Thinning. Cutting in immature stands to improve the quality and growth of the remaining stand. Trees removed in the thinning are used for sawtimber or products (poles, posts, props, fuelwood, etc.)

Compliance Officer. The Deputy Chief, or the Associate Deputy Chiefs, National Forest System or the line officer designated to act in the absence of the Deputy Chief.

Condition of Approval (COA). Conditions or provisions (requirements) under which an Application for a Permit to Drill or a Sundry Notice is approved.

Consent for Oil and Gas Leasing. A consent by the Forest Service for oil and gas leasing on a specified parcel of NFS land. Grants the right to explore, develop, extract, and dispose of a specific mineral or minerals in lands covered by the lease, subject to various terms and conditions.

Contrast. Diversity of adjacent parts. The closer the position of two dissimilar objects the more powerful the appeal to attention.

Controlled Surface Use (CSU). Allowed use and occupancy (unless restricted by another stipulation) with identified resource values requiring special operational constraints that may modify the lease rights. CSU is used as an operating guideline, not as a substitute for NSO or Timing stipulations.

Cover, Hiding. Vegetation capable of hiding 90 percent of a standing adult deer or elk from the view of a human at a distance of 200 feet or less.

Cover, Thermal. Cover used by animals for protection against adverse effects of weather.

Crucial Habitat. A biological feature, that if lost, would adversely affect the species.

Cultural Resources. Those fragile and non-renewable remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in human events.

Cultural Resources Inventory Classes.

CLASS I. An existing data survey. This is an inventory of a study area to (1) provide a narrative overview of cultural resources by using existing information, and (2) compile existing cultural resources site record data on which to base the development of the Forest's site record system.

CLASS II. A sampling field inventory designated to locate, from surface and exposed profile indications, all cultural resource sites within a portion of an area so that an estimate can be made of the cultural resources for the entire area.

CLASS III. An intensive field inventory designed to locate, from surface and exposed profile indications, all cultural resource sites in an area. Upon its completion, no further cultural resources inventory work is normally needed.

Cumulative Impact. The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

- D -

Developed Recreation. Recreation which occurs at man-made developments, such as campgrounds, picnic grounds, resorts, ski areas, trailheads, etc.

Development and Full-Field Development.

Development well - well drilled in proven territory in a field to complete a pattern of production.

Full field development - the drilling of the necessary development wells and associated field facilities, including roads, production facilities, pipelines, injection wells, power lines, etc.

Diastrophism. A general term for all movement of the crust produced by tectonic processes, including the formation of ocean basins, continents, plateaus, and mountain ranges.

Directional Drilling. Drilling borehole with course of hole planned before drilling. Such holes are usually drilled with rotary equipment at an angle to the vertical and are useful in avoiding obstacles, or in reaching side areas or mineral estate beneath restricted surface.

Discovery Well. A well that yields commercial quantities of oil or gas.

Discretionary "No Lease". Forest Service discretionary authority to remove sensitive resource lands from oil and gas leasing. Authority must be based on sound management justification. The

Federal Onshore Oil and Gas Leasing Reform Act of 1987 expanded the Forest Service authority to include a "discretion" to consent or deny consent on all NFS lands with leasable minerals. Formerly, the BLM had authority to issue oil and gas leases on public domain lands without Forest Service consent. According to the Reform Act, the BLM may not issue an oil and gas lease on NFS lands without consent from the Forest Service.

Dispersed Recreation. That type of outdoor recreation which tends to be spread out over the land such as hunting, fishing, snowmobiling, hiking, driving for pleasure, cross-country skiing, motorbiking, and mountain climbing.

Distance Zone. The divisions of a landscape being viewed. Three zones are used to describe a landscape: foreground, middleground, background.

Diversity. (1) The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area. (2) The distribution and abundance of different plant and animal communities and species within the area covered by a Land and Resource Management Plan (36 CFR Part 219.3(g)).

Duration. As pertains to visual evaluation criteria: the length of time the management activity and its impacts will be taking place.

- E -

Easement. Right afforded a person or agency to make limited use of another's real property for access or other purposes.

Ecosystem. All organisms in a community plus the associated environmental factors.

Effects.

Direct Effects - Caused by the action and occur at the same time and place.

Indirect Effects - Caused by the action later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Endangered Species. Any species which is in danger of extinction throughout all or a significant portion of its range.

Enhancement. A short-term visual resource management objective aimed at increasing positive visual variety where little variety now exists.

Environmental Assessment (EA). A concise public document prepared to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. It includes a brief discussion of the need for the proposal,

alternatives considered, environmental impact of the proposed action and alternatives, and a list of agencies and individuals consulted.

Environmental Impact Statement (EIS). A formal public document prepared to analyze the impacts on the environment of a proposed project or action and released for comment and review. An EIS must meet the requirements of NEPA, CEQ guidelines, and directives of the agency responsible for the proposed project or action.

Erosion. 1. The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. 2. Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. The following terms are used to describe different types of erosion:

> **Accelerated Erosion** - Erosion much more rapid than normal, natural, or geologic erosion, primarily as a result of the activities of man or animals or natural catastrophes such as fire that expose base surfaces.
>
> **Geological Erosion** - The normal or natural erosion caused by geological processes acting over long geologic periods and resulting in the wearing away of mountains, the building up of floodplains, coastal plains, etc. Also called natural erosion.
>
> **Gully Erosion** - The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to considerable depths, ranging from 1 to 2 feet to as much as 75 to 100 feet.
>
> **Rill Erosion** - An erosion process in which numerous small channels only several inches deep are formed: occurs mainly on recently cultivated soils.
>
> **Sheet Erosion** - The removal of a fairly uniform layer of soil from the land surface by runoff water.

Erosion Hazard. The probability of soil loss resulting from complete removal of vegetation and litter. It is an interpretation based on potential soil loss in relation to tolerance values. Soil loss tolerance rate: An estimate of the amount of erosion which could occur over a short period of time (one year) without causing irreparable damage to the long-term productivity of the soil.

> **Ratings:**
> **Slight** - Potential soil loss rates do not exceed tolerance soil loss. Loss in soil production potential from erosion is of low probability.
>
> **Moderate** - Potential soil loss rates exceed tolerance soil loss. Loss in soil production potential from erosion is probable and significant if unmitigated. On-site investigation by watershed specialists may be needed for activities on such areas.
>
> **Severe** - Potential soil loss rates exceed tolerance soil loss. Loss in soil production potential from erosion is inevitable and irreversible if unmitigated. These soils may require expensive measures to control erosion and sedimentation when activities are planned for such areas. On-site investigation by watershed specialists is highly recommended.

Even-aged Management. The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short

period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Exception. Case by case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria applies.

Existing Visual Condition (EVC). An inventory of the present state of visual alteration. The existence, size and location of alterations are identified through the use of six categories; category one having the least alterations and category six the most.

Exploration and Wildcat Wells . Wells drilled to test for the presence of oil or gas in a previously undeveloped area. Nine out of ten wildcats are dry holes.

- F -

Facies. The aspect, appearance, and characteristics of a rock unit, usually reflecting the conditions of its origin; especially as differentiating the unit from adjacent or associated units.

Fault. A fracture or zone of fractures along which there has been displacement of the sides relative to one another parallel to the fracture.

Federal Land Policy and Management Act of 1976 (FLPMA). Public Law 94-579 signed by the President on October 21, 1976. Established public land policy for management of lands administered by the Bureau of Land Management. FLPMA specifies several key directions for the Bureau, notably (1) management on the basis of multiple-use and sustained yield, (2) land use plans prepared to guide management actions, (3) public lands for the protection, development, and enhancement of resources, (4) public lands retained in federal ownership, and (5) public participation utilized in reaching management decisions.

Fold. A curve or bend of a planar structure such as rock strata, bedding planes, foliation, or cleavage. A fold is usually a product of deformation, although its definition is descriptive and not genetic and may include primary structures.

Forage. All browse and herbaceous foods that are available to grazing animals.

Foreground. One of the distance zones of a landscape being viewed. Distance at which details can be perceived, normally within 1/4 to 1/2 mile of the viewer. Must be determined on a case by case basis.

Forest Management. The application of business methods and technical forestry principles to the operation of a forest property.

Form. The mass of an object or objects that appear unified.

Formally Withdrawn From Oil and Gas Leasing. A Formal Withdrawal of lands is segregation of public lands from specific management activities by Acts of Congress or other types of administrative regulations subject to valid existing rights. A number of National Forest System lands have been removed from oil and gas leasing as well as other mineral development as a result of Congressional Acts or other forms of withdrawal such as by the Department of Interior. Such lands include designated wilderness areas, wilderness study area lands which were found to be suitable by the surface management agency for wilderness designation as identified by the Federal Onshore Oil and Gas Leasing Reform Act, as well as other specially classified lands.

Formation. A body of rock identified by lithic characteristics and stratigraphic position; it is prevailingly but not necessarily tabular, and is mappable at the earth's surface or traceable in the subsurface (NACSN, 1983, Art. 24).

Fossil. The remains or traces of an organism or assemblage of organisms which have been preserved by natural processes in the earth's crust exclusive of organisms which have been buried since the beginning of historical time. Minerals, such as oil and gas, coal, oil shale, bitumen, lignite, asphaltum, and tar sands, phosphate, limestone, diatomaceous earth, uranium and vanadium, while they may be of biologic origin, are not here considered "fossils." Fossils of scientific value may occur within or in association with such materials.

Fragile Soil. A soil that is especially vulnerable to erosion or deterioration due to its physical characteristics and/or location. Disturbance to the surface or the vegetative cover can initiate a rapid cycle of loss and destruction of the soil material, structure, and ability to sustain a biotic community.

- G -

Geophysics. Study of the earth by quantitative physical methods.

Glacial Outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial Till (geology). Unsorted, nonstratified glacial drift consisting of soil material and boulders transported and deposited by glacial ice.

Granite Wash Trap. Granite wash is a sandstone formed by weathered granite basement rock. Granite is composed of coarse, sand-sized crystals that weather to form a sandstone covering the flanks of buried granite mountains and hills. Source rocks occur deeper, along the flanks.

Grazing Association. Organization set up by the permittees to manage grazing resources on the National Grasslands. They are also responsible for collecting all applicable fees.

Grazing System. Scheduled grazing use and nonuse of an allotment to reach identified goals or objectives by improving the quality and quantity of vegetation.

Ground Cover. The area of ground surface occupied by the stem(s) of a range plant, as contrasted with the full spread of its herbage or foliage, generally measured at one inch above soil level.

Growing Season. Generally, the period of the year during which the temperature of vegetation remains sufficiently high to allow plant growth.

- H -

Habitat. A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

Habitat Capability. The estimated ability of an area, given existing or predicted habitat conditions to support a wildlife, fish or plant population. It is measured in terms of potential population numbers.

Habitat Effectiveness. The degree to which a physical wildlife habitat (food, water, shelter) is free from disturbances, and therefore attractive for wildlife occupancy.

Horizontal Diversity. The vegetative diversity resulting from several stands of different plant communities or successional stages or both.

Hydrocarbon. Any organic compound, gaseous, liquid, or solid, consisting solely of carbon and hydrogen.

- I -

Igneous. Type of rock or mineral that solidified from molten or partly molten material.

Impact. The effect, influence, alteration, or imprint caused by an action.

Intensive Grazing. Management designed to increase the carrying capacity through structural and nonstructural practices. Complex livestock management systems are employed. Management seeks to maximize livestock forage production.

Intermontaine. Situated between or surrounded by mountains, mountain ranges, or mountainous regions.

Invertebrate. An animal lacking a spinal column.

- K -

Known Geologic Structures (KGS). A trap in which an accumulation of oil and gas has been discovered by drilling and which is determined to be productive. Its limits include all acreage that is presumptively productive (43 CFR 3100.0-5(a)).

- L -

Land Treatment. All methods of artificial range improvement and soil stabilization such as reseeding, brush control (chemical and mechanical), pitting, furrowing, water spreading, etc.

Leasable Mineral(s). Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. They include coal, phosphate, asphalt, sulphur, potassium, sodium minerals, and oil and gas. Geothermal resources are also leasable under the Geothermal Stream Act of 1970.

Lease. A legal contract that provides for the right to develop and produce oil and gas resources for a specific period of time under certain agreed-upon terms and conditions.

Lease Modification. Fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A modification may include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria applied.

Lease Notice. Provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. A Lease Notice also addresses special items the

lessee would need to consider when planning operations, but does not impose new or additional restrictions. Lease Notices that are attached to leases should not be confused with formal Information Notices or Notices to Lessees (43 CFR Part 3160.0-5).

Lease Stipulations. Additional specific terms and conditions that change the manner in which operation may be conducted on a lease, or modify the lease rights granted.

Leasehold. The area described in a Federal oil and gas lease, communitized, or unitized area.

Lessee. A person or entity holding record title in a lease issued by the United States.

Line. An extended point, or anything that is arranged in a row. Can be found in ridgelines, timberlines, tree trunks, or vegetative boundaries.

Locatable Minerals. Minerals or materials subject to claim and development under the Mining Law of 1872, as amended. Generally includes metallic minerals such as gold and silver, and other materials not subject to lease or sale (some bentonites, limestone, talc, some zeolites, etc.).

Location. Perfecting the right to a mining claim by discovery of a valuable mineral, monumenting the corners, completing discovery work, posting a notice of location, and recording the claim.

Long-Term. Describes impacts which would occur over a 20-year period.

- M -

Magnitude. The number of different viewpoints a site can be seen from, or the length of time a site is visible (as along a trail or road).

Management Area. An area with similar management objectives and a common management prescription.

Management Concern. An issue, problem, or condition which constrains the range of management practices identified by the Forest Service in the planning process (36 CFR Part 219.3).

Management Direction. A statement of multiple use, other goals, and objectives; and associated management prescriptions, standards, and guidelines for attaining them (36 CFR Part 219.3).

Management Indicator Species. Those wildlife species selected in the planning process to monitor the effects of planned management activities of viable populations of all wildlife and fish species including those species that are socially or economically important.

Mass Wasting (geologic hazard). A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. (American Geological Institute, 1974, p.308) Slow displacements include slumping and soil creep. Rapid movements include slope failures, landslides, debris flows, and rock slides.

Ratings:
Slight - Management practices are not limited by special precautions to maintain slope stability. Slope gradients are under 40 percent.

Moderate - Management practices which disturb the land surface will be limited by precautionary measures to maintain slope stability. Slope gradients are usually in the 40 to 60 percent range. However, there is no evidence of past slope failures.

Severe - Management practices are severely limited. Slope gradients are over 60 percent, and evidence of past mass wasting usually exists. Special on-site investigations are required prior to ground disturbing activities, and higher costs for design and construction can be anticipated to achieve adequate resource protection.

Maximum Modification (MM). A visual resource management objective in which management activities may dominate the landscape characteristic. When viewed as background they should appear natural. In middleground or foreground they may not completely blend in. Introduced structures should remain subordinate. Contrast reduction should be completed within five years.

Middleground. One of the distance zones of a landscape being viewed. This zone extends from the foreground to 3 to 5 miles from the observer. Texture is characterized by masses of trees.

Mineral Entry. Claiming public lands (administered by the Forest Service) under the Mining Law of 1872 for the purpose of exploiting minerals. May also refer to mineral exploration and development under the mineral leasing laws and the Material Sale Act of 1947.

Mineral Estate (Mineral Rights). The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

Mineral Materials. Common varieties of sand, building stone, gravel, clay, moss rock, etc., obtainable under the Minerals Act of 1947, as amended.

Mineral Potential. The classification of lands according to the probability of undiscovered mineral resources, delineated as to the type of mineral, the extent of the expected deposit, and the likelihood of its occurrence. The likelihood of occurrence for oil and gas is classified as follows:

High Potential - Describes geologic environment that is highly favorable for discovering oil and gas resources. The area is on or near a producing field and evidence exists that the geologic conditions of reservoir, source, and trap necessary for the accumulation of oil and gas are present.

Moderate Potential - Refers to environment that is favorable for the occurrence of undiscovered oil and gas resources, however one of the geologic conditions necessary for the accumulation of oil or gas may be absent.

Low Potential - Refers to an environment that is not favorable for the accumulation of oil and gas as indicated by geologic, geochemical, and geophysical characteristics. Evidence exists that one of the geologic conditions necessary for the accumulation of oil or gas is absent.

Unknown Potential - Refers to a region for which geologic information is insufficient to otherwise categorize potential. This category should be limited to specific areas for which there is a true lack of data and should not be used as a substitute for performing the interpretation.

Mining Law of 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the "General Mining Laws" or "Mining Laws."

Mitigation. Includes:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.
(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
(e) Compensating for the impact by replacing or providing substitute resources or environments.

Modification (M)(VQO). A visual resource management objective in which the characteristic landscape may be dominated by management activities. Vegetative and landform disturbances must borrow from existing line, form, color and texture patterns. Introduction of structures should also borrow from existing patterns to be compatible with surroundings. Reduction in contrast should be completed within one year.

Monitoring and Evaluation. Analyzing on a sample basis Forest Plan implementation to determine how well objectives have been met, and how closely management standards and guidelines have been applied.

Monocline. A geologic structure in which the strata are all inclined in the same direction at a uniform angle of dip.

Multiple-use. Management of surface and subsurface resources so that they are jointly utilized in the manner that will best meet the present and future needs of the public without permanent impairment of the productivity of the land or the quality of the environment.

- N -

National Environmental Policy Act of 1969 (NEPA). Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

National Forest System (NFS). All National Forest lands reserved or withdrawn from the public domain of the United States; all National Forest lands acquired through purchase, exchange, donation, or other means, the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (7 U.S.C. 1010 et seq.,); and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system (16 U.S.C. 1609).

National Register of Historic Places (National Register, NRHP). A listing of architectural, historical, archaeological, and cultural sites of local, state, or national significance, established by the Historic Preservation Act of 1966 and maintained by the National Park Service.

No Surface Disturbance. Defined on a case by case basis when the activity plan for an area is developed. In general, an activity would be allowed if it would not interfere with the management objectives of the area.

No Surface Occupancy (NSO). A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the land surface to protect special values or uses. The NSO stipulation includes stipulations which may have been worded as "No Surface Use/Occupancy," "No Surface

Disturbance," "Conditional NSO," and "Surface Disturbance or Surface Occupancy Restriction by location)." Lessees may exploit the oil and gas or geothermal resources under leases restricted by this stipulation through use of directional drilling from sites outside the no surface occupancy area.

Notice to Lessees, Transferees, and Operators. Written notice issued by an authorized Forest officer. Notices To Lessees, Transferees, and Operators implement regulations and serve as instructions on specific item(s) of importance within a Forest Service Region, National Forest, or Ranger District.

- O -

Off-Highway Vehicle (OHV). Any motorized vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain.

Off-Road Vehicle (ORV). Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, snow, ice, marsh, swampland or other natural terrain. It includes, but is not limited to, four-wheel drive or low-pressure-tire vehicles, motorcycles and related two-wheel vehicles, amphibious machines, ground-effect or air-cushion vehicles.

Off-Road Vehicle Designations.

Closed. Designated areas and trails where the use of off-road vehicles is permanently or temporarily prohibited. Emergency use of vehicles is allowed.

Limited. Designated areas and trails where the use of off-road vehicles is subject to restrictions such as limiting the number or types of vehicles allowed, dates and times of use (seasonal restrictions), limiting use to existing roads and trails, or limiting use to designated roads and trails. Under the designated roads and trails designation, use would be allowed only on roads and trails that are signed for use. Combinations of restrictions, such as limiting use to certain types of vehicles during certain times of the year, are possible.

Open. Designated areas and trails where off-road vehicles may be operated (subject to operating regulations and vehicle standards).

Oil and Gas Lease. An oil and gas lease grants the right to explore, develop, extract, and dispose of a specific mineral or minerals in lands covered by the lease, subject to various terms and conditions. Oil and gas leases are issued by the Bureau of Land Management, Department of the Interior.

Onlap. An "overlap" characterized by the regular and progressive pinching out, toward the margins or shores of a depositional basin of the sedimentary units within a conformable sequence of rocks. The boundary of each unit is exceeded by the next overlying unit and each unit in turn terminates farther from the point of reference.

Onlap Sands Trap. Beach sands that were deposited on an unconformable surface as sea level rose. Numerous buttress sand can occur along a single unconformity and each can form a pool.

Onshore Oil and Gas Order. A formal numbered order issued by or signed by the Chief of the Forest Service that implements and supplements the regulations in this subpart.

Operating Right. The interest created out of a lease that authorizes the holder of that interest to enter upon the leased lands to conduct drilling and related operations, including production of oil and gas from such lands in accordance with lease terms.

Operating Rights Owner. A person holding operating rights in a lease issued by the United States. This may be the lessee if the operating rights in a lease or portion thereof have not been conveyed to another person.

Operations. Surface disturbing activities that are conducted on a leasehold on National Forest System lands pursuant to a current approved surface use plan of operations, including but not limited to, exploration, development, and production of oil and gas resources and reclamation of surface resources.

Operator. Any person or entity, including, but not limited to, the lessee or operating rights owner, who has stated in writing to the authorized Forest officer the intent to be responsible under the terms of the lease for the operations conducted on the leased lands or a portion thereof.

Overstory. That portion of a plant community consisting of the taller plants on the site; the forest or woodland canopy.

- P -

Paleontological Resource. A site containing evidence of non-human life of past geological periods, usually in the form of fossil remains.

Partial Retention (PR). A visual resource management objective in which management activities remaining visually subordinate to the surrounding landscape. Repetition of line, form, color, and texture is allowed, but changes in qualities, size, amount, intensity, direction, pattern should remain subordinate. New contrast may be introduced but should remain subordinate as well. Reduction in contrast should be accomplished within one year of project completion.

Patent. A grant made to an individual or group conveying fee simple title to selected public lands.

Patented Claim. A claim for which title has passed from the federal government to the mining claimant under the Mining Law of 1872.

People At One Time (PAOT). Used to define recreation capacity which is equal to five persons per family unit for camp and picnic grounds. Other sites vary.

Person. An individual, partnership, corporation, association or other legal entity.

Planning Area. A geographical area for which land use and resource management plans are developed and maintained.

Plant Community. A group of individual plants of one or more species growing in a specific area in association with one another and with a complex of other plants and animals (Spurr & Barnes, 1980).

Preservation (P). A visual resource management objective in which only ecological changes are allowed. Management activities, except low impact recreation facilities are prohibited. This objective applies mainly to wilderness, primitive areas and areas with special classifications.

Primitive (P). A recreation opportunity classification term for describing a land area that is almost completely free of management controls. Essentially unmodified natural environment where evidence of other users is low, usually three miles or more from roads. Visitors enjoy hiking, horseback riding, nature study and other nonmotorized uses. Visitors experience isolation, independence, closeness to nature, and self-reliance in an environment offering a high degree of challenge and risk.

- R -

Range Allotment. A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under an allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System lands administered by the Forest Service.

Raptors. Birds of prey with sharp talons and strongly curved beaks, e.g., hawks, owls, vultures, eagles.

Reasonably Foreseeable Development (RFD). A projection of likely exploration, development, and production within a study area based on existing and credible geologic data, technology, economics, and activity trends.

Reclamation. Returning disturbed lands to a form and productivity that will be ecologically balanced and in conformity with a predetermined land management plan.

Recreation and Public Purposes Act (R&PP). This Act authorizes the Secretary of the Interior to lease or convey public lands for recreational and public purposes under specified conditions to states or their political subdivisions, and to nonprofit corporations and associations.

Recreation Opportunity Spectrum (ROS). Land delineations which identify a variety of recreation experience opportunities in six classes along a continuum from primitive to urban. Each class is defined in terms of natural resource settings, activities and experience opportunities. The six classes are: Urban, Rural, Roaded Natural, Semiprimitive Motorized, Semiprimitive Nonmotorized and Primitive.

Recreation Visitor Day (RVD). An RVD is 12 hours of recreation for one person or one hour of recreation for 12 persons or any combination thereof.

Rehabilitation. A short-term visual resource management objective used to restore landscapes containing undesirable visual or other resource impacts to the desired visual or other acceptable quality level.

Research Natural Area. Designated areas of land established by the Chief of the Forest Service under 36 CFR Part 251.23 for research and educational purposes and to typify important forest and range types of the Forest as well as other plant communities that have special or unique characteristics of scientific interest and importance.

Resource Area. The smallest administrative subdivision of an area of public lands administered by the Bureau of Land Management.

Resource Management Plan (RMP). A land use plan that establishes land use allocations, multiple-use guidelines, and management objectives for a given planning area.

Retention (R). A visual resource management objective allowing for management activities which are not visually evident. Activities may only repeat line, form color and textures found in the characteristic landscape. Reductions in form, line, color, and texture contrasts should be completed either during or after project completion

Revegetation Potential. The probable success and ease in establishment of native grass and shrub species. This rating is influenced by climate, topography, and soil type. Stratification by climate yields limitations that are not normally economical to mitigate. Ratings relate to use of a rangeland drill, broadcast seeding, and aerial seeding with no consideration for site preparation (removal of trees, etc.)

Ratings:
Slight - Potential is not restricted by properties in the rating, and sites offer optimum conditions for establishment of plants.

Moderate - Potential is restricted by properties in the rating that can be reasonable or economically mitigated.

Severe - Potential is restricted by properties in the rating that severely restrict reasonable or economical means of mitigation.

Riparian. Riparian areas consist of terrestrial and aquatic ecosystems. These areas may be associated with lakes, reservoirs, estuaries, hotholes, marshes, streams, bogs, wet meadows, and intermittent or permanent streams where free and unbound water is available.

Roaded Natural (RN). A recreation opportunity classification term for describing a land area that has predominately a natural appearing environment with moderate evidence of sights and sounds of humans. Concentration of users is moderate to low. Roads of better than primitive class are usually within 1/2 mile. A broad range of motorized and nonmotorized activity opportunities are available. Management activities including timber harvest are present and harmonize with the natural environment.

Roadless. Refers to the absence of roads that have been constructed and maintained by mechanical means to ensure regular and continuous use.

Roads. Vehicle routes which have been improved and maintained by mechanical means to ensure relatively regular and continuous use. (A way maintained strictly by the passage of vehicles does not constitute a road.)

Rural (R). A recreation opportunity classification term for describing land areas that are substantially modified. Sights and sounds of others are readily evident. Interactions between users is moderate to high. Numerous facilities are usually present. Challenge and risks are unimportant. Motorized use and facilities are common. Resource management activities may be common and obvious.

- S -

Salinity. Refers to the solids such as sodium chloride (table salt) and alkali metals that are dissolved in water. Often in non-saltwater areas, total dissolved solids is used as an equivalent.

Scoping Process. An early and open public participation process for determining particular issues to be addressed and for identifying the significant issues related to a proposed action.

Sediment Yield. The amount of sediment produced in a watershed, expressed as tons, acre-feet, or cubic yards of sediment per unit of drainage area per year.

Semiprimitive. A recreation opportunity classification term for describing land areas that have very few management controls lying between half a mile and three miles from the nearest point of motor vehicle access, excepting four-wheel drive roads and trails, with mostly natural landscapes and some evidence of other people.

Semiprimitive Motorized (SPM). A land area classified as semiprimitive that may have primitive roads present and where motorized use is permitted. Settings, activities and opportunities are affected accordingly though there is still a moderate probability of experiencing isolation from sights and sounds of humans.

Semiprimitive Nonmotorized (SPN). A land area classified as semiprimitive that has a natural environment and motorized use is not permitted. Nonmotorized status increases the probability of experiencing isolation, independence, and closeness to nature. Challenge and risk is generally high. Resource management activities may be present; however, natural appearance is still maintained.

Sensitivity Levels. A measure of people's concern for the scenic quality of the Forest. Sensitivity levels are developed for visitors viewing the Forest as a result of traveling by car, hiking, camping, fishing or boating. Some degree of sensitivity is established for all National Forest System lands. Three levels of sensitivity are used, with one being most sensitive and three the least.

Sheet Erosion. The removal of a fairly uniform layer of soil from the land surface by runoff water.

Shelterwood Method. An even-aged method in which a new stand is established under the protection of a partial canopy of trees. The old stand is removed in a series of two or three harvest cuts, the last of which removes the shelterwood when the new even-aged stand is well established.

Short-Time. In this document, refers to the 10- to 12-year life of the Forest Plan. Short-term impacts would occur within that time period.

Shut-In. An oil or gas well that is capable of production but is temporarily not producing.

Significant. An effect that is analyzed in the context of the proposed action to determine the importance of the effect, either beneficial or adverse. The degree of significance is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment and when the effects on the quality of the human environment are likely to be highly controversial.

Silviculture: The science and art of cultivating (i.e., growing and tending) forest stands.

Silvicultural System. A management process whereby forests are tended, harvested, and replaced, resulting in forests of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced (36 CFR Part 219.3).

Slope. The amount or degree of deviation from the horizontal or vertical. Landscape is categorized into three slope classes: 0-15%, 16-40% and greater than 40%. Concerning visual resources, as slope increases, views into a site and the size of the disturbance increase. Generally, the steeper slopes are more visible due to their location in the landscape.

Soil Depth. Depth classes:

Shallow - Bedrock at less than 20 inches
Moderately Deep - Bedrock at 20 to 40 inches
Deep - Bedrock at below 40 inches

Soil Drainage. Refers to the frequency and duration of periods when the soil is free of saturation.

Classes:
Excessively Drained - These soils have very high hydraulic conductivity and low water holding capacity.

Somewhat Excessively Drained - These soils have high hydraulic conductivity and low water holding capacity.

Well-Drained - These soils have intermediate water holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately Well-Drained - These soils are wet close enough to the surface for long enough that planting or harvesting operations or yields of some field crops are adversely affected unless artificial drainage is provided. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained - These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained - These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained - These soils are wet to the surface most of the time. These soils are wet enough to prevent the growth of important crops unless artificially drained.

Soil Fertility. The quality of a soil that enables it to provide nutrients in adequate amounts and in proper balance for the growth of specified plants when other growth factors are favorable.

Soil Texture. The relative proportions of sand, silt, and clay particles in a mass of soil. Basic textural classes, in order of increasing proportion of fine particles, are: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay.

Special Recreation Management Area (SRMA). An area that possesses outstanding recreation resources or where recreation use causes significant user conflicts, visitor safety problems, or resource damage.

Split-Estate Lands. Lands which do not have both the mineral rights and the surface owned by one party. The most common split estate is federal ownership of mineral rights on lands to which someone else holds ownership. In such instances the Federal Government can lease the oil and gas rights without surface owner consent. Other split estate lands may be federally owned but with

the mineral rights owned by a private party; or, federal ownership of the land with some percentage of the mineral rights owned by a private party.

Stand. An aggregation of forested vegetation occupying a specific area and sufficiently uniform in species composition, age arrangement and condition as to be distinguishable from adjoining stands.

Stipulation. A provision that modifies standard lease rights and is attached to and made a part of the lease.

Stream Bank (and Channel) Erosion. The removal, transport, deposition, recutting, and bed load movement of material in streams by concentrated water flows.

Study Area. Refers to all the Resource Areas and Planning Areas covered in this EIS collectively.

Structural (successional) Stage. "A stage or recognizable condition of a plant community which occurs during its development from bare ground to climax" (Thomas 1979:491). Although successional stages may be defined in any ecosystem, structural stages are usually defined only in coniferous or other forested ecosystems in which five stages can be seen: grass/forb, shrub/seedling, sapling, pole/mature, and old growth.

Substantial Modification. A change in lease terms or a modification, waiver; or exception to a lease stipulation that would require an environmental assessment or environmental impact statement pursuant to the National Environmental Policy Act of 1969.

Suitability. As used in the Wilderness Act and in the Federal Land Policy and Management Act refers to a recommendation by the Secretary of the Interior or the Secretary of Agriculture that certain federal lands satisfying the definition of wilderness in the Wilderness Act have been found appropriate for designation as wilderness on the basis of an analysis of the existing and potential uses of the land.

Sundry Notice. Standard form to notify of or approve well operations subsequent to Application for Permit to Drill in accordance with Forest Service regulations.

Supplemental Values. Resources associated with wilderness which contribute to the quality of wilderness areas.

Surface Management Agency. Any agency outside the Department of the Interior with jurisdiction over the surface overlying federally owned minerals.

Surface Use Plan of Operations (SUPO). A plan for surface use, disturbance, and reclamation.

Sustained Yield. The achievement and maintenance in perpetuity of a high-level annual or regular period output of the various renewable resources of the public lands consistent with multiple-use.

Syncline. A fold with a core that contains the stratigraphically younger rocks; it is generally concave upward.

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Tectonics. A branch of geology dealing with the broad architecture of the outer part of the earth; that is the regional assembling of structural or deformational features and a study of their mutual relations, origin, and historical evolution.

Terrestrial. Living or growing in or on the land.

Terrestrial Ecosystem. All organisms in a land-based community plus the associated environmental factors.

Texture. Detail of landscape that varies with distance.

Thinning. Cutting made in an immature stand to accelerate the diameter increment (annual growth) and improve the average form of the remaining trees.

Threatened Species. Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been designated in the Federal Register by the Secretary of Interior as a threatened species.

Thrust Fault. A fault with a dip of 45 degrees or less over much of its extent, on which the hanging wall (overlying side) appears to have moved upward relative to the footwall (underlying side).

Timber Production. The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For planning purposes, the term "timber production" does not include production of fuelwood (36 CFR Part 219.3).

Timing Limitation (Seasonal Restriction). Prohibits surface use during specified time periods to protect identified resource values. The stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.

Total Dissolved Solids (TDS). Salt, or an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts.

Trailhead. Developed recreation sites with parking, signing, and other facilities designated to provide a take-off point for trail users at a major access point and terminus of a trail.

Transfer. Any conveyance of an interest in a lease by assignment, sublease or otherwise. This definition includes the terms: "Assignment" which means a conveyance of all or a portion of the lessee's record title interest in a lease; and "sublease" which means a conveyance of a non-record interest in a lease, i.e., a conveyance of operating rights. A sublease also is a subsidiary arrangement between the lessee (sublessor) and the sublessee, but a sublease does not include a transfer of a purely financial interest, such as overriding royalty interest or payment out of production, nor does it affect the relationship imposed by a lease between the lessee(s) and the United States.

Transferee. A person to whom an interest in a lease issued by the United States has been transferred.

Trap. Any barrier to the upward movement of oil or gas, allowing either or both to accumulate. A trap includes a reservoir rock and an overlying or updip impermeable roof rock; the contact between these is concave as viewed from below.

Trespass. Any unauthorized use of public land.

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Unacceptable Modification. A landscape management term for describing visual impacts that contrast excessively in form, line, color, or texture.

Unconformity. A substantial break or gap in the geologic record in which a rock unit is overlain by another that is not next in stratigraphic succession, such as an interruption in the continuity of a depositional sequence of sedimentary rocks or a break between eroded igneous rocks and younger sedimentary strata.

Understory. That portion of a plant community growing underneath the taller plants on the site.

Uneven-Aged Management. Application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain with each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection (36 CFR Part 219.3).

Universal Soil Loss Equation (USLE). A formula for predicting soil loss resulting from sheet and rill erosion caused by rainfall.

Updip Pinch Out of Sandstone Trap. An updip pinch of wedge out of a sandstone in shale forms a trap. These are common in coastal plains where updip is landward. They tend to be small traps. If uplift caused dip, the trap type is combination.

Urban. A recreation opportunity classification term for describing a land area that is usually highly modified and contains numerous improvements and large concentrations of humans. Experiencing the natural environment is unimportant.

User Activity. Any activity a Forest visitor is involved in, i.e., camping, hiking, fishing, scenic driving, etc.

Utilization. The proportion of current year's forage production that was consumed or destroyed by grazing animals; usually expressed as a percentage.

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Valid Existing Rights. Legal interests that attach to a land or mineral estate that cannot be divested from the estate until that interest expires or is relinquished.

Vandalism. Willful or malicious destruction or defacement of public property; specifically cultural or paleontological resources.

Variety Class. Determined by classifying different degrees of variety in a landscape. A determination is made on a landscape's importance based on scenic quality. Those landscapes with the most diversity have the greatest potential for scenic value. In order of importance the classes are:

Class A	Those areas that have outstanding or unusual landforms, vegetation, water features or rock formations.
Class B	Areas that have a variety of features but tend to be common and are not outstanding.
Class C	Features that have little change in line, form, color or texture.

Vegetation Manipulation. Planned alteration of vegetation communities through use of prescribed fire, plowing, herbicide spraying, or other means to gain desired changes in forage availability, wildlife cover, species composition, etc.

Vegetation Type. A plant community with immediately distinguishable characteristics based upon and named after the current dominant plant species.

Vertebrate. An animal having a spinal column.

Viewer Position. The relationship of the viewer to a specific site or structure, i.e., whether a person is looking up at, down at, or across. Viewer position is classified as superior, normal, or inferior.

Visual Absorption Capability (VAC). The relative ability of a landscape to accept management practices without affecting its visual characteristic. The capability to absorb visual change. A prediction of how difficult it will be for a landscape to meet recommended VQO's.

Visual Quality Objectives (VQO's). Based upon variety class, sensitivity level and distance zone determinations. Each objective describes a different level of acceptable alteration based on aesthetic importance. The degree of alteration is based on contrast with the surrounding landscape.

Visual Resource. The composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal of the unit.

Visual Resource Management (VRM). Inventory and planning to identify visual resource values and establish objectives for managing those values, and the management actions taken to achieve those objectives.

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Waiver. Permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.

Wetlands. Lands where saturation with water is the primary factor determining the nature of soil development and the kinds of animal and plant communities living under or on its surface.

Wild and Scenic River System. A system of selected rivers as provided in the Wild and Scenic Rivers Act of October 2, 1968, as amended, that are authorized by Act of Congress or Act of the State Legislature and designated as Wild, Scenic or Recreational Rivers. They are free flowing streams free of impoundments with varying degrees of accessibility and shoreline development with outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural or other similar values, to be preserved for the benefit of present and future generations.

Wildcat Well. A well drilled in unproved territory.

Wilderness. An area of undeveloped Federal land designated Wilderness by Congress, retaining its primeval character and influence, without permanent improvements or human habitation, protected and managed to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or primitive and unconfined recreation; (3) has at least 5,000 acres or is of sufficient size to make practical its preservation and use in an unimpaired condition; and (4) may also contain features that are of ecological, geological, scientific, educational, scenic, or historical value. These characteristics were identified by Congress in the Wilderness Act of 1964.

Wilderness Inventory. An evaluation conducted by the Bureau of Land Management of the public land in the form of a written description and a map showing those lands that meet the wilderness criteria as established under Section 2(c) of the Wilderness Act.

Wilderness Management Policy. Policy document prescribing the general objectives, policies, and specific activity guidance applicable to all designated Forest wilderness areas. Specific management objectives, requirements, and decisions implementing administrative practices and visitor activities in individual wilderness areas are developed and described in the wilderness management plan for each unit.

Wilderness Study Area (WSA). An area included in Section 105(a) of Public Law 96-560 (Colorado Wilderness Bill) which the Secretary of Agriculture shall review. Following review he will report his recommendations on suitability or unsuitability of the lands for inclusion in the National Wilderness Preservation System.

Withdrawal. An action which restricts the use of public land and segregates the land from the operation of some or all of the public land and mineral laws. Withdrawals are also used to transfer jurisdiction of management of public lands to other federal agencies.

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