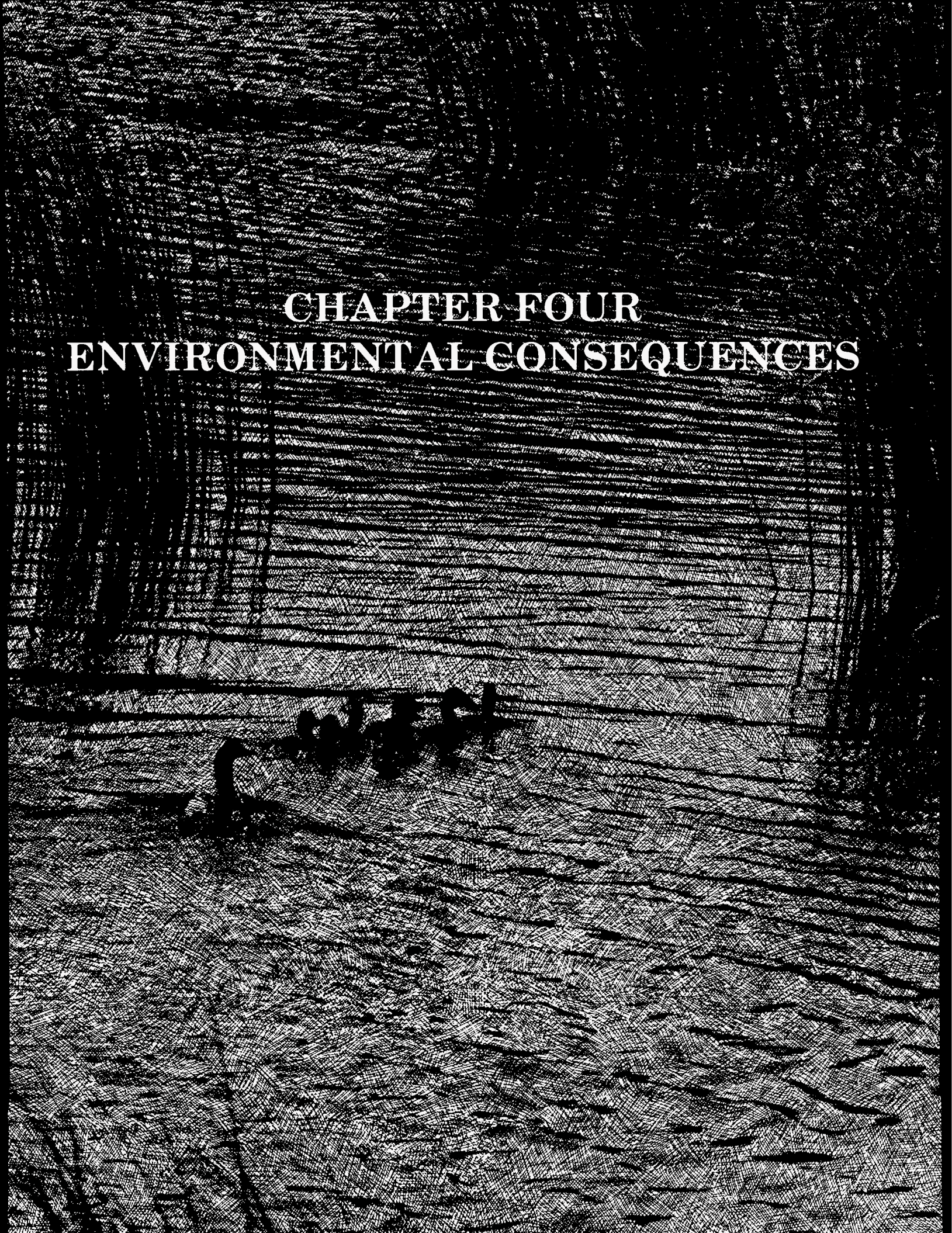


CHAPTER FOUR ENVIRONMENTAL CONSEQUENCES



CHAPTER FOUR

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter presents an analysis of the effects of implementing each of the four alternative management plans. Projected impacts to individual environmental conditions or resource management programs are included under each alternative.

Impacts to resources resulting from various coal management actions are addressed for the entire planning area in this chapter. Impacts specific to the development of a surface coal mine and related power generation facility are presented in Appendices H and I. The analyses of coal-related impacts presented in this chapter are based on the impact assessments presented in the two appendices.

Impact assessments refer to 20 coal unsuitability criteria by number. Descriptions of the unsuitability criteria, as well as the other three coal screens, are provided in Appendices B through E. The results of the application of the coal screens specific to each of the 24 CSAs are presented in Appendices B through G. A summary table of the application of the four coal screens is provided in this chapter following the discussion of impacts for each alternative.

ALTERNATIVE A—NO ACTION OR CONTINUATION OF PRESENT MANAGEMENT

Air Quality

The identification of 391,179 acres as acceptable for coal leasing and possible development of new mines and facilities in up to 13 CSAs, and application of Montana BLM Standard Stipulations on all future oil and gas leases and Standard Conditions of Approval on all APDs, are the primary factors impacting air quality.

Appendix H illustrates air quality impacts for a typical North Dakota mine and Appendix I illustrates air quality impacts for a mine and end-use facility. The air quality impacts identified in Appendix I show that any further coal development in North Dakota would further utilize the increment for SO₂ which may be fully consumed under certain meteorological conditions.

Prior to any leasing of federal coal a detailed site-specific analysis of potential air quality impacts would be conducted. Prior to development of any mine or large scale end-use facility, NDSDH would require a detailed permit review for mine or end-use facility application.

Continued application of the air quality stipulations included in the Standard Conditions of Approval for all APDs (see Management Guidance Common to all Alternatives) would help minimize the human safety risks of H₂S, as well as provide necessary gas content information to be used in future air quality studies.

All releases of H₂S and SO₂ would affect the air quality of the local area; primarily through the creation of offensive odors. The impacts to air quality beyond the local area are



not yet fully documented. It is evident that there is great potential for AAQs and PSD increments to be exceeded in the Williston Basin. Exceedance of these standards has occurred on a local scale and could occur on a regional scale under present conditions and management practices.

Further studies need to be conducted for the oil and gas fields within the district to establish the level of ambient air contamination. Also, studies of cumulative impacts are needed to establish the effects of all the fields on the air resource, including effects on the Theodore Roosevelt National Park and Class II areas.

Minerals

Coal

The management action significantly affecting the coal resource is the finding of 391,179 acres (7,656 MM tons) as acceptable for further consideration for leasing or exchange and potential leasing and development.

Under this alternative 607,131 acres (approximately 12,168 MM tons) of federal coal were identified as having coal development potential. A total of 215,952 acres (4,512 MM tons) were eliminated from areas acceptable for further consideration for leasing or exchange. Following the application of the unsuitability criteria, multiple-use trade-off, and surface owner consultation screens, 391,179 acres of federal coal were found acceptable for further consideration for leasing or exchange (Appendices B through G).

Following the application of the coal screens, 13 CSAs contain sufficient tonnages of federal coal in relatively

consolidated patterns to support new mines and, presumably, facilities. The CSAs able to support new mines and facilities with federal coal are:

Antelope
Bowman-Gascoyne
Center-Stanton
Dickinson
Dunn Center
Elgin-New Leipzig
Garrison
Golden Valley
Hanks
Mott
New England
Sand Creek
Williston

The remaining CSAs contain federal coal found acceptable for further consideration in tonnages or patterns which would severely hinder or preclude large scale mine development. These areas, however, would be able to support small scale mining or maintenance of existing mining operations.

All federal coal mined within the area found acceptable for further consideration for leasing or exchange would be irreversibly and ir retrievably lost. It is highly unlikely that all of the coal acceptable for further consideration would be mined based on recent downward trends in coal demand, as well as various engineering and permitting restrictions. Also, only portions of the CSAs would be offered for individual lease sales under the leasing process (Appendix A).

Exchange of coal for coal in AVFs and through other exchange processes could remove a significant amount of coal from potential development. Exchanges may result in compensation to the federal government by providing coal lands or resources other than coal.

Oil and Gas

The application of special oil and gas lease stipulations on 29,136 acres of federally reserved oil and gas, including "No Surface Occupancy" (NSO) on 1,096 acres, and the possible disposal of 9,580 acres of public land are the primary change agents affecting oil and gas.

Special stipulations requiring "NSO" would be attached to new leases on 1,096 acres (greater than one percent of the federal reserves in the District). NSO stipulations would have a long-term adverse impact through increased drilling costs to the lessee. NSO stipulations may cause the lessee to decide not to drill the lease and elect to pay compensatory royalties if the operator's adjacent well are found to be draining the lease.

Including NSO stipulations in leases would affect the overall development of oil and gas fields by precluding the strategic placement of wells in some spacing windows. This impact would be slight due to the small acreage involved, the scattered pattern of the federal reserves, and the predominance of private oil and gas. NSO stipulations would require more complete geologic information than if convention drilling methods were used, thus causing increased expense.

The possible seasonal or spatial limitations on drilling in the 29,136 acres of potential golden eagle habitat would have some short-term impacts. These stipulations could upset the drilling schedules of lessees; resulting in increased costs to the developer and, possibly, should rescheduling be impossible, the forfeiture of the lease.

There is a possibility of federal reserves being drained by wells outside the area addressed by the stipulations, being brought into production while drilling inside the stipulated area was delayed because of seasonal restrictions. This would cause a loss of royalties to the federal government.

There would be no significant impact to oil or gas field development because the seasonal restrictions apply to exploratory and not development wells.

Exploration and development would remain at the present rate and would be influenced more by the economic climate, spacing pattern, geological analysis, technological advance and rig availability than applications of lease stipulations.

Disposal of the surface estate over oil and gas reserves would complicate the permitting process for lessees since an additional participant, the surface owner, is involved besides the BLM.

Other Minerals

The identification of 391,179 acres as acceptable for further consideration and assumed coal leasing and development and the possible disposal of up to 9,580 acres of public land are the primary change agents affecting salable, leasable (other than oil and gas and coal) and locatable minerals.

An undetermined amount of scoria would be buried or displaced during surface mining. This disturbance would essentially eliminate the scoria from future commercial use.

The creation of split estate situations, by land exchanges and other disposals, would cause slight adverse impacts to the mineral material resource. Although the availability would not be affected, development would require agreements with both private and federal parties resulting in greater processing time and expense.

Disposal of the surface estate would prevent unclaimed locatable minerals from being claimed and recorded, pending regulations. This would not affect the federal government because no royalties are received from locatable minerals. Impacts would occur to private mining parties who lose access to potential mineral resources. Little development of federal locatable minerals has occurred in North Dakota.

Soils

The management action significantly affecting the soil resource is the finding of acceptable for further consideration and assumed development of up to 391,179 acres of federal coal, including about 2,793 acres with steep slopes (greater than 30 percent) that were not excluded in the West-Central MFP. Management actions causing less significant impact to the soil resource include: land pattern adjustment involving up to 9,580 acres, continuation of the present range management program, continuation of all areas open for ORVs, and continuing the application of Montana BLM standard stipulations (plus the addition of NSO stipulations on 1,096 acres) on all new oil and gas leases.

Coal Study Areas

The West-Central MFP did not exclude any areas from further consideration for leasing because of steep slopes. The 2,793 acres of steep slopes fall into LCCs VII and VIII. These capability classes have low reclamation potential because of topography, shallow depth to bedrock, rock out-

crops, and steepness of slope. If leased and mined, the areas would have problems with erosion, stability, revegetation, and return to approximate original contours in the short term. They would eventually be reclaimed in the long term but with an irreversible and irretrievable loss of some soil material. Most of the problem areas with steep slopes in the West-Central MFP would be found in what is now the Antelope and to a lesser extent the Dickinson CSAs. North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would prevent some, but possibly not all, of the steep slopes from being disturbed by surface mine operations.

A total of 41,180 acres of steep slopes were eliminated from further study in the Southwest and McKenzie-Williams MFPs. Therefore, there would be no significant impacts to soils and topography on these steep areas from surface coal mining.

The impacts to the soil from mine development (Appendix H) would cause a short-term loss in soil productivity. However, the proper recontouring of overburden and replacement of topsoil and subsoil as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would return productivity to acceptable levels in a relatively short number of years (Appendix H, Table H-1). No major long-term impacts to the soil would be anticipated.

Surface Lands

The exchange of land would not impact the soil resource in most cases, assuming no change of use. Soils on tracts of land disposed to other federal agencies would basically remain the same. If tracts are sold or otherwise transferred to the private sector, erosion could be accelerated by overgrazing or a change in land use. The type of change made; e.g., agriculture and road or building construction, would determine the amount of erosion. This is expected to be a minimal loss since a significant switch to agriculture or construction is not likely. Public lands retained under this alternative would see little impact to the soil resource.

Continuation of the present range management program under this alternative would have a positive impact to soils. A long-term increase of approximately 6.5 percent in vegetative production would result in less soil erosion due to the added cover.

Unrestricted ORV use on public lands would cause some soil loss due to erosion and compaction. Most disturbed areas would stabilize within two to three years because of lack of use. Small areas would remain compacted and subject to erosion in the long term because the same ORV trails would receive repeated use.

Other Mineral Estate

Oil and gas exploration normally disturbs a small area of soils along a seismic line and drilling site. With proper cleanup and handling of soil, this activity causes minor short-term negative impacts. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment, disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Stipulations on oil and gas leases would minimize impacts to soil resources by prohibiting activities during wet or muddy periods and requiring erosion control on slopes of erodible soils over 20 percent. There would be no soil disturbance resulting from development of federal oil and gas on the 1,096 acres protected by NSO stipulations (see Appendix K).

Hydrology

The identification of 391,179 acres as acceptable for further consideration and assumed coal leasing and development, unrestricted ORV use on 67,520 acres of public lands, and the application of Montana BLM Standard Stipulations to all new oil and gas leases are the primary change agents affecting hydrology. The disposal of up to 9,580 acres of lower-value federal surface lands and continuation of present rangeland management would have minor impacts to hydrology.

Coal Study Areas

In the previous land-use plans of McKenzie-Williams, Southwest, West-Central, and Golden Valley MFPs, 92,096 acres were considered unsuitable under unsuitability criteria 16 and 19. Under multiple-use tradeoff, a total of 10,520 acres of buried-valley aquifers were protected along with 54,492 acres of Dickinson's municipal watershed and the proposed watershed for add-on to the current watershed. In the McKenzie-Williams MFP a Lake Sakakawea buffer was established under multiple-use tradeoff for Williston and Tobacco Garden CSAs, consisting of 36,387 acres.

Under criterion 16, 3704 acres are considered unsuitable for six CSAs. These areas protect losses to downstream occupants of flood plains.

Under criterion 19, 88,392 acres are considered as a preliminary determination of AVFs. The area determined was the maximum extent of the AVF.

In addition to those acreages under unsuitability criteria, another 101,399 acres were considered unacceptable for further consideration for coal leasing under the multiple-use tradeoff screen. This determination would protect the area surrounding Lake Sakakawea in two CSAs, buried-valley aquifers in four CSAs and the City of Dickinson's municipal watershed and proposed add-on watershed.

Appendix H describes the probable major impacts of coal mining to the hydrologic resources of the planning area.

Criteria 16 and 19 are not adequately applied to all of the CSAs under this alternative. In some cases AVFs are not protected and in other areas AVF delineations were too extensive. Because of this inadequacy, AVFs which are productive agricultural lands may not be protected. Inadequacies of applying criteria 16 and 19 are corrected in the other alternatives.

Surface Lands

Minor impacts to the water resources would occur by the disposal of up to about 9,580 acres of lower-value scattered tracts. Disposal to other federal agencies would have no short-term impacts but should have positive long-term impacts due to the acquiring agency being better able to monitor and manage lands that are physically closer.

Disposal of lands to individuals whose primary interest is not protecting the water resources would have either no impact or minor negative long-term impacts, because high-value tracts along major rivers with high watershed value

would be retained in compliance with the floodplain management EO. The exchange of scattered tracts to provide for larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would have long-term positive impacts on the water resources. Lands gained through exchange would consolidate public land and, in some cases, allow BLM to more efficiently manage the watershed to reduce water yields, improve water quality, and decrease erosion and sedimentation from the watershed.

Under the current range management program sediment and water yields are expected to be reduced by 10 percent and 5 percent respectively (USDI 1984a).

Unrestricted ORV use in the Big Gumbo area during periods of wet soil conditions could cause increased upland erosion. Compaction of soils would result if ORV use is concentrated on trails during wet periods.

Other Mineral Estate

All phases of oil and gas operations have the potential to cause significant impacts to local water resources. Major oil and gas development increases sediment load by compaction of the soil, reduction of vegetation, building of roads and other surface disturbing activity. Roads or seismic lines crossing ephemeral, intermittent, or perennial stream channels and wetlands do the most damage. Activity during a wet period would have a greater potential for increasing sediment yields than activity during periods when the ground is dry.

Shallow water wells and springs may be impacted by the detonation of explosives or by other methods of seismic exploration. Aquifers composed of brittle material may shatter when explosions occur in the immediate area. This may decrease the water quality of the aquifer because shattering of the aquifer allows many new surfaces for dissolution of material. A shock wave could cause a formation to fracture and cause movement of ground water to or from the aquifer. In some cases flows from shallow water wells may be either increased or decreased by such fracturing. In addition plugging of shot holes is not always successful allowing cross-contamination of aquifers or contamination by surface inflow.

When abandoning the site, disturbed areas are regraded and revegetated; sediment production would decline and return approximately to initial levels. During the lifetime of oil and gas development in an area (20-30 years), some water consumption occurs as well as some degradation of water quality. In the long term, following reclamation, water consumption would stop and water quality would return to predevelopment levels.

Continued application of Montana Standard oil and gas lease stipulations would minimize negative impacts to water resources by providing for erosion control (activities may be prohibited during muddy and/or wet periods), and provide for a buffer from reservoirs, lakes, ponds, streams, or rivers, and on slopes of erodable soils over 20 percent.

Vegetation

The management action significantly affecting vegetation is the finding as acceptable and assumed leasing and development of up to 391,179 acres of federal coal. Management actions causing less significant impacts to vegetation are: land pattern adjustment on up to 9,580 acres, continuation of the present range management program,

continuation of no restrictions on use by ORVs on public lands, and the continued application of Montana BLM Standard Stipulations on all new oil and gas leases.

Coal Study Areas

The areas found acceptable would consist primarily of farmland (about 274,000 acres) used for growing crops such as wheat, sunflowers, and alfalfa. Native vegetation remaining (about 70,000 acres) would primarily consist of native prairie located on rather gentle slopes used for live-stock grazing and wooded draws (about 47,000 acres). Mining would cause significant short- and long-term losses in vegetative productivity depending on the vegetation disturbed (Appendix H). The proper recontouring of overburden, replacement of soil material and revegetation as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (PSC 1986) would normally return productivity to acceptable levels in relatively few years (Table H-1).

Surface Lands

Disposal or exchange of up to 9,580 acres of public lands under this alternative would have only minor impacts on vegetation. Vegetation on tracts of land disposed to other federal agencies would remain the same or possibly improve due to better management. If tracts are sold or otherwise transferred to the private sector, the vegetation might be improved by better management or degraded by overgrazing, agriculture, or building construction for example. This loss would be minimal both in the short and long term because a significant switch to agriculture or construction is not likely.

Vegetation on public lands retained under this alternative would either remain in the same condition or improve slightly. A continuation of the present range management program would have long-term positive impacts to vegetation. Total vegetation production would increase approximately 6.5 percent in the long term.

If larger parcels are obtained near Big Gumbo and Lost Bridge through pooling, BLM management would dictate that they be returned to native vegetation, if not currently in such a state. The vegetation would be used to graze livestock and wildlife, provide habitat, and control erosion.

The continuation of present ORV management (all areas open) would have only a slight effect on vegetation of the public lands. Public lands in North Dakota receive minimal use by ORVs so vegetative loss with resulting increases in erosion would be insignificant. Localized impacts would occur, especially under wet soil conditions. An unexpected increase in ORV use on specific areas such as the Big Gumbo and Lost Bridge could cause localized vegetative loss with resulting erosional problems. If the increased ORV use was only for a brief period of time, the impacts would be short term. However, if an area continued to be regularly used by ORV, impacts would be on a long-term basis.

Other Mineral Estate

Oil and gas exploration normally disturbs a small area of vegetation along a seismic line and drilling site. Assuming proper cleanup and handling of soil, these areas would be revegetated within one to two years. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to

production, an area usually less than an acre would remain stripped of soil and out of crop or grass production until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Continued application of Montana BLM Standard Stipulations on all new oil and gas leases would minimize negative impacts to vegetation by providing for erosion control and revegetation of disturbed sites. There would be no vegetation loss resulting from development of federal oil and gas on 1,096 acres protected by NSO stipulations.

Wildlife

The finding as acceptable and assumed leasing and development of 391,179 acres of federal coal, including 47,373 acres of woody draws, the application of Montana BLM Standard Stipulations on oil and gas leases on 460,394 acres, and unrestricted ORV use on 67,520 acres of public lands would have substantial impacts on a variety of high priority wildlife species and their habitats. The disposal of up to 9,580 acres of lower-value federal surface lands and continuation of present range management would have minor long-term impacts.

Coal Study Areas

No federally-listed threatened and endangered species would be affected by this alternative. The bald eagle, peregrine falcon, and whooping crane migrate through the area but their use of the planning area is erratic. No interior least terns, black-footed ferrets, or piping plovers are known to breed in the CSAs. However, they may occur on scattered tracts (see below).

In previous land-use plans (McKenzie-Williams, Southwest, and West-Central MFPs) no acreages were classified unsuitable under the wildlife unsuitability criteria 9, 10, 11, 12, 13, 14, and 15. A total of 4,520 acres were protected under the multiple-use tradeoffs (Appendix D), but decisions on unsuitability were postponed until more data were available.

Wildlife data are now adequate for determinations of unsuitability. No habitats were considered unsuitable under criteria 9, 10, and 12. Under unsuitability criteria 11, 13, 14, and 15, a total of 76,340 acres of wildlife habitat are considered to be unsuitable for further consideration for coal leasing (Appendix C). In addition, another 1,636 acres are considered unsuitable under criterion 1 as it applies to wetlands under management for waterfowl production by the USFWS. Thus, the total acreage unsuitable due to wildlife values is 77,976 acres. A more detailed explanation of the habitats protected under criteria 11, 13, 14, and 15 follows.

Under criterion 11, 6,145 acres (Appendix C) are considered unsuitable due to golden eagle nest sites and buffer zones. These occur in Tobacco Garden and Williston CSAs. Buffer zones include the nest site (typically a badlands cliff area), woody draws, native prairie, and, in some cases, agricultural lands.

Under criterion 14, 2,491 acres are considered unsuitable. These acreages occur in two CSAs. The habitats protected are ferruginous hawk nest sites and their buffer zones.

Under criterion 15, 67,704 acres are considered unsuitable. These are predominantly large blocks of contiguous woody

draw habitats in the Williston (50,136 acres), and Tobacco Garden (17,248 acres) CSAs, where a variety of high priority wildlife species occur, especially big game.

Assuming a moderate pace of development and realizing that only a small portion of the lands in a mine area are actually disturbed at any time (Appendix H) short- and long-term impacts on wildlife would be significant but local.

Suitable acreages in the CSAs are comprised mainly of agricultural lands and some native prairie of lower quality. Agricultural lands can be reclaimed effectively. Productivity of native prairie may be reclaimed in the short term; however, the natural diversity of native prairie may only be achieved in the long term (Appendix H). Woody draws may never be reclaimed to their original character. All reclamation would extend into the long term. Thus, the most significant long-term impacts would occur to species occupying the 47,373 acres of woody draws that could be mined under this alternative.

Surface Lands

The disposal of up to 9,580 acres of lower-value scattered surface tracts would have only minor impacts on wildlife. Disposal of lands to individuals or organizations who are primarily interested in wildlife management would have positive long-term impacts on wildlife. Disposal to individuals or organizations whose primary interest is not in managing wildlife would have either no impact or minor negative long-term impacts because high-value tracts would be retained. Under disposal, the future enhancement of these habitats would be the main opportunity foregone. For example, as long as these lands are in federal ownership, it would be possible to construct wetlands, plant trees, fence, or do other project work at some future time. Disposal also would forego the opportunity to carry out beneficial land exchanges that may emerge at some future date.

The exchange of scattered tracts to provide larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would generally have positive long-term impacts on wildlife. The consolidation of lands in these areas would make management more efficient and allow greater opportunities for enhancing wildlife habitats. In the Big Gumbo area, benefitting species would be pronghorn, sage grouse, raptors, and other species of high interest such as the long-billed curlew. In the Lost Bridge area, key species are elk, raptors and possibly, in future years, bighorn sheep.

Unrestricted ORV use may have significant local impacts on fragile wetland, riparian, and woody draw habitats by initiating or accelerating vegetative loss and soil erosion. Direct loss of terrestrial habitat and loss of quality in aquatic habitats due to sedimentation may reduce local wildlife and fishery populations.

Disturbance and harassment of elk and bighorn sheep on winter and calving/lambing habitats may directly reduce population numbers. The creation of new roads and trails by repeated use also makes more areas accessible to hunters and others who otherwise would not be able or inclined to drive into particular areas. This increases general disturbance of wildlife as well as the potential for poaching. These factors might decrease wildlife populations, especially in local areas.

Continuation of the present rangeland management program would benefit wildlife as a result of minor long-term positive impacts on Category "M" allotments (20,403

acres) and on unleased lands (14,510 acres). There would be long-term negative impacts to wildlife on Category "C" allotments in less than good condition (3506 acres).

Other Mineral Estate

Continued application of Montana Standard Oil and Gas Lease Stipulations on 460,394 acres may result in long-term negative impacts to golden eagles, prairie falcons, ferruginous hawks, prairie dogs, sage grouse, elk, bighorn sheep, wetlands, and riparian habitat. Current stipulations for wildlife and habitat resources are not specific enough, with two exceptions, to adequately protect priority species and habitats. The NSO stipulation on 1,096 acres of floodplains, wetlands, and native prairie would protect these specific tracts. Also, golden eagles receive special consideration through a NTL. However, the area to which the special stipulation presently applies only encompasses a portion of golden eagle breeding habitat in the district. The lessees are not advised in sufficient detail of possible seasonal or spatial restrictions at the time of leasing. Conflicts may then occur at APD time that otherwise could have been avoided.

Agriculture

The finding of 391,179 acres of federal coal acceptable and the assumed leasing and development, the identification of up to 9,580 acres of public lands for disposal, and the continuation of present grazing management would have only minor impacts on the region's agricultural production.

Coal Study Areas

Within the CSAs, short-term loss of crop production would be the principal impact because cropland is the major land type left (about 274,000 acres) after the application of the four coal screens. Dunn Center and Beulah-Zap CSAs are the exception to this. Grazing land makes up 40-50 percent of these two study areas. Reclaimed cropland has the best chance of succeeding and meeting regulatory requirements.

At the height of the mining operation, normally slightly over 36 percent of a typical mine permit area would be in some phase of mining or reclamation (Appendix H). Some production would occur during reclamation. The degree of impact to an individual farmer would depend on how much of his operation falls within the active mine area.

There would not be a significant loss of grazing land. Much of the grazing land excluded out under the multiple-use tradeoff screens for slopes and wildlife habitat. About 117,000 acres remain acceptable for further consideration. Reclamation of pasture lands has generally proved successful. Significant increases in total production are often possible but accompanied by a long-term loss of plant species diversity.

Surface Lands

Blocking up of scattered tracts into more manageable units would benefit grazing management and add efficiency to grazing lease administration. Upon the acquisition of sizable blocks of land, detailed AMPs that would benefit long-term range production and livestock use would be developed.

Land disposal could have both positive and negative impacts on grazing lessees. Historically, BLM lease rental rates have been much lower than private and state leases. Land ownership gives the owner total control over how the

land is used. Land pattern adjustment may remove all or portions of an individual's grazing lease. This would disrupt, presumably over the short term, the livestock operation.

Other Mineral Estate

There would be no significant impacts to agriculture caused by mineral development other than coal.

Lands and Realty

Coal leasing and mining, developing oil and gas leases, or disposing of mineral materials would have no significant impacts on the land base or the ability to process realty actions. Up to 9,580 acres could be sold or exchanged, significantly affecting the public land base and ability to accommodate some land uses. The termination of land reclassifications and revocation of withdrawals would also significantly impact lands and realty.

Surface Lands

There is a possibility of bringing more lands under BLM administration by reviewing and revoking some of the approximately 330,800 acres withdrawn. Land classifications would be removed from all lands now encumbered by C & MU land classifications, approximately 8,000 acres. Removing the classifications would have no long-term adverse effects but would make the lands available for the highest and best use as well as discretionary actions. This would increase the public land acreage in multiple-use.

In the long term, the land pattern on up to 57,940 acres of public land would remain fixed, perpetuating the existing intermingled ownership pattern. Scattered tracts would be exchanged for lands meeting the criteria in Appendix N.

In Bowman County, 27,433 acres, including the Big Gumbo area, would be retained (Map 2-1). In the Lost Bridge area (Map 2-2), in Dunn County, 15,405 acres of public lands would be retained. No public lands within the Lost Bridge area would be sold.

A maximum of 9,580 acres (15 percent) of the scattered tracts would be available for disposal by R & PP patent, exchanges, and sales. Land pattern repositioning would be limited to Adams, Bowman, Dunn, Grant, McKenzie, and Williams Counties. Lands outside of the previous planning areas would not be available for sale or exchange. The area available for repositioning would restrict acquisition. Public lands would remain in 29 counties.

Other Mineral Estate

There would be no significant adverse impacts on the land resource from exploring and developing oil and gas leases or permitting disposals of mineral materials.

Recreation and Visual Resources

The finding as acceptable and assumed leasing and mining of up to 391,179 acres of federal coal, the disposal of up to 9,580 acres of public lands, the application of Montana BLM Standard Stipulations to future oil and gas leases, and the continuation of nonrestricted ORV use would have minor impacts on recreation and visual resources.

Coal Study Areas

Coal mining on portions of the CSAs found acceptable would remove this land as a recreational resource until it is reclaimed. The loss of these areas would create additional



hunting pressure on surrounding land; however, after successful reclamation this would be an insignificant impact. Increased population resulting from new mining activities would place additional demands on popular outdoor recreation areas such as Lake Sakakawea and Theodore Roosevelt National Park. Development would also increase demand for community and indoor recreational facilities. Mitigation of development impacts would require additional outdoor, indoor, and community recreation facilities.

Development of portions of the CSAs would have an impact on the visual resources of these areas. Due to the relatively flat terrain of the CSAs, mine and related facilities would intrude into the landscape. In most cases this would be an acceptable intrusion. Mine sites and facilities near the Missouri breaks and Lake Sakakawea would impact the high visual resource values of this area. A protective buffer zone would be necessary to maintain the high visual qualities of this area. Such a buffer zone would be developed following the introduction of a specific development plan.

Surface Lands

The disposal of up to 9,580 acres would have a minimal effect on recreational resources, because most of these tracts are isolated and access to them is difficult. Many tracts are surrounded by private land where land owner permission for access is uncertain. The consolidation of public land through exchange and exchange pooling would result in more recreational opportunities through the creation of larger, more accessible tracts.

Unrestricted ORV use of surface lands would benefit recreational opportunities in the short-term by allowing greater access to public land. Long-term impacts to ORV use on resources such as vegetation and wildlife would result in the loss of some recreational opportunities, primarily sight-seeing and hunting. However, current ORV use of surface lands is minimal and impacts from future ORV activities are expected to be slight.

Other Mineral Estate

Oil and gas development under standard lease stipulations would continue to have an affect on recreation by limiting hunting and other dispersed activities in well-developed oil and gas fields and by generally decreasing the quality of dispersed recreation opportunities. This impact may be offset by additional road development that would enhance access to recreational areas. Continued oil and gas development would also increase hunting pressure on areas adjacent to development. Mitigation of impacts to natural resources from oil and gas development under standard stipulations is adequate. The impacts on recreational resources under these stipulations would be minimal.

Oil and gas development under current lease stipulations would have an effect on visual resources. If there is development in presently undisturbed areas, the intrusion of oil and gas facilities would have a greater impact. Mitigation of the impact would be accomplished by requiring the maintenance of the visual qualities of the landscape and ensuring that facilities have proper design, painting, and camouflage to blend in with the natural surroundings.

Cultural Resources

Management actions significantly affecting cultural resources include the finding of 391,179 acres acceptable for further consideration and assumed coal leasing and development, the application of Montana BLM Standard Stipulations on all federal oil and gas, the disposal of up to 9,580 acres during land pattern adjustment, and unrestricted ORV use on 67,520 acres of public lands.

Coal Study Areas

Prior to 1983, unsuitability criterion 7 specified that all sites eligible to or listed on the NRHP shall be considered unsuitable for coal mining. In 1983 BLM modified the scope of criterion 7. The decision excluded sites eligible to the NRHP from protection under criterion 7. A subsequent District Court ruling in 1985 limited protection to all publicly owned sites listed on the NRHP.

Previous MFP decisions are affected by the changes in criterion 7. The Golden Valley MFP found 10 acres unsuitable (A.C. Townley farmstead) for further consideration for coal leasing under criterion 7 and in the West-Central MFP addendum all archaeological sites within the eligible KRF National Register District were excluded from further consideration under criterion 7. Final decision on whether to apply an exception to sections 32 and 34 (also within the district) was deferred until mining plan time and the submission of a mitigation plan. As a result, 2,897 acres were found unsuitable within the eligible KRF District and a decision on the remaining 1024 acres was postponed.

Although criterion 7, as revised in 1983, no longer applies to the 3,931 acres excluded in previous MFPs, these areas still contain regionally or nationally significant cultural resources. It is assumed that the 3,931 acres would remain excluded from further consideration as multiple-use trade-offs.

Inventory data varies in intensity of effort from one CSA to another. Data adequacy problems will be improved at the completion of a Class II survey on five CSAs located in the Southwest and McKenzie-Williams MFP areas. This sample survey, currently in progress, will generate sufficient data to assess the risk of impact from coal leasing and subsequent mining. Using existing regional inventory

data an estimated 156-782 sites (5 to 25 percent of estimated total) would be significant and would be indirectly or directly impacted by the leasing and subsequent mining of coal found acceptable for further consideration.

Archaeological investigations indicate that areas such as the Missouri breaks, elevated land forms, stream valleys, terraces, and coulees are more likely to contain cultural resources in greater frequencies. Impacts to eligible cultural resources in portions of these areas found acceptable are anticipated.

Eligible sites subject to direct adverse impacts would be avoided or mitigated through documentation (historic Euro-American sites) or a data recovery program (archaeological sites). Standard data recovery methods would, in most cases, be adequate to minimize direct adverse impacts from coal leasing and subsequent mining.

Knife River Flint Quarry and related sites located within the Dunn Center CSA outside of the eligible National Register District are often large and/or contextually complex. Mitigation of the impacts to such sites presents immense problems. However, data recovery in these areas would improve our understanding of the quarries and related sites, somewhat offsetting the risk of data loss.

Surface Lands

Disposal of up to 9,580 acres of public land would require a survey to identify all significant cultural resources. Four alternative mitigation measures are considered when lands contain eligible sites: (1) no disposal-subject lands are retained in Federal ownership, (2) exchange of public land for private land when both contain sites of equal value, (3) extensive documentation and recordation (historic Euro-American properties), and (4) data recovery (archaeological sites). Data recovery is not usually employed because costs often exceed the value of the lands involved. Where feasible, data recovery is considered along with other alternatives during a proposed disposal action.

Based on the data generated from existing inventories, it is estimated that the 10,040 acres identified for disposal contain at least 77 cultural resources. Between 5 percent and 25 percent (4-19 sites) of these sites would be eligible for National Register listing. The risk of impacts from disposal of eligible cultural resources would be minimal if mitigable.

ORV use of public lands would minimally impact cultural resources assuming current levels of ORV use. Some incidental impacts may occur from vehicle damage to surface cultural resources and collection of artifacts.

Other Mineral Estate

Montana BLM Standard Oil and Gas Lease Stipulations require cultural resources be considered during development of a lease. Standard stipulations require that lands affected by development are examined to determine if cultural resources are present and to specify necessary mitigation measures. Standard stipulations also direct the operator/lessee to contact the Surface Management Agency if cultural resources are discovered during construction activities. The Surface Management Agency will evaluate the significance of the resources in accordance with provisions of policies, laws, and regulations.

Approximately 3 percent of BLM public surface and private surface over federal oil and gas has been inventoried for cultural resources. It is estimated at least 4000 sites are located in the unsurveyed areas. Past data indicate 5 to 25

percent (200-1000 sites) would be significant and subject to impacts from development. Impacts to cultural resources from oil and gas development would be slight.

Paleontology

Major management actions affecting the paleontological resources include the finding of 391,179 acres acceptable for further consideration and assumed leasing and mining, disposal of up to 9,580 acres of public lands, unrestricted ORV use of 67,520 acres of public lands, and continued application of Montana BLM Standard Stipulations to future oil and gas leases.

Coal Study Areas

Paleontological investigations have not been systematically conducted for any of the CSAs. Thirty fossil localities have been recorded within the CSAs. Four of these sites are considered rare. Of the 30 recorded sites, only 10 are located over federal coal and only one contains rare fossils.

The risk of impacts to the paleontological resources would be minimal provided that prior to mining of coal, sites that contain fossils of significant interest be protected or salvaged. Residual impacts following salvage would be slight.

Surface Lands

Paleontological investigations have not been identified on tracts designated for disposal; however, some tracts are located within the Hell Creek Formation which has produced significant fossil discoveries. Parcels containing significant vertebrate fossils would generally be retained in federal ownership until appropriate salvage can be conducted. Due to excessive costs, salvage is unlikely unless time and expertise is donated. Overall the disposal of public land would not have a significant impact on paleontological resources.

Unrestricted ORV use would not have a significant impact on paleontological resources assuming current levels of use. Minor impacts are anticipated from fossil prospecting.

Other Mineral Estate

Montana BLM Standard Stipulations provide for the protection of paleontological resources. The standard stipulations do not specifically require the identification of these resources prior to an authorization. The potential exists for impacts to occur to significant paleontological resources under Montana BLM Standard Stipulations. Once these resources are discovered and reported; however, the disposition of the resources would be on a case-by-case basis. Risk of impacts to paleontological resources under continued application of Montana BLM Standard Stipulation would be slight.

Economic and Social Conditions

The finding of 391,179 acres as acceptable and assumed leasing and mining, the disposal or exchange of up to 9,580 acres, the continued use of Montana Standard Oil and Gas Stipulations on all future leases, and leaving all public lands open to ORV travel would result in significant social and economic impacts.

Impacts of Coal Mining and Related End-Use Facilities

A detailed analysis of impacts related to the development of a generic mine and end-use facility is presented in

Appendix I. The impacts resulting from the development of a mine and facility is summarized below.

Thirteen CSAs capable of supporting at least one new mine and facility with federal coal are available for further consideration under this alternative. This alternative offers the least opportunity for coal development. These 13 CSAs are dispersed over much of western North Dakota. The following communities may be impacted depending upon where development occurs: Williston, Tioga, Garrison, Center, Stanton, Beulah, Hazen, Halliday, Killdeer, Dickinson, Belfield, Beach, Bowman, New England, Mott, and Elgin. Each of these communities is located in proximity to one or more CSAs and is large enough that it would attract in-migrants if development were to occur. Some of these communities such as Williston, Dickinson, and Beulah have experienced energy-related development in the recent past.

Direct and indirect employment for the mine and facility would peak at approximately 2500 during construction, and level off to about 1150 during the operations phase (Table 4-1). Peak construction employment of 1400 for this mine and facility represents about 10 percent of the 1984 statewide figure for construction employment. Long-term mining and utilities (facility) employment represent 20 percent and 4 percent, respectively, of 1984 statewide employment figures. In-migration to communities surrounding the development would peak at about 2000 and decline to 1100 in the long term. The project and resulting in-migration could place considerable stress on local services and infrastructure during the construction phase depending upon current community conditions and the size of the incoming population. In the long run, coal severance tax payments would increase 23 percent over 1985 statewide payments, and coal conversion tax payments would increase 31 percent over 1985. These payments could be used to meet some of the increased demand for public services.

The economic impacts of the mine and electric power generation facility on farm and ranch operations, expressed as the dollar value of agricultural production lost, would be \$138,600 annually. This represents 0.5 percent of the average value of the annual agricultural production (in 1982) of

counties containing CSAs and about 0.006 percent of the value of the annual agricultural production for the state. Impacts of strip mining on the operation and management of livestock ranches could be more severe than on dryland farming (USDI 1981). Mine development located near the center of a ranch could seriously interfere with movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution and, in general, disrupt the overall operation. Compensation to the farm/ranch operator would depend upon the type of landowner lease, land ownership pattern, and percentage of land owned versus land leased. The greatest impacts would occur to operators who lease all the land which is removed from production; no compensation would be made for lost leases.

Social impacts include changes in social organization and social well-being, and depend upon the community itself and the number and types of in-migrants. Impacts to social organization (the way in which the people in the community relate to each other) could include: residents no longer knowing everyone else, greater diversity in resident lifestyles, changes in business transactions and government structures from casual to more formalized, increases in the level of outside influences in the community, and erosion of the traditional community power bases. These changes could be permanent, substantial, and intense. Impacts to social well-being could include: the provision of private and public services; increases in stressors such as strangers, noise, crowds, and crime; and increases in income for those who are able to find employment or expand business as a result of the development. Negative impacts to social well-being would be mostly of a short-term nature, noticeable primarily during periods of peak construction (Appendix I).

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character. Some area ranchers and farmers have organized in opposition to development because of their concern

TABLE 4-1
MINE AND COAL-FIRED ELECTRIC POWER GENERATION PLANT SUMMARY TABLE¹

	Employment				Payroll to Direct and Indirect Employees (Thousands of Dollars)	In-Migrating Population Associated with Direct and Indirect Employment
	Direct Construction	Direct Operation	Indirect	Total		
1	450	50	300	800	20,500	650
2	1,200	100	750	2,050	52,600	1,700
3	1,400	150	900	2,450	63,000	2,050
4	850	250	800	1,900	47,600	1,600
5	650	350	850	1,850	45,400	1,600
6	600	350	800	1,750	43,100	1,550
7	700	350	900	1,950	47,800	1,700
8	150	450	750	1,350	31,400	1,300
9	0	450	700	1,150	25,900	1,100
10-40	0	450	700	1,150	25,900	1,100

¹Summary of Tables I-1 through I-5.

over regional impacts to air and water resources that they feel could affect their economic and social welfare and, ultimately, limit their future options. These agricultural producers are not convinced that the coal in the Fort Union region is needed to meet national energy goals or that the successful reclamation of agricultural land can be guaranteed (USDI 1982).

Impacts to the Fort Berthold and/or Standing Rock Indian Reservations could occur if development takes place close to the Reservations. Potential in-migration would be influenced by the location of the mine and facility in relation to Reservation towns, the availability of services in the towns, and the relative location of off-Reservation towns. If there is significant migration onto one of the Reservations, the affected Tribe's cultural characteristics, social organization, and social well-being could be impacted. Services and facilities could be negatively impacted causing a decrease in social well-being. Positive impacts to social well-being could occur if Tribal members were able to acquire employment on energy projects. With increased employment opportunities, Indians who may have had to leave the Reservations for work may find they are able to stay in the area.

Impacts of Other Management Actions

Land adjustment would continue at the same level as in the past. There would be little or no impact on the area economy.

Leaving all land open to ORV travel is a continuation of present management and would have no impact on the area economy.

Oil and gas development would continue to occur as it has in the past. Exploration would provide jobs for the local economy. The extent of other employment in the oil and gas industry in the area will depend upon discovery of any deposits, the size of such deposits, and their development potential.

This alternative would not change the general attitudes or values presently held by the residents of the study area, but it could affect attitudes toward and expectations of BLM. Those individuals and groups who want management to continue as it has in the past, would favor this alternative. Individuals and groups that favor resource development would probably approve of the lack of designations for ORV use which would leave all lands open to ORV travel, and the usage of Montana Standard Stipulations rather than special stipulations for oil and gas development. Other groups and individuals who are concerned with environmental protection may feel the adoption of this alternative would mean in the future BLM would inadequately protect some of its resources such as wetlands and wildlife.

ALTERNATIVE A SUMMARY OF COAL SCREENS

CSA	Acres Federal Coal	Unsuit.	ACRES EXCLUDED			Acres Acceptable
			Multiple Use	Surface Owner	Other	
ANTELOPE	19482	1217	0	0	0	18265
ARNEGARD	11600	0	0	9563	0	2037
BEULAH-ZAP	10613	943	0	0	0	9670
BOWMAN-GASCOYNE	21320	320	1440	0	0	19560
CENTER-STANTON	12895	1200	0	0	0	11695
DICKINSON	78924	26469	28986	0	0	23469
DIVIDE						
DUNN CENTER	41550	14342	0	0	0	27208
ELGIN-NEW LEIPZIG	14400	1400	100	0	0	12900
ELKHORN						
FORTUNA						
GARRISON	8808	1991	0	0	0	6817
GOLDEN VALLEY	11794	301	80	0	0	11413
HANKS	47100	2261	4605	0	0	40234
KEENE						
MOTT	42200	790	1031	0	0	40379
NEW ENGLAND	95800	18280	620	3800	0	73100
NIOBE						
SAND CREEK	57240	200	2410	5280	280 ¹	49350
TOBACCO GARDEN	32920	25892	2507	429	0	4092
UNDERWOOD	1430	400	0	0	0	1030
VELVA						
WASHBURN	1035	52	0	0	0	983
WILLISTON	98020	55510	3493	40	10168 ²	38977
TOTAL	607131	151568	45272	19112	10448	391179

¹Land Use Plan consistency.

²Oil and gas fields deferred.

ALTERNATIVE B

Air Quality

The identification of 597,016 acres as acceptable for assumed coal leasing and possible development of new mines and facilities in 16 CSAs and application of Montana BLM Standard Stipulations on oil and gas leasing on 460,394 acres are the primary factors impacting air quality.

Appendix H illustrates air quality impacts for a typical North Dakota mine and Appendix I illustrates air quality impacts for a mine and end-use facility. The air quality impacts identified in Appendix I show that any further coal development in North Dakota would further utilize the increment for SO₂, which may be fully consumed under certain meteorological conditions.

Prior to any leasing of federal coal, a detailed site-specific analysis of potential air quality impacts would be conducted. Prior to development of any mine or large-scale end-use facility, NDSHD would require a detailed permit review for mine or end-use facility application.

Continued application of the air quality stipulations included in the Standard Conditions of Approval for all APDs (see Management Guidance Common to all Alternatives) would help minimize the human safety risks of H₂S, as well as provide necessary gas content information to be used in future air quality studies.

All releases of H₂S and SO₂ affect the air quality of the local area; primarily through the creation of offensive odors. The impacts to air quality beyond the local area are not yet fully documented. It is evident that there is potential for AAQs and PSD increments to be exceeded in the Williston Basin. Exceedance of these standards has occurred on a local scale and could occur on a regional scale under present conditions and management practices.

If the increase in wells producing H₂S in the Williston Basin is not closely monitored, there is a significant potential to exceed AAQs and PSD increments. These standards will be exceeded not only on a local scale as is presently occurring but also on a regional scale.

Further studies need to be conducted for the oil and gas fields within the district to establish the level of ambient air contamination. Also, studies of cumulative impacts are needed to establish the effects of all the oil and gas fields on the air resource, including effects on the Theodore Roosevelt National Park and Class II areas.

Minerals

Coal

The management action significantly affecting the coal resource is the finding of 597,016 acres (10,972 MM tons) as acceptable for further consideration for leasing or exchange and potential leasing and development.

A total of 1,009,648 acres (approximately 17,750 MM tons) of federal coal were identified as having coal development potential. A total of 412,632 acres (6,778 MM tons) were eliminated from areas acceptable for further consideration for leasing or exchange. Following the application of the unsuitability criteria, multiple-use tradeoff, and surface owner consultation screens 597,016 acres of federal coal were found acceptable for further consideration for leasing or exchange (Appendices B through G).

Following the application of the coal screens, 16 CSAs contain sufficient tonnages of federal coal in relatively consolidated patterns to support new mines and, presumably, facilities. The CSAs able to support new mines and facilities with federal coal are:

- Antelope
- Arnegard
- Beulah-Zap
- Bowman-Gascoyne
- Center-Stanton
- Dickinson
- Dunn Center
- Elgin-New Leipzig
- Elkhorn
- Golden Valley
- Hanks
- Keene
- Mott
- New England
- Sand Creek
- Williston

The remaining CSAs contain federal coal found acceptable for further consideration in tonnages or patterns which would severely hinder or preclude large scale mine development. These areas would, however, be able to support small scale mining or maintenance of existing mining operations.

All federal coal mined within the area found acceptable for further consideration for leasing or exchange would be irreversibly and irretrievably lost. It is highly unlikely that all of the coal acceptable for further consideration would be mined based on recent downward trends in coal demand, as well as various engineering and permitting restrictions. Also, only portions of the CSAs would be offered for individual lease sales under the leasing process (Appendix A).

Exchange of coal for coal in AVFs and through other exchange processes could remove a significant amount of coal from potential development. Exchanges may result in compensation to the federal government by providing coal lands or resources other than coal.

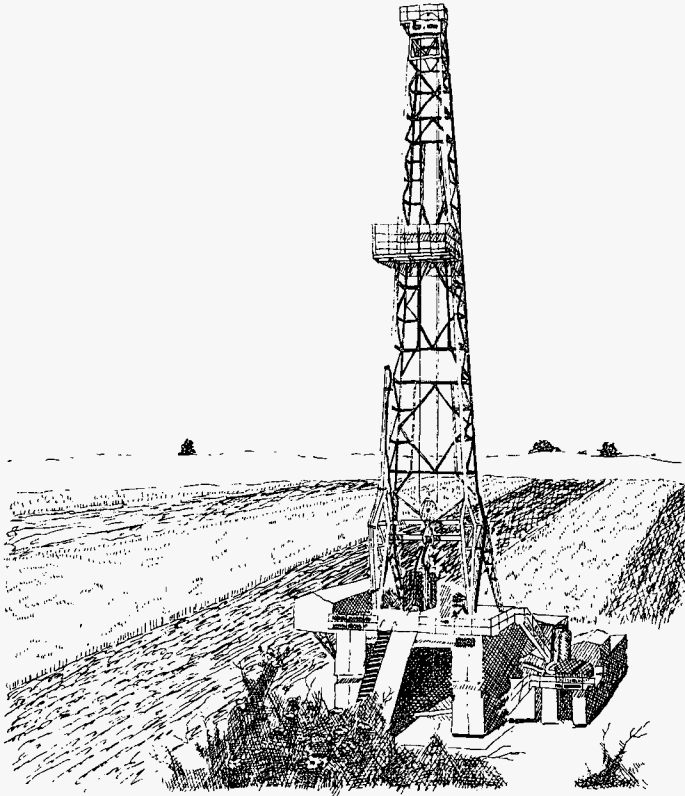
Land pattern adjustment would have minor impacts to the coal resource if the new surface owner was able to deny consent to mine underlying federal coal. Because there are only 40 acres of public lands included in the areas acceptable for further consideration, the overall impact of land pattern adjustment or any other lands action would be insignificant.

Oil and Gas

The application of Montana BLM Standard Lease Stipulations to future leases on 460,394 acres of federal oil and gas and the possible disposal of 38,848 acres of public land are the primary change agents affecting oil and gas.

Not restricting oil and gas activities, with respect to time of the year or requiring avoidance of specific areas would allow unhindered exploration and development of oil and gas. Lessees would have more control of their drilling schedule and better able to minimize development costs by taking advantage of drilling opportunities. Protection of leases from drainage by an outside well could be accomplished without being regulated to a specific time of the year.

Exploration and development may increase slightly but would be influenced more by the economic climate, spacing pattern, geological analysis, technological advances and rig availability than by the lack of lease stipulations.



Disposal of the surface estate over oil and gas reserves would complicate the permitting process for lessees since an additional participant, the surface owner, is involved besides the BLM.

Other Minerals

The identification of 597,016 acres as acceptable for further consideration and assumed coal leasing and development and the possible disposal of up to 38,848 acres of public land are the primary change agents affecting salable, leasable (other than oil and gas and coal) and locatable minerals.

An undetermined amount of scoria would be buried or displaced during surface mining. The disturbance would essentially eliminate the potential of future development of the scoria.

The creation of split estate situations, by land exchanges and other disposals, would cause slight adverse impacts to the mineral material resource. Although the availability would not be affected, development would require agreements with both private and federal parties resulting in greater processing time and expense.

Disposal of the surface estate would prevent unclaimed locatable minerals from being claimed and recorded, pending regulations. This would not affect the federal government because no royalties are received from locatable minerals. Impacts would occur to private mining parties who lose access to potential mineral resources. Little development of federal locatable minerals has occurred in North Dakota.

Soils

The management action significantly affecting the soil resource is the finding as acceptable for further consideration and assumed leasing and development of up to 597,016 acres of federal coal. Management actions causing less

significant impact to soils are: land disposal of up to 38,848 acres, the continuation of the present range management program, designating all public lands open for ORV use, and applying Montana BLM Standard Stipulations to all new oil and gas leases.

Coal Study Areas

Under this alternative, no areas would be dropped from further consideration by the BLM due to steep slopes. Reclamation potential is generally low on about 244,987 acres that are in LCCs VII and VIII because of topography, shallow depth to bedrock, rock outcrops and steepness of slope. Although this alternative does not drop steep slopes from consideration, mining of most of the 79,478 acres of slope concentrations over 30 percent would be prohibited by the NDPSC. The balance of the Class VII and VIII land over federal coal (165,509 acres) contains slopes between 15-30 percent. The NDPSC would likely allow surface mining on some of the less rugged areas in this slope category. Problems with initially removing soil material, erosion, and returning approximate original contours would increase as steeper slopes are encountered.

Impacts to the soil from mine development (Appendix H) would cause a short-term loss in soil productivity. However, the proper recontouring of overburden and replacement of topsoil and subsoil as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would return productivity to acceptable levels in a relatively short time (Appendix H; Table H-1.) No major long-term impacts to the soil would be anticipated unless concentrated areas of steep slopes were disturbed.

Surface Lands

The disposal or exchange of land would not impact the soil resource, in most cases, assuming no change of use. Soils on tracts of land transferred to other federal agencies would remain the same or even improve slightly in the long term if the acquiring agency is better able to manage the land. If tracts are sold or otherwise transferred to the private sector, the soil could be abused by overgrazing or a change in land use. The type of change made; e.g., agriculture and road or building construction would determine the amount of erosion. This is expected to be an insignificant loss since a major switch to agriculture or construction is not likely.

Only Big Gumbo and Lost Bridge areas would be retained under this alternative. Lands acquired in their vicinity through pooling would possibly receive short- and long-term positive impacts to the soil. By repositioning to create larger blocks of public land, BLM would have more opportunity to manage the watershed to decrease erosion and compaction.

Grazing under the present range management program would have positive impacts to soils. Soil conditions would improve in the long term due to an increase in vegetative production resulting in more cover with less erosion.

Unrestricted ORV use on public lands would cause some soil loss due to erosion and compaction. Most disturbed areas would stabilize within two to three years if use remains light. Small areas receiving repeated use would remain compacted and subject to erosion.

Other Mineral Estate

Oil and gas exploration normally disturbs a small area of soils along a seismic line and drilling site. With proper clean-up and handling of soil, this activity causes minor

short term impacts. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre, would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment, disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Oil and Gas Lease Stipulations would minimize erosion and compaction impacts to soil resources on up to 460,394 acres by prohibiting activities during muddy and/or wet periods. Erosion control is also called for on slopes of erodible soils over 20 percent.

Hydrology

The identification of 597,016 acres as acceptable for further consideration and assumed coal leasing and development, identification of zero acres of buried-valley aquifers as high value areas, unrestricted ORV use on 67,520 acres of public lands, identification of 38,536 acres for the protection of Dickinson's municipal watershed, and the application of Montana BLM Standard Stipulations on all future oil and gas leases are the primary change agents affecting hydrology under this alternative. The disposal of up to 38,848 acres of federal surface lands would have only minor impacts to hydrology.

Coal Study Areas

Under criterion 16, 15,515 acres are considered unsuitable in 19 CSAs. These areas protect losses to downstream occupants and dwellings on flood plains.

Under criterion 19, 32,009 acres are considered unsuitable under a preliminary determination of AVFs.

In addition to those acreages considered under the unsuitability criteria, another 38,536 acres were considered unacceptable for further consideration for coal leasing under the multiple resource tradeoff screen to protect the City of Dickinson's Municipal watershed.

Appendix H describes the probable major impacts of coal mining to the hydrologic resources of the planning area.

Surface Lands

The disposal of up to about 38,848 acres of scattered tracts under this alternative would have minor impacts on water resources. Disposal to other federal agencies would have no short-term impact but should have positive long-term impacts due to the acquiring agency having greater ability to monitor and manage lands that are physically closer.

Disposal of lands to individuals whose primary interest is not protecting the water resources would have either no impact or minor negative long-term impacts because high-value tracts along major rivers with high watershed values would be retained in compliance with the floodplain management EO. The exchange of scattered tracts to provide for larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would have long-term positive impacts on the water resources. Lands gained through exchange would consolidate public land and, in some cases, allow BLM to more efficiently manage the watershed to reduce water yields, improve water quality,

and decrease erosion and sedimentation from the watershed. Under the current range management program, sediment and water yields are expected to be reduced by 10 and 5 percent respectively (USDI 1984a).

Unrestricted ORV use in the Big Gumbo area during periods of wet soil conditions may cause increased upland erosion. Compaction of soils would result if ORV use is concentrated on trails during wet periods.

Other Mineral Estate

All phases of oil and gas operations have the potential to cause significant impacts to local water resources. Oil and gas development increases sediment load through compaction of the soil, reduction of vegetation, building of roads, and other surface disturbing activity. Roads or seismic lines crossing ephemeral, intermittent, or perennial stream channels and wetlands do the most damage. Activity during periods of high soil moisture would cause greater sediment yields than when the soils are dry.

Shallow water wells and springs may be impacted by the detonation of explosives or other methods of seismic exploration. Aquifers composed of brittle material may shatter when explosions occur in the immediate area. This may decrease the water quality of the aquifer because shattering of the aquifer exposes many new surfaces for dissolution of material. A shock wave could cause a formation to fracture and cause movement of ground water to or from the aquifer. In some cases flows from shallow water wells may be affected by this fracturing. In addition, plugging of shot holes is not always successful thus allowing for cross-contamination of aquifers or contamination by surface inflow.

After abandoning the site, disturbed areas are regraded and revegetated; sediment production would decline and return approximately to initial levels. During the lifetime of oil and gas development in an area (20-30 years), some water consumption occurs as well as some degradation of water quality. In the long term, following reclamation, water consumption would stop and water quality would return to predevelopment levels.

Continued application of Montana Standard Stipulations for oil and gas leases would minimize negative impacts to water resources by providing for erosion control (activities may be prohibited during muddy and/or wet periods), and provide for a buffer from reservoirs, lakes, ponds, streams, or rivers, and on slopes of erodible soils over 20 percent.

Vegetation

The management action significantly affecting vegetation is the finding as acceptable and assumed leasing and development of up to 597,016 acres of federal coal. Management actions causing less significant impact to vegetation are: land disposal of up to 38,848 acres, continuation of the present range management program, unrestricted ORV use on all public lands, and application of Montana BLM Standard Stipulations on all future oil and gas leases.

Coal Study Areas

The acres found acceptable for coal leasing and development consist largely of farmland (about 384,000 acres) used for growing crops such as wheat, sunflowers, and alfalfa. Native vegetation remaining would primarily consist of native prairie (about 136,000 acres) on gentle to moderate slopes used for livestock grazing and wooded draws (about 29,000 acres).

Mining would cause significant short- and long-term losses in vegetative productivity depending on the vegetation disturbed (Appendix H). The proper recontouring of overburden, replacement of soil material and revegetation is required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) and would normally return productivity to acceptable levels in a relatively short number of years (Appendix H; Table H-1).

Surface Lands

Disposal or exchange of up to 38,848 acres of public lands under this alternative would have only minor impacts on vegetation. Disposal of tracts to other federal agencies would have either no impacts or long-term positive impacts to vegetation if they are better able to manage the land. If tracts are sold or otherwise transferred to the private sector, the vegetation might be improved by better management or degraded by overgrazing, agriculture, or building construction, for example. This loss would be minimal both in the short- and long-term because a significant switch to agriculture or construction is not likely.

Only lands in the Big Gumbo and Lost Bridge areas would be retained under this alternative. Contiguous lands acquired in their vicinity through pooling would receive short- and long-term positive impacts to vegetation. By repositioning to create larger blocks of public land, BLM would have better opportunities to manage the watershed to increase plant cover and, in turn, decrease erosion.

A continuation of the present range management program would have positive impacts on vegetation. Total vegetation production would increase approximately 6.5 percent in the long term.

Unrestricted ORV use on all public lands would cause some vegetative loss due to erosion, compaction, and ORV damage. Most disturbed areas would stabilize within two to three years under light use. Small areas would remain unvegetated in the long term as a result of concentrated or repeated use.

Other Mineral Estate

Oil and gas exploration normally disturbs a small area of vegetation along a seismic line and drilling site. Assuming proper cleanup and handling of soil, these areas would be revegetated within one to two years. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM standard oil and gas lease stipulations would minimize impacts to vegetation on up to 460,394 acres by prohibiting activities during muddy and/or wet periods.

Wildlife

The finding as acceptable and assumed leasing and development of up to 597,016 acres of federal coal, including 29,246 acres of woody draws, the disposal of up to 38,848 acres of public lands, the application of Montana Standard Stipulations on oil and gas leases on 460,394 acres, and

unrestricted ORV use on 67,520 acres of federal surface lands would have substantial short- and long-term impacts on a variety of high priority wildlife species and their habitats.

Coal Study Areas

No federally-listed threatened and endangered species would be affected by this alternative. The bald eagle, peregrine falcon, and whooping crane migrate through the area but their use of the planning area is erratic. No interior least terns, black-footed ferrets, or piping plovers are known to breed in the CSAs. However, they may occur on BLM surface tracts (see below.)

No habitats were considered unsuitable under criteria 9, 10, and 12. Under unsuitability criteria 11, 13, 14, and 15, 148,045 acres of wildlife habitat are considered unsuitable for further consideration for coal leasing (Appendix C). In addition, another 12,809 acres are considered unsuitable under criterion 1 as it applies to wetlands under management for waterfowl production by the USFWS. Thus, the total acreage unsuitable due to wildlife values is 160,854 acres. A more detailed explanation of the habitats protected under criteria 11, 13, 14, and 15 follows.

Under criterion 11, 16,239 acres (Appendix C) are considered unsuitable due to golden eagle nest sites and buffer zones. These occur in five CSAs. Buffer zones include the nest site (typically a badlands cliff area) woody draws, native prairie, and, in some cases, agricultural lands.

Under criterion 13, 98 acres in the Keene CSA are considered unsuitable due to the buffer zone around a prairie falcon nest site.

Under criterion 14, 23,943 acres are considered unsuitable. These acreages occur in 12 CSAs. The habitats protected are, most notably, 11,419 acres of wetlands in the Velva CSA and 3,908 acres of wetlands in the Fortuna CSA. Many of these acreages occur adjacent to waterfowl habitat considered unsuitable under criterion 1. Other habitats unsuitable under this criterion are ferruginous hawk nest sites and their buffer zones in six CSAs. As with golden eagles, buffer zones include woody draws, native prairie, and agricultural lands where necessary.

Under criterion 15, 107,765 acres are considered unsuitable. These are predominantly large blocks of contiguous woody draw habitats in the Williston (50,270 acres), Tobacco Garden (36,711 acres), and Keene (11,805 acres) CSAs, where a variety of high priority wildlife species occur, especially big game. In the Beulah-Zap CSA, 8,979 acres are unsuitable, primarily to preserve habitat for a pronghorn population that is locally important for observation and, in the past, hunting. Woody draws are also the main habitats protected in the Arnegard CSA.

In addition to those acreages considered unsuitable, another 90,244 acres were identified under the multiple-use tradeoff screen. Of this acreage, 54,626 acres are woody draws, 35,247 acres are native prairie, and 371 acres are wetlands. These habitats were not known to contain values sufficient to qualify under the unsuitability criteria. However, it was evident that they are of value to a number of wildlife species.

Almost 29 percent (26,195 acres) of the lands identified under multiple-use tradeoffs because of wildlife values was excluded from further consideration for coal leasing due to overlap with other unsuitability criteria, multiple-use tradeoffs, or surface owner consultation. Thus, 64,049 acres remain in this category.

Habitats identified under multiple-use tradeoffs would be allowed to go forward for coal leasing under the threshold concept. Up to 48,522 acres or 53.8 percent of the area in this category could be leased. However, each CSA has an individual threshold percentage that was determined from the particular values of the CSA. Once the threshold percentage is reached, no further leasing would occur without a joint review of the situation in the individual CSA by BLM, NDGFD, and USFWS. The intent of the threshold approach is to minimize long-term adverse impacts by protecting a portion of the remaining higher value habitats without having to arbitrarily specify precise geographic areas.

A total of 597,016 acres remains suitable for leasing and subsequent mining of coal. Included in this acreage are 151,577 acres acceptable with stipulations (Appendix F). Assuming a moderate pace of development and realizing that only a small portion of the lands in a mine area are actually disturbed at any time (Appendix H) short- and long-term impacts on wildlife would be significant but local.

Suitable acreages in the CSAs are comprised mainly of agricultural lands and some native prairie of lower quality. Agricultural lands can be reclaimed effectively. The productivity of native prairie may be reclaimed in the short term; however, the natural diversity of native prairie may only be achieved in the long term (Appendix H). Woody draws may never be reclaimed to their original character and all reclamation would extend into the long term. Thus, the most significant long-term impacts would occur to species occupying the 29,387 acres of woody draws that could conceivably be mined under this alternative.

Surface Lands

Impacts to wildlife resulting from the disposal of up to 38,848 acres of scattered surface tracts would depend on who acquires the land. Disposal to other federal agencies would have no short-term impacts but should have positive long-term impacts. This would result from the acquiring agency being better able to monitor and manage lands to which they are physically closer. Disposal of lands to individuals or organizations who are primarily interested in wildlife management would similarly have positive long-term impacts on wildlife.

Disposal to individuals or organizations whose primary interest is not in managing wildlife would have either no impact or negative long-term impacts. Once the habitat is disposed of, the habitat could be plowed, logged, burned, over-grazed, or otherwise degraded. The future opportunity to enhance these habitats is also foregone. For example, as long as these lands are in federal ownership, it would be possible to construct wetlands, plant trees, fence, or do other project work at some future time. Disposal also would forego the opportunity to carry out future land exchanges more beneficial to wildlife.

Under this alternative, it is important to note that BLM would be initiating disposal actions. If public interest is high, it could result in a large number of disposals under consideration at one time. Whereas all legally-mandated clearances would be carried out; e.g., threatened and endangered species clearances, it may not be possible to fully evaluate tracts for the presence of other species (State-proposed threatened and endangered, migratory birds of high federal interest, and State high priority species).

The exchange of scattered tracts to provide larger contiguous blocks of surface lands in the Big Gumbo and Lost

Bridge areas would generally have positive long-term impacts on wildlife. The consolidation of lands in these areas would make management more efficient and allow greater opportunities for enhancing their habitats. In the Big Gumbo area, benefitting species would be pronghorn, sage grouse, raptors, and other species of high interest such as the long-billed curlew. In the Lost Bridge area, key species are elk, raptors and, possibly in future years, bighorn sheep.

Unrestricted ORV use may have significant local impacts on fragile wetland, riparian, and woody draw habitats by initiating or accelerating vegetative loss and soil erosion. Direct loss of terrestrial habitat and loss of quality in aquatic habitats due to sedimentation may reduce local wildlife and fishery populations.

Disturbance and harassment of elk and bighorn sheep on winter and calving/lambing habitats may directly reduce population numbers. The creation of new roads and trails by repeated use also makes more areas accessible to hunters and others who otherwise would not be able or inclined to drive into particular areas. This increases general disturbance of wildlife as well as the potential for poaching.

Other Mineral Estate

Continued application of Montana Standard Stipulations for oil and gas development on 460,394 acres may result in long-term negative impacts to golden eagles, prairie falcons, ferruginous hawks, prairie dogs, sage grouse, elk, bighorn sheep, wetlands, and riparian habitat. Current stipulations for wildlife and habitat resources are not specific enough to adequately protect priority species and habitats. The lessees are not advised in sufficient detail of possible seasonal or spatial restrictions at the time of leasing. Conflicts may then occur at APD time that otherwise could have been avoided.

Agriculture

The finding of 597,016 acres of federal coal acceptable and the assumed leasing and development, the disposal of up to 38,848 acres, and the continuation of present grazing management would have only minor impacts on the region's agricultural production.

Coal Study Areas

There would be a short-term loss to crop production and livestock grazing. Crop production is the leading commodity impacted because cropland in the major land type left (about 384,000 acres) after the application of the four coal screens. However, reclaimed cropland has the best chance of succeeding and meeting regulatory requirements.

At the height of a mining operation, normally slightly over 36 percent of a typical mine permit area would be in some phase of mining or reclamation (Appendix H). Some crop production and grazing would occur during the latter part of the reclamation process. The degree of impact to an individual farmer would depend on how much of his operation falls within the active mine area.

There would not be a significant loss of grazing land. About 165,000 acres remain acceptable for further consideration. Reclamation of pasture lands has generally proved successful. Significant increases in total production are often possible but accompanied by a long-term loss of plant species diversity.

Surface Lands

Blocking up of scattered tracts into more manageable units would benefit grazing management and add efficiency to grazing lease administration. Upon the acquisition of sizable blocks of land, detailed AMPs that would benefit long-term forage production and livestock use would be developed.

Land disposal could have both positive and negative impacts on grazing lessees. Historically, BLM lease rental rates have been much lower than private and state leases. Land ownership gives the owner total control on how the land is used. Land disposal or exchange could result in part or all of a permittee's leased forage being transferred to a different manager or owner. This would disrupt, presumably over the short term, the livestock operation.

Other Mineral Estate

There would be no significant long-term impacts to agriculture caused by mineral development other than coal.

Lands and Realty

There would be no significant impacts on the land resource resulting from coal leasing, developing oil and gas leases or disposing of mineral materials. There would be an opportunity to reposition the land ownership pattern on up to 38,848 acres which is 58 percent of the public land in the state. There would be an improved ownership pattern and reduced management difficulties.

Surface Lands

Lands in the Big Gumbo area totalling 21,282 acres would be retained (Map 2-1). It is anticipated exchanges (mostly exchange pooling) would provide for acquisition of approximately 2000 acres of private land based on past exchange cases where exchange ratios for public to private land ranged from 1.4:1 to 1.75:1. Disposal of significant acreages by R & PP patent, Color-of-Title patent or withdrawals is not anticipated.

Lands in the Lost Bridge area totaling 7,390 acres would be retained (Map 2-2). Exchange pooling utilizing public lands from outside the Lost Bridge area would take place. This would bring about a long-term improved land ownership pattern but there would be no opportunity to exchange public land within the area, only to acquire private land. Disposing of significant acreage by withdrawals, R & PP Act patent or Color-of-Title Act patent is not anticipated.

The remainder of the public lands in the state, approximately 38,848 acres, would be open for consideration for repositioning. Over the next 15 years it is estimated 50 percent of these lands would leave BLM administration by transfer to another agency, R & PP patent, exchanges, sales or removed from the records by a Disclaimer of Interest.

There is a possibility of bringing more lands under BLM administration by reviewing and possibly revoking some of the approximately 330,800 acres withdrawn in the state. Land classifications would be removed from all lands, approximately 8,000 acres. Removing the classifications would have no long-term adverse effects but would make the lands available for the highest and best use as well as discretionary actions. This would increase the public land acreage in multiple-use.

Other Mineral Estate

There would be no significant adverse impacts on the land resource from exploring and developing oil and gas leases or permitting disposals of mineral materials.

Recreation and Visual Resources

The finding of 597,016 acres acceptable for further consideration and the assumed coal leasing and development, the disposal of up to 38,848 acres of public lands, application of Montana BLM Standard Oil and Gas Lease Stipulations, and the continuation of all public lands open to ORV use would not have significant impacts to recreation and visual resources.

Coal Study Areas

Coal mining on portions of the CSAs found acceptable would remove this land as a recreational resource until reclaimed. The loss of these areas would create additional recreation pressure on surrounding land; however, after successful reclamation, this would be an insignificant impact. Increased regional population resulting from mine and facility development may exceed the capacity of outdoor recreational facilities at areas such as Lake Sakakawea and Theodore Roosevelt National Park. Increased populations would also exceed the capacity of the indoor recreational facilities located in the small rural towns near the CSAs. Mitigation of development impacts would require additional outdoor, indoor, and community recreation facilities.

Development of portions of the CSAs would have an impact on the visual resources of these areas. Due to the relatively flat terrain of the CSAs, mines and related facilities would intrude into the landscape. In most cases this would be an acceptable intrusion. Mine site and facilities near the Missouri breaks and Lake Sakakawea would impact the high visual resource values of this area. A protective buffer zone may be necessary to maintain the high visual qualities of this area. The need for and extent of a buffer zone would be determined during the review of specific lease proposals or during activity planning.

Surface Lands

The disposal of up to 38,848 acres would have a minimal effect on recreational resources because most of these tracts are isolated and access to them difficult. Tracts are often surrounded by private land where landowner permission for access may be denied. The consolidation of public land through exchange and exchange pooling would fulfill management objectives for recreation by easing access to public lands thereby increasing the opportunity for recreational use.

Unrestricted ORV use of surface lands would benefit recreational opportunities in the short-term by allowing greater access to public land. Long-term impacts of ORV use on resources such as vegetation and wildlife would result in the loss of some recreational opportunities, primarily sight-seeing and hunting. However, current ORV use of surface lands is minimal and impacts from future ORV activities are expected to be slight.

Other Mineral Estate

Oil and gas development under standard lease stipulations would continue to have an effect on recreation by limiting hunting and other dispersed activities in well developed oil and gas fields and by generally decreasing the quality of

dispersed recreation opportunities. This impact may be offset by additional road development, which would enhance access to recreational areas. Continued oil and gas development would also increase hunting pressure on areas adjacent to development. The overall impacts on recreational resources under these stipulations would be minimal.

Oil and gas development under current lease stipulations would have an effect on visual resources. If there is a new development, the intrusion of oil and gas facilities would have a greater impact. Mitigation of the impact would be accomplished by requiring the maintenance of the visual qualities of the landscape and ensuring that facilities have proper design, painting and camouflage, to blend in with the natural surroundings.

Cultural Resources

The finding of 597,016 acres acceptable for further consideration and the assumed coal leasing and development, application of Montana BLM Standard Stipulations for future oil and gas leases, disposal of up to 38,848 acres of public lands, and the designation of all surface lands as open for ORV use, would be the major management actions affecting cultural resources.

Coal Study Areas

Under multiple-use tradeoff 3,961 acres of federal coal were dropped from further consideration for coal leasing due to the regional or national significance of the cultural resources. Included is all federal coal within the eligible Knife River Flint Historic District, Writing Rock State Historic Site, and the A.C. Townley farmstead.

Inventory data is not uniform for all CSAs. As a result, the exact number of sites within these areas is unknown. Data adequacy problems will be improved at the completion of an ongoing Class II cultural resource survey of five CSAs. Extrapolation of existing inventory data to all CSAs indicates that under this alternative 239-1194 sites would be significant and would be indirectly or directly impacted by the leasing and subsequent mining of coal.

Cultural resources determined eligible through consultation will be avoided or mitigated through documentation (historic Euro-American sites) or a data recovery program (archaeological sites). Standard data recovery methods, in most cases, would be adequate to minimize direct adverse impacts from coal leasing and subsequent mining (see discussion in Alternative A).

Surface Lands

Based on the extrapolation of existing data, the disposal of up to 38,848 acres would potentially affect 311 cultural resources. Between 5 and 25 percent (16-78) of these sites would be significant.

Cultural resources determined eligible would require mitigation prior to disposal (see discussion in Alternative A). Overall impacts to cultural resources would be minimal if proper mitigation measures are observed.

Unrestricted ORV use of public lands would minimally impact cultural resources, assuming current levels of ORV use. At the present levels of ORV use some impacts may occur due to vehicle damage to surface cultural resources and collection of artifacts.

Other Mineral Estate

Cultural resources would continue to be provided protection by standard oil and gas lease stipulations. Oil and gas development would possibly affect an estimated 200-1000 eligible cultural resources (see discussion in Alternative A).

The preferred method of reducing the level of impact on cultural resources is avoidance through relocation of project development. If it is not possible to relocate the project the adverse effects from development would be mitigated by extensive documentation/recordation or through a data recovery program. Overall impacts to cultural resources on 460,394 of federal oil and gas estate, following proper mitigation measures, would be minimal.

Paleontology

Major management actions affecting paleontological resources include the finding of up to 597,016 acres acceptable for further consideration and assumed coal leasing and development, disposal of up to 38,848 acres of public lands, unrestricted ORV use of public lands, and continued application of Montana BLM Standard Oil and Gas Lease Stipulations to future oil and gas leases.

Coal Study Areas

Paleontological investigations have not been systematically conducted for any of the CSAs. Thirty-three fossil locations have been recorded within the CSAs. Four of these sites are considered rare. Of the 33 recorded sites only 11 are located over federal coal and one contains rare fossils.

Direct impacts to paleontological resources would presumably be mitigated by salvage. Residual impacts following mitigation are not anticipated.

Surface Lands

Paleontological resources have not been recorded on tracts identified for disposal; however, if significant fossils are discovered, their disposition would be on a case-by-case basis. Alternatives include retention of federal land or salvage of fossil resources. Due to excessive costs, salvage is unlikely unless time and expertise is donated. The risk of impacts to paleontological resources are slight provided mitigation occurs prior to disposal.

Unrestricted ORV use would not have a significant impact on paleontological resources, provided the level of ORV use does not increase. Some impacts may occur due to fossil prospecting.

Other Mineral Estate

Montana BLM Standard Stipulations provide for the protection of paleontological resources. The standard stipulations, however, do not specifically require the identification of these resources prior to a lease. The potential exists for impacts to occur to significant paleontological resources under Montana BLM Standard Stipulations. Once these resources are discovered and reported; however, the disposition of the resources would be on a case-by-case basis. Fossil sites of significant scientific interest would be protected or salvaged at the discretion of the BLM. Impacts to paleontological resources under continued application of Montana BLM Standard Stipulation would be slight.

Economic and Social Conditions

The finding of 597,016 acres as acceptable for further consideration and assumed coal leasing and development, the disposal or exchange of up to 38,848 acres, the application of Montana Standard Oil and Gas Stipulations on up to 460,394 acres, and the designation of all lands as open to ORV travel could result in significant social and economic impacts.

Impacts of Coal Mining and Related End-Use Facilities

A detailed analysis of possible coal development is presented in Appendix I. The impacts resulting from the development of a mine and facility are summarized below.

Sixteen CSAs capable of supporting at least one new mine and facility with federal coal are available for further consideration under this alternative. Therefore, this alternative offers more opportunity for coal development than currently exists. The 16 CSAs are dispersed over much of western North Dakota. The following communities may be impacted depending upon where development occurs: Williston, Tioga, Watford City, Center, Stanton, Beulah, Hazen, Halliday, Killdeer, Dickinson, Belfield, Beach, Bowman, New England, Mott, and Elgin. Each of these communities is located in proximity to one or more CSAs and is large enough that it would attract in-migrants if development were to occur. Some of these communities such as Williston, Dickinson, and Beulah have experienced energy-resource-related development in the recent past.

Direct and indirect employment for the mine and facility would peak at approximately 2500 during construction, and level off to about 1150 during the operations phase (Table 4-1). Peak construction employment of 1400 for this mine and facility represents about 10 percent of the 1984 statewide figure for construction employment. Long-term mining and utilities (facility) employment represent 20 percent and 4 percent, respectively, of 1984 statewide employment figures. In-migration to communities surrounding the development would peak at about 2000 and decline to 1100 in the long term. The project and resulting in-migration could place considerable stress on local services and infrastructure during the construction phase depending upon current community conditions and the size of the incoming population. In the long run, coal severance tax payments would increase 23 percent over 1985 statewide payments, and coal conversion tax payments would increase 31 percent over 1985. These payments could be used to meet some of the increased demand for public services.

The economic impacts of the mine and electric power generation facility on farm and ranch operations, expressed as the dollar value of agricultural production lost, would be \$138,600 annually. This represents 0.5 percent of the average value of the annual agricultural production (in 1982) of counties containing CSAs and about 0.006 percent of the value of the annual agricultural production for the state. Impacts to surface mining on the operation and management of livestock ranches could be more severe than on dryland farming (USDI 1981). Mine development located near the center of a ranch could seriously interfere with movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution and, in general, disrupt the overall operation. Compensation to the farm/ranch operator would depend upon the type of landowner lease, land ownership pattern, and percentage of land

owned versus land leased. The greatest impacts would occur to operators who lease all the land which is removed from production; no compensation would be made for lost leases.

Social impacts include changes in social organization and social well-being, and depend upon the community itself and the number and types of in-migrants. Impacts to social organization (the way in which the people in the community relate to each other) could include: residents no longer knowing everyone else, greater diversity in resident lifestyles, changes in business transactions and government structures from casual to more formalized, increases in the level of outside influences in the community, and erosion of the traditional community power bases. These changes could be permanent, substantial, and intense. Impacts to social well-being could include: the provision of private and public services; increases in stressors such as strangers, noise, crowds, and crime; and increases in income for those who are able to find employment or expand business as a result of the development. Negative impacts to social well-being would be mostly of a short-term nature, noticeable primarily during periods of peak construction (Appendix I).

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character. Some area ranchers and farmers have organized in opposition to development because of their concern over regional impacts to air and water resources that they feel could affect their economic and social welfare and, ultimately, limit their future options. These agricultural producers are not convinced that the coal in the Fort Union region is needed to meet national energy goals or that the successful reclamation of agricultural land can be guaranteed.

Impacts to the Fort Berthold and/or Standing Rock Indian Reservations could occur if development takes place close to the Reservations. Potential in-migration would be influenced by the location of the mine and facility in relation to Reservation towns, the availability of services in the towns, and the relative location of off-Reservation towns. If there is significant migration onto one of the Reservations, the affected Tribe's cultural characteristics, social organization, and social well-being could be impacted. Services and facilities could be negatively impacted causing a decrease in social well-being. Positive impacts to social well-being could occur if Tribal members were able to acquire employment on energy projects. With increased employment opportunities, Indians who may have had to leave the Reservations for work may find they are able to stay in the area.

Impacts of Other Management Actions

Assessing the impacts of adjustments in land ownership patterns to county revenues from changes in PILT is very difficult to do at this level of planning because of the many variables involved. For instance, in 1985, per acre PILT varied from \$.10 in some counties to \$.75 in others. How counties will be affected depends upon a variety of factors including: (1) whether land is exchanged or sold, (2) the per acre county value of PILT, (3) whether exchanges are between or within county acreages, (4) the type of land that

is being picked up in exchanges (federal, state, or fee), and (5) the new jurisdiction of disposed land and the kind of tax payments that will be made in the future on that land.

Examination of six sales and exchanges that occurred in North Dakota in the past few years indicates small losses in tax revenues occurred in affected counties because per acre real estate property tax was generally slightly less than PILT. However, in all North Dakota counties but Bowman, less than 0.5 of 1 percent of the county total is BLM surface that would be available for disposal. Changes in county revenue due to changes in PILT are expected to be insignificant. The economic impacts of specific proposals will be assessed at the activity plan level in the Land Report and EA.

Designating all lands open to ORV travel would not change present management and would have little or no impact on the local economy.

Oil and gas development would continue to occur as it has in the past. Exploration would provide jobs for the local

economy. The extent of other employment in the oil and gas industry in the area will depend upon discovery of any deposits, the size of such deposits, and their development potential.

This alternative would not change the general attitudes or values presently held by the residents of the study area, but it could affect attitudes toward and expectations of BLM. Individuals and groups that favor resource development may approve of the large amount of coal acceptable for further consideration, the disposal of lands that are difficult to manage, the designation of all lands as open to ORV use, and the usage of Montana Standard Stipulations rather than special stipulations for oil and gas development. Other groups and individuals who are concerned with environmental protection may feel the adoption of this alternative would mean in the future the BLM would inadequately protect some of its resources such as wetlands, wildlife, and air quality.

**ALTERNATIVE B
SUMMARY OF COAL SCREENS**

CSA	Acres Federal Coal	Unsuit.	ACRES EXCLUDED			Acres Acceptable
			Multiple Use	Surface Owner	Wildlife Threshold ¹	
ANTELOPE	32360	910	2014	0	1354	29436
ARNEGARD	25020	105	1774	10561	859	12580
BEULAH-ZAP	57200	10274	1556	1779	1485	43591
BOWMAN-GASCOYNE	21320	231	1395	0	868	19694
CENTER-STANTON	27480	1197	1640	1120	1054	23523
DICKINSON	108628	6842	40263	9050	199	52473
DIVIDE	3760	461	0	480	0	2819
DUNN CENTER	88560	5196	5286	15115	639	62963
ELGIN-NEW LEIPZIG	14400	325	92	240	92	13743
ELKHORN	25380	267	2512	4070	2512	18531
FORTUNA	19400	8539	1875	1676	56	7301
GARRISON	12660	4067	5623	627	0	2343
GOLDEN VALLEY	21960	850	1021	2478	0	17611
HANKS	47100	2917	2188	3084	1901	38911
KEENE	122700	14600	45496	16304	3148	46300
MOTT	42200	806	279	0	279	41115
NEW ENGLAND	95800	5569	277	11889	162	78065
NIOBE	160	0	0	0	0	160
SAND CREEK	57240	1761	5742	7906	616	41831
TOBACCO GARDEN	64060	50385	0	3884	0	9791
UNDERWOOD	2600	995	0	0	0	1605
VELVA	20280	16122	1525	0	0	2633
WASHBURN	1360	85	86	0	86	1189
WILLISTON	98020	60878	8189	154	217	28799
TOTAL	1009648	193382	128833	90417	15527	597016

¹Wildlife threshold acreages are included in multiple use.

ALTERNATIVE C—PREFERRED

Air Quality

The identification of 571,388 acres as acceptable for further consideration and assumed coal leasing and possible development of new mines and facilities in 15 CSAs, and present application of Montana BLM Standard Stipulations on all future oil and gas leases (as well as special stipulations on 206,117 acres) are the primary factors impacting air quality.

Appendix H illustrates air quality impacts for a typical North Dakota mine and Appendix I illustrates air quality impacts for a mine and end-use facility. The air quality impacts identified in Appendix I show that any further coal development in North Dakota would further utilize the increment for SO₂, which may be fully consumed under certain meteorological conditions.

Prior to any leasing of federal coal, a detailed site specific analysis of potential air quality impacts would be conducted. Prior to development of any mine or large scale end-use facility, NDSDH would require a detailed permit review for mine or end-use facility application.

Continued application of the air quality stipulations included in the Standard Conditions of Approval for all APDs (see Management Guidance Common to all Alternatives) would help minimize the human safety risks of H₂S, as well as provide necessary gas content information to be used in future air quality studies.

All releases of H₂S and SO₂ affect the air quality of the local area, primarily through the creation of offensive odors. The impacts to air quality beyond the local area are not yet fully documented. Any increase in wells producing H₂S in the Williston Basin would be closely monitored to determine if there is a significant potential to exceed AAQS and PSD increments. These standards would not be allowed to be exceeded at a local scale or regional scale.

Further studies would be conducted for the oil and gas fields within the district to establish the level of ambient air contamination. Also, studies of cumulative impacts are needed to establish the effects of all the fields on the air resource, effects on the Theodore Roosevelt National Park, and Class II areas.

Measures to be taken for air emission reductions in oil and gas fields would be the installation of gas gathering systems and processing (sweetening) plants. These sweetening plants would help eliminate H₂S and SO₂ from the environment and also make the H₂S-contaminated gas a saleable item for consumers.

Minerals

Coal

The management action significantly affecting the coal resource is the finding of 571,388 acres (10,533 MM tons) as acceptable for further consideration for leasing or exchange and potential leasing and development.

Under this alternative 1,009,648 acres (approximately 17,750 MM tons) of federal coal were identified as having coal development potential. A total of 438,260 acres (7,217 MM tons) were eliminated from areas acceptable for further consideration for leasing or exchange. Following the application of the unsuitability criteria, multiple-use

tradeoff, and surface owner consultation screens, 571,388 acres of federal coal were found acceptable for further consideration for leasing or exchange (Appendices B through G).

Following the application of the coal screens, 15 CSAs contain sufficient tonnages of federal coal in relatively consolidated patterns to support new mines and, presumably, facilities. The CSAs able to support new mines and facilities with federal coal are:

- Antelope
- Arnegard
- Beulah-Zap
- Bowman-Gascoyne
- Center-Stanton
- Dickinson
- Dunn Center
- Elgin-New Leipzig
- Golden Valley
- Hanks
- Keene
- Mott
- New England
- Sand Creek
- Williston

The remaining CSAs contain federal coal found acceptable for further consideration in tonnages or patterns which would severely hinder or preclude large scale mine development. These areas would, however, be able to support small scale mining or maintenance of existing mining operations.

All federal coal mined within the area found acceptable for further consideration for leasing or exchange would be irreversibly and irretrievably lost. It is highly unlikely that all of the coal acceptable for further consideration would be mined based on recent downward trends in coal demand, as well as various engineering and permitting restrictions. Also, only portions of the CSAs would be offered for individual lease sales under the leasing process (Appendix A).

Exchange of coal for coal in AVFs and through other exchange processes could remove a significant amount of coal from potential development. Exchanges may result in compensation to the federal government by providing coal lands or resources other than coal.

Oil and Gas

The possible disposal or exchange of up to 22,819 acres and exchange only of up to 11,844 acres of public land, the application of Montana BLM Standard Oil and Gas Lease Stipulations on 460,394 acres of land with a potential for oil and gas development, and the addition of special stipulations to future lease on 206,117 acres are the primary change agents affecting oil and gas.

Disposal of the surface estate over oil and gas reserves would complicate the permitting process for leases since an additional participant, the surface owner, is involved besides the BLM.

This alternative carries more restrictive stipulations than Alternatives A and B and has less restrictive stipulations than Alternative D. All the federal oil and gas reserves would be open to leasing.

NSO stipulations would have a long-term adverse impact through increased drilling costs to the lessee. NSO stipulations may cause the lessee to decide not to drill the lease and elect to pay compensatory royalties if the operator's adjacent well are found to be draining the lease.

Including NSO stipulations in leases would affect the overall development of oil and gas fields by precluding the strategic placement of wells in some spacing windows. This impact would be slight due to the scattered pattern of the federal reserves and predominance of private oil and gas. NSO stipulations would require more complete geologic information than if convention drilling methods were used, thus causing increased expense.

Limiting oil and gas exploration activities to specified times of the year on up to 206,117 acres would have a short-term adverse impact. These stipulations could upset the drilling schedules of lessees. There is a possibility of reserves being drained by a well outside of the lease being brought into production while drilling inside the lease was delayed. This would cause a temporary loss of royalties to the federal government. Stipulations limiting exploration activities to specific times of the year would increase the need for long range planning. Use of this type of stipulations could cause drilling to take place during the winter causing increased construction and drilling costs. There would be no long-term impacts on oil and gas field development due to seasonal restrictions.

Exploration and development could drop slightly from the present rate under this alternative, but would be influenced more by the economic climate, spacing pattern, geological analysis, technological advance and rig availability than application of lease stipulations.

Other Minerals

The identification of 571,388 acres as acceptable for further consideration and assumed coal leasing and development and the possible disposal of up to 22,819 acres and exchange only of up to 11,844 acres of public land are the primary change agents affecting salable, leasable (other than oil and gas and coal) and locatable minerals.

An undetermined amount of scoria would be buried or displaced during surface mining. The disturbance would essentially eliminate the potential for future development of the scoria.

The creation of split estate situations, by land exchanges and other disposals, would cause slight adverse impacts to the mineral material resource. Although the availability would not be affected, development would require agreements with both private and federal parties resulting in greater processing time and expense.

Disposal of the surface estate would prevent unclaimed locatable minerals from being claimed and recorded, pending regulations. The resulting impact would not affect the federal government because no royalties are received from locatable minerals. Impacts would occur to private mining parties who lose access to potential mineral resources. Little development of federal locatable minerals has occurred in North Dakota.

Soils

Management actions significantly affecting the soil resource include: the finding as acceptable and assumed leasing and development of up to 571,388 acres of federal coal and identification of 79,478 acres of steep slopes (over 30 percent) to be eliminated from further consideration of leasing. Management actions causing less significant impact to soils are: land disposal or exchange of up to 22,819 acres and exchange only of up to 11,844 acres, the continuation of the present range management program,

seasonally restricting ORV use on 22,164 acres in the Big Gumbo area, and applying Montana BLM Standard Stipulations and additional wetland and riparian area special stipulations, where necessary, for all new oil and gas leases.

Coal Study Areas

Reclamation potential of the CSAs is generally low on about 244,987 acres of surface land over federal coal that are in LCCs VII and VIII because of topography, shallow depth to bedrock, rock outcrops, and steepness of slopes. The 79,478 acres of steep slopes noted above are included in these two LCCs, and since eliminated from further consideration for leasing, there would not be any significant short- or long-term impacts to soils on them. About 73 percent of the 79,478 of steep slopes are found in the Tobacco Garden and Williston CSAs.

The balance of class VII and VIII land over federal coal (165,509 acres) has slopes of 15-30 percent. Much of this acreage has been eliminated from further consideration for leasing by the other coal screens. However, a small amount would be included in the federal coal found acceptable for leasing. The NDPSC would likely allow surface mining on only the less rugged areas in this slope category. Problems with initially removing soil material, erosion, and returning approximate original contours would increase as steeper slopes are encountered.

The impacts to the soil from mine development (Appendix H) would cause a short-term loss in soil productivity. However, the proper recontouring of overburden and replacement of topsoil and subsoil as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would return productivity to acceptable levels in a relatively short time (Appendix H, Table H-1). No major long-term impacts to the soil would be anticipated.

Surface Lands

The disposal or exchange of lands would not impact the soil resource, in most cases, assuming no change of use. Soils on tracts transferred to other federal agencies basically would remain the same or even improve slightly in the long term if they are better able to manage the land.

Obtaining larger parcels near Big Gumbo and Lost Bridge through pooling would mean giving up scattered BLM tracts for privately-owned surface. BLM lands exchanged during pooling would pass into private ownership. The soil might then be abused by overgrazing or a change in land use. The type of change made; e.g., agriculture and road or building construction, would determine the amount of erosion. Major changes in land use are unlikely, therefore, soil loss is expected to be insignificant in the short and long term.

Big Gumbo, Lost Bridge and scattered lands with high wildlife, watershed, and recreation values would be retained. Lands gained in their vicinity through pooling would possibly receive short- and long-term positive impacts to the soil. With larger blocks of public land, BLM could more efficiently manage the watershed to decrease erosion and compaction.

Grazing under the present range management program would have positive impacts to soils in the long term. Soil conditions would improve slightly because an increase in vegetative cover through mechanical or grazing treatments would result in increased soil moisture, less runoff, and subsequently less erosion.

ORV restrictions would adequately protect the soil resource during the period of typically high soil moisture. Most areas disturbed by ORVs would stabilize within two to three years if use remains light. Small areas receiving repeated use would remain compacted and subject to erosion. If erosion and compaction become excessive on these trails, they would be closed.

Other Mineral Estate

Oil and gas exploration normally disturbs a small area of soils along an seismic line and drilling site. With proper cleanup and handling of soil, this activity causes minor short-term impacts. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). Additional areas of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Oil and Gas Lease Stipulations would allow only minor erosion and compaction impacts to soil resources by prohibiting activities during muddy and/or wet periods. Erosion control is also called for on slopes of erodible soils over 20 percent. NSO stipulations would further protect the soil from erosion and compaction.

Hydrology

The identification of approximately 571,388 acres as acceptable for further consideration and assumed coal leasing and development, identification of 38,536 acres for the protection of Dickinson's municipal watershed, special stipulations on 12,318 acres of federal coal to protect buried-valley aquifers, seasonal ORV restrictions on 22,164 acres of public lands, and the application of Montana BLM Standard Stipulations on oil and gas leasing on 460,394 acres in addition to special stipulations are the primary change agents affecting hydrology under this alternative. The exchange or disposal of up to 22,819 acres and exchange only of up to 11,844 acres of public lands would have only minor impacts to hydrology.

Coal Study Areas

Under criterion 16, 15,515 acres are considered unsuitable in 19 CSAs. These areas protect losses to downstream occupants and dwellings of flood plains.

Under criterion 19, 32,009 acres are considered unsuitable under a preliminary determination of AVFs.

In addition to those acreages considered under the unsuitability criteria, another 38,536 acres are considered unacceptable for further consideration for coal leasing under the multiple resource tradeoff screen to protect the City of Dickinson's municipal watershed.

Appendix H describes the probable major impacts of coal mining to the hydrologic resources of the planning area.

Federal coal acres overlying buried-valley aquifers found acceptable for coal leasing will be evaluated on a site-by-site basis and stipulated if necessary to prevent irreversible and irretrievable damage to the ground water hydrology of the aquifer (Appendix F).

Surface Lands

The exchange or disposal of up to 22,819 acres and exchange only of up to 11,844 acres of public lands under this alternative would have minor impacts on water resources. Disposal to other federal agencies would have no short-term impacts but should have positive long-term impacts due to the acquiring agency being better able to monitor and manage lands that are physically closer.

Disposal of lands to individuals whose primary interest is not protecting the water resources would have either no impact or minor negative long-term impacts because high-value tracts along major rivers with high watershed values would be retained in compliance with the floodplain management EO. The exchange of scattered tracts to provide for larger contiguous block of surface lands in the Big Gumbo and Lost Bridge areas would have long-term positive impacts on water resources. Lands gained through exchange would consolidate public land and, in some cases, allow BLM to more efficiently manage the watershed to reduce water yields, improve water quality, and decrease erosion and sedimentation from the watershed. Under the current range management program, sediment and water yields are expected to be reduced by 10 and 5 percent respectively (USDI 1984a).

ORV use would not be allowed in the Big Gumbo area during March 1 through June 1 which is the time when frost is breaking up the soil, plants are starting to grow and green up, and there is high moisture content in the soils due to snowmelt and spring rains. The potential for damage to vegetation and soil resource is higher at this time than any other during the year. If a trail is found to be a problem due to excessive erosion and degradation of the soil or water resource, the problem trail would be closed.

Other Mineral Estate

All phases of oil and gas operations have the potential to cause significant impacts to local water resources. Oil and gas development increases sediment load through compaction of the soil, reduction of vegetation, building of roads and other surface disturbing activity. Roads or seismic lines crossing ephemeral, intermittent, or perennial stream channels and wetlands do the most damage. Activity during periods of high soil moisture would cause greater sediment yields than when the ground is dry.

Shallow water wells and springs may be impacted by the detonation of explosives or other methods of seismic exploration. Aquifers composed of brittle material may shatter when explosions occur in the immediate area. This may decrease the water quality of the aquifer because shattering of the aquifer exposes many new surface for dissolution of material. A shock wave could cause a formation to fracture and cause movement of ground water to or from the aquifer. In some cases flow from shallow water wells may be affected by this fracturing. In addition, plugging of shot holes is not always successful thus allowing cross-contamination of aquifers or contamination by surface inflow.

After abandoning the site, disturbed areas are regraded and revegetated; sediment production would decline and return approximately to initial levels. During the lifetime of oil and gas development in an area (20-30 years), some water consumption occurs as well as some degradation of water quality. In the long term, following reclamation, water consumption would stop and water quality would return to predevelopment levels.

Continued application of Montana Standard Oil and Gas Lease Stipulations would minimize negative impacts to water resources by providing for erosion control (activities may be prohibited during muddy and/or wet periods), and provide for a buffer from reservoirs, lakes, ponds, streams, or rivers, and on slopes of erodible soils over 20 percent.

Vegetation

The management action significantly affecting vegetation is the finding as acceptable and assumed leasing and development of up to 571,388 acres of federal coal. Management actions causing less significant impact to vegetation are: land exchange or disposal on up to 22,819 acres and exchange only of up to 11,844 acres, continuation of the current range management program, seasonally restricting ORV use on 22,164 acres in the Big Gumbo area, and applying Montana BLM Standard Stipulations and additional wetland and riparian area stipulations, where necessary, for all new oil and gas leases.

Coal Study Areas

The areas found acceptable for coal leasing consist largely of farmland (about 381,000 acres) used for growing crops such as wheat, sunflowers, and alfalfa. Native vegetation remaining in this acreage primarily consists of native prairie (about 146,000 acres) on rather gentle slopes used for livestock grazing and wooded draws (about 17,000 acres). Mining would cause significant short- and long-term losses in vegetative productivity depending on the vegetation disturbed (Appendix H). The proper recontouring of overburden, replacement of soil material and revegetation as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would normally return productivity to acceptable levels in a relatively short number of years. (Appendix H, Table H-1.)

Surface Lands

Disposal or exchange of up to 22,819 acres and exchange only of up to 11,844 acres of public lands would have only minor impacts on vegetation. Vegetation on tracts of land transferred to other federal agencies would remain the same as possible. Most tracts would continue to be used for grazing and/or wildlife purposes.

If larger parcels are obtained near Big Gumbo and Lost Bridge through pooling, management would normally dictate that they be returned to rangeland/pasture, if not currently in such a state. The vegetation would be used to graze livestock and wildlife, provide habitat, and control erosion. This would be a long-term positive impact.

High resource value areas retained in public ownership would see little impacts to vegetation or slight improvements. A continuation of the present range management program would have positive impacts on vegetation. Total vegetation production would increase about 6.5 percent in the long term. Management actions that would enhance vegetative growth, such as contour furrowing, change in livestock use, etc., would be carried out if necessary.

By emphasizing trespass abatement, the small areas of public land being farmed would be returned to rangeland/pasture. The permanent cover returned would provide forage, habitat, and erosion protection.

ORV restrictions would adequately protect vegetation on the area of public lands most likely to receive significant ORV use. Most areas disturbed by ORVs would recover within two to three years under light use. Small areas

receiving repeated use would remain unvegetated in the long term. These trails would be closed if excess erosion and vegetative loss is identified.

Other Mineral Estate

Oil and gas exploration normally disturbs small areas of vegetation along a seismic line and drilling site. Assuming proper cleanup and handling of soil, these areas would be revegetated within one to two years. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short-term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment, disturbed areas would be regraded, soil material replaced and revegetated.

Loss and disturbance of vegetation due to oil and gas activity would be kept minimal on up to 460,394 acres by applying the Montana BLM Standard Stipulations to all new leases. Special stipulations identified in Appendix N would protect vegetation in or adjacent to wetlands and riparian areas.

Wildlife

The finding as acceptable and assumed leasing and development of up to 571,388 acres of federal coal, including 16,771 acres of woody draws, would have substantial short- and long-term impacts on a variety of high priority wildlife species and their habitats. The exchange or disposal of up to 22,819 acres and exchange only of up to 11,844 acres of public lands would have beneficial short- and long-term impacts. The application of special stipulations on oil and gas leases on 206,117 acres, and limited ORV use on 22,164 acres of public lands would have only minor short- and long-term impacts in high priority species and their habitats.

Coal Study Areas

No federally-listed threatened and endangered species would be affected by this alternative. The bald eagle, peregrine falcon, and whooping crane migrate through the area, but their use of the planning area is erratic. No interior least terns, black-footed ferrets, or piping plovers are known to breed in the CSAs. However, they may occur on BLM surface tracts. (See below.)

No habitats were considered unsuitable under criteria 9, 10, and 12. Under unsuitability criteria 11, 13, 14, and 15, 148,045 acres of wildlife habitat are considered unsuitable for further consideration for coal leasing (Appendix C). In addition, another 12,809 acres are considered unsuitable under criterion 1, as it applies to wetlands under management for waterfowl production by the USFWS. Thus, the total acreage unsuitable due to wildlife values is 160,854 acres. A more detailed explanation of the habitats protected under criteria 11, 13, 14, and 15 follows.

Under criterion 11, 16,239 acres (Appendix C) are considered unsuitable due to golden eagle nest sites and buffer zones. These occur in five CSAs. Buffer zones include the nest site (typically a badlands cliff area) woody draws, native prairie, and, in some cases, agricultural lands.

Under criterion 13, 98 acres in the Keene CSA are considered unsuitable due to the buffer zone around a prairie falcon nest site.

Under criterion 14, 23,943 acres are considered unsuitable. These acreages occur in 12 CSAs. The habitats protected are, most notably, 11,419 acres of wetlands in the Velva CSA and 3,908 acres of wetlands in the Fortuna CSA. Many of these acreages occur adjacent to waterfowl habitat considered unsuitable under criterion 1. Other habitats unsuitable under this criterion are ferruginous hawk nest sites and their buffer zones in six CSAs. As with golden eagles, buffer zones include woody draws, native prairie, and agricultural lands where necessary.

Under criterion 15, 107,765 acres are considered unsuitable. These are predominantly large blocks of contiguous woody draw habitats in the Williston (50,270 acres), Tobacco Garden (36,711 acres), and Keene (11,805 acres) CSAs, where a variety of high priority wildlife species occur, especially big game. In the Beulah-Zap CSA, 8,979 acres are unsuitable, primarily to preserve habitat for a pronghorn population that is locally important for observation and, in the past, hunting. Woody draws are also the main habitats protected in the Arnegard CSA.

In addition to those acreages considered unsuitable, another 90,244 acres were identified under the multiple-use tradeoff screen. Of this acreage, 54,626 acres are woody draws, 35,247 acres are native prairie, and 371 acres are wetlands. These habitats were not known to contain values sufficient to qualify under the unsuitability criteria. However, it was evident that they are of value to a number of wildlife species.

Over 41 percent (37,194 acres) of the lands identified under multiple-use tradeoffs because of wildlife values was excluded from further consideration for coal leasing due to overlap with other unsuitability criteria or surface owner consultation in this alternative. Thus, 53,050 acres remain in this category.

Habitats identified under multiple-use tradeoffs would be allowed to go forward for coal leasing under the threshold concept. Up to 27,745 acres in this category could be leased. However, each CSA has an individual threshold percentage that was determined from the particular values of the CSA. Once the threshold percentage is reached, no further leasing can occur without a joint review of the situation in the CSA by BLM, NDGFD, and USFWS. The intent of the threshold approach is to protect a portion of the remaining higher value habitats without having to arbitrarily specify precise geographic areas.

A total of 571,388 acres remains suitable for leasing and subsequent mining of coal; included in this acreage are 149,470 acres with vegetative reclamation stipulations (Appendix F). Assuming a moderate pace of development and realizing that only a small portion of the lands in a mine area are actually disturbed at any time (Appendix H) short- and long-term impacts on wildlife would be significant but local.

Suitable acreages in the CSAs are comprised mainly of agricultural lands and some native prairie of lower quality. Agricultural lands can be reclaimed effectively. The productivity of native prairie may be reclaimed in the short term; however, the natural diversity of native prairie can only be achieved in the long term (Appendix H). Woody draws may never be reclaimed to their original character and all reclamation would extend into the long term. Thus, the most significant long-term impacts would occur to species occupying the 16,771 acres of woody draws that could conceivably be mined.

Surface Lands

The exchange or disposal of up to 22,819 acres of scattered surface tracts and exchange of up to 11,844 acres in the Big Gumbo and Lost Bridge areas would have only minor impacts on wildlife because high-value tracts would generally be retained. Disposal to other federal agencies would have no short-term impacts but should have positive long-term impacts. This would result from the acquiring agency being better able to monitor and manage lands to which they are physically closer. Disposal of lands to individuals or organizations who are primarily interested in wildlife management would similarly have positive long-term impacts on wildlife.

Disposal to individuals or organizations whose primary interest is not in managing wildlife would have either no impact or minor negative long-term impacts. The future opportunity to enhance these lower-value habitats is the main value that would be foregone. For example, as long as these lands are in federal ownership, it would be possible to construct wetlands, plant trees, fence, or do other project work at some future time. Disposal of land would forego the opportunity to carry out future land exchanges more beneficial to wildlife that may emerge at some future date.

The exchange of scattered tracts to provide larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would generally have positive long-term impacts on wildlife. The consolidation of lands in these areas would make management more efficient and allow greater opportunities for enhancing their habitats. In the Big Gumbo area, benefitting species would be pronghorn, sage grouse, raptors, and other species of high interest such as the long-billed curlew. In the Lost Bridge area key species are elk, raptors and, possibly in future years, bighorn sheep.

The increased emphasis on trespass abatement would, on the whole, benefit wildlife. If the portion of land under trespass is sold to the trespasser, there would be only minor long-term impacts to wildlife, because the acreages are usually small and scattered. Another possible resolution is to have the habitat under trespass restored to its original condition. This provides a recovery after minor short-term losses and discourages future trespass and habitat loss. In cases of agricultural trespass it is possible to resolve cases so the habitat is better than it originally was. Under authority of the Sikes Act, it is possible to obtain a cooperative agreement with the trespasser whereby the trespassed acreage is still planted, for example, with wheat, but half the crop is left standing for wildlife. Beneficial agreements involving irrigation or other improvements may also be reached.

Other Mineral Estate

Special stipulations on new oil and gas leases will be applied in addition to Montana Standard stipulations on 206,117 acres (Appendix K). These will help minimize impacts to high-priority wildlife species and habitats. Impacts under these special stipulations would be long-term but minor. No significant impacts to wildlife resources would occur on the remaining areas covered by standard stipulations only.

Vehicle travel limitations between March 1 and June 1 in the Big Gumbo area would reduce disturbances of nesting sage grouse, nesting raptors, female pronghorn during fauning, and a variety of nesting non-game birds. This limitation may also prevent the establishment of new trails

or roads that permanently lower the quality of habitat because of traffic disturbance and increased access by poachers. The ability to close problem areas will help protect critical seasonal use habitats for pronghorn, sage grouse, and raptors that may be identified in the future.

Agriculture

The finding of 571,388 acres acceptable for further consideration and the assumed coal leasing and development, the identification of 22,819 acres of public lands for exchange or disposal and exchange only of up to 11,844 acres, and the continuation of present grazing management would have only minor impacts on the region's agricultural production.

Coal Study Areas

At the height of mining operations, over 36 percent of a typical mine permit area would be in some phase of mining or reclamation (Appendix H). Some production would occur during reclamation. The degree of impact to an individual farmer would depend on how much of his operation falls within the active mine area.

Within the CSAs, short-term loss of crop production would be the greatest impact to agriculture. This results because after the coal screening process is completed, cropland is the major land use remaining (about 381,000 acres). Reclaimed cropland has the best chance of succeeding and meeting regulatory requirements.

There would not be a significant loss of grazing land. Much of the grazing land was excluded under the multiple-use tradeoff screens for slopes and wildlife habitat. Reclamation of pasture lands has generally proved successful. Significant increases in total production are often possible but accompanied by a long-term loss of plant species diversity.

Surface Lands

Blocking up of scattered tracts into more manageable units would benefit grazing management and add efficiency to grazing lease administration. Upon the acquisition of sizable blocks of land, detailed AMPs that would benefit long-term forage production and livestock use would be developed. Grazing management would be concentrated on the Lost Bridge and Big Gumbo areas.

Land disposal could have both positive and negative impacts on grazing lessees. Historically, BLM lease rental rates have been much lower than private and state leases. Land ownership gives the owner total control on how the land is used. Land pattern adjustment could result in part or all of a permittee's leased forage being transferred to a different manager or owner. This would disrupt, presumably over the short term, the livestock operation.

Other Mineral Estate

There would be no significant long-term impacts to agriculture.

Lands and Realty

There would be no significant impacts on the land resources resulting from assumed coal leasing, developing oil and gas leases or disposing of mineral materials. There would be a long-term opportunity for repositioning land ownership on up to 34,663 acres (including exchange only areas) which is 5 percent of the public land in the state. There would be an improved ownership pattern, reduced man-

agement difficulties and an overall increase in public values. A total of 44,701 acres of public lands would be retained.

Surface Lands

In the Big Gumbo consolidation area (Map 2-1) 28,490 acres would be retained. Of this acreage, 4,427 acres would be available for repositioning via exchanges (one-to-one or exchange pooling) within the same area or within the Lost Bridge consolidation area. Those lands not exchanged would be retained. There would be no land disposals via sale within the consolidation area. It is anticipated at least 2000 acres of private land would be acquired by the federal government based on past exchange ratios of public to private land (1.4:1 to 1.75:1).

Disposal of significant acreages by R & PP patent, Color-of-Title Act patent or withdrawal is not anticipated. No land would be added to the public land base by withdrawal revocations in the Big Gumbo area.

In the Lost Bridge consolidation area (Map 2-2) 14,806 acres would be retained. Of this acreage, 7,417 acres would be available for repositioning via exchanges (one-to-one or exchange pooling) within the Lost Bridge consolidation area or within the Big Gumbo consolidation area. Lands not exchanged would be retained. There would be no land disposals via sale.

Disposals of significant acreages by R & PP patent, Color-of-Title patent or withdrawals is not anticipated. A small undetermined acreage would be added to the public land base by withdrawal revocations in the Lost Bridge area.

Of the remaining public lands in the state, up to 22,819 acres would be available for exchange, exchange pooling, sale, R & PP patent, or transfer to other agencies.

Over the next 15 years, it is estimated 40 percent of these lands would leave public ownership. Most of the lands not transferred to another agency or addressed in a Disclaimer of Interest would be utilized in exchanges. These would balance the impacts of the disposal with those of acquisition and would result in a net increase in public values. The long-term result would be an improved ownership pattern, reduced management difficulties and an overall increase in public values.

An unknown acreage of withdrawn land would be returned to BLM administration. The withdrawals would be assessed on a case-by-case basis to determine their final disposition.

Land classifications would be removed from all lands now classified, approximately 8,000 acres. This would increase the public land acreage under multiple-use management.

Other Mineral Estate

There would be no impacts on the land resources from exploring and developing oil and gas leases or permitting disposals of mineral materials.

Recreation and Visual Resources

The finding of 571,388 acres acceptable for further consideration and assumed coal leasing and development, the exchange or disposal of up to 22,819 acres of public lands and exchange only of up to 11,844 acres, the application of Montana BLM Standard Oil and Gas Lease Stipulations and additional special stipulations, and the seasonal limitation on ORV use of 22,164 acres would have only minor impacts on recreation and visual resources.

Coal Study Areas

Coal mining on portions of the CSAs found acceptable would remove this land as a recreational resource until it is reclaimed. The loss of these areas would create additional recreation pressure on surrounding land; however, after successful reclamation this would be an insignificant impact. Increased regional population resulting from mine and facility development would place additional demands on outdoor facilities such as Lake Sakakawea and Theodore Roosevelt National Park. It is expected that the demand for developed recreation would exceed the capability of current outdoor recreation facilities. Population growth would also exceed the capability of indoor facilities. Mitigation of development impacts would require additional outdoor, indoor, and community recreational facilities.



Development of portions of the CSAs would have an impact on the visual resources of these areas. Due to the relatively flat terrain of the CSAs, mines and related facilities would intrude into the landscape. In most cases this would be an acceptable intrusion. Mine site and facilities near the Missouri breaks and Lake Sakakawea would impact the high visual resource values of this area. A protective buffer zone may be necessary to maintain the high visual qualities of this area. The need for and extent of a buffer zone would be determined during the review of specific lease proposals or during activity planning.

Surface Lands

The exchange or disposal of up to 22,819 acres and exchange only of up to 11,844 acres would have minimal effect on recreational resources because most of these tracts are isolated and access difficult. Tracts are often

surrounded by private land where landowner permission for access may be denied. The consolidation of public land through exchange and exchange pooling would benefit recreation.

Seasonal restrictions of ORV use on 22,164 acres within the Big Gumbo area would not have a severe impact on recreational activities. Winter sport activities would be coming to a close and spring activities would be just beginning. Since most of the warm weather recreational activities on public land consists of hunting, overall impacts to recreation from seasonal ORV restrictions would be slight.

Other Mineral Estate

Oil and gas development would under standard lease stipulations would continue to affect recreation by limiting hunting and other dispersed activities in well developed oil and gas fields and by generally decreasing the quality of dispersed recreation opportunities. This impact may be offset by additional road development, which would enhance access to recreational areas. Continued oil and gas development would also increase hunting pressure on areas adjacent to development. Mitigation of impacts from oil and gas development under BLM standard stipulations would minimize impacts on recreational resources.

Oil and gas development under the proposed standard and special stipulations would have an effect on visual resources. If there is new field development, the intrusion of oil and gas facilities would have a greater impact. Mitigation of the impact would be accomplished by requiring the maintenance of the visual qualities of the landscape and ensuring that facilities have proper design, painting and camouflage, to blend in with the natural surroundings.

Cultural Resources

The finding of 571,388 acres acceptable for further consideration and the assumed coal leasing and development, application of Montana BLM Standard Stipulations and additional special stipulations to future oil and gas leases, disposal or exchange of up to 22,819 acres of public surface and exchange only of up to 11,844 acres, and the seasonal limitation on ORV use of 22,164 acres would be the major management actions affecting cultural resources.

Coal Study Areas

Under multiple-use tradeoff 3,961 acres of federal coal were eliminated from further consideration for coal leasing due to the regional or national significance of the resources located over federal coal. Included here is all federal coal within the eligible KRF National Register District, Writing Rock State Historic Site, and the A.C. Townley farmstead.

Inventory data is not uniform or adequate for all CSAs. As a result, the exact number of sites within these areas is unknown. Data adequacy problems will be improved at the completion of an ongoing Class II cultural resource survey of five CSAs. Extrapolation of existing inventory data to all CSAs indicates that under this alternative 229-1143 sites would be significant and would be impacted by the leasing and subsequent mining of coal.

Cultural resources determined eligible through consultation would be avoided or mitigated through documentation and recordation (historic Euro-American sites) or a data recovery program (excavation). Standard data recovery methods, in most cases, would be adequate to minimize impacts from coal leasing and subsequent mining (see discussion in Alternative A).

Surface Lands

This alternative identifies 22,819 acres for exchange or disposal and 11,844 acres for exchange only. It is estimated the disposal would affect 183 cultural resources of which approximately 5 percent to 25 percent (9-46) would be significant. Exchange of lands within the Big Gumbo and Lost Bridge consolidation areas could affect an additional 95 sites but may result in the acquisition of similar cultural resources.

Cultural resource determined eligible would require mitigation prior to disposal (see discussion in Alternative A). Overall impacts to cultural resources would be minimal following proper mitigation.

Impacts to cultural resources from ORV use even in areas designated as "open" are not anticipated to be high given the current level of use. Some impacts may occur due to vehicle damage to surface cultural resources and collection of artifacts.

Other Mineral Estate

Cultural resources would continue to be provided protection by application of MSO standard lease stipulations and additional special stipulations for oil and gas. Oil and gas development would affect an estimated 200-1000 significant cultural resources.

Some decrease in the number of acres available for development may occur in this alternative due to NSO or seasonal restrictions for wildlife and wetlands. These stipulations could possibly reduce the total area available within a given lease thereby limiting the number of alternate project locations. This may tend to limit opportunities to avoid impacts to cultural resource resulting in the selection of a more destructive form of mitigation. Conversely, wetland and wildlife restrictions may have a beneficial effect on cultural resources by eliminating areas with high cultural resource values. Overall impacts to cultural resources resulting from oil and gas development would be slight.

Paleontology

Major management actions affecting paleontological resource include the finding of 571,388 acres acceptable for further consideration and assumed coal leasing and development, disposal or exchange of up to 22,819 acres and exchange only of 11,844 acres of public lands, seasonal limitations of ORV use on 22,164 acres of public lands and continued application of Montana BLM Standard Stipulations and additional special stipulations to future oil and gas leases.

Coal Study Areas

Paleontological investigations have not been systematically conducted for any of the CSAs. Thirty-three fossil locations have been recorded within the CSAs. Four of these sites are considered rare. Of the 33 recorded sites only 11 are located over federal coal, and one contains rare fossils.

Direct impacts to paleontological resources would be minimal. Paleontological resources of significant scientific interest would be protected or salvaged. Residual impacts following mitigation are not anticipated.

Surface Lands

Paleontological resources have not been identified on tracts identified for exchange or disposal; however, some

parcels are located within the Hell Creek Formation which has produced significant fossil discoveries. Parcels which contain fossils of significant scientific interest would be retained in federal ownership or the effect of disposal on significant fossil resources would be mitigated by salvage.

Salvage is unlikely, due to excessive costs, unless time and expertise is donated. Overall, the disposal of public land would not have a significant impact on paleontological resources.

Impacts to paleontological resources from ORV use would be minimal provided mitigation is employed. Some impacts may occur due to fossil prospecting.

Other Mineral Estate

Montana BLM Standard Oil and Gas Lease Stipulations provide for the protection of paleontological resources. The standard stipulations, however, do not specifically require the identification of these resources prior to operations on a lease. The potential exists for impacts to occur to significant paleontological resources under Montana BLM Standard Stipulations. Once these resources are discovered and reported, however, the disposition of the resources would be on a case-by-case basis. Overall impacts to paleontological resources would be slight.

Economic and Social Condition

The finding of 571,388 acres as acceptable for further consideration and assumed coal leasing and development, the disposal or exchange of up to 22,819 acres and exchange only of 11,844 acres, the application of special oil and gas lease stipulations on 206,117 acres in addition to the application of standard stipulations to all future leases, and the designation of 22,164 acres as limited use areas for off-road travel result in significant social and economic impacts.

Impacts of Coal Mining and Related End-Use Facilities

A detailed analysis of possible coal development is presented in Appendix I. The impacts resulting from the development of a mine and related facility are summarized below.

Fifteen CSAs capable of supporting at least one mine and facility with federal coal are available for further consideration under this alternative. These 15 CSAs are dispersed over much of western North Dakota. The following communities may be impacted depending upon where development occurs: Williston, Tioga, Watford City, Center, Stanton, Beulah, Hazen, Halliday, Killdeer, Dickinson, Belfield, Beach, Bowman, New England, Mott, and Elgin. Each of these communities is located in proximity to one or more CSAs and is large enough that it would attract in-migrants. Some of these communities such as Williston, Dickinson, and Beulah have experienced energy-resource-related development in the recent past.

Direct and indirect employment for the mine and facility would peak at approximately 2500 during construction, and level off to about 1150 during the operations phase (Table 4-1). Peak construction employment of 1400 for this mine and facility represents about 10 percent of the 1984 statewide figure for construction employment. Long-term mining and utilities (facility) employment represent 20 percent and 4 percent, respectively, of 1984 statewide employment figures. In-migration to communities surrounding the development would peak at about 2000 and decline to 1100 in the long term. The project and resulting

in-migration could place considerable stress on local services and infrastructure during the construction phase depending upon current community conditions and the size of the incoming population. In the long run, coal severance tax payments would increase 23 percent over 1985 statewide payments, and coal conversion tax payments would increase 31 percent over 1985. These payments could be used to meet some of the increased demand for public services.

The economic impacts of the mine and electric power generation facility on farm and ranch operations, expressed as the dollar value of agricultural production lost, would be \$138,600 annually. This represents 0.5 percent of the average value of the annual agricultural production (in 1982) of counties containing CSAs and about 0.006 percent of the value of the annual agricultural production for the state. Impacts of surface mining on the operation and management of livestock ranches could be more severe than on dryland farming (USDI 1981). Mine development located near the center of a ranch could seriously interfere with movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution and, in general, disrupt the overall operation. Compensation to the farm/ranch operator would depend upon the type of landowner lease, land ownership pattern, and percentage of land owned versus land leased. The greatest impacts would occur to operators who lease all the land which is removed from production; no compensation would be made for lost leases.

Social impacts include changes in social organization and social well-being, and depend upon the community itself and the number and types of in-migrants. Impacts to social organization (the way in which the people in the community relate to each other) could include: residents no longer knowing everyone else, greater diversity in resident lifestyles, changes in business transactions and government structures from casual to more formalized, increases in the level of outside influences in the community, and erosion of the traditional community power bases. These changes could be permanent, substantial, and intense. Impacts to social well-being could include: provision of private and public services; increases in stressors such as strangers, noise, crowds, and crime; and increases in income for those who are able to find employment or expand business as a result of the development. Negative impacts to social well-being would be mostly of a short-term nature, noticeable primarily during periods of peak construction (Appendix I).

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character. Some area ranchers and farmers have organized in opposition to development because of their concern over regional impacts to air and water resources that they feel could affect their economic and social welfare and, ultimately, limit their future options. These agricultural producers are not convinced that the coal in the Fort Union region is needed to meet national energy goals or that the successful reclamation of agricultural land can be guaranteed.

Impacts to the Fort Berthold and/or Standing Rock Indian Reservations could occur if development takes place close

to the Reservations. Potential in-migration would be influenced by the location of the mine and facility in relation to Reservation towns, the availability of services in the towns, and the relative location of off-Reservation towns. If there is significant migration onto one of the Reservations, the affected Tribe's cultural characteristics, social organization, and social well-being could be impacted. Services and facilities could be negatively impacted causing a decrease in social well-being. Positive impacts to social well-being could occur if Tribal members were able to acquire employment on energy projects. With increased employment opportunities, Indians who may have had to leave the Reservations for work may find they are able to stay in the area.

Impacts of Other Management Actions

Assessing the impacts of adjustments in land ownership patterns to county revenues from changes in PILT is very difficult to do at this level of planning because of the many variables involved. For instance, in 1985, per acre PILT varied from \$.10 in some counties to \$.75 in others. How counties will be affected depends upon a variety of factors including: (1) whether land is exchanged or sold, (2) the per acre county value of PILT, (3) whether exchanges are between or within county acreages, (4) the type of land that is being picked up in exchanges (federal, state, or fee), and (5) the new jurisdiction of disposed land and the kind of tax payments that will be made in the future on that land.

Examination of six sales and exchanges that occurred in North Dakota in the past few years indicates small losses in tax revenues occurred in affected counties because per acre real estate property tax was generally slightly less than PILT. However, in all North Dakota counties but Bowman, less than 0.5 of 1 percent of the county total is BLM surface that would be available for disposal. Changes in county revenue due to changes in PILT are expected to be insignificant. The economic impacts of specific proposals will be assessed at the activity plan level in the Land Report and EA.

In this alternative, acreage would be designated where leases require special stipulations. However, most land is currently under lease and would not be subject to special stipulations until the lease expires or otherwise terminates. These restrictions would generally not prohibit exploration and development, but would tend to increase costs. While the restrictions would have an effect on oil and gas development in specific areas, they would not be major components in determining the extent of development. The price of these commodities and the relative availability and grade of local deposits will have a far greater effect on the development of these resources in the area. Exploration could provide a few jobs in the local economy. The extent of other employment in the oil and gas industry in the area will depend upon discovery of any deposits and the extent of such deposits, and their development potential.

This alternative would not change the general attitudes or values presently held by the residents of the study area, but it could affect attitudes toward and expectations of BLM. Individuals and groups concerned with environmental protection may support many aspects of this alternative, such as restrictions on ORV travel, special stipulations on some oil and gas development, and blocking lands in the Big Gumbo area. However, some individuals may not feel these restrictions go far enough and that too much coal is available for further consideration. Individuals and groups that favor resource development may feel the increased restrictions would hinder development.

**ALTERNATIVE C
SUMMARY OF COAL SCREENS**

CSA	Acres Federal Coal	Unsuit.	ACRES EXCLUDED		Wildlife Threshold ¹	Acres Acceptable
			Multiple Use	Surface Owner		
ANTELOPE	32360	910	3436	0	1082	28014
ARNEGARD	25020	105	3108	10517	2147	11290
BEULAH-ZAP	57200	10274	4013	1779	1627	41134
BOWMAN-GASCOYNE	21320	231	1828	0	1301	19261
CENTER-STANTON	27480	1197	2457	1120	1316	22706
DICKINSON	108628	6842	42877	8882	290	50027
DIVIDE	3760	461	0	480	0	2819
DUNN CENTER	88560	5196	6859	15115	382	61390
ELGIN-NEW LEIPZIG	14400	325	399	240	219	13436
ELKHORN	25380	267	4185	3911	2442	17017
FORTUNA	19400	8539	2028	1636	169	7197
GARRISON	12660	4067	5623	627	0	2343
GOLDEN VALLEY	21960	850	852	2478	0	17780
HANKS	47100	2917	6663	2755	3947	34765
KEENE	122700	14600	49462	16085	5618	42553
MOTT	42200	806	1591	0	1300	39803
NEW ENGLAND	95800	5569	1266	11770	196	77195
NIOBE	160	0	0	0	0	160
SAND CREEK	57240	1761	8406	7298	2328	39775
TOBACCO GARDEN	64060	50385	283	3796	0	9596
UNDERWOOD	2600	995	0	0	0	1605
VELVA	20280	16122	1596	0	0	2562
WASHBURN	1360	85	273	0	130	1002
WILLISTON	98020	60878	9030	154	811	27958
TOTAL	1009648	193382	156235	88643	25305	571388

¹Wildlife threshold acreages are included in multiple use.

ALTERNATIVE D

Air Quality

The identification of 484,592 acres as acceptable for further consideration, assumed coal leasing and possible development of new mines and facilities in 14 CSAs, and application of Montana BLM Standard Stipulations on all future oil and gas leases, in addition to special stipulations, are the primary factors impacting air quality.

Appendix H illustrates air quality impacts for a typical North Dakota mine and Appendix I illustrates air quality impacts for a mine and end-use facility. The air quality impacts identified in Appendix I show that any further coal development in North Dakota would further utilize the increment for SO₂, which may be fully consumed under certain meteorological conditions.

Prior to any leasing of federal coal, a detailed site-specific analysis of potential air quality impacts would be conducted. Prior to development of any mine or large scale end-use facility, NDSDH would require a detailed permit review for mine or end-use facility application.

Continued application of the air quality stipulations included in the Standard Conditions of Approval for all APDs (see Management Guidance Common to all Alternatives) would help minimize the human safety risks of H₂S, as well as provide necessary gas content information to be used in future air quality studies.

All releases of H₂S and SO₂ affect the air quality of the local area; primarily through the creation of offensive odors. The impacts to air quality beyond the local area are not yet fully documented. Any increase in wells producing H₂S in the Williston Basin would be closely monitored to determine if there is a significant potential to exceed ambient air standards and PSD increments. These standards would not be allowed to be exceeded at a local scale or regional scale.

Further studies would be conducted for the oil and gas fields within the district to establish the level of ambient air contamination. Also, studies of cumulative impacts are needed to establish the effects of all the fields on the air resource, including effects on the Theodore Roosevelt National Park and Class II areas.

Measures to be taken for air emission reductions in oil and gas fields would be the installation of gas gathering systems and processing (sweetening) plants. These sweetening plants would help eliminate H₂S and SO₂ from the environment and also make the H₂S-contaminated gas a saleable item for consumers.

The closure of 99,497 acres to oil and gas leasing would prohibit development of these areas thereby limiting emissions of pollutants.

Minerals

Coal

The management action significantly affecting the coal resource is the finding of 484,592 acres (9,233 MM tons) as acceptable for further consideration for leasing or exchange and potential leasing and development.

Under this alternative 1,009,648 acres (approximately 17,750 MM tons) of federal coal were identified as having coal development potential. A total of 525,056 acres (8,517

MM tons) were eliminated from areas acceptable for further consideration for leasing or exchange. Following the application of the unsuitability criteria, multiple-use tradeoff, and surface owner consultation screens 484,592 acres of federal coal were found acceptable for further consideration for leasing or exchange (Appendices B through G).

Following the application of the coal screens, 14 CSAs contain sufficient tonnages of federal coal in relatively consolidated patterns to support new mines and, presumably, facilities. The CSAs able to support new mines and facilities with federal coal are:

- Antelope
- Arnegard
- Beulah-Zap
- Bowman-Gascoyne
- Center-Stanton
- Dickinson
- Dunn Center
- Elgin-New Leipzig
- Golden Valley
- Hanks
- Mott
- New England
- Sand Creek
- Williston

The remaining CSAs contain federal coal found acceptable for further consideration in tonnages or patterns which would severely hinder or preclude large scale mine development. These areas would, however, be able to support small scale mining or maintenance of existing mining operations.

All federal coal mined within the area found acceptable for further consideration for leasing or exchange would be irreversibly and irretrievably lost. It is highly unlikely that all of the coal acceptable for further consideration would be mined based on recent downward trends in coal demand, as well as various engineering and permitting restrictions. Also, only portions of the CSAs would be offered for individual lease sales under the leasing process (Appendix A).

Exchange of coal for coal in AVFs and through other exchange processes could remove a significant amount of coal from potential development. Exchanges may result in compensation to the federal government by providing coal lands or other resources.

Oil and Gas

The application of special lease stipulations on new leases on 106,620 acres, closing 99,497 acres to future leasing, standard stipulations to all remaining federal oil and gas, and retaining essentially all public lands, are the primary change agents affecting oil and gas.

NSO stipulations would have a long-term adverse impact on oil and gas development through increased drilling due to the need for nonconventional drilling techniques such as directional drilling. In some cases the drilling would not be carried out at the exact location the lessee desires. NSO stipulations may cause the lessee to decide not to drill the lease and elect to pay compensatory royalties if potential drainage from the operator's adjoining lease is identified. Including NSO stipulations in leases would affect the orderly development of oil and gas in some instances. This would be slight due to the scattered nature of the federal reserves and the resulting small role federal oil and gas may play in overall field development. NSO stipulations

would require more complete geologic information than if conventional drilling methods were used, thus causing increased expense.

Limiting oil and gas exploration activities to specified times of the year on up to 106,620 acres would have a short-term adverse impact. These stipulations could upset the drilling schedules of lessees. There is a possibility of reserves being drained by a well outside the area, addressed by the stipulations, being brought into production while drilling inside the areas was delayed. This would cause a temporary loss of royalties to the federal government. Stipulations limiting exploration activities to specific times of the year would increase the need for long range planning. Use of this type of stipulations could cause drilling to take place during the winter causing increased construction and drilling costs. There would be no long-term impacts on oil and gas field development due to seasonal restrictions.

A "No Leasing" designation on 99,497 acres of oil and gas reserves could cause a loss of an undetermined amount of royalties to the federal government. It would remove potential oil and gas reserves from leasing. This would be a long term, irreversible impact. The federal oil and gas reserves could not be developed, even from outside the "No Leasing" areas. Oil and gas resources might then be drained from wells on adjacent state or privately owned mineral; resulting in an irretrievable adverse impact.

Exploration and development could drop slightly from the present rate under this alternative, but would be influenced more by the economic climate, spacing pattern, geological analysis, technological advance and rig availability than application of lease stipulations.

Other Minerals

The identification of 484,592 acres as acceptable for further consideration and assumed coal leasing and development is the primary change agents affecting salable, leasable (other than oil and gas and coal) and locatable minerals.

An undetermined amount of scoria would be buried or displaced during surface mining. This disturbance would essentially eliminate the potential for future development of the scoria.

Soils

The management action significantly affecting the soil resource is the finding as acceptable for further consideration and assumed leasing and development of 484,592 acres of federal coal. Management actions causing less significant impact to soils are: grazing under the current range management program, limitations of ORV use of 22,164 acres in the Big Gumbo area, and applying Montana BLM Standard Stipulations and other special oil and gas stipulations to all future leases.

Coal Study Areas

By eliminating from further consideration 244,987 acres with slopes greater than 15 percent, almost all the soil in LCCs VII and VIII over federal coal would not be disturbed for mining. Therefore, negative short-and long-term impacts to the soil from surface mining these acres would be avoided. The Williston CSA would have 68 percent, Tobacco Garden CSA, 59 percent and Beulah-Zap CSA, 43 percent of the federal coal acreage eliminated from further consideration for leasing under this alternative due to slopes greater than 15 percent.

The impacts to the soil from mine development (Appendix H) would cause a short-term loss in soil productivity. However, the proper recontouring of overburden and replacement of topsoil and subsoil as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would return productivity to acceptable levels in a relatively short number of years (Appendix H, Table H-1). No major long term impacts to the soil would be anticipated.

Surface Lands

Retention of essentially all public lands in North Dakota would generally cause the soil resource to remain the same. Retention of low value scattered tracts may have long-term negative impacts, due to the BLM not being able to manage the lands as effectively as other potential managers or owners.

By not consolidating lands into larger contiguous blocks, BLM would lose the opportunity to more efficiently manage the watershed to reduce impacts such as excess erosion and compaction.

Grazing under the current range management program would have positive impacts to soils. Soil conditions would improve in the long term due to an increase in vegetation production resulting in more cover and less erosion.

Management actions which limit ORV travel in the Big Gumbo area (22,164 acres) would result in no impact to the soil resource by ORVs. Occasional unauthorized ORV use on BLM public lands would cause slight erosion and compaction of soil in the short term.

Other Mineral Estate

Oil and gas exploration normally disturbs a small area of soils along a seismic line and drilling site. With proper cleanup and handling of soil, this activity only causes minor short-term impacts. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short-term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Oil and Gas Lease Stipulations would allow only minor erosion and compaction impacts to soil resources by prohibiting activities during muddy and/or wet periods. Erosion control is also called for on slopes of erodible soils cover 20 percent. In addition, special stipulations would be applied in all areas where it is felt necessary to protect other resources to the maximum reasonable extent within legal frameworks (Appendix K). This would include wetland and riparian stipulations to protect fragile soil resources. The 99,497 acres closed to all future leasing would experience no impacts to the soils from oil and gas development.

Hydrology

The identification of 484,592 acres as acceptable for further consideration and assumed coal leasing and development, identification of 32,273 acres of buried-valley aquifers as multiple-use tradeoff, identification of 38,536 acres to protect Dickinson's Municipal Watershed, ORV use restric-

tions on 22,164 acres in the Big Gumbo area, and application of Montana BLM Standard Stipulations, special stipulations and closures of 99,497 acres to all future oil and gas leases are the primary change agents affecting hydrology under this alternative.

Coal Study Areas

Under criterion 16, 15,515 acres are considered unsuitable in 19 CSAs. These areas protect losses to downstream occupants and dwellings of flood plains.

Under criterion 19, 32,009 acres are considered unsuitable under a preliminary determination of AVFs.

In addition to those acreages considered under the unsuitability criteria, another 70,809 acres were considered unacceptable for further consideration for coal leasing under the multiple-use tradeoff screen. These acreages will protect the buried-valley aquifers in 17 CSAs and the City of Dickinson's municipal watershed.

Appendix H describes the probable major impacts of coal mining to the hydrologic resources of the planning area.

Surface Lands

Retention of public lands under this alternative would have only minor impacts on water resources. Retention of low value scattered tracts could have long-term negative impacts due to the BLM not being able to physically manage the lands as effectively as other potential managers or owners.

No exchange of scattered tracts to provide for larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would have long-term negative impacts to water resources. Lands would not be gained through exchange, thus BLM would lose the chance to more efficiently manage the watershed to reduce water yields, improve water quality, and decrease erosion and sedimentation.

Limitation of ORV use in the Big Gumbo area, over the long term, would cause little improvement to the water resource due to the lack of intensive ORV use. Slight improvements in vegetation would occur resulting in a slight decrease in upland erosion. Under current range management program sediment and water yields are expected to be reduced by 10 and 5 percent respectively (USDI 1984a).

Other Mineral Estate

All phases of oil and gas operations have the potential to cause significant impacts to local water resources. Oil and gas development increases sediment load through compaction of the soil, reduction of vegetation, building of roads and other surface disturbing activity. Roads or seismic lines crossing ephemeral, intermittent, or perennial stream channels and wetlands do the most damage. Activity during periods of high soil moisture would cause greater sediment yields than activity during periods when the ground is dry.

Shallow water wells and springs may be impacted by the detonation of explosives or other methods of seismic exploration. Aquifers composed of brittle material may shatter when explosions occur in the immediate area. This may decrease the water quality of the aquifer because shattering of the aquifer exposes many new surfaces for dissolution of material. A shock wave could cause a formation to fracture and cause movement of ground water to or from the aquifer. In some cases flow from shallow water wells

may be affected by this fracturing. In addition plugging of shot holes is not always successful thus allowing cross-contamination of aquifers or contamination by surface inflow.

After abandoning the site, disturbed areas are regraded and revegetated; sediment production would decline and return approximately to initial levels. During the lifetime of oil and gas development in an area (20-30 years), some water consumption occurs as well as some degradation of water quality. In the long term, following reclamation, water consumption would stop and water quality would return to predevelopment levels.

Continued application of Montana Standard Oil and Gas Lease Stipulations would minimize negative impacts to water resources by providing for erosion control (activities may be prohibited during muddy and/or wet periods), provide for a buffer from reservoirs, lakes, ponds, streams, or rivers, and on slopes of erodible soils over 20 percent. The closure of 99,497 acres to oil and gas leasing and exploration would reduce the possibility of negative impacts to the water resources through oil and gas activities.

Vegetation

The management action significantly affecting vegetation is the finding as acceptable and assumed leasing and development of up to 484,592 acres of federal coal. Management actions causing less significant impacts to vegetation are: grazing under the current range management program, ORV limitations on 22,164 acres in the Big Gumbo area, and application of Montana BLM Standard Stipulations (in addition to special oil and gas stipulations), and closure of 99,497 acres to future oil and gas leasing.

Coal Study Areas

The acres found acceptable would consist largely of farmland (about 332,000 acres) used for growing crops such as wheat, sunflowers, and alfalfa. Native vegetation remaining would primarily consist of native prairie (about 137,000 acres) on rather gentle slopes used for livestock grazing and wooded draws (6,000 acres). The impacts of mining would cause significant short- and long-term losses in vegetative productivity depending on the vegetation disturbed (Appendix H). The proper recontouring of overburden, replacement of soil material and revegetation as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would normally return productivity to acceptable levels in a relatively short time (Appendix H, Table H-1). Establishing species diversity on areas presently native prairie and returned to rangeland would be accomplished only in the long term.

Surface Lands

Retention of all BLM lands in North Dakota would result in different long-term impacts to vegetation depending on the area. Retention of low-value scattered tracts may have long-term negative impacts due to the BLM not being able to manage the lands as effectively as other potential managers or owners. A continuation of the present range management program would have positive impacts on vegetation. Total vegetation production would increase approximately 6.5 percent in the long term.

By retaining scattered tracts and not consolidating into larger, contiguous blocks, BLM would lose some opportunity to efficiently manage vegetation to benefit wildlife, soils, hydrology, and agricultural uses.

By emphasizing trespass abatement, the small areas of public land that are being farmed would be returned to rangeland/pasture. The permanent cover returned would provide forage, habitat, and erosion protection that would be a long-term positive impact.

Management actions which limit vehicle travel in the Big Gumbo area to maintained roads and trails would minimize impact to vegetation by ORVs. Occasional unauthorized ORV use on BLM public lands would cause slight vegetative loss, erosion and compaction in the short term.

Other Mineral Estate

Oil and gas exploration normally disturbs a small area of vegetation along a seismic line and drilling site. Assuming proper cleanup and handling of soil, these areas would be revegetated within one to two years. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Oil and Gas Lease Stipulations would allow only minor impacts to vegetation by providing for erosion control, revegetation of disturbed sites, and compaction problems (activities may be prohibited during muddy and/or wet periods). Erosion control is also called for on slopes of erodible soils over 20 percent. In addition, special stipulations would be applied to protect fragile riparian and wetland vegetation. The closure of 99,497 acres to future oil and gas leasing would result in no vegetation impacts on these areas.

Wildlife

The finding as acceptable and assumed leasing and subsequent mining of 484,592 acres of federal coal, including 6,117 acres of woody draws, would have substantial short- and long-term impacts on a variety of high priority wildlife species and their habitats. The application of special stipulations to oil and gas leases on 106,620 acres and closure of 99,497 acres to future leasing, and restricted ORV use on 22,164 acres of federal surface land would have beneficial short- and long-term impacts on high priority species and their habitats. The retention of all federal surface lands would have minor beneficial long-term impacts.

Coal Study Areas

No federally-listed threatened and endangered species would be affected by this alternative. The bald eagle, peregrine falcon, and whooping crane migrate through the area, but their use of the planning area is erratic. No interior least terns, black-footed ferrets, or piping plovers are known to breed in the CSAs. However, they may occur on BLM surface tracts (see below).

No habitats were considered unsuitable under criteria 9, 10, and 12. Under unsuitability criteria 11, 13, 14, and 15, 148,045 acres of wildlife habitat are considered unsuitable for further consideration for coal leasing (Appendix C). In addition, another 12,809 acres are considered unsuitable under criterion 1, as it applies to wetlands under management for waterfowl production by the USFWS. Thus, the

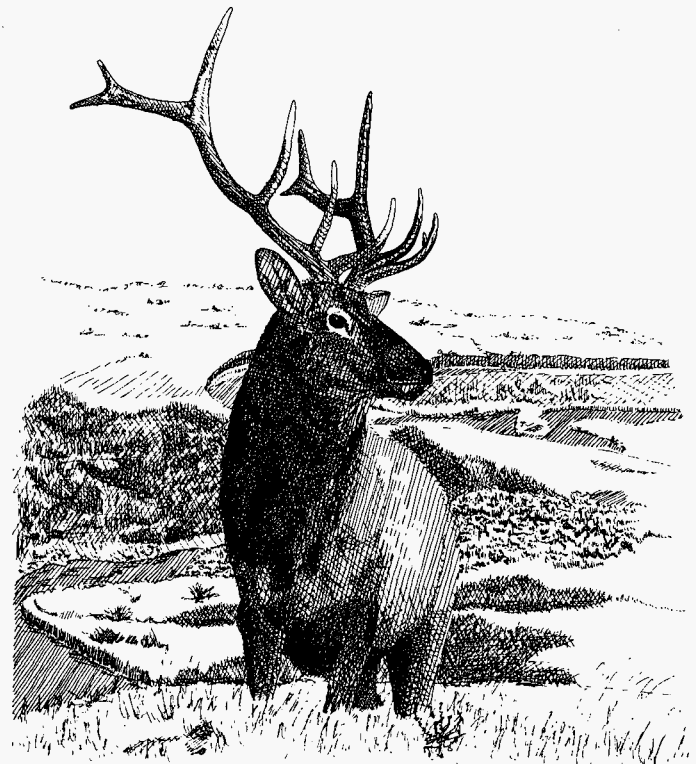
total acreage unsuitable due to wildlife values is 160,854 acres. A more detailed explanation of the habitats protected under criteria 11, 13, 14, and 15 follows.

Under criterion 11, 16,239 acres (Appendix C) are considered unsuitable due to golden eagle nest sites and buffer zones. These occur in five CSAs. Buffer zones include the nest site (typically a badlands cliff area) woody draws, native prairie, and, in some cases, agricultural lands.

Under criterion 13, 98 acres in the Keene CSA are considered unsuitable due to the buffer zone around a prairie falcon nest site.

Under criterion 14, 23,943 acres are considered unsuitable. These acreages occur in 12 CSAs. The habitats protected are, most notably, 11,419 acres of wetlands in the Velva CSA and 3,908 acres of wetlands in the Fortuna CSA. Many of these acreages occur adjacent to waterfowl habitat considered unsuitable under criterion 1. Other habitats unsuitable under this criterion are ferruginous hawk nest sites and their buffer zones in six CSAs. As with golden eagles, buffer zones include woody draws, native prairie, and agricultural lands where necessary.

Under criterion 15, 107,765 acres are considered unsuitable. These are predominantly large blocks of contiguous woody draw habitats in the Williston (50,270 acres), Tobacco Garden (36,711 acres), and Keene (11,805 acres) CSAs where a variety of high priority wildlife species occur, especially big game. In the Beulah-Zap CSA, 8,979 acres are unsuitable, primarily to preserve habitat for a pronghorn population that is locally important for observation and, in the past, hunting. Woody draws are also the main habitats protected in the Arnegard CSA.



In addition to those acreages considered unsuitable, another 90,244 acres were identified under the multiple-use tradeoff screen. Of this acreage, 54,626 acres are woody draws, 35,247 acres are native prairie, and 371 acres are wetlands. These habitats were not known to contain values sufficient to qualify under the unsuitability criteria. However, it was evident that they are of value to a number of wildlife species.

Over 67 percent (60,391 acres) of the land identified under multiple-use tradeoffs, wildlife values was excluded from further consideration for coal leasing due to overlap with other unsuitability criteria or surface owner consultation. Thus, in this alternative 29,853 acres remain in this category.

Habitats identified under multiple-use tradeoffs would be allowed to go forward for coal leasing under the threshold concept. Up to 10,064 acres in this category could be leased. However, each CSA has an individual threshold percentage that was determined from the particular values of the CSA. Once the threshold percentage is reached, no further leasing can occur without a joint review of the situation in the CSA by BLM, NDGFD, and USFWS. The intent of the threshold approach is to protect a portion of the remaining higher value habitats without having to arbitrarily specify precise geographic areas.

A total of 484,592 acres remains suitable for leasing and subsequent mining of coal. Included in this acreage are 110,120 acres with vegetative reclamation stipulations (Appendix F). Assuming a moderate pace of development and realizing that only a small portion of the lands in a mine area are actually disturbed at any time (Appendix H) short- and long-term impacts on wildlife would be significant but local.

Suitable acreages in the CSAs are comprised mainly of agricultural lands and some native prairie of lower quality. Agricultural lands can be reclaimed effectively. The productivity of native prairie may be reclaimed in the short term; however, the natural diversity of native prairie can only be achieved in the long term (Appendix H). Woody draws may never be reclaimed to their original character and all reclamation would extend into the long term. Thus, the most significant long-term impacts would occur to species occupying the 6,117 acres of woody draws that could conceivably be mined.

Surface Lands

The disposal of scattered tracts only when lands actions are initiated by outside parties allows BLM to conduct a careful wildlife evaluation of each tract prior to a decision on disposal. Future opportunities to improve tracts through project work or to enter into exchanges are maintained. However, if BLM does not actively pursue disposal to other federal agencies, some tracts may not be managed as well as they could. Whereas small tracts relatively distant from the BLM district office may contain good wildlife habitat, it is less likely that trespass or other management problems will be discovered than if those tracts were managed by an agency nearer to them.

The inability to exchange scattered tracts to provide larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would have minor long-term impacts on wildlife. The failure to consolidate in these areas would preclude more efficient management and reduce opportunities for enhancing wildlife habitats.

The increased emphasis on trespass abatement would, on the whole, benefit wildlife. If the portion of land under trespass is sold to the trespasser there would be only minor long-term impacts to wildlife because the acreages are usually small and scattered. Another possible resolution is to have the habitat under trespass restored to its original condition. This provides a recovery after minor short-term losses and discourages future trespass and habitat loss. In cases of agricultural trespass it is possible to resolve cases so the habitat is better than it originally was. Under authority of the Sikes Act it is possible to obtain a cooperative agreement with the trespassers whereby the trespasser's acreage is still planted, for example, with wheat, but half the crop is left standing for wildlife. Beneficial agreements, involving irrigation or other improvements may also be reached.

Restriction of ORVs to roads and trails in the Big Gumbo area, and the seasonal limitation from March 1 to June 1, would reduce disturbance of sage grouse, pronghorn, raptors, and a variety of other wildlife. This would increase the quality of their habitat during the winter, reproductive periods, and other critical times of the year. Closure would also prevent the establishment of unplanned roads that permanently lower the quality of habitats because of traffic disturbance and increased access by poachers. The ability to close problem areas would help protect critical seasonal habitats for pronghorn, sage grouse, and raptors that may be identified in the future.

Other Mineral Estate

Special stipulations on new oil and gas leases would be applied in addition to Montana Standard Stipulations on 106,620 acres. Up to an additional 99,497 acres could be closed to leasing (Appendix K). These stipulations would help minimize impacts to wetlands. Closures would prevent impacts to nesting areas of golden eagles, prairie falcons, ferruginous hawks, and sage grouse. Closures would also protect winter and calving area of elk and bighorn sheep if and when these areas are identified. Riparian habitats would be completely protected from disturbance. No significant impacts to these resources are expected to occur.

The remaining 254,277 acres would be subject to Montana Standard Stipulations only. No significant impacts to wildlife resources on these acreages are expected to occur.

Agriculture

The finding of 484,592 acres acceptable for further consideration and the assumed coal leasing and development, the retention of all public lands, and the continuation of present grazing management would have only minor impacts on the region's agricultural production.

Coal Study Areas

Within the CSAs, short-term loss of crop production would be the principal commodity impacted. After completing the coal screening process cropland is the major land use remaining (about 332,000 acres). Reclaimed cropland has the best chance of succeeding and meeting regulatory requirements.

At the height of a mining operation, normally slightly over 36 percent of a typical mine permit area would be in some phase of mining or reclamation (Appendix H). Some production would occur during reclamation. The degree of

impact to an individual farmer would depend on how much of his operation falls within the active mine area.

There would not be a significant loss of grazing land. Most of the grazing land was excluded under the multiple-use tradeoff screens for slopes and wildlife habitat. About 143,000 acres remain acceptable for further consideration. Reclamation of pasture lands has generally proved successful. Significant increases in total production are often possible but accompanied by a long-term loss of plant species diversity.

Surface Lands

From a range management standpoint, this alternative is the least efficient to administer and makes it difficult to protect and manage the range resource. Small, scattered tracts often preclude effective management such as pasture rotation, enhanced distribution, or noxious weed control. If surface lands remain scattered, range condition could decline.

Other Mineral Estate

There would be no significant long-term impacts to agriculture.

Lands and Realty

There would be no significant impacts on the land resources resulting from coal leasing, developing oil and gas leases or disposing of mineral materials. An undetermined acreage of public land would be withdrawn to other agencies or patented via Color-of-Title Act or R & PP Act. There would be no other opportunities for repositioning of the land ownership. The long-term land pattern would remain fixed.

Surface Lands

There would be no Bureau-initiated land disposals under this alternative. Applications for transfer of public lands such as R & PP Act patents, Color-of-Title patents, and withdrawals would be considered on a case-by-case basis. Disposing of significant acreages by withdrawals, R & PP act patents or Color-of-Title Act patents is not anticipated.

The current pattern of intermingled ownership would remain fixed for the life of the plan. Management difficulties because of remoteness, distance, access and size would continue.

The revocation of withdrawals no longer necessary would return an unknown acreage of lands to BLM administration. Land classifications would be removed from approximately 8,000 acres of public land. Removing the classifications would have no long-term adverse impacts, but would make the lands available for the highest and best use, as well as discretionary actions.

Other Mineral Estate

There would be no significant adverse impacts on the land resources from exploring and developing oil and gas leases or permitting disposal of mineral materials.

Recreation and Visual Resources

The finding of 484,592 acres acceptable for further consideration and assumed coal leasing and development, the application of Montana BLM Standard Oil and Gas Lease Stipulations (and additional special stipulations), the closure of 99,497 acres to future oil and gas leasing, and lim-

itation of ORV use on 22,164 acres would have insignificant impacts to recreation and visual resources.

Coal Study Areas

Coal mining on portions of the CSAs found acceptable would remove this land as a recreational resource until it is reclaimed. The loss of these areas would create additional recreation pressure on surrounding land; however, after successful reclamation, this would be an insignificant impact. Increased regional population expected to result from mining and coal conversion would place additional demands on outdoor facilities such as Lake Sakakawea and Theodore Roosevelt National Park. Population growth would also increase demand for community and indoor recreational facilities. Mitigation of development impacts may require additional outdoor, indoor, and community recreational facilities.

Development of portions of the CSAs would have an impact on the visual resources of these areas. Due to the relatively flat terrain of the CSAs, mines and related facilities would intrude into the landscape. In most cases this would be an acceptable intrusion. Mine site and facilities near the Missouri breaks and Lake Sakakawea would impact the high visual resource values of this area. The need for and extent of a protective buffer zone would be determined during the review of specific lease proposals or during activity planning.

Surface Lands

Essentially all public lands would be retained in federal ownership. Many of the public tracts are isolated and surrounded by private land. Access to these tracts is often difficult. Retention of tracts would impact recreation by prohibiting consolidation of public lands perpetuating access problems and limiting recreational opportunities.

This alternative would limit ORV opportunities on public land in the Big Gumbo area. Recreational use of public land would decrease, placing additional demand on surrounding areas.

Other Mineral Estate

Oil and gas development, under standard lease stipulations, has an effect on recreation by limiting hunting and other dispersed activities in developed oil and gas fields and by generally decreasing the quality of recreational opportunities. This impact may be offset by additional road development that would enhance access to recreational areas. Continued oil and gas development would also increase hunting pressure on areas adjacent to development. Additional special lease stipulations and closures to leasing would reduce this impact. The impacts on recreational resources under these stipulations would be less than under all other alternatives.

Oil and gas development would have an effect on visual resources. If there is a new development, the intrusion of oil and gas facilities would have more of an impact. Mitigation of the impact would be accomplished by requiring the maintenance of the visual qualities of the landscape and ensuring that facilities have proper design, painting and camouflage, to blend in with the natural surroundings.

Cultural Resources

The finding of 484,592 acres acceptable for further consideration and the assumed coal leasing and development, the closure of 99,497 acres to future oil and gas leasing, reten-

tion of all public lands in North Dakota, and the limitation of ORV use in the Big Gumbo area, would be the major management actions affecting cultural resources.

Coal Study Areas

Under multiple-use tradeoff, 3,961 acres of federal coal were dropped from further consideration for coal leasing due to the regional or national significance of the resources located over federal coal. Included here is all federal coal within the eligible KRF National Register District, Writing Rock State Historic Site, and the A.C. Townley farmstead.

Inventory data is not uniform or adequate for all CSAs. As a result, the exact number of sites within these areas is unknown. Data adequacy problems will be improved at the completion of an ongoing Class II cultural resource survey of five CSAs. Extrapolation of existing inventory data to all CSAs indicates that under this alternative 194-969 sites would be significant.

Cultural resources determined eligible through consultation would be avoided or mitigated through documentation (historic Euro-American sites) or a data recovery program (archaeological sites). Standard data recovery methods, in most cases, would be adequate to minimize direct adverse impacts from coal leasing and subsequent mining. (See discussion in Alternative A).

Surface Lands

All public lands would be retained in federal ownership. Impacts to cultural resources are not expected.

ORV use would be restricted to maintained roads and trails throughout the year within the Big Gumbo area. Between March 1 and June 1, ORV use is restricted to maintained roads. Significant impacts to cultural resources are not anticipated even in areas designated as open. Some impacts may occur due to vehicle incurred damage to cultural resources or through collection of artifacts.

Other Mineral Estate

No new oil and gas leases would be issued on 99,497 acres. This would reduce the potential for impact to cultural resources. It is estimated between 147 and 738 cultural resources would be significant in the remaining areas. Further reduction in the area available for leasing would occur under NSO restrictions applied to some portions of the lease areas.

NSO or seasonal restrictions would reduce acreage available within a given lease area, thereby limiting the number of alternate project locations. This may limit opportunities to avoid impacts to cultural resources, possibly resulting in the selection of a more destructive form of mitigation. Conversely, these restrictions may have a beneficial effect on cultural resources by eliminating areas with high cultural resource values.

This alternative provides protection for cultural resources by application of standard lease stipulations for oil and gas to all new leases, in addition to any added special stipulations. Adverse impacts to cultural resources would be avoided or mitigated by documentation/recording or through a data recovery program. Overall impacts to cultural resources, following proper mitigation measures, would be minimal.

Paleontology

Major management actions affecting paleontological

resources include the finding of 484,592 acres acceptable for further consideration and assumed coal leasing and development, retention of all public lands, restricted ORV use on 22,164 acres of public lands, application of Montana BLM Standard Stipulations and necessary special stipulations to future oil and gas leases, and the closure of 99,497 acres to future oil and gas leasing.

Coal Study Areas

Paleontological investigations have not been systematically conducted for any of the CSAs. Thirty-three fossil locations have been recorded within the CSAs. Four of these sites are considered rare. Of the 33 recorded sites, only 11 are located over federal coal, and one contains rare fossils.

Direct impacts to paleontological resources would be minimal; resources of significant scientific interest would be protected where feasible. If direct impacts are unavoidable, mitigation would be accomplished by salvage. Residual impacts following mitigation are not anticipated.

Surface Lands

Essentially, all public lands would be retained in federal ownership. Impacts to paleontological resources resulting from this management action are not expected.

ORV use within the Big Gumbo area would be restricted to maintained roads and trails. Between March 1 and June 1 ORV use would be restricted to maintained roads. Overall impacts to paleontological resources would be minimal even in areas designated as open. Some impacts may occur from individual fossil prospecting on public land.

Other Mineral Estate

Montana BLM Standard Stipulations provide for the protection of paleontological resources. The standard stipulations, however, do not specifically require the identification of these resources prior to operations on a lease. The potential exists for impacts to occur to significant paleontological resources under Montana BLM Standard Stipulations. Once these resources are discovered and reported; however, the disposition of the resources would be on a case-by-case basis. Overall impacts to paleontological resources would be slight.

Economic and Social Condition

The finding of 484,592 acres as acceptable for further consideration and assumed coal leasing and development, the retention of essentially all public lands, the application of special oil and gas lease stipulations on 106,620 acres, the closure of 99,497 acres to future oil and gas leasing, and the limitation of ORV use on 22,164 acres would result in significant social and economic impacts.

Impacts of Coal Mining and Related End-Use Facilities

A detailed analysis of two possible coal development scenarios is presented in Appendix I. The impacts resulting from the development of a mine and related facility are summarized below.

Fourteen CSAs capable of supporting at least one mine and facility with federal coal are available for further consideration under this alternative. These 14 CSAs are dispersed over much of western North Dakota. The following communities may be impacted depending upon where development occurs: Williston, Tioga, Watford City, Center,

Stanton, Beulah, Hazen, Halliday, Killdeer, Dickinson, Belfield, Beach, Bowman, New England, Mott, and Elgin. Each of these communities is located in proximity to one or more CSAs and is large enough that it would attract in-migrants. Some of these communities such as Williston, Dickinson, and Beulah have experienced energy-resource-related development in the recent past.

Direct and indirect employment for the mine and facility would peak at approximately 2500 during construction, and level off to about 1150 during the operations phase (Table 4-1). Peak construction employment of 1400 for this mine and facility represents about 10 percent of the 1984 statewide figure for construction employment. Long-term mining and utilities (facility) employment represent 20 percent and 4 percent, respectively, of 1984 statewide employment figures. In-migration to communities surrounding the development would peak at about 2000 and decline to 1100 in the long term. The project and resulting in-migration could place considerable stress on local services and infrastructure during the construction phase, depending upon current community conditions and the size of the incoming population. In the long run, coal severance tax payments would increase 23 percent over 1985 statewide payments, and coal conversion tax payments would increase 31 percent over 1985. These payments could be used to meet some of the increased demand for public services.

The economic impacts of the mine and electric power generation facility on farm and ranch operations, expressed as the dollar value of agricultural production lost, would be \$138,600 annually. This represents 0.5 percent of the average value of the annual agricultural production (in 1982) of counties containing CSAs and about 0.006 percent of the value of the annual agricultural production for the state. Impacts of surface mining on the operation and management of livestock ranches could be more severe than on dryland farming (USDI 1981). Mine development located near the center of a ranch could seriously interfere with movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution and, in general, disrupt the overall operation. Compensation to the farm/ranch operator would depend upon the type of landowner lease, land ownership pattern, and percentage of land owned versus land leased. The greatest impacts would occur to operators who lease all the land which is removed from production; no compensation would be made for lost leases.

Social impacts include changes in social organization and social well-being, and depend upon the community itself and the number and types of in-migrants. Impacts to social organization (the way in which the people in the community relate to each other) could include: residents no longer knowing everyone else, greater diversity in resident lifestyles, changes in business transactions and government structures from casual to more formalized, increases in the level of outside influences in the community, and erosion of the traditional community power bases. These changes could be permanent, substantial, and intense. Impacts to social well-being could include: provisions of private and public services; increases in stressors such as strangers, noise, crowds, and crime; and increases in income for those who are able to find employment or expand business as a result of the development. Negative impacts to social well-being would be mostly of a short-term nature, noticeable primarily during periods of peak construction (Appendix I).

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character. Some area ranchers and farmers have organized in opposition to development because of their concern over regional impacts to air and water resources that they feel could affect their economic and social welfare and, ultimately, limit their future options. These agricultural producers are not convinced that the coal in the Fort Union region is needed to meet national energy goals or that the successful reclamation of agricultural land can be guaranteed.

Impacts to the Fort Berthold and/or Standing Rock Indian Reservations could occur if development takes place close to the Reservations. Potential in-migration would be influenced by the location of the mine and facility in relation to Reservation towns, the availability of services in the towns, and the relative location of off-Reservation towns. If there is significant migration onto one of the Reservations, the affected Tribe's cultural characteristics, social organization, and social well-being could be impacted. Services and facilities could be negatively impacted, decreasing social well-being. Positive impacts to social well-being could occur if Tribal members were able to acquire employment on energy projects. With increased employment opportunities, Indians who may have had to leave the Reservations for work may find they are able to stay in the area.

Impacts of Other Management Actions

In this alternative, land adjustment would not occur. There would be little or no impact to the area economy.

In this alternative acreage would be designated where leases require special stipulations or prevent surface occupancy. However, most land is currently under lease and would not be subject to special stipulations until the lease expires or otherwise terminates. These restrictions would generally not prohibit exploration and development, but would tend to increase costs. While the restrictions would have an effect on oil and gas development in specific areas, they are not major components in determining the extent of development. The price of these commodities and the relative availability and grade of local deposits will have a far greater effect on the development of these resources in the area. Exploration could provide jobs for the local economy. The extent of other employment in the oil and gas industry in the area will depend upon discovery of any deposits, the extent of such deposits, and their development potential.

This alternative would not change the general attitudes or values presently held by the residents of the study area, but it could affect attitudes toward and expectations of BLM. Individuals and groups concerned with environmental protection may support many aspects of these alternatives such as restrictions on ORV travel, special stipulations on some oil and gas development, and less coal acreage available for further consideration. Individuals and groups that favor resource development may feel the increased restrictions would hinder development.

**ALTERNATIVE D
SUMMARY OF COAL SCREENS**

CSA	Acres Federal Coal	Unsuit.	ACRES EXCLUDED		Threshold ¹	Acres Acceptable
			Multiple Use	Surface Owner		
ANTELOPE	32360	910	7065	0	153	24385
ARNEGARD	25020	105	8320	10082	5042	6513
BEULAH-ZAP	57200	10274	18523	55	0	28348
BOWMAN-GASCOYNE	21320	231	2890	0	1602	18199
CENTER-STANTON	27480	1197	3854	1120	296	21309
DICKINSON	108628	6842	47614	8009	371	46163
DIVIDE	3760	461	29	480	0	2790
DUNN CENTER	88560	5196	15537	13385	491	54442
ELGIN-NEW LEIPZIG	14400	325	887	240	377	12948
ELKHORN	25380	267	10232	3610	1723	11271
FORTUNA	19400	8539	4371	1517	336	4973
GARRISON	12660	4067	5837	558	0	2198
GOLDEN VALLEY	21960	850	1100	2360	0	17650
HANKS	47100	2917	12911	1917	3351	29355
KEENE	122700	14600	72358	9123	1122	26619
MOTT	42200	806	5274	0	1031	36120
NEW ENGLAND	95800	5569	2463	11668	92	76100
NIOBE	160	0	0	0	0	160
SAND CREEK	57240	1761	15991	6514	3802	32974
TOBACCO GARDEN	64060	50385	2665	3103	0	7907
UNDERWOOD	2600	995	189	0	0	1416
VELVA	20280	16122	1992	0	0	2166
WASHBURN	1360	85	588	0	0	687
WILLISTON	98020	60878	17089	154	0	19899
TOTAL	1009648	193382	257779	73895	19789	484592

¹Wildlife threshold acreages included in multiple use.