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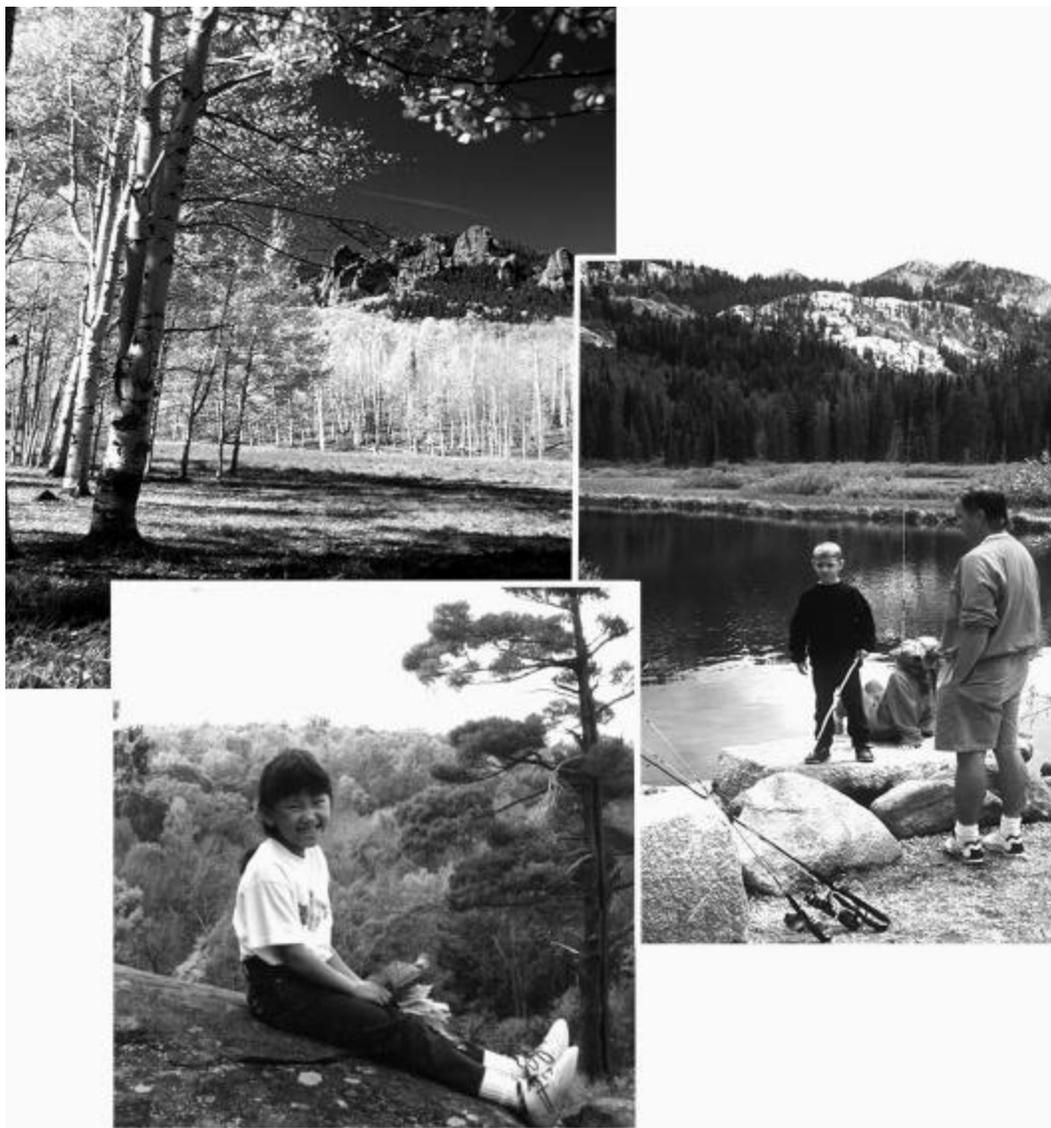
Washington  
Office

November 2000

# Forest Service Roadless Area Conservation

## Final Environmental Impact Statement

### Minerals and Geology Specialist Report





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# **Minerals and Geology Specialist Report**

**R. J. Gauthier-Warinner, Geologist**

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## Abstract

On National Forest System (NFS) lands, minerals are classified according to the law under which they are managed. Minerals are classified as locatable, leasable, and salable (common variety). This distinction is important because each classification is subject to different requirements for exploration and development, and in some cases the Forest Service cannot prohibit exploration and development. Other topics discussed in this section are abandoned and inactive mines, and geological and paleontological resources.

## Changes between Draft and Final EIS

- A possible exception to the prohibition alternatives that would allow road construction or reconstruction for prospective mineral leasing activities in inventoried roadless areas has been analyzed.
- The discussion of the need for temporary roads in mineral exploration and their impacts has been added.
- There is no longer a reference to and discussion of valid existing rights as they pertain to minerals because this term is not a part of any of the action alternatives examined in the FEIS.
- The discussion of leasable minerals has been expanded.

## Affected Environment

### *Locatable Minerals*

Most valuable minerals deposits on lands open to mineral entry are considered locatable unless otherwise determined to be leasable or salable. Locatable minerals include commodities like gold, silver, copper, lead, zinc, barite, gypsum, and certain varieties of limestone, which are subject to appropriation under the General Mining Law of 1872 (17 Stat. 91, as amended). This law provides United States citizens a right to prospect, explore and develop these minerals on public domain lands. It applies to NFS lands by virtue of the Organic Administration Act (16 U.S.C. §§ 482). It also provides for access suitable to conduct these activities. Depending on the stage of exploration or development, reasonable access can range from unimproved temporary roads for prospecting or drilling to more permanent improved roads for full mine development and transportation of ore.

Valuable deposits of locatable mineral resources do occur in inventoried roadless areas, principally west of the 100<sup>th</sup> meridian. Therefore, in the long term, it is reasonable to assume that future exploration, mining, and mineral processing activities will continue to occur in inventoried roadless areas where valuable deposits exist.

Exploration and development of locatable mineral resources are non-discretionary activities, meaning that the Forest Service cannot prohibit reasonably necessary activities required for the exploration, prospecting, or development of valuable mineral deposits. However, the Forest Service has the authority and the obligation to regulate locatable mineral operations in order to prevent or minimize damage to NFS surface resources. This is the purpose of 36 CFR 228, Subpart A. In support of this obligation, a forest manager may direct a certified mineral examiner to conduct a surface-use determination (SUD) to ensure that a proposed mineral exploration or development activity conforms to reasonable industry standards for that type of activity, based on the appropriate stage of development of the operation. If the mineral examiner concludes in the SUD that the proposed activity is not reasonable, it would not be approved under 36 CFR 228, Subpart A.

Currently, there appears to be a trend of decreasing exploration and development of domestic locatable mineral resources.

### *Leasable Minerals*

Leasable minerals are those minerals that can be explored for and developed under one of several mineral leasing acts. They include energy mineral resources such as oil, gas, oil shale, coal, gilsonite, and geothermal. They also include non-energy minerals such as phosphate and minerals important for their sodium, potassium, or sulfur content. Moreover, for lands acquired or administered under the Weeks Act (PL 61-435), which generally applies to lands in the Eastern United States, and the Bankhead-Jones Act (PL 75-210), they include deposits of otherwise locatable minerals like gold, copper, lead, barite, and gypsum.

Exploration and development of leasable mineral resources are discretionary activities, meaning that leasing of them may or may not be allowed. The Bureau of Land Management (BLM) has the authority to dispose of leasable mineral resources on NFS lands. Most leasable mineral resources, however, may only be leased subject to Forest Service concurrence. Exceptions to this are gilsonite, sodium, and phosphate. These may be leased without Forest Service concurrence. The holder of a lease or permit has a contractual agreement with the government that allows reasonable exploration and development of the leased commodity.

After a lease is issued, it may be modified and adjusted for economic or technical reasons. Often, during the development of a mine, small areas of mineral reserves that are not included in the original lease may be identified. To promote recovery or prevent environmental damage, these small areas may be added to the existing leases. As an example, it may be more environmentally sound to locate ancillary facilities such as topsoil and overburden stockpiles in areas outside the boundaries of the issued lease. This would require a modification of the lease and could possibly expand the lease boundary.

Environmental impact statements are generally prepared before the issuance of mineral leases in inventoried roadless areas. The effects of any future lease exploration or development are also addressed in subsequent environmental analysis, which may be

another site-specific environmental impact statement. Presently, coal, oil and gas, and phosphate mineral exploration and development would be most affected by the action alternatives.

*Oil and Gas* - Area-wide environmental impact statements are generally prepared before accepting lease nominations for oil and gas. Leases are generally issued for 10 years. The effects of oil and gas development activities on the surface resources of NFS lands are managed by the Forest Service subject to the provisions of 36 CFR 228, Subpart E, which provides for the requirement of surface use plans of operations, for monitoring of surface disturbing activities, and enforcement of surface-use requirements and reclamation standards.

With the exception of the Los Padres National Forest in California, discussed below, inventoried roadless areas with the highest potential for the occurrence of oil and gas resources are located in a general area referred to in the USFS Roadless Area Conservation FEIS as the Rocky Mountain Area and defined by the Rocky Mountains, Northern Great Plains, and Colorado Plateau provinces. Table 1 depicts, by Forest Service region within the general area, the number of acres of inventoried roadless areas with potential to produce oil and gas; however, the location and extent of any possible reserves are not known. The information in this table was obtained by digitally overlaying areas with potential for containing oil and gas resources (Petroleum Information Corp. 1988) with USFS inventoried roadless areas<sup>1</sup>. A recent natural gas study indicates that as much as 137 trillion cubic feet of gas may be contained within Federal lands in the Rocky Mountain Area, but the study did not determine what proportion of this estimate may be found on NFS lands (National Petroleum Council 1999).

Since the RARE II EIS, the USGS completed a petroleum resource estimate for the entire United States (Gautier and others 1998). Because inventoried roadless areas are not delineated subsets of the geologic areas, the amount of petroleum resource contained within inventoried roadless areas cannot be extrapolated from the study. For a discussion of this study and its results, see the Socio-Economic Specialist Report.

**Table 1. Potential oil and gas resource acreage in inventoried roadless areas by Forest Service region in the Rocky Mountain area.**

Forest Service region	Inventoried roadless area acres having oil and gas potential
Region 1	2,029,000
Region 2	2,484,000
Region 3	83,000
Region 4	3,045,000

(USDA, Forest Service 2000a)

Because of the downturn in the domestic oil and gas industry, the amount of NFS lands under oil and gas lease dropped from about 35 million acres in the mid-1980s to about 5 million acres today. However, United States consumption of natural gas has increased

<sup>1</sup> For this table, the area of oil and gas potential is bounded on the south by 35°-north latitude, on the north by 49°-north latitude, on the west by 112°-west longitude, and on the east by 100°-west longitude. Areas of oil and gas potential were delineated by Bruce Ramsey, USFS Minerals & Geology Management Staff, Washington, DC.

14% between 1992 and 1998 and is projected to increase an additional 32% by 2010 (National Petroleum Council 1999). This increased consumption and recent technological advances have caused a significant increase of interest in development of coal bed methane. Current interest is focused on the Powder River Basin of Wyoming and Montana. Other areas may have coal bed methane resources, including the Dakota Prairie Grasslands. Their acreages are included in Table 1.

Oil and gas lease sales are scheduled on a regular basis for those NFS lands where there is interest in leasing and environmental analyses have been completed. Since 1992, more than 30 environmental impact statements have been completed for NFS lands where there is current industry interest. Remaining to be completed are the Los Padres National Forest, parts of the Custer National Forest, and several areas on the Bridger-Teton National Forest. The records of decision for these environmental impact statements did concur with some leasing in inventoried roadless areas. For example, the Grand Mesa, Uncompahgre, and Gunnison (GMUG) National Forests issued a record of decision that concurred with leasing approximately 171,500 acres of inventoried roadless areas under standard lease terms (USDA Forest Service 1993). Also, field information gathered during the analysis for the Interim Roads Policy indicated that 334,000 acres within inventoried roadless areas were scheduled for lease auction on the Beaverhead-Deerlodge, Custer, San Juan-Rio Grande, White River, Bridger-Teton, Manti-La-Sal, and Monongahela National Forests (USDA Forest Service 1999).

In August 2000, the Targhee National Forest released its decision for oil and gas leasing on the forest. Some large blocks of land with a high development potential are located within inventoried roadless areas and would be made available for leasing with no-surface occupancy stipulations (Robison 2000a, USDA Forest Service 2000b).

The Los Padres National Forest, the only forest in Region 5 with appreciable oil and gas reserves, is about to release a draft EIS for oil and gas leasing on the forest. Its Reasonable Foreseeable Development scenario (RFD) identified five areas on the forest as having high potential for oil and gas development. These areas comprise 222,000 acres (12.5% of the forest), some of which are in Wilderness or otherwise withdrawn from mineral leasing. A total of 21.4 million barrels of oil is estimated to occur in these high potential areas and, consequently, they are the most likely to have industry interest for leasing. The Cuyama high potential area is the largest high potential area. It is comprised of about 85,000 acres, and estimated to contain 18 million barrels (84% of the total estimated reserves in high potential areas). Nearly all of the Cuyama high potential area is within inventoried roadless areas (Riddle 2000, Derby 2000).

*Coal* – Federally owned coal plays a major role in the energy supply of the United States. Large reserves of low-sulfur coal are located in Wyoming, Utah, Montana, Colorado, and New Mexico, where the Federal government owns the rights to the majority of coal reserves (USGS 1998). USGS estimates that approximately 60% of the area underlain by coal-bearing rocks in the conterminous United States is under Federal surface.

Considerable quantities of coal, on the order of 30 billion tons of minable coal, are located in National Forests and National Grasslands (USGS 1995). Coal produced from Federal leases has tripled from about 12% of the total U.S. production in 1976 to almost 34% in 1995. The reason for this increase is demand for low-sulfur coal for use in power

plants and the fact that large reserves of this low-sulfur coal are in the western interior U.S., where the Federal government owns the rights to most of the coal reserves (USGS 1997). Currently, 57.3% of United States electric power is generated from coal (National Mining Association 1999). Domestic demand and consumption of coal will continue to increase. Because of its low-sulfur and high air quality-compliance status, western interior U.S. coal will be increasingly relied upon to meet future demand.

There are approximately 2,539,000 acres of coal-bearing rocks (geologic formations of known coal-bearing potential) within inventoried roadless areas (USDA, Forest Service 2000c). Of this, it is important to note that approximately 308,000 acres (12%) are in Region 1, approximately 886,000 acres (35%) are in Region 2, and approximately 1,171,000 acres (46%) are in Region 4. Together, these three Regions contain approximately 93% of the total acres of coal-bearing rocks in inventoried roadless areas. Each of the remaining Regions contain one-sixth or less of the acres given for Region 1. There are no known significant occurrences of coal within the National Forests of Alaska (USGS 1995).

Table 2 depicts acres not currently leased in inventoried roadless areas containing known coal reserves or resources near or adjacent to active mines. Some of these reserves or resources would likely be developed within the next 5 years if offered for lease. Other inventoried roadless areas contain coal resources; however, they are not listed because the extent of the resource is not known and there is no demonstrated industry interest in these areas (or in some cases, their development is precluded by the Surface Mining Control and Reclamation Act of 1977 [PL 95-87, as amended]).

**Table 2. Known coal resources or reserves in inventoried roadless areas by forest.**

<b>National forest</b>	<b>Mining method</b>	<b>Inventoried roadless area acres not leased</b>	<b>Estimated resources/recoverable reserves (million tons)</b>
Grand Mesa- Uncompaghre Gunnison	Underground	47,400	237 - 1, 300
Manti La-Sal	Underground	13,800	71

(USDA Forest Service 2000d)

The mining of coal from inventoried roadless areas is not extensive, but there are two National Forests with active mining. In March 2000, the GMUG National Forests consented to lease approximately 500 acres within an inventoried roadless area for development of coal resources by underground methods (USDA Forest Service 2000e). In addition, the forest received an application for coal lease modification encompassing approximately 300 acres within inventoried roadless areas, also to be mined using underground methods. Access for this new mining would be from existing underground mines, not surface roads on NFS lands (Mattson 2000).

On the Manti-La Sal National Forest, three potential coal tracts remain on the Wasatch Plateau that total 36,200 acres and contain recoverable reserves of 185 million tons of high-BTU bituminous coal; however, none of these tracts have been leased. Approximately 40% of these reserves are within inventoried roadless areas (Table 2).

One tract would require full development of an underground mine (i.e., transportation and portal facilities) within an inventoried roadless area; surface development of another could be done outside of inventoried roadless. The third tract could be developed from an adjacent underground mine. However, development of the three tracts would depend on the ability to conduct both pre-lease exploration drilling and post-lease development drilling. Included in the above figures are approximately 22 million tons of recoverable coal reserves within inventoried roadless areas that were transferred to the State of Utah School and Institutional Trust Lands Administration (SITLA) under the Utah Schools and Lands Exchange Act of 1998 (PL 105-335) (Reed 2000). They would be considered outstanding rights.

Additional discussion of the coal situation on the Manti-La Sal and Grand Mesa, Uncompaghe, Gunnison National Forests is included in the Socio-Economic Specialist Report.

*Phosphate* – Table 3 depicts known phosphate resources on the Caribou-Targhee National Forest in inventoried roadless areas adjacent to active mines. Some of these resources would likely be developed within the next 5 years if offered for lease. There are other inventoried roadless areas containing phosphate resources; however, they are not listed because the extent of the resources is not known and there is no demonstrated industry interest in those areas.

**Table 3. Known phosphate resources in inventoried roadless areas by forest.**

National forest	Mining method	Inventoried roadless areas acres not leased	Estimated resource (million tons)
Caribou	Surface	7,939	873.3 <sup>2</sup>

(USDA Forest Service 2000f)

Currently, the Caribou-Targhee National Forest has 46 phosphate leases affecting 23,843 acres of NFS lands. Of these, approximately 6,282 acres are within inventoried roadless areas. In addition, 7,939 acres of inventoried roadless areas have been identified as Known Phosphate Lease Areas (KPLA), a U.S. Geological Survey designation to identify lands known to contain phosphate deposits and, thus, subject to competitive leasing. Over 1,000 acres in inventoried roadless areas are included in pending lease modifications (to be mined by surface methods), exploration licenses, and prospecting permits that could result in additional lease acreage (Robison 2000b).

### *Salable Minerals*

Salable minerals are common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. Generally, they are widespread and of low value, primarily used for construction or landscaping materials. Their value is dependent upon market factors, quality of the material, and availability of transportation.

The Forest Service is the principal user of material from borrow pits on NFS lands. The Agency develops borrow pits to obtain surfacing material for construction and

<sup>2</sup> Based on Caribou-Targhee Forest Geologist's estimate of 110,000 tons/acre (Robison 2000c).

maintenance of forest system roads. Other Federal agencies, State and local governments, and non-profit organizations may obtain free use permits for these materials for public projects. The public may purchase these materials from the Forest Service. Disposal of these resources is at the sole discretion of the Forest Service and subject to the provisions of 36 CFR 228, Subpart C.

### *Abandoned and Inactive Mines*

Abandoned mines, oil and gas wells, quarries, and other mineral sites that pose human health, environmental or safety risks and may exist in inventoried roadless areas and may require some type of reclamation or mitigation. If they do exist and are releasing, or have the potential to release, a hazardous substance, they would require some type of response action under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (P.L. 96-510, Stat. 2767; 42 U.S.C. 9601, 9603, 9607, 9620) (CERCLA) (USDA Office of Inspector General 1996). This act addresses emergency response, site remediation and spill prevention. The Forest Service has authority for CERCLA enforcement on NFS lands under Executive Order 12580, sec. 2(j). An Engineering Evaluation/Cost Analysis (EE/CA) or remedial investigation/feasibility study (RI/FS) would include provisions for proposed road construction required for CERCLA response actions, consistent with the National Contingency Plan, 40 CFR Part 300.

Also, inventoried roadless areas may contain sites that require some type of reclamation to resolve violations of the Clean Water Act (USDA Office of Inspector General 1996).

### *Geological and Paleontological Resources*

Paleontological resources are recognized as important both for their scientific and natural resource values and in terms of the active protection required in their management. Identification of fossil resource probability in an area and the appropriate management prescriptions is accomplished in the land management planning process. The Probable Fossil Yield Classification (PFYQ) is a planning tool wherein geological units, usually at the formation or member level, are classified according to the probability of yielding paleontological resources that are of concern to land managers. This classification is based largely on how likely a geologic unit is to produce vertebrate fossils of terrestrial origin. Management prescriptions are generally based upon scientific significance of a specimen and sensitivity ranking of a locality. Existing policies regulate the collection and disposition of vertebrate but usually not invertebrate or plant fossils (Kuizon 2000).

The Forest Service only recently began to inventory paleontological resources on NFS lands for purposes of land and resource management planning (Kuizon 2000). The first efforts are now underway on the Dakota National Grasslands, the Caribou-Targhee National Forest, and the Manti-LaSal National Forest (Kuizon 2000, Robison 2000a).

Generally, NFS lands are available for collecting rocks and minerals, except on lands withdrawn to prohibit these activities.

Geologic processes such as landslides, earthquakes, or volcanic hazards affect peoples' lives. To enhance public understanding and appreciation of them, the Forest Service

develops interpretive sites to highlight examples of them. This has been done on numerous forests throughout the country, notably on the Deschutes and the Gifford Pinchot National Forests.

Karst and cave resources can be expected to occur on NFS lands underlain by limestone or marble or areas having exposed basaltic flows. Some of the values associated with karst and cave resources are their ability to store and transmit groundwater, their importance as subterranean wildlife habitats, their importance as cultural resource or paleontological sites, and their ability to provide interpretive sites or recreational opportunities for spelunkers or cavers. They can also present hazards, such as sinkholes, to resource use and development.

Road construction or reconstruction activities and other developments are sources of sediment, debris, and other pollutants that, when entering karst or cave systems can damage them and their associated resources.

## **Assumptions**

- A lack of roads, as they were defined in the criteria for identifying inventoried roadless areas, should not necessarily imply that all inventoried roadless areas have little or no prospective value for containing valuable mineral deposits. Roads generally constructed for mineral prospecting activities are temporary in nature and, therefore, not forest system roads.
- The trend of decreasing exploration and development of domestic mineral resources appears to be a function of fluctuating commodity prices, higher environmental and permitting costs associated with domestic mineral resource development, declining accessibility to domestic mineral resources, and apparent lack of general public support for mineral resource development on federal lands.

## **Information Used**

Information used in this analysis came from two main sources:

- Agency sources, such as national databases and personnel at the national level, regional level, and forest level.
- Other than agency sources, such as the U.S. Geological Survey and Dept. of Energy publications and databases, USDI Bureau of Land Management personal communications, National Mining Association, etc.

## **Methodology**

Each of the Roadless Area Conservation proposal action alternatives was observed to have the same effect on minerals and geology resources. Each would prohibit road

construction or reconstruction except where a road is needed pursuant to reserved or outstanding rights or as provided for by statute or treaty. Therefore, each alternative would prohibit road construction or reconstruction for all minerals and geology activities except those necessary for exploration or development of locatable mineral resources or leasable mineral resources within existing leases. Thus, for purposes of minerals and geology, all action alternatives were analyzed as though they were one alternative.

Similarly, only one of the social and economic mitigation measures was determined to have an effect on minerals and geology resources. Thus, for purposes of minerals and geology, the exception for where a road is needed for prospective mineral leasing activities in inventoried roadless areas was the only mitigation measure analyzed.

The Tongass National Forest was considered as part of NFS lands in this analysis. The Tongass Not Exempt and the Tongass Selected Areas alternatives would provide an exception to allow road construction or reconstruction necessary for exploration or development of locatable mineral resources or leasable mineral resources within existing leases. The Tongass Exempt alternative would have the same effect as the No Action alternative. The effects of the Tongass Deferred alternative would be analyzed as part of the 5-year review of the 1999 Tongass Land Management Plan.

## Results

### Alternative 1 – No Action

#### *Locatable Minerals*

All proposals for locatable mineral exploration or development would be subject to the planning and design requirements governing locatable minerals in 36 CFR 228, Subpart A. If proposed activities cause significant disturbance to NFS surface resources, a Plan of Operations would be required of the mining operator, and the appropriate level of analysis of environmental effects would be conducted under NEPA. An EIS would likely be required for proposed activities that would substantially alter the undeveloped character of an inventoried roadless area of 5,000 acres or more. Otherwise, proposed activities affecting inventoried roadless areas would be considered extraordinary circumstances [FSH 1909.15,30.3(2)(e)], and would require at least the preparation of an environmental assessment. The plan of operations would be approved subject to modifications identified in the environmental analysis and would be binding on the operator.

Under this alternative, an estimated 61 miles of road construction or reconstruction for locatable minerals would occur in inventoried roadless areas during the next 5 years. This same rate of mineral exploration and development was assumed for future decades since we have little information that would lead to higher or lower expectations for development.

### *Leasable Minerals*

Management of leasable mineral resources in inventoried roadless areas would not change from the way they are currently managed. Environmental impact statements are expected to be prepared for leasing decisions in these areas. Areas with management prescriptions that prohibit construction or reconstruction of roads either may not be leased or may be leased with a no-surface occupancy stipulation. Areas with management prescriptions that allow road construction or reconstruction may be leased subject to standard lease terms and any other supplemental stipulations deemed appropriate and necessary by the Forest Service.

Overall, an estimated 103 miles of road construction or reconstruction in inventoried roadless areas over the next 5 years would occur for exploration or development within existing leases. An additional 59 miles of road construction or reconstruction would occur outside of existing leases in inventoried roadless areas over the next 5 years.

### *Salable Minerals*

The Forest Service would have no need to develop future sites in inventoried roadless areas except as incidental to new road construction or reconstruction. This alternative would not depend on or require the Forest Service to use salable minerals from inventoried roadless areas. There would not likely be an interest in development of material sites in inventoried roadless areas by others because inventoried roadless areas are generally remote to the areas of intended use and would not be cost-effective to develop. Generally, other sources of similar material are available outside inventoried roadless areas.

### *Abandoned and Inactive Mines*

Management of abandoned and inactive mines would not change from what is described above in the affected environment. Forests have identified 42 abandoned mine land projects, within inventoried roadless areas, that would require approximately 21 miles of road construction or reconstruction to meet reclamation objectives.

### *Geological and Paleontological Resources*

Management of geological and paleontological resources would not change from what is described above in the affected environment. Access would depend on whether land management prescriptions prohibit construction or reconstruction of roads in inventoried roadless areas. Access may be affected in those areas with management prescriptions that currently do not allow road construction or reconstruction.

## Alternatives 2 through 4

### *Locatable Minerals*

Construction or reconstruction of roads for locatable mineral exploration or development would be considered a part of the right of access provided by the General Mining Law. Therefore, locatable mineral exploration and development would be excepted from the prohibition of road construction or reconstruction and not affected by the alternatives. The effects on locatable mineral exploration and development are the same as for Alternative 1.

There were several public comments referring to the Roadless Area Conservation proposal as a mineral withdrawal. Mineral withdrawals would involve further public notice and more specific analysis. Mineral withdrawals are not proposed in any of the alternatives.

### *Leasable Minerals*

The prohibition alternatives would not directly prohibit mineral leasing in inventoried roadless areas; but would prohibit construction or reconstruction of roads associated with future leasing. Proposals for exploration or development of leasable minerals using existing roads or not requiring use of roads may be allowed within inventoried roadless areas. Construction or reconstruction of roads that are reasonable and necessary for development of existing energy or mineral leases, for access to existing energy or mineral leases, and for access to associated product conveyance lines would be allowed, as necessary. When existing leases expire, any renewals would have to be considered in light of the prohibition directed by these alternatives. This applies to any modifications of existing leases, as well. Prohibition of road construction or reconstruction in inventoried roadless areas may influence reanalysis of lands available for lease when forest and grassland plans are revised or amended.

The prohibition of road construction or reconstruction would restrict or preclude the opportunity for exploration or development of presently undiscovered leasable mineral resources in inventoried roadless areas.

*Oil and Gas* -- Alternatives 2 through 4 could affect exploration and possible development of five high potential oil and gas areas on the Los Padres National Forest. The prohibitions could preclude possible future development of up to an estimated 21.4 million barrels of oil on Forest. In the Rocky Mountain Area, up to an estimated 7,641,000 acres of inventoried roadless areas with varying levels of potential to contain oil and gas would be affected by Alternatives 2 through 4. Consequently, any exploration for or development of these resources would likely be restricted and possibly precluded in some areas. The GMUG National Forests would be required to review for conformance to the prohibition alternatives its 1993 decision to allow leasing of oil and gas on approximately 171,500 acres of inventoried roadless areas within the Forest. Plans to auction for lease 334,000 acres within inventoried roadless areas on the Beaverhead-Deerlodge, Custer, San Juan-Rio Grande, White River, Bridger-Teton, Manti-La Sal, and Monongahela National Forests would also require review for conformance with the prohibition alternatives. The outcome of these reviews would likely include a recommendation of no-surface occupancy stipulations in inventoried roadless areas without present access, yet still feasible to develop, and no USFS consent to lease in areas without present access and not feasible to develop without road construction or reconstruction.

In cases where oil or natural gas resources in inventoried roadless areas cannot be developed because of the prohibition alternatives and are likely to be drained by wells on adjacent non-federal lands, the recourse is to lease them with no-surface occupancy stipulations and recover them by off-site directional drilling methods. When this is not technically and economically feasible and minimum drill-spacing requirements are being observed in resource recovery, the federal government cannot recover the value of the resources being drained.

*Coal* -- Alternatives 2 through 4 would affect up to an estimated 2,539,000 acres of inventoried roadless areas with various levels of potential to contain coal resources. Consequently, exploration for or possible development of this resource would likely be restricted to some degree and possibly precluded in some areas. The GMUG National Forests' recent consent to lease 500 acres for underground coal development within inventoried roadless areas was conditioned on the outcome of the Roadless Area Conservation proposal. If road construction or reconstruction are necessary for mining of the coal (i.e., construction of required ventilation shafts), development would likely be restricted, or possibly precluded. The same applies to a proposed 300-acre coal lease modification on the Forest. Recovery of coal reserves within the three tracts identified on the Manti-La Sal National Forest would be affected by Alternatives 2 through 4. On one tract, the prohibition alternatives could preclude construction of the portal and transportation facilities; thus, they could preclude development of 135 million tons of recoverable coal reserves within the entire tract. However, these facilities would be necessary for development of the 22 million tons of SITLA recoverable coal reserves within the tract, an outstanding right and excepted from the prohibition alternatives. On all three tracts, the prohibition alternatives could affect pre-lease exploration drilling, post-lease development drilling, and construction of ventilation shafts; thus increasing costs and probably lowering the bonus bids for the three parcels if and when they are leased.

*Phosphate* -- On the Caribou-Targhee National Forest, there are 7,939 unleased acres designated as Known Phosphate Lease Areas (KPLA) within inventoried roadless areas that would probably be affected by Alternatives 2 through 4 (Table 3). Because development of new phosphate surface mines or expansion of existing phosphate surface mines would require construction or reconstruction of roads in inventoried roadless areas on the Forest, leasing would probably be denied, thus precluding development of an estimated 873.3 million tons of phosphate resource (see the Socio-Economic Specialist Report for further discussion of the effects).

Some areas will not be affected by the prohibitions. These include forests and grasslands within the Powder River Basin area of coal bed methane potential area and any reasonably foreseeable future leases areas for lead mining in the Mark Twain National Forest because there are no inventoried roadless areas in those existing or potential lease areas.

### *Salable Minerals*

For the same reasons discussed in Alternative 1, there would not likely be an interest in development of material sites in inventoried roadless areas by others. The effects of Alternatives 2 through 4 are the same as those for Alternative 1; consequently, there are no anticipated effects to salable minerals because of the prohibition alternatives.

### *Abandoned and Inactive Mines*

An exception to these alternatives provides for the construction or reconstruction of roads needed to conduct a response action under CERCLA or to conduct a natural resource restoration action under CERCLA, Oil, and Hazardous Substance Liability – Sec. 311 of the Clean Water Act, or the Oil Pollution Act.

These alternatives would not change the Agency's response to CERCLA violations at abandoned mines, oil and gas wells, quarries, and other mineral sites. Construction or reconstruction of any necessary temporary roads for this activity would be excepted from the prohibition alternatives.

### *Geological and Paleontological Resources*

Roads provide access to paleontological sites for purposes of research, restoration, teaching, and interpretation. By making these sites accessible, it is possible to raise public awareness and help protect resource values. Alternatively, by making sites accessible to the public, roads can provide increased opportunities for vandalism or unauthorized removal of paleontological resources, especially now when some specimens are commanding record high prices by collectors (Flynn 2000). The discovery of significant vertebrate fossil sites and collecting sites for rocks, minerals, and invertebrate and plant fossils usually occurs in areas having roaded access. Although other forms of access may be used (i.e., off-road vehicles, helicopters, etc), Alternatives 2 through 4 could reduce the possibility for discovery of new sites and subsequent efforts to locate, interpret, remove, and preserve vertebrate fossils from erosion or corrosion by natural elements. Alternatively, prohibiting road access to undiscovered vertebrate fossil sites could lessen

the possibility of vandalism or unauthorized removal of fossils. Overall, these alternatives are not likely to adversely, or favorably, affect paleontological resources and activities associated with management of these resources.

Opportunities for development of interpretive sites for unique geologic features or paleontological resources, when dependent on road construction or reconstruction for site access, would not be achieved under Alternatives 2 through 4.

Alternatives 2 through 4 could reduce potential damage to karst and cave systems in roadless areas from sedimentation, debris, and other pollutants associated with roads, as well as vandalism or unauthorized removal of speleothems or other valuable cave features. Consequently, the functions of karst systems and the protection of cave resources would be maintained.

## **Effects of Social and Economic Mitigation**

A social and economic mitigation measure could be applied to any of the action alternatives that would allow the responsible official to authorize road construction or reconstruction where a road is needed for prospective mineral leasing activities in inventoried roadless areas. If this mitigation measure were selected as a part of the proposed action, the effects of the action alternatives on leasable minerals described above would not apply. Decisions to lease would be made on a case-by-case basis after completion of environmental analyses. Construction or reconstruction of roads, where no other feasible alternatives exist, would be allowed as necessary for access to all mineral leases and for access to associated product conveyance lines. The effects of this mitigation on mineral development are discussed in the Specialist Report for Energy and Non Energy Minerals. Also, additional discussion of these effects can be found in the National Forest System Roads Specialist Report.

## **Other Indirect and Cumulative Effects**

The action alternatives 2 through 4 would limit leasable mineral and salable mineral exploration and development opportunities in inventoried roadless areas and increase their costs. This could contribute to a greater reliance on some mineral resources from abroad where foreign political and economic influences would factor into their price and availability.

A reduction in the potential for leasable and salable mineral development may reduce revenues or production royalties to Federal, State, and local governments. For further discussion, see the Socio-Economic Specialist Report.

## **Conclusions**

Under the prohibition alternatives, road construction or reconstruction would be allowed when necessary for locatable mineral activities and leasable mineral activities on existing leases; it would be prohibited for all other minerals and geology activities. This would require several forests to review earlier decisions to allow oil and gas leasing in inventoried roadless areas to assure conformance with the Roadless Area Conservation proposal. It could affect future leasing of five high-potential oil and gas areas on the Los Padres National Forest, future leasing of up to an estimated 7,641,000 acres of inventoried roadless areas with varying levels of potential to contain oil and gas in the Rocky Mountain Area, future leasing of known phosphate resources on the Caribou-Targhee National Forest, and future leasing of known coal resources on the GMUG National Forests.

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