The Mineral Potential of Lands Proposed for Wilderness Classification by the Roadless Area Review and Evaluation Program (RARE II) of the U.S. Forest Service

Earl H. Bennett
Mary P. Gaston
THE MINERAL POTENTIAL OF LANDS PROPOSED FOR WILDERNESS
CLASSIFICATION BY THE ROADLESS AREA REVIEW AND EVALUATION PROGRAM
(RARE II) OF THE U. S. FOREST SERVICE

Earl H. Bennett
Mary P. Gaston
LIST OF REPORTS

The Mineral Potential of Lands Proposed for Wilderness Classification by the Roadless Area Review and Evaluation Program (RARE II) of the U. S. Forest Service, by Earl H. Bennett and Mary P. Gaston.


This report is a follow-up study to two other reports prepared by the Idaho Bureau of Mines and Geology concerning the mineral potential of the RARE II areas in Idaho. The previous studies are included in Appendices A and B and contain background information and mineral potential evaluation data for many of the RARE II areas.

The final U. S. Forest Service recommendations for classification of the RARE II areas are complete (U. S. Forest Service, 1979). Figure 1 shows most of the areas in Idaho that were recommended for classification as wilderness. The mineral potential of these areas, as suggested by the U. S. Geological Survey (1978), the mineral belts that cover the area, and the location of significant recent exploration are also shown in Figure 1. Figure 2 shows the overlap of the mining district

1Idaho Bureau of Mines and Geology, Moscow, Idaho 83843.
boundaries with the proposed wilderness areas. A summation of the mineral potential for the 32 proposed wilderness areas in Idaho is presented in Table 1. Ratings of mineral potential by the USFS (1979) and the USGS (1978) as well as a listing of mining districts with significant production that coincide with the areas are included in the table.

Most of the proposed wilderness areas are contiguous to or interconnect existing wilderness and primitive areas in the central part of the state (Figure 1). This is ideal for surface management; however, it may be disastrous for mineral exploration. The Idaho Primitive Area is thought of by many people as the prime example of wilderness. Many have forgotten or never realized that a high potential exists for significant mineralization in large parts of this vast area (Appendix A, p. 16-18). A similar situation exists in the Selway-Bitterroot wilderness area that is only now being examined by the USGS. If one remembers that several of the additional proposed wilderness areas listed on Table 1 are close to or are themselves high potential areas, then the data in Table 1 becomes significant.

The proposed wilderness areas in Table 1, with high potential areas listed first, are ranked according to mineral potential as determined by the USGS (1978). The first six of these areas are given a very high rating for hard rock minerals by the USFS, and all or parts of these six areas are given a high potential rating by the USGS.

Of major concern to many geologists is the inclusion of the first area, Pinnacle Peak (04454). This area, is just north of Stibnite. The mines around Stibnite are being investigated by Canadian Superior
Figure 1. The mineral potential of areas recommended for wilderness classification by the RARE II study (mineral potential adapted from U. S. Geological Survey, 1978).
Figure 2. Mining districts covering the areas recommended for wilderness classification by the RARE II study.
### Table 1. Mineral potential of the 32 areas recommended for wilderness classification based on the final recommendation of the Roadless Area Review and Evaluation Program (RARE II) of the U. S. Forest Service (1979).

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Area Name</th>
<th>U. S. Forest Service Rating</th>
<th>USGS Mineral Potential</th>
<th>Mining District</th>
<th>District Production</th>
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<td>Pinnacle Peak</td>
<td>100</td>
<td>0</td>
<td>99</td>
<td>100%H</td>
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<tr>
<td>14555</td>
<td>So. Boise River - Yuba River</td>
<td>99</td>
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<td>78</td>
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<tr>
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<td>McEleny</td>
<td>95</td>
<td>0</td>
<td>52</td>
<td>2</td>
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<tr>
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<td>sulphur</td>
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<td>West Panther Creek</td>
<td>81</td>
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<tr>
<td>A1981</td>
<td>Salmo - Priest</td>
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<td>71</td>
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<td>0</td>
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<td>M1845</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>01846</td>
<td>Middle Bargemin</td>
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<tr>
<td>E4921</td>
<td>Gospel Hump</td>
<td>96</td>
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<td>Needles (east)</td>
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<td>Tumble (East)</td>
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<td>Meadow Creek</td>
<td>94</td>
<td>94</td>
<td>50</td>
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<tr>
<td>04455</td>
<td>Italian Peaks (middle)</td>
<td>97</td>
<td>70</td>
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<tr>
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<td>Li $\ddagger$ Creek</td>
<td>95</td>
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<td>Worm Creek</td>
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<td>Borah Peak</td>
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<td>0</td>
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<tr>
<td>A1662</td>
<td>Scotchman Peak</td>
<td>70</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>L4685</td>
<td>Steel Mountain</td>
<td>50</td>
<td>0</td>
<td>50</td>
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1. Numerical ratings from -1 (no potential) to 100 (high potential) from U. S. Forest Service, 1979.
3. Based on best available estimates. District production figures for gold converted to Sept., 1978 price of $215/oz. Figures adapted from Table 1 IBMG Special Report (Appendix B).
4. Value of antimony at current prices. Mines also produced in excess of 10,000 oz./gold.
5. Estimated value of reserves in the Blackbird mine as of mid 1977 based on a cobalt price of $5.00/oz. Current price is near $25.00/oz. The mine has produced over $3,000,000 in gold and $36,000,000 of cobalt/copper in the past.
for the possible production of gold. The company has successfully tested a pilot plant for cyanide heap leaching at Stibnite. This mining district produced 310,000 ounces of gold for a net worth of $77,500,000 at the current price of $250.00 per ounce. The area also contains the largest antimony resource known in the United States with a reserve estimated in 1950 at 34,500 tons for a value of $88,320,000 based on the current price ($1.28 per pound). The Pinnacle Peak area has a high potential for containing similar deposits.

The Panther Creek (west) area (W4504) ranks eighth on the list, but it should be noted that approximately 45 percent of the area in the eastern part of this section is given a high potential rating by the USGS. A recent study by the IBMG (Pamphlet 167, 1977) shows that the eastern part of W4504 does contain a potential for cobalt/copper mineralization similar to the Blackbird Mine area just east of the wilderness boundary. In the original RARE II studies, the Blackbird Mine area was included in the Panther Creek section but was removed when its potential was recognized. The skyrocketing value of cobalt has put the Blackbird Mine in the billion dollar range based on known and suspected reserves. The potential of the area just west of the mine should not be underestimated and should likewise be removed from wilderness status for the following reasons, as explained in a letter from IBMG to Sen. James McClure of Idaho in February 1979:

Noranda, Inc., a large Canadian-owned mining company, is studying the feasibility of reopening the Blackbird Mine with a distinct possibility of starting production in 1981. The mine is currently owned by Hannah Mining Company.
Representatives of Noranda met with state officials several weeks ago in January 1979 in Boise to find out what permits will be needed to open the mine. If Noranda goes into production, the operation will be strictly underground (no open pit) and will probably employ around two hundred people.

The recent interest in the cobalt area by many companies is due to the spectacular price increase of this metal. Cobalt went from $6.50 per pound to over $20.00 per pound during 1978 and has continued to increase in early 1979 to around $25.00 per pound. The lack of adequate supply from South Africa is the main reason for the increase.

The importance of Idaho's cobalt deposits cannot be overemphasized. They are the only readily available supply of this strategically critical metal within the domestic United States. Mining ceased at the Blackbird Mine in the early 1960's because of low metal prices and metallurgical problems with the ore. Noranda now feels that it has these metallurgical problems solved.

There are some rather severe environmental problems at the Blackbird Mine left over from the old operations. The only way that this mess will be cleaned up is if a large company using modern methods comes into the area. Noranda is well aware of the problems and will improve the quality of Blackbird Creek and the surrounding area if they go into production.

Another fairly large copper/cobalt deposit is located approximately 15 air miles southeast of the Blackbird Mine on Iron Creek. Noranda apparently has an option on this property also and reportedly staked 1,000 claims last summer connecting the Iron Creek and Blackbird properties. I don't think that they have any plans at present for developing the Iron Creek property. If Noranda goes into production, it will be good for the country and Lemhi County and will clean up the environmental mess on Blackbird Creek.

The known potential for the Stibnite and Blackbird Mine areas must be carefully considered when the classification of the RARE II areas is completed. The high potential for mineralization of other areas including South Fork of the Boise River-Yuba River (I4554), McEleny (0505), and parts of Sulphur (E4066, I4066), Camas Creek (W4202), Pioneer Mountains (N4201), and the Gospel-Hump (E4921) is more difficult to substantiate but is in no way less important than Pinnacle Peak or Panther Creek (west). Note that most of these areas with a high
potential are contained within known "mineral belts." These belts are corridors that contain significant mineralization. The areas noted as having a high potential by the USGS and the USFS may contain significant ore deposits that may eventually be critical to this country's future.

Metallic minerals are not the only commodities that may be present in these critical areas. Several areas including Lick Creek (M4455), Worm Creek (I4179), and Meadow Creek (D1845) are given a high rating for potential deposits of uranium or oil and gas either of which is a critical element for our nation's economic survival. Utmost caution should be used before closing these areas to mineral entry.

The final recommendations of the IBMG are as follows:

1. Remove the Pinnacle Peak and the eastern part of the Panther Creek (west) area, which have a high mineral potential, from wilderness status and give very careful consideration to the other high potential areas including those for oil and gas or uranium.

2. Consult with USGS geologists about the other high potential areas. The USGS did prepare a map of the mineral potential in Idaho for all of the RARE II areas. Perhaps it could provide more specific information on the 32 critical areas under consideration for wilderness status. Some recent information such as the new aeromagnetic map of Idaho (Zietz and others, 1978) may reinforce the high mineral potential rating of some wilderness areas.

3. Be aware that the Idaho Primitive Area and other wilderness areas in the central part of the state may have high mineral potential. It may be more beneficial to have smaller
scattered wilderness areas that are known to contain little or no significant mineralization. These areas should only be considered for wilderness status after a thorough evaluation by the U. S. Geological Survey and the U. S. Bureau of Mines as required by the Wilderness Act of 1964. They should not be given a wilderness classification and then studied at a later date by these agencies.

BIBLIOGRAPHY


APPENDIX A

The Mineral Potential of Lands Proposed for Wilderness Classifications in Idaho with Emphasis on the Rare II Roadless Area

Earl H. Bennett
Mary P. Gaston
H. Theodore Smith
THE MINERAL POTENTIAL OF LANDS
PROPOSED FOR WILDERNESS CLASSIFICATION IN IDAHO
WITH EMPHASIS ON THE RARE II ROADLESS AREAS

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Mary P. Gaston
H. Theodore Smith

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THE MINERAL POTENTIAL OF LANDS
PROPOSED FOR WILDERNESS CLASSIFICATION IN IDAHO
WITH EMPHASIS ON THE RARE II ROADLESS AREAS

by
Earl H. Bennett, Mary P. Gaston, and H. Theodore Smith

INTRODUCTION

This report reviews the mineral potential of areas within Idaho that are being studied for possible inclusion in the Wilderness System by the Department of Agriculture, U. S. Forest Service. In particular, it examines the mineral potential of land in the Roadless Area Review and Evaluation program, RARE II.

Data on the mineral potential in Idaho have been collected from several published and unpublished studies and compilations that are now combined for the first time. It is unfortunate that more thorough studies cannot be conducted for each of the RARE II areas. However, the data as presented will show that if many of the RARE II areas are closed to mineral entry, such closures may have a drastic impact on the state and national mineral economy. A few short paragraphs are included at

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the beginning of this report to familiarize the reader with some background in mineral economics as related to land-use planning.

THE IMPORTANCE OF MINERALS IN THE U.S. ECONOMY

Without an abundant supply of minerals for energy and industrial production, the life-style and general economy of the United States would deteriorate alarmingly, and the position of the U.S. as the world's leading industrial nation would also be in jeopardy. Almost everything that we use in our daily lives and everything that has allowed us to form our industrial society is based on minerals. In 1972, for example, domestic raw materials valued at $32 billion were converted into energy and processed goods valued at over $150 billion. For that year these products formed the base for much of the gross national product of $1.1 trillion (Mining and Minerals Policy, 1973). Looking at it in another way, the total mineral production for the eleven contiguous western states plus Alaska from 1924-74 was $370 billion (Table 1). Total mineral production in the entire U.S. during the same 50-year period exceeded $2 trillion or about $10,000 for each person living in the United States (Task Force Report, 1977, p. 17).

HOW LONG WILL OUR MINERALS LAST?

Table 2 lists sixteen metals (Group 3) that are probably available as "estimated undiscovered resources" in quantities adequate to meet domestic needs for the next 25 years and the six metals (Group 4) that are probably not in adequate supply even in undiscovered ore bodies
Table 1.

Land used for mining except oil and gas (1930-71) and the cumulative value of raw mineral production (1924-74) in 1975 prices

<table>
<thead>
<tr>
<th>State</th>
<th>Total State Land Area (1,000 acres)</th>
<th>Area Used for Mining (1,000 acres)</th>
<th>Percent of Total</th>
<th>Mineral Lands Reclaimed (1,000 acres)</th>
<th>Value of Mineral Lands Production (billion dollars)</th>
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<td>.07</td>
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<td>Total U.S.</td>
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1Includes surface area actually excavated, used for disposal of overburden and waste, subsided or disturbed because of underground mining, used for disposal of underground mine waste, and used for disposal of mill or processing waste.

General outlook for domestic reserves and resources through 2000 A.D.

[Within each group commodities are listed in order of relative importance as determined by dollar value of U.S. primary demand in 1971. An asterisk marks those commodities which may be in much greater demand than is now projected because of known or potential new applications in the production of energy.]

**Group 3:** Estimated undiscovered (hypothetical and speculative) resources in quantities adequate to fulfill projected needs beyond 25 years and in quantities significantly greater than identified subeconomic resources; research efforts for these commodities should concentrate on geologic theory and exploration methods aimed at discovering new resources.

<table>
<thead>
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<th>Iron</th>
<th>*Copper</th>
<th>*Zinc</th>
<th>Gold</th>
<th>*Lead</th>
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<tr>
<td></td>
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<td>Tungsten</td>
<td>*Beryllium</td>
<td>*Cobalt</td>
<td>*Cadmium</td>
<td>*Bismuth</td>
<td>Selenium</td>
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</table>

**Group 4:** Identified subeconomic and undiscovered resources together in quantities probably not adequate to fulfill projected needs beyond the end of the century; research on possible new exploration targets, new types of deposits, and substitutes is necessary to relieve ultimate dependence on imports.

| Tin       | Asbestos | Chromium | *Antimony | *Mercury | *Tantalum |

Source: U. S. Geological Survey, 1976, p. 6, part of Table 2.
(USGS, 1976, p. 17). These two groups contain most of the essential and strategic metals that the U.S. needs to sustain its life-style and economy. Note that all are shown as adequate in "undiscovered" resources. This means that we will only have these minerals in the quantity needed in the future if we continue with constant exploration and development. Known domestic reserves of many strategic minerals represent only a few years' supply.

**HOW MUCH OF OUR MINERAL SUPPLY IS IMPORTED?**

Many people are unaware that the United States is highly dependent on foreign sources for some commodities. This lack of awareness was made painfully clear by the shock of U.S. citizens over the Arab oil embargo. The balance of payments deficit in the U.S. and the declining value of the dollar against foreign currencies are directly related to the United States' dependence on foreign oil and to the trade deficit in other commodities, including mineral imports and exports.

Unfortunately, foreign oil is not the only commodity imported by the U.S. From 50 to over 90 percent of many important metals are imported (Table 3). These metals include gold, silver, tungsten, nickel, aluminum, chromium, and platinum. One of the major sources for several of these metals is southern Africa, where political unrest could curtail the export of these commodities. At the present time, there are no known domestic sources that can provide these metals in the quantities required. Recycling, substituting one metal in place of another, or a technologic breakthrough in replacing a metal by other materials can help alleviate part of this reliance upon foreign imports, but these
Table 3.

Dependence of United States on foreign sources for some of its minerals

<table>
<thead>
<tr>
<th>A. Less than one-half imported from foreign sources:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
</tr>
<tr>
<td>Iron</td>
</tr>
<tr>
<td>Titanium (Ilmenite)</td>
</tr>
<tr>
<td>Lead</td>
</tr>
<tr>
<td>Silicon</td>
</tr>
<tr>
<td>Magnesium</td>
</tr>
<tr>
<td>Molybdenum</td>
</tr>
<tr>
<td>Vanadium</td>
</tr>
<tr>
<td>Antimony</td>
</tr>
<tr>
<td>Tellurium</td>
</tr>
<tr>
<td>Stone</td>
</tr>
<tr>
<td>Cement</td>
</tr>
<tr>
<td>Salt</td>
</tr>
<tr>
<td>Gypsum</td>
</tr>
<tr>
<td>Barite</td>
</tr>
<tr>
<td>Rare earths</td>
</tr>
<tr>
<td>Pumice</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. One-half to three-fourths imported from foreign sources:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc</td>
</tr>
<tr>
<td>Gold</td>
</tr>
<tr>
<td>Silver</td>
</tr>
<tr>
<td>Tungsten</td>
</tr>
<tr>
<td>Nickel</td>
</tr>
<tr>
<td>Cadmium</td>
</tr>
<tr>
<td>Selenium</td>
</tr>
<tr>
<td>Potassium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. More than three-fourths imported from foreign sources:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
</tr>
<tr>
<td>*Manganese</td>
</tr>
<tr>
<td>Platinum</td>
</tr>
<tr>
<td>Tin</td>
</tr>
<tr>
<td>*Cobalt</td>
</tr>
<tr>
<td>*Chromium</td>
</tr>
<tr>
<td>*Titanium (Rutile)</td>
</tr>
<tr>
<td>*Niobium</td>
</tr>
<tr>
<td>Tantalum</td>
</tr>
<tr>
<td>Bismuth</td>
</tr>
<tr>
<td>Fluorine</td>
</tr>
<tr>
<td>*Strontium</td>
</tr>
<tr>
<td>Asbestos</td>
</tr>
<tr>
<td>*Sheet mica</td>
</tr>
<tr>
<td>Mercury</td>
</tr>
</tbody>
</table>

*Commodities more than 90 percent imported.

alternatives cannot provide the metals that the U.S. will need for future orderly economic growth and security. Indeed, even a subsistence level at present day requirements may not be maintained. If at all possible, domestic sources of these metals should be located to help alleviate the dependence on foreign suppliers.

WHERE WILL WE FIND THE MINERALS FOR PRESENT AND FUTURE USE?

The federal government owns or manages approximately 762 million acres or about one-third of the land in the U.S. Almost one-half of this land is in Alaska, and 90 percent of the rest is in the 11 contiguous western states (Figure 1). In Idaho 64 percent of the land is federally controlled (Table 4). It is estimated that 85 percent of the mineral potential of this country is in the eleven western states and Alaska. Obviously in the years ahead, many of the new minerals must come from the western U.S.

HOW MUCH LAND IS USED FOR MINING?

There are 52,933,000 acres of land in Idaho. Of this, 41,300 acres, or 0.08 percent of the area of the entire state, are used for mining (Table 1). This 0.08 percent of the land produced $9.4 billion (1975 dollars) from 1924 to 1974 (Task Force Report, 1977, p. 17). A very small part of the U.S. has been disturbed by mining. Throughout the entire country less than 0.2 percent of the land has been used to provide the great mineral wealth upon which the nation's economy is based (Ohle, 1975, p. 6-14).
Table 4.
Federally owned land in 11 western states and Alaska as of June 30, 1971

<table>
<thead>
<tr>
<th>State</th>
<th>Federal Lands (millions of acres)</th>
<th>Percent of total area of State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>31.9</td>
<td>44.0</td>
</tr>
<tr>
<td>California</td>
<td>44.9</td>
<td>44.8</td>
</tr>
<tr>
<td>Colorado</td>
<td>23.9</td>
<td>36.0</td>
</tr>
<tr>
<td>Idaho</td>
<td>33.8</td>
<td>63.8</td>
</tr>
<tr>
<td>Montana</td>
<td>27.6</td>
<td>29.6</td>
</tr>
<tr>
<td>Nevada</td>
<td>60.8</td>
<td>86.5</td>
</tr>
<tr>
<td>New Mexico</td>
<td>26.0</td>
<td>33.5</td>
</tr>
<tr>
<td>Oregon</td>
<td>32.2</td>
<td>52.3</td>
</tr>
<tr>
<td>Utah</td>
<td>34.8</td>
<td>66.0</td>
</tr>
<tr>
<td>Washington</td>
<td>12.6</td>
<td>29.6</td>
</tr>
<tr>
<td>Wyoming</td>
<td>30.0</td>
<td>48.1</td>
</tr>
<tr>
<td><strong>Total in 11 Western States</strong></td>
<td><strong>358.5</strong></td>
<td></td>
</tr>
<tr>
<td>Alaska</td>
<td>353.5</td>
<td>96.7</td>
</tr>
</tbody>
</table>

HOW MUCH OF THE FEDERAL LANDS IN THE WEST ARE CLOSED TO MINERAL ENTRY?

Several studies have shown that, in one way or another, approximately two-thirds of the federal lands in the west are removed from, or have restrictions imposed upon, mineral exploration and development (Task Force Report, 1977, p. 47). As has been previously noted, a large portion of these lands are highly favorable for providing the minerals that the U.S. will need in the near future. A wide variety of federal lands, other than wilderness areas, are restricted, including Native lands, Military reservations, National Parks and Monuments, and many others. Major controversies concerning withdrawals from possible mineral entry have recently focused on the U. S. Forest Service-administered lands. The U. S. Forest Service (USFS) controls approximately 160.2 million acres throughout the U.S. (Figure 2). More controversy can be anticipated as the Bureau of Land Management (BLM) under the Organic Act of 1976 begins studying and classifying lands as the USFS has done. The BLM controls approximately 463.3 million acres in the U.S. On the basis of past events, large acreages may be expected to be withdrawn from mineral entry as these studies get under way.

WHY IS IT SO DIFFICULT TO EVALUATE THE MINERAL POTENTIAL OF AN AREA?

Minerals are difficult to inventory because they are buried beneath the ground and the surficial evidence of their existence may be nil or minimal. Unfortunately, most mineral deposits cannot be inventoried
Figure 2. Federal land ownership (Task Force Report, 1977, p. 37).
like trees, plants, and animals that can be easily counted. Minerals are site specific; they occur only in places where the geology is favorable for mineral deposition.

The proper geologic conditions for mineral deposition are also the proper geologic conditions that form mountains and other scenic landforms that, in turn, are often judged as having an esthetic or intrinsic value as wilderness areas. Not uncommonly, such value is judged differently by people with different interests.

Because most of the ore deposits that are exposed at the surface have been found by early prospectors, it is difficult and costly to find deeper, hidden mineral resources. Exploration today requires more sophisticated techniques that use geochemistry, geophysics, geology, and remote sensing. Important discoveries still require a great deal of luck.

Mineral deposits are unique geologic occurrences requiring a concentration of elements many times the amount normally widely disseminated in the earth's crust. It takes 60 times the concentration of copper and 3,500 times the normal concentration of gold to make a mineral deposit of potential value (Ohle, 1975, p. 614). Even when this degree of concentration occurs, the deposit must be large enough to constitute ample reserves for economic development. The exploration geologist does not, unfortunately, find a mineable ore body at every site of mineralization. It is estimated that only one in a thousand prospects has the potential to become a mine.

Minerals are nonrenewable; a hillside cannot be "planted" with copper crystals to "grow" a new mineable copper deposit. Therefore, before an ore body is depleted, it is vital that continual exploration
be conducted to locate new ore resources. Otherwise the production of strategic minerals could be disrupted.

A statement that is frequently heard from advocates for wilderness areas is that we can get the minerals from areas that are designated as wilderness if and when we need them. Unfortunately, this is far from the truth. By the time a mineral shortage becomes critical, it may be too late to do anything about it because of the "lag time" between finding the ore body and then developing it. Examples are as follows:

a. Copper Range in White Pine, Michigan, was first discovered in 1929. Production started in 1955 at an initial investment of $61.7 million.

b. The Henderson-molybdenum deposit in Colorado required eight years to develop at a cost of $250 million.

The ultimate problem with any type of mineral inventory that relies on surface data alone is that it is impossible to tell what lies below the surface without some type of direct observation, for example, in core samples from a diamond drilling program. Drilling is the most objective way to determine the presence or absence of ore.

WILDERNESS IN IDAHO--A BRIEF HISTORY

The history of classification and withdrawal from mineral entry of federally administered, high-potential mineral lands in Idaho is shown in Figure 3:A-D. The original areas proposed for wilderness classification include the Idaho Primitive Area (designated primitive in the 1930's), the Salmon River Breaks Primitive Area (combined acreage 1.5 million acres), the Selway-Bitterroot Wilderness Area (1.25 million
acres), and the Sawtooth Wilderness Area (0.25 million acres). The four areas together cover more than 4,600 square miles (Harper, 1973, p. 2). Other closed areas include the National Reactor Test Site and the Craters of the Moon National Monument (Figure 3:B). All of these areas, combined with the areas originally proposed in RARE I, are shown in Figures 3:C and 3:D. This land amounts to 12 million acres, much of it in high-potential mineral resource areas that are withdrawn or may be closed to mineral entry. RARE II affects approximately 8.2 million acres of land out of the 35.8 million acres under federal management in the state, and much of this area is believed to have a high mineral potential. Several million acres of RARE II land is expected to be classified as wilderness.

The U. S. Geological Survey and the U. S. Bureau of Mines are charged with evaluating the mineral potential of proposed wilderness areas by the Wilderness Act of 1964. For the three areas originally proposed for wilderness in Idaho, two evaluations are completed. Field mapping and reconnaissance mineral exploration is finally scheduled to start this year in the Selway-Bitterroot area. Most of the RARE II areas that may be designated for possible wilderness classification obviously cannot receive much attention by the 1984 deadline stipulated in the Wilderness Act. The U. S. Geological Survey has too few people and resources to be able to carry out a comprehensive mineral evaluation over such a vast area before the deadline.
TWO EXAMPLES OF MINERAL INVENTORY STUDIES IN IDAHO:  
THE IDAHO PRIMITIVE AREA STUDY AND  
THE SAWTOOTH NATIONAL RECREATION AREA STUDY

As noted, the U. S. Geological Survey and the U. S. Bureau of Mines are charged with doing mineral potential evaluations in areas proposed for wilderness classification by the Wilderness Act of 1964. A brief synopsis of two of these studies that have been completed in Idaho follows.

THE IDAHO PRIMITIVE AREA STUDY

The Idaho Primitive Area is a 1,915 square mile area in central Idaho. An additional 272 square miles is included in this study from land surrounding the original primitive area. Techniques used in the evaluation include reconnaissance geologic mapping, reconnaissance geochemical sampling (more than 3,000 stream sediment, soil, and rock samples were analyzed), and aeromagnetic survey interpretation by the U. S. Geological Survey and detailed mapping and sampling of all known mines and prospects in the area by the U. S. Bureau of Mines.

The summary statement of the U. S. Geological Survey is as follows (Cater and others, 1973):

Our study of all aspects of the mineral resources led us to conclude that some localities in the primitive area contain or may contain a few small mineable metal deposits. Possibly some worthwhile deposits exist beneath the thick sequence of Challis Volcanics, but they would be extremely difficult and prohibitively costly to find.

The U. S. Geological Survey report devotes 55 pages to a discussion of the geology, geochemistry, and aeromagnetic survey of this vast area.
In the same report, the U. S. Bureau of Mines devotes 334 pages to describing mines and prospects that are part of the 5,400 recorded mining claims in the primitive area. Early mineral production from the primitive area and adjacent areas has a value of $95,232,000 (Cater and others, 1973, p. 55).

A different interpretation of the data collected by the U. S. Geological Survey and the U. S. Bureau of Mines in the Idaho Primitive Area is proposed by S. Norman Kesten (1973), an environmental scientist with the American Smelting and Refining Company. An adaptation of Kesten's evaluation of the USGS-USBM publication, Cater and others (1973), was prepared in 1973 by H. E. Harper, vice-president of Hecla Mining Co. The pertinent points of Harper's presentation follow (the figure numbers are changed from the original and the number substitutions herein refer to figure numbers in this document):

While the large number of known mineral occurrences in the Idaho Primitive Area is the most obvious and direct evidence of its mineralized character, there are numerous other basic geologic criteria that are important in assessing or judging the mineral potential of the area. A number of these factors are well documented in the USGS-USBM mineral survey of the Idaho Primitive Area and I would like to briefly discuss and illustrate a few of them.

Figure [4] is a simplified geologic map of the Idaho and Salmon River Breaks Primitive Area-Study Area. There are 4 main rock types exposed in the Study area. The oldest are the Precambrian rocks (pG) shown as isolated remnants extending across the north central part of the area. Next are the intrusive rocks of the Idaho batholith (Ku) covering about the northerly one-third of the area, and also covering a smaller area in the southwest portion. Intruding and overlying these older rocks are younger Tertiary intrusives (Ti) and volcanic rocks (Tv) which cover much of the central and southeasterly part of the area. These younger intrusive rocks and those adjacent to them are considered the most favorable for mineral occurrences in the area. A large proportion of the important mineral deposits in the mountainous areas of western North and South America are related to similar types of Tertiary intrusive rocks. The presence of these favorable type rocks exposed at the surface along the
easterly portion of the Study area and in numerous smaller, isolated exposures intruding the older rocks in the central and southwesterly part of the area provides a favorable geologic environment for mineralization in almost all of the southerly two-thirds of the Study area.

The mineralized character of this portion of the area is also indicated by the geochemical sampling undertaken by the U. S. Geological Survey in their study of the area. Geochemistry is used extensively in modern day exploration for minerals and involves analyzing samples of rock, soil and stream sediments for a variety of metals. When a sample contains an unusual amount of any metal it is said to be anomalous. Groups or clusters of anomalous samples are referred to as geochemical anomalies, and often signify areas of exploration interest. Figure [5] shows the location of anomalous samples collected and analyzed by the U. S. Geological Survey. You will note the greatest density of anomalous sample is in the southerly two-thirds of the Study area.

As mentioned earlier, the known mines and prospects are the most direct evidence of mineralization in the Primitive areas. The USGS-USBM minerals survey report describes and gives the locations of a great many of these mineral occurrences. . . . The locations are shown in Figure [6]. Please note that while the known occurrences are scattered throughout the entire area, the greatest concentration is again in the southerly two-thirds of the area.

The distribution of the mineral prospects and the anomalous geochem samples is somewhat similar. The locations of both are shown in Figure [7] to show this relationship. This figure also shows the main rock types of the area so the spatial relation of anomalous geochem samples and known mineral occurrences to these rocks can be seen. As pointed out earlier, the Tertiary intrusive rocks (Ti) are thought to be most directly related to mineralization and these rocks together with the older rocks effected and altered by the Tertiary intrusions provides the favorable geologic environment for minerals.

Other favorable geologic criteria, the extension of mineral belts into the Study area and the presence of numerous aeromagnetic anomalies, tend to further indicate the favorableness of portions of the area for mineral exploration. The mineral belts were delineated by the Idaho Bureau of Mines and Geology (Green, 1972). . . .

To summarize and emphasize our views, we think a large portion of the Study area has a favorable and yet untested potential for mineral development. These favorable areas cannot be adequately tested if left under a restrictive
Primitive or Wilderness type classification, but development of the mineral resources can proceed along with that of timber and other surface resources if the lands are made available to mining and placed under multiple-use type management.

An omission in these USGS-USBM projects is that the commodities that may be important in the future, such as uranium, are generally not evaluated in mineral studies for wilderness areas, because a different type of analysis and sampling technique is required to explore for uranium than for other metals. Because President Carter has committed the nation to using new, as opposed to recycled, uranium for energy, more and more new supplies of uranium ore will be needed. The Department of Energy (DOE) started the National Uranium Resource Evaluation Program (NURE) during 1977. Idaho is a prime state for having uranium potential and, therefore, is scheduled for intensive exploration in the NURE program. The Idaho Primitive Area will be resampled and examined for uranium potential, according to recent decisions. It will be most interesting to view future events. If indeed new uranium deposits are found by DOE in an area designated for possible wilderness classification by the Department of the Interior or the Department of Agriculture, will any such potential reserves be developed?

THE SAWTOOTH NATIONAL RECREATION AREA STUDY

The Sawtooth National Recreation Area study produced quite different results from the Idaho Primitive Area study. The overall mineral potential of the Sawtooth National Recreation Area (approximately 820 square miles) is described by the U. S. Geological Survey and the U. S. Bureau of Mines as follows:
Figure 4. Geology of the Idaho Primitive Area (Kesten, 1973).
Figure 5. Samples that are anomalous in copper, lead, zinc, molybdenum, silver, cold extractable heavy metals, and cold extractable copper in the Idaho Primitive Area (Kesten, 1973).
Figure 6. The location of mines and prospects in the Idaho Primitive Area (Kesten, 1973).
Figure 7. Anomalous samples, mines and prospects, and geology of the Idaho Primitive Area (Kesten, 1973).
The economic potential of large parts of the study area is high and new mineable deposits of many metals will probably be developed by further exploration. . . The potential value of the known mineral resources in the study area that are well enough known to be evaluated in this report at prices in mid-May 1973 exceeds the total historic production value by a factor of about 100 to 200. (Tschanz and others, 1973, p. 33).

Past production within the study area has been estimated at $5 million; however, production from mines within 15 miles of the study area is close to $50 million (Tschanz and others, 1973, p. 2). This area was dedicated as a National Recreation area in 1972 before the USGS' field work for that year was finished, and the data, not fully analyzed by the time of dedication, became irrelevant.

It is apparent from these two case histories that the wilderness studies were rushed to completion or completely ignored. Mining interests are concerned that there will be a similar lack of thoroughness in evaluating the mineral potential of the RARE II areas.

A MINERAL INVENTORY OF THE RARE II AREAS IN IDAHO

One of the main goals of the RARE II inventory (Figure 8) was to speed up the procedure whereby lands can be selected for wilderness classification. Yet, this speed-up has curtailed thorough mineral inventories that rely on extensive sampling and other costly and necessarily time-consuming studies. As a consequence, planners have had to resort to general studies that are based on the presence or absence of known ore deposits in the area, extrapolation, and regional geologic interpretations.
The first of these studies to be examined is based on an experiment conducted by the U. S. Forest Service for a portion of Idaho lying north of the Salmon River (Hintzman, 1976). The mineral potential of the area was estimated by the presence of known occurrences, by the presence or absence of strong faulting or other structural criteria, and by the type of rock within the area (certain rock units are considered more likely to contain mineralization than others).

The following quotation from USFS' report highlights one of the problems in this type of study:

Stratabound mineralization was not considered in this evaluation as these deposits can occur anywhere in the Precambrian belt series rocks [sic]. This creates a situation that is difficult to appraise. It is sufficient to say that all Precambrian belt series rocks [sic] are potential hosts for stratabound mineralization.

Figure 9 shows the approximate outcrop pattern of Belt Supergroup rocks as related to RARE II areas in northern Idaho. Stratabound deposits within these rock units could be similar to the Spar Lake deposit in western Montana that is currently being developed by ASARCO. Figure 10 (Hintzman, 1976) is the map of the mineral potential for northern Idaho from the U. S. Forest Service's compilation with the RARE II areas outlined. On the basis of the USFS' study most of the RARE II areas north of the Salmon River have proven mineral potential or probable mineral potential.

A similar type of study was conducted by geologists from the U. S. Geological Survey. Their report and mineral potential map of the RARE II areas in Idaho should be open-filed shortly. USGS personnel participating in this study are some of the most competent earth scientists in mineral resource evaluation. Some are nationally recognized experts on
the geology of Idaho. The map shows that extensive tracts of RARE II lands in central and southeastern Idaho are given a high priority for having mineral resource potential.

Another study evaluating the mineral potential of the RARE II areas is shown in Figure 11, a plot of known mines and prospects in or near RARE II areas in Idaho. The illustration was adapted from the U. S. Bureau of Mines Mineral Inventory Location System (MILS) map showing the location of mines and prospects, gravel pits, and geothermal springs in the state. Each point represents a cluster of up to five or more occurrences. There are a total of 5,860 entries in Idaho. Practically every RARE II area has mines or prospects enclosed within its boundaries. As noted, the presence of a mine or prospect is an obvious indication of past mineral location or production and may represent possible future mineral potential.

Figure 12 shows the same type of data more graphically. There are 183 mining districts in Idaho. A mining district is an area that at some time in the past had some substantial production of minerals. Again, it is obvious that most of the RARE II areas are covered in part, or wholly, by one or several mining districts.

Another excellent source of information similar to the MILS data is the Computerized Resources Information Bank (CRIB) system of the U. S. Geological Survey. There are currently over 3,500 mines and prospects in this system for Idaho. Unfortunately, the short time in preparing this IBMG open-file report has not permitted including a resource map on the RARE II areas from the CRIB data base.

A different type of inventory technique is shown in Figure 13. This map shows (1) the trend of "mineral belts" in Idaho (several broad
structural trends that are important to the location of mineral deposits), (2) the location of recent mineral exploration in Idaho that exceeds an investment of $50,000 a year, (3) the sites of recent oil and gas activity, (4) areas with proven mineral resources exceeding $25,000,000, and (5) mining districts with past production in excess of $25,000,000. The "mineral belts" contain significant mineralization that is probably related to large scale geologic features. The Idaho porphyry belt, for example, is a corridor extending across Idaho that is characterized by numerous porphyry dikes of Tertiary age; the belt also contains significant mineralization.

It should be noted that unlike several of the previous illustrations that show only mine and prospect locations, Figure 13 shows areas with significant mineral production. As with the previous illustrations many of the RARE II areas lie within the mineral belts or have had significant past mineral production or recent major development or exploration efforts.

The last illustration is perhaps the least complicated. If the distribution of only a single metal is examined, the mineral potential in many RARE II areas becomes immediately obvious. Figure 14 is the first in a series of commodity maps in preparation by geologists at the Idaho Bureau of Mines and Geology, and it shows the location of all known gold in placer and lode deposits in the state. There is a high concentration of these gold locations in the central part of Idaho, and most of the RARE II areas in this same part of the state contain numerous gold deposits.
The previous illustrations (Figures 8-14) point out that a review of the literature shows that past production and future mineral potential are present in most, if not all, of the areas proposed for RARE II. It should be noted that this estimate of possible mineral potential is incomplete because of many unpredictable factors and a serious lack of data including the following important omissions: (1) Certain mineral commodities were not sought out in the past, and these may be of great importance in the future. Beryllium and tin are two of these commodities. Tin is an especially important strategic mineral that is in short supply in the continental U.S. Extensive granite outcrops of Tertiary age in Idaho may well be favorable hosts for tin mineralization; however, very few, if any, federal or other published studies have looked for tin in particular. (2) As old mines played out and the ore grade decreased, the mines were abandoned. However, some of these low-grade deposits may well be the high-grade ore bodies of tomorrow. An example of such an ore body is Earth Resources' Delamar mine in Owyhee County, Idaho. High-grade lode mining within this area played out at the turn of the century. Earth Resources has recently developed a low-grade open-pit mine with an expected annual yield of 2.5 million ounces of silver and 16,500 ounces of gold. This mine may become the nation's third largest silver producer and eventually may be the largest open-pit silver mine in the world.

THE PUBLIC'S OPINION OF RARE II

Rupert Cutler, assistant secretary for Conservation Research and Education, U. S. Department of Agriculture, reported on May 6, 1977,
that "in 1964 the newly established wilderness system contained 9.1 million acres, all national forest land. Since then, Congress has expanded the system in an orderly way to 14.4 million acres 86 percent of it on National Forest lands." Mr. Cutler goes on to note that "there is support for prompt action on wilderness among environmentalists, but also among those whose livelihood depend on the availability of timber and other industrial raw material from the National Forests."

On the other hand, questionnaires filled out by the public in response to the RARE II program reveal the following (Northwest Mining Association Bulletin, February 1978):

No group considered the need for more wilderness near population centers important.

Little importance was credited to the need for more wilderness for scientific or educational endeavors.

Less than moderate importance was attached to preservation of a variety of landscapes.

More wilderness for mental challenge attracted few.

There was almost no demand that wilderness areas be large.

Most thought a wilderness should be scenic.

Few felt the need to establish new wilderness areas within a day's travel.

Moderate importance was given to the ability to manipulate wildlife habitat.

It is notable that this compilation of questionnaire results shows that the majority of the 50,000 respondents consider the production of timber, mineral, and energy resources to be the most important use of U. S. Forest Service's land now being studied for RARE II. According to the report, the need to provide areas within the USFS' lands for motorized or intensive recreational uses has been judged to be second most important.
BIBLIOGRAPHY


APPENDIX B

THE MINERAL POTENTIAL OF 32 RARE II AREAS OF IDAHO

TO ACCOMPANY IBMG OPEN-FILE REPORT 78-2

Earl H. Bennett
Mary P. Gaston
H. Theodore Smith

Idaho Bureau of Mines and Geology
Department of Lands
Moscow, Idaho 83843
September 1978

Special Report Requested by:
Office of John V. Evans
Governor, State of Idaho.
INTRODUCTION

The purpose of this report is to provide mineral data on 32 RARE II (Roadless Area Review and Evaluation) areas in Idaho. This study was requested by the Office of John V. Evans, Governor, State of Idaho. Background information about the history of wilderness development in Idaho, mineral economics, RARE II, and associated problems that are peculiar to the minerals industry are presented in IBMG's Open-File Report 78-2 that accompanies the present report. Our study is by no means intended as a "yes or no" statement of the total mineral potential of these 32 areas. As noted in Report 78-2, this is almost impossible to do. We have, however, tried to include what information is available, but it should be understood that for many of the RARE II areas basic mineral data and geologic knowledge is lacking.

INDICATORS USED FOR EVALUATION

Table 1 lists each RARE II area by number (column 1) and by name (column 2). The acreage covered by each area is shown in column 3. Figure 1 shows the location of most of the RARE II areas discussed.

The Idaho Supplement to the Draft Environmental Statement, Roadless Area Review and Evaluation (USDA-FS-WO, FY'78-04, DES-LEG), contains ten alternatives for each area that range from wilderness classification to multiple use. Appendix A contains the description of each alternative from the Draft Statement, and Table 1, column 4, shows all alternatives for each area that have a wilderness designation (three alternatives, no
Figure 1. The mineral potential of selected RARE II areas in Idaho (adapted from U. S. Geological Survey Open-File Report 78-360).
<table>
<thead>
<tr>
<th>Map</th>
<th>Area Name</th>
<th>Total Acres</th>
<th>USGS Classification</th>
<th>USGS Mineral Potential</th>
<th>Mining District</th>
<th>District Production</th>
<th>Recent Activity</th>
<th># of Mines/Projects</th>
<th>Geoth. Group Suggestion</th>
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<td>4554</td>
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<td>84,257</td>
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<td>Edwardsburg</td>
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<td>4</td>
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<tr>
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<td>S. Pa. Boise-</td>
<td>167,647</td>
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<td>100% H</td>
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<td>Big Smoky</td>
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<tr>
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<td>0</td>
<td>Yes</td>
<td>9</td>
<td>w</td>
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</table>

5. Presence of geothermal resources from U.S. Bureau of Mines MWS data.
6. Value of antimony reserves at present prices. Mines also produced in excess of $10,000,000 (value today $66,500,000).
8. Value of antimony reserves at present prices. Mines also produced in excess of $10,000,000 (value today $66,500,000).
9. The Cresco Corral, Seven Devils and Mountain View districts produced 420,000 pounds of copper and there has been a great deal of recent exploration activity in this area. Considerable reserves are known to exist in some of the old mines.
10. Estimated value of reserves in the Blackbird mine. This mine has produced approximately 14,000,000,000 ounces of gold (value today $5,000,000).
action (a), all wilderness (j), and no wilderness (b) are left off Table 1). Several of the RARE II areas have boundary changes suggested under alternative H. These changes are described under the appropriate RARE II area section discussion that follows.

The Draft Environmental Statement also included an evaluation of the mineral potential of each RARE II area (column 5). Minerals considered important for the evaluation were selected from the list of 38 minerals that are now imported into the United States (Department of the Interior, 1976). These evaluations are not considered satisfactory, and the Forest Service is currently reevaluating all RARE II areas on a 100 point system (results not available at the time of this study).

One of the most important parameters in the evaluation of the RARE II areas is the U. S. Geological Survey's mineral potential map (Leonard, 1978) covering the RARE II areas in Idaho. Criteria used to develop this map are explained as follows:

The definitions of areas of high, moderate, and low mineral-resource potential are as follows: high, geologic environment highly favorable for the occurrence of mineral resources; moderate, geologic environment interpreted to be favorable for the occurrence of mineral resources; and low, geologic environment interpreted to be less favorable for the occurrence of mineral resources. The basis for classification is fundamentally geologic. It takes into consideration what we know about the geology of an area; the distribution of productive mineral deposits and promising mineral prospects in the area; the kind and mode of occurrence of mineral deposits in comparable areas; and, to the extent that we can estimate the nation's needs for mineral products in the foreseeable future, the expected occurrence of resources of some substances for which a use or demand is only now emerging, or for which new and unusual geologic occurrences are just now being recognized. Examples of such substances are silicon (from high-purity quartzites) for solar cells; chromium in the Phosphoria Formation of Idaho and adjacent states; and disseminated, accessory tantalum- and uranium-bearing oxides in granitic stocks of the Cordilleran region.
The current evaluation of the mineral-resource potential of proposed Roadless Areas in Idaho is on the whole conservative because it must be defended on the evidence at hand. Geologic information is scant for some parts of the State; there are many areas where geologic mapping is out of date and geochemical and geophysical data are almost lacking. Nevertheless, geologic evidence for recognizing either high or low mineral-resource potential is adequate for the immediate evaluation of most of the Roadless Areas in Idaho. Geologic evidence for recognizing moderate mineral-resource potential is less good. Where better evidence is needed, it can be obtained by field studies, and the mineral-resource potential can be reevaluated on the basis of the accumulated evidence. This gathering and assessing of evidence can be scheduled; it need not and should not be a chance event. In contrast, the emergence of an unforeseeable need for some mineral substance, or the discovery of a radically different geologic occurrence for a mineral deposit, can require a drastic re-assessment of the mineral-resource potential of whole regions. Such chance events have occurred and therefore can be expected to recur, but their character and timing cannot be estimated in advance.

Figure 1 shows the mineral potential from the U. S. Geological Survey's map of the RARE II areas considered in the present study. Areas of recent exploration and known reserves are also included on Figure 1.

Many RARE II areas are located in part or entirely within known mining districts (column 7, Table 1, and Figure 2). These districts are areas with proven past mineral production. Several of these districts contain known mineral reserves. Where information is available, the total production in dollars from the district is shown in column 8. Because many of the districts were gold producers, the production figures are misleading as they are generally based on $20-30/oz gold. We have adjusted these figures to show the current price of gold at $215 an ounce.

Column 9 shows whether there is presently activity within the area or not. Activity may include recent exploration for minerals or gas and oil, or current development or production.
Figure 2. Mining districts covering selected RARE II areas in Idaho (adapted from Ross, C. P., 1941).
Column 10 contains the number of mines or prospects within a given RARE II area. This information is taken from the U.S. Bureau of Mines Mineral Inventory Location System (MILS).

There is currently a great interest in geothermal energy in Idaho. Column 11 shows if there is a geothermal resource within the RARE II area. This information is also from the U.S. Bureau of Mines MILS system.

A Pamphlet entitled RARE II in Idaho: A Citizen's Alternative was recently circulated by several environmental groups. Column 12 shows the suggested course of action proposed in this circular for each of the areas.

There are certain "mineral belts" that cross parts of Idaho. These belts contain areas of known mineralization. The location of these belts is shown in Figure 1.

AREA DISCUSSIONS

INTRODUCTION

The RARE II areas are ranked in Table 1 by a classification of high mineral potential, moderate potential, or low potential. This ranking is based essentially on the USGS mineral potential map. Several RARE II areas are split into two or three subareas with different potentials. The ranking in Table 1 is based on using the classification of mineral potential that covers most of the area.
Most of the major mine sites in Idaho are not located within RARE II areas; however, similar geology and mineralization occur in many of the RARE II areas adjacent to these sites. The following section in part describes the mining districts where the old mines are found. In some places these mines are the only indicator of mineralization, and therefore some are discussed in relation to the RARE II areas.

High Potential Areas

Eight RARE II areas are rated high in mineral potential according to the U. S. Geological Survey. The reasons for this high ranking are based not only on geologic considerations and past production, but also on the experience of the USGS geologists who are the recognized experts in their area of research on Idaho geology.

Meadow Creek (4453)

The Meadow Creek area is in the heart of the Yellowpine mining district. Mines in and around Stibnite, Idaho, have produced antimony, tungsten, gold, and silver in important quantities. The Stibnite area constitutes the largest known antimony resource in the United States. Reserves in 1950 were estimated at 34,500 tons of metallic antimony. The price of antimony in 1976 was $1.65 a pound making this reserve worth $113,850,000. These mines also produced 310,000 ounces of gold that are worth $66,650,000 at a current price of $215/oz. Canadian Superior Mining Company has recently announced plans to reopen this district and will mine the area primarily for gold.
Pinnacle Peak (4454)

Pinnacle Peak is just north of the Stibnite area. There are 33 mines and claims in the RARE II area that are located for gold, silver or antimony. The geology is similar to the Yellowpine district, and for this reason the area is classified as having high mineral potential.

Placer Creek (4456) and Smith Creek (4457)

Placer Creek and Smith Creek are two RARE II areas that are covered by the Edwardsburg mining district. Production for this area was approximately $97,485 based on $20/oz gold. At a current market value of $215/oz gold, production would be valued at $1,047,963. The geology of both of these areas is similar to the Stibnite area and, therefore, has a high mineral potential.

McEleny (4505)

The McEleny area is part of the Yellowjacket mining district. Production for this gold-producing area is estimated at $450,000 ($20/oz gold). Based on present prices, the value would be $4,837,500. There are 27 mines and claims in this area, and the geology is similar to the Panther Creek area (4504) to the north that contains important reserves of copper-cobalt mineralization.

South Boise-Yuba River (4553)

The South Boise-Yuba River area is covered, in part, by four mining districts: the Skeleton Creek, Big Smokey, Warm Springs, and Vienna. Figure 3 shows the proposed boundary changes under alternative H of the
Figure 3. Possible boundary adjustments from alternative H (U.S. Forest Service, 1978).
Draft Environmental Statement. If these changes were adopted it would leave most of the historical mining areas out of the RARE II area; however, the entire area has a high potential rating. Total production from mines just to the south in the Big Smokey district is estimated at $2,150,000 (current price). The Webfoot Mine in the Vienna district is currently being operated on a small scale. Production in the Vienna district from 1880-1922 is estimated at $1,327,290. Because of favorable geology and past production from 16 mines and prospects, the area ranks high in mineral potential. There is little geologic mapping available for this part of Idaho. More study is needed before it can be fully evaluated.

Rapid River (1922 and 4922)

The Rapid River RARE II area lies adjacent to the Hell's Canyon Recreation Wilderness area. It is covered, in part, by the Crooks Corral, Mountain View, and Seven Devil's districts. These districts are known to contain copper reserves. The entire region is given a high potential rating by the U. S. Geological Survey and has lately been actively explored for disseminated copper deposits by several companies. Recently it was announced that a major ore deposit might lie below the old Bluejacket Mine in the Hell's Canyon area. This is a similar geologic environment as covered by the Rapid River RARE II area.

Loon Creek (4207)

A recent study by IBMG [Open-File Report 78-3] in the Loon Creek area notes that Tango and Pioneer Creeks (center of the Loon Creek RARE II area) are anomalous in molybdenum. Unpublished geologic mapping
conducted this summer shows that a Tertiary granite is exposed at the headwaters of Tango, Pioneer, and Cabin Creeks. This type of rock is commonly associated with molybdenum, tungsten, gold, and uranium mineralization throughout Idaho.

Several mines, including the Independence, Hineman, and Jumbo, are located on the West Fork of the Yankee Fork in the central part of the area. According to Choate (1962) "possibly the best virgin placer grounds remaining in the area [Yankee Fork area] are along the West Fork of Yankee Fork and one of its tributaries, Cabin Creek."

Just beyond the southern border of the Loon Creek area is the Basin Creek uranium occurrence. This area has been extensively explored, and numerous discoveries of uranium have been made. Several thousand tons of uranium have been shipped from these deposits. Although the uranium area is slightly outside of the RARE II area, it is possible that uranium deposits exist along the southern edge of Loon Creek area. Several companies have recently invested much time and money in exploring this region. The Loon Creek mining district has a total production of $7,637,058 (current price) from 48 known mines and prospects.

Panther Creek Area (4504)

The Panther Creek area contains what may be one of the most significant mineral occurrences in the United States: the Blackbird Mine. This mine contains the only readily available domestic supply of cobalt. The United States imports most of its cobalt from South Africa. Domestic problems in Zaire have interrupted cobalt supplies and elevated the price from $5 per pound in January 1977, to $12.50 in July 1978 (free market price is now $30 per pound). A report prepared by IBMG (Pamphlet 167) in 1977 estimated that the Blackbird Mine contained approximately
$475,000,000 of ore at a cobalt price of $5 per pound. Several mining companies are currently active in the area, including Noranda Exploration which is reportedly considering reopening the Blackbird Mine and has staked approximately 700 new claims adjacent to the mine.

A new boundary (Figure 4) is proposed for the Panther Creek area under alternative H in the RARE II Draft Environmental Statement. Although not ideal (the boundaries should extend several miles west of Indian Point, based on geochemical anomalies, Bennett, 1977), it is a much better proposal than including all of the land north of the Blackbird Mine, as this area has a high potential for containing more cobalt-copper deposits.

Garns Mountain (4611, not shown in Figures 1 and 2)

Garns Mountain is in the geologic province known as the Idaho-Wyoming overthrust belt in southeastern Idaho. This area contains known reserves of phosphate, and is a possible target for oil and gas development. The U. S. Geological Survey rates 80 percent of this area as having a high mineral potential. The area east of Driggs also contains small deposits of coal and peat.

Lemhi Range (4503)

Three-quarters of the Lemhi Range RARE II area has a high mineral potential according to the U. S. Geological Survey. Parts of four mining districts cover the area: the McDevitt, Junction, Bluewing, and Texas. The Ima Mine in the Bluewing district has produced 257,544 units of tungsten worth $27,299,664 at a 1976 price of $106 per unit. There are 20 mines and prospects in the area taken from the MILS data supporting the high mineral potential rating.
Figure 4. Possible boundary adjustments from alternative H (U. S. Forest Service, 1978).
Camas Creek (4202)

Seventy-five percent of the Camas Creek area is rated as high mineral potential by the U. S. Geological Survey. There are several prospects near Sleeping Deer Mountain in the northwest corner of the area. Meyers Cove (located just north of the area boundary) contains a fluorspar mine that has recently been active. Other than these localities very little is known about the geology and mineralization in this area, and it should receive more study.

Sulphur (4066)

According to alternative H in the U. S. Forest Service Draft Environmental Statement, the Sulphur RARE II area has been divided as shown in Figure 5. This would place much of the area back into multiple use. The remaining area is covered by parts of the Sheep Mountain, Seafoam, and Loon Creek districts (total lode production of $1,083,734 at $20/oz gold; $11,650,140 at $215/oz gold). The Sulphur area contains 19 mines, including the Parker Mountain Mine (production approximately $50,000).

The area north and east of Grayhound Mountain contains mines and prospects and is described in the Idaho Primitive area study (Cater and others, 1973). Most of the mines are in roof pendants within the Idaho batholith. The Mountain King Mine just east of Rapid River has a recorded production of $323,000 from 1935-65. Production prior to this is estimated to be somewhere between $500,000 and $800,000. The U. S. Bureau of Mines has recognized a potential source within the area of the Mountain King Mine of 60,000 tons of ore. Samples from several other mines and prospects within this district also give high assay values.
Figure 5. Possible boundary adjustments from alternative H (U. S. Forest Service, 1978).
Pioneer Mountains (4201)

The Pioneer Mountains area was studied by the U. S. Geological Survey and the U. S. Bureau of Mines in 1974-75 as a wilderness study (extension to the White Cloud study). The area is covered in part by the Alto, Copper Basin, and Little Wood River mining districts. Alternative H for this area (Figure 3) would exclude the Copper Basin district from wilderness consideration. The northern part of the Pioneer area contains the Phi Kappa Mine that has known tungsten reserves. Other tungsten mines occur in the Wild Horse Canyon region. These mines produced $211,680 of tungsten ore in 1964 and 1965. Perhaps of more importance is the extensive Phi Kappa Formation, a sequence of the Ordovician black shales that are currently of interest as a potential source of uranium.

Italian Peaks (4945, see Figure 6)

The Italian Peaks are split into two sections. All of the area to the north has a high mineral potential while the area to the south is split between moderate potential in the west and low potential in the east. Alternative H (Figure 6) excludes all of the high and moderate potential areas from wilderness and suggests that the remainder of the southern part of the area be held for future planning.

The southern part is covered by the Nicholia and Birch Creek mining districts. There are 36 mines and prospects in this area according to MILS data. Production from mines in these districts is estimated by Anderson and Wagner (1944) at between $2,500,000 and $5,000,000. The mines have produced silver, lead, zinc, and copper. The northern part of the Italian Peaks area contains a single mineral occurrence for phosphate.
Figure 6. Possible boundary adjustments from alternative H (U. S. Forest Service, 1978).
Blue Joint (1941, 4941)

The Blue Joint area is divided into two parts, 1941 and 4941. Both areas have moderate mineral potential (U. S. Geological Survey, 1978). There are no mining districts covering either area and no mines or prospects according to MILS data. Very little is known about the geology of the Blue Joint area. Much more data should be obtained before the mineral potential can be estimated with any degree of accuracy.

Salmo Priest (1981, not shown in Figures 1 and 2)

Located in the northwestern corner of the panhandle, the Salmo Priest area is given a wilderness designation in five of the U. S. Forest Service (1978) alternatives. The area contains one prospect and is part of the Priest Lake mining district. No production has been recorded from this area, but the area has a potential for uranium mineralization, as one of the most active areas for uranium exploration in Idaho lies just to the south.

Selkirks (1125, not shown in Figures 1 and 2)

The Selkirk crest area contains some of the most scenic country in Idaho. This area is covered by the Porthill mining district and contains a single prospect (for mica) according to MILS data. A thorium belt encompasses most of the Selkirk crest and there may be some potential for a thorium deposit in this area. There is, however, no recorded production of metallic minerals.
Meadow Creek (1845)

The Meadow Creek area is a good example of an area that we know very little about. Virtually no geologic work has been done in this RARE II area, and, therefore, the mineral potential is difficult to assess. Much more study is needed. Alternative H (USFS, 1978) suggests that less than half of this area be considered for wilderness and the rest returned to multiple use (Figure 7).

White Cloud-Boulder (4551)

Most of the White Cloud-Boulder area is within the Sawtooth National Recreation area that was intensively studied by the U. S. Geological Survey in 1971-72. A report open-filed by the U. S. Geological Survey in 1973 stated the following: "The economic potential of large parts of the study area is high and new mineable deposits of many metals will probably be developed by further exploration." Later the report noted that "the potential value of the known mineral resources in the study area that are well enough known to be evaluated in this report at prices in mid-May 1973 exceeds the total historic production value by a factor of about 100-200" (Tschanz and others, 1973, p. 33).

Past production within the study area has been estimated at $5,000,000; however, production from mines within 15 miles of the study area is close to $50,000,000. This area was dedicated as a National Recreation area in 1972 before the USGS field work for that year was finished. The project data, not fully analyzed by the time of dedication, became irrelevant and have not been considered since.
Figure 7. Possible boundary adjustments from alternative H (U. S. Forest Service, 1978).
The White Clouds contain a high tonnage molybdenum deposit that made national headlines when environmentalists and mining interests clashed over development plans for the property. Work is currently being done on these claims by American Smelting and Refining Company (ASARCO). The area undoubtedly contains other economic ore deposits, but few companies are willing to explore in an area that has restricted mineral entry.

Middle Bargamin (1846)

The Middle Bargamin area contains no mines or prospects according to the MILS data and is given a moderate mineral potential rating by the U. S. Geological Survey. There is little known about the geology of this remote area.

Gospel-Hump (1921, 4921)

There are two parts to the Gospel-Hump area, 1921 and 4921. With the exception of the part of 1921 that parallels the Salmon River between 4921 and 1847, the rest of the area has been either returned to multiple use or designated for further study by the Endangered American Wilderness Act (1978). The remaining section is covered in part by the Dixie district (produced over $1,500,000 in gold at $30/oz; present value would be $16,125,000).

Area 4921 is partially within the Warren mining district (production $3,462,137 at $20-30/oz gold; present value would be $23,080,912). The southeastern part of this area is given a high mineral potential by the U. S. Geological Survey. Figure 8 shows new boundaries proposed under alternative H (USFS, 1978). Only a small part of the area would be recommended for wilderness under this alternative.
Figure 8. Possible boundary adjustments from alternative H (U.S. Forest Service, 1978).
Diamond Peak (4601, not shown in Figures 1 and 2)

The Diamond Peak area has a seventy percent moderate mineral potential rating, contains 17 mines or prospects, and is covered in part by the Dome, Hamilton, and Spring Mountain mining districts. According to Ross (1961) the Dome district has produced 365,702 ounces of silver, 54,358 pounds of copper, 39,390,189 pounds of lead, and 142,000 pounds of zinc. The Hamilton district produced 11,825 ounces of silver, 38,852 pounds of copper, and 599,339 pounds of lead from 1901-55. These mines are currently inactive; however, at current market prices total production from both districts would be valued at $13,992,340.

Hoodoo (A1301, H1301)

The division of the Hoodoo area under alternative H (U. S. Forest Service, 1978) is shown in Figure 9. This area is located in both Montana and Idaho. All of the area in Idaho is given a low mineral potential rating by the U. S. Geological Survey. The area is covered by the Moose Creek and Blacklead mining districts and contains nine mines and prospects according to the MILS data.

Lick Creek (4455)

The Lick Creek area is split into two sections; however, alternative H (Figure 8, U. S. Forest Service, 1978) would eliminate all of the eastern area and several small parts of the western block. The Meadow Creek (4453) discussion applies to the eastern part of Lick Creek as well as to Pinnacle Peak (4454).
Figure 9. Possible boundary adjustments from alternative H (U. S. Forest Service, 1978).
This area is a good example of how minerals were not considered when the RARE II boundaries were drawn. The eastern area is covered by the Resort district and the far eastern one-third of this area is given a high mineral potential rating by the U. S. Geological Survey. This area contains 39 mines and prospects (tungsten and gold). The western section is not covered by any mining districts and contains a single geothermal spring according to MILS data. Alternative H would at least solve the disparity between the western and eastern sections of the Lick Creek RARE II area.

Areas with Low Potential

Several RARE II areas are given a low mineral potential rating by the U. S. Geological Survey, including French Creek (4461), Big Horn-Weitas (1306), Borah Peak (4210), and Mallard (1947). Mallard and Big Horn-Weitas, for example, are not covered in part by any mining district and have no known mines or prospects according to the U. S. Bureau of Mines MILS data. Borah Peak is also not part of any mining district but does contain four mines or prospects. Big Horn-Weitas is covered in part by the Moose Creek and Blacklead mining districts but does not contain any mines or prospects within the immediate RARE II area.

Mallard Larkin (1300, 1799)

The Mallard Larkin area is included in part of the St. Joe and Moose Creek mining districts. There are only two mines and prospects located in this area according to the MILS data. Almost all of this area is given a low mineral potential rating by the U. S. Geological Survey.
Scotchman (1662, not shown in Figures 1 and 2)

The Scotchman RARE II area is located east of Clark Fork, Idaho, and extends into Montana. The entire area was recently studied by the U. S. Geological Survey as part of their Wilderness program (Earhart and others, 1976). The part of the area in Idaho was given a low mineral potential rating by the U. S. Geological Survey (1978). The area received four wilderness designations in the planning alternatives (U. S. Forest Service, 1978). There are nine mines and prospects within the area, which is part of the Clark Fork mining district.

Summary

This report has presented a brief look at the mineral potential of several RARE II areas. The study is far from complete and lacks much information that simply is not available. The closure of large tracts of land that have a high or even moderate potential for containing mineral resources must be given very serious thought. The economy of this nation is built on its mineral wealth and we can only survive as a nation if certain critical raw materials are provided in abundance to satisfy our future needs.
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II. ALTERNATIVES CONSIDERED

The alternatives considered and rationale for developing them are discussed in some detail in the National RARE II draft environmental statement. A brief summary of the 10 alternatives is presented here, along with Idaho's contributions under each alternative. Further information on the specific rationale for developing each alternative, by area, is available at the Northern Regional Forester's Office in Missoula, Montana, and Intermountain Regional Forester's Office in Ogden, Utah, as well as in all National Forest headquarters in Idaho. In each alternative, areas are allocated to Wilderness (W), Further Planning (FP), and Nonwilderness (NW) categories.

Specific areas are listed by alternative in table 1, pages 30 through 35. On the state map (appendix A), Blue Joint Mountain (1941) is the same area as Magruder Corridor M1941 which is listed in table 1. The Gilt Edge-Silver Creek (1792) and West Slope Tetons (4610) areas are not shown on the State map (appendix A). About 300 acres of Gilt Edge-Silver Creek extend into Idaho from Montana. About 160 acres of the West Slope Tetons extend into Idaho from Wyoming. Table 2, page 36, summarizes the allocation of areas and acreage by alternative. Figure 2, page 37, is a graphic representation of the allocation.

The distribution and allocation of RARE II areas for alternatives C through I are illustrated in appendix E.

ALTERNATIVE A - No action is to be taken at the present time; allocation decisions for the inventoried roadless areas will continue to be made through the Forest Service land management planning process.

ALTERNATIVE B - All of the inventoried roadless areas are allocated to nonwilderness uses.

ALTERNATIVE C - Output of commodities is emphasized by allocating roadless areas with high resource values to nonwilderness uses, but consideration is also given to areas with particularly high wilderness attributes ratings.

ALTERNATIVE D - Quality wilderness is emphasized through allocation of roadless areas with high attribute ratings to wilderness, but consideration is also given to areas with especially high resource values.

ALTERNATIVE E - Low-level target assignment for characteristics of landform, ecosystem, wildlife, and accessibility representations is achieved. In Idaho, this would mean allocating two areas for wilderness: Salmo-Priest (1981) and Scotchman Peaks (1662). These areas meet the wildlife targets. They provide areas that contain habitat suitable for the grizzly bear (102) and caribou (111). Regional representation targets were met.

ALTERNATIVE F - A moderate-level target assignment for the same characteristics as alternative E is achieved; further planning is proposed for those areas with high wilderness attribute ratings.

In Idaho, this means three areas would be allocated to wilderness. They meet ecosystem and wildlife targets that provide areas with grand fir/Douglas-fir
forests (13) in the Rocky Mountain forest ecoregion (M3110); cedar-hemlock-pine forest (12) in the Columbia forest ecoregion (M2110); as well as habitat for grizzly bear (102) and caribou (111).

ALTERNATIVE G - A high-level target assignment for the same characteristics as alternatives E and F is achieved.

In Idaho, 15 areas would be allocated to wilderness. They meet the ecosystem and wildlife targets: grand fir/Douglas-fir forests (13) in the Rocky Mountain ecoregion (M3110); grand fir/Douglas-fir forests (13) in the Columbia forest ecoregion (M2110); and habitat for grizzly bear (102), caribou (111), lynx (106), Rocky Mountain bighorn sheep (118), mountain goat (114), moose (113), wolf (107), and habitat for grayling (131), and golden trout (130).

ALTERNATIVE H - responds primarily to regional, State, and/or local issues and positions but is tempered by the National goal of achieving a quality wilderness system in balance with nonwilderness needs.

Forest Service Regions were given flexibility to develop criteria responsive to each Region's needs and environmental setting. Consistent with this national direction, alternative 'H' criteria varies between the Northern (R-1) and Intermountain Regions (R-4). Both regions used the following criteria:

- Local and State government concerns and positions.
- Social and economic impacts on multi-county analysis units.

The Intermountain Region (R-4) criteria also reflects the positions of organizations and special interest groups in the Region, as well as completed land management plans.

The Northern Region (R-1) used the following additional criteria:

- RARE II areas with high local, State and National interests.
- RARE II areas with high wilderness ratings that also meet multiple ecosystem, wildlife or accessibility/distribution targets.
- Existing National Wilderness Preservation System Units.

Several RARE II areas were split between the three allocation categories.

The Hoodoo area (1301) would be allocated in part for nonwilderness (A1301) and part for wilderness uses (H1301). See Appendix F, which shows the allocation.

Meadow Creek (A1845) and (M1845); Blue Joint Mountain (A1941) and (4941); and Magruder Corridor (M19410 are allocated in part to either wilderness or nonwilderness. See appendix G, which shows the allocation.

Ten Mile (4061) and Sulphur (4066) are allocated in part to wilderness, non-wilderness, or further planning. See appendix H, which shows the allocation.
Lick Creek (4455) and Gospel-Hump (4921) are allocated in part to all three categories. See appendix I, which shows the allocation.

Panther Creek (4504) and Blue Joint Mountain (4941) are allocated in part to either wilderness or nonwilderness. See appendix J, which shows the allocation.

West Big Hole (4943) is allocated in part to wilderness or further planning, as shown in appendix K.

Italian Peak (4945) is allocated in part to nonwilderness or further planning, as shown in appendix L.

Mount Jefferson (4962) would be allocated in part to further planning and nonwilderness, as shown in appendix M.

Pioneer Mountains (4201) and South Boise-Yuba River (4553) would be allocated in part among the three allocation categories, as shown in appendix N.

ALTERNATIVE I - Quality wilderness is emphasized by allocating roadless areas with high attribute ratings to wilderness while giving secondary consideration to extremely high resource outputs.

ALTERNATIVE J - All of the inventoried areas are allocated to wilderness.