

STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of Forest Service wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "cane" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. In addition, the Federal Land Policy and Management Act, FLPMA (Public Law 94-579, October 21, 1976), requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain Bureau of Land Management areas to determine their mineral resource potential. This report presents the results of a mineral survey of the West Needle Wilderness Study Area, San Juan National Forest, San Juan and La Plata Counties, Colorado, and the Bureau of Land Management's West Needles Contiguous Wilderness Study Area (CO-030-229A), San Juan County, Colorado. The West Needle Wilderness Study Area was established by Public Law 96-560, December 22, 1980. The West Needles Contiguous Wilderness Study Area (CO-030-229A) is being studied for wilderness suitability under section 603 of FLPMA.

MINERAL RESOURCE POTENTIAL
SUMMARY STATEMENT

The West Needles Contiguous Wilderness Study Area (CO-030-229A) contains an area near the Elk Park mine that has a moderate mineral resource potential for uranium with associated silver, nickel, cobalt, copper, molybdenum, lead, and zinc. Recent exploration at Elk Park, an area adjacent to the wilderness study area boundary, has identified uranium reserves, and the same structures and geologic conditions that localized the uranium mineralized bodies continue westward into the study area. No indications for other mineral or energy resources were identified by this study in the remainder of the West Needle Wilderness Study Area. Although the study area is centered near important mining districts where mineralization is related directly to volcanic activity during Tertiary time, the study area does not contain Tertiary igneous rocks, and it probably was not affected by the nearby volcanic activity.

INTRODUCTION

The study area occupies approximately 34 sq mi or nearly all of the West Needle Mountain. Of this total area about 25 sq mi lie within the West Needle Wilderness Study Area, La Plata and San Juan Counties, and is managed by the U.S. Forest Service. The remaining 9 sq mi (5,780 acres) lie within the West Needles Contiguous Wilderness Study Area (CO-030-229A) and is managed by the U.S. Bureau of Land Management. Both areas were studied simultaneously and are discussed in this report as a single area--the West Needle Wilderness Study Area (here referred to as the WSA or the study area). The West Needle Mountains form very rugged and steep terrain; altitudes range from 7,800 ft along the Animas River to more than 13,000 ft on the Twilight Peaks. Steep canyons cut by the Animas River on the east and south and the canyons of Lime and Cascade Creeks on the west form a spectacular natural boundary around most of the WSA. The northern boundary, not as clearly defined topographically, in part is marked by Three Lakes Creek and Molas Creek. Access to the area is provided by U.S. Highway 550, which is the main road between Durango and Silverton; the Lime Creek road (U.S. Forest Service road 591) borders the WSA on the west. The Durango-Silverton Narrow Gauge Railroad follows the Animas River along the southern and eastern boundaries of the WSA. The railroad right-of-way separates the WSA from the Reminuche Wilderness. Trails are limited to the Crater Lake and the Molas trails, both totaling only 5.5 mi within the northern part of the WSA.

Studies supporting the evaluation of this area consisted of a claim record search, mine and prospect evaluations, and geologic and geochemical surveys (Van Loenen, 1983; Scott, 1983; Birmingham and Van Loenen, 1983). The mineral resource potential map includes the locations of mines and prospects with an annotation of the metals identified in samples from these sites.

GEOLOGY, GEOCHEMISTRY, AND GEOPHYSICS

The West Needle Wilderness Study Area is underlain essentially by metamorphic and igneous rocks of Proterozoic age. These rocks represent two age groups: the Twilight Gneiss (older than 1.7 b.y.) and a younger sequence termed the Uncompahgre Formation (1.4-1.7 b.y.) (Barker, 1969). Both of these units were intruded by granites and highly deformed during several periods of metamorphism. Paleozoic sedimentary rocks ranging in age from Cambrian to Pennsylvanian overlie the metamorphic rocks along the northern part of the WSA. Volcanic and related rocks of Tertiary age lie to the east of the WSA.

Major faulting that occurred during and after the Uncompahgre disturbance has provided structural controls for the Centennial ore deposit, located east of the WSA. A geochemical survey of the West Needle WSA did not identify any mineral deposit that was not previously known. Geologically favorable targets that were tested for metals during this study included the mafic rocks of the Twilight Gneiss, carbonaceous slates of the Uncompahgre Formation, stream placers, and altered rocks from shear zones. Samples contain a negligible amount of metals.

The Proterozoic rocks in the West Needle Mountains generally have no strong gravity or magnetic expression. A gravity high, centered in the Columbine Lake area to the southwest, is probably due to the Electra Lake Gabbro (Plouff and Pakiser, 1972). This rock unit is shown as a magnetic low on a U.S. Geological Survey aeromagnetic map (U.S. Geological Survey, 1972). Magnetic contours over the WSA show a very uniform increase from south to north and west to east. This increase in the magnetic field is due to the presence of Tertiary igneous rocks to the north and east of the WSA.

MINING DISTRICTS AND MINERALIZED AREAS

Claims, mines, and prospects

Although no patented claims were on record with the U.S. Bureau of Land Management in the WSA as of September 1982, 210 unpatented claims are on record and within the WSA. Most of the claims in the WSA were staked by Exxon Minerals Company during their exploration for uranium in 1980-81, at the Elk Park mine. These claims staked by Exxon have since been dropped.

During the time of this study, assessment work and prospecting were being done only at the Hidden Hole prospect, located inside the western boundary of the WSA.

Several small mines and prospects within and near the WSA (see map for locations) have been developed along quartz-fissure veins. These veins occupy minor fault zones in the Proterozoic Twilight Gneiss and the overlying Paleozoic sedimentary rocks.

The Mastadon mine, on patented claims 1 mi east of the WSA, consists of workings on quartz-pyrite fissure veins within fault zones in the Twilight Gneiss. These veins appear to pinch out in the gneiss and do not extend into the WSA. Silver was probably produced from this mine (Scott, 1983).

A similar mineral occurrence, located on unpatented claims within the WSA at the Bitterroot mine, is along quartz-pyrite-calcite veins within fault zones in the Twilight Gneiss. The mine never produced, but reportedly contained tungsten, native gold, and auriferous pyrite (Silver, 1957).

The Silver Star Extension mine, located in the southwestern part of the WSA, is also in a fault zone in the Twilight Gneiss. Talus covers the portal of the adit, and the vein was not visible on the surface. No mineral resource could be determined from information available, and the vein could not be traced on the surface.

An adit at Purgatory Flats, west of the WSA, was driven on a quartz-pyrite vein within a fault zone in the Twilight Gneiss. This fault zone does not extend into the WSA. Minor amounts of precious metals were detected in samples from the vein. A limonite-stained sample of fault gouge contained gold (0.048 oz per ton of ore) and silver (0.3 oz per ton of ore).

The area north of Columbine Lake, 1 mi southwest of the WSA, contains a number of prospects and shafts on mineralized fault zones in Paleozoic limestones. Silver, from 0.2 oz to 28 oz per ton of ore, and base metals were detected in these veins.

Paleozoic limestones north of the WSA contain barite, calcite, copper, lead, and silver in fault-controlled veinlets. These veinlets pinch out rapidly and cannot be traced into the WSA.

The Sally Bowman mine, located on the fringe of the east-central boundary of the WSA, is on a small fault-controlled fissure vein in the Twilight Gneiss. Traces of gold and silver were found in dump samples. This vein cannot be traced into the WSA.

Based on analytical data, the limited nature of controlling structure, and past records of production, the area of the fissure veins in either the Proterozoic Twilight Gneiss or the overlying Paleozoic limestones has a low potential for mineral resources. Moderate to high values of silver were found localized in veins in the Paleozoic limestone southwest of the WSA; however, this limestone does not extend into the WSA.

In 1956, uranium was discovered near the west bank of the Animas River in Elk Park near the WSA. In 1957, a Defense Mineral Exploration Assistance contract was granted to explore the deposit. Sporadic production since then has amounted to about 300 tons of ore, which averaged approximately 0.2 percent U₃O₈ (Scott, 1983). An extension program during 1980 and 1981 by Exxon Minerals Company resulted in the delineation of a large mineralized body. This zone of mineralization lies along the WSA boundary and, as defined from surface and subsurface exploration, its limits remain undetermined laterally and at depth. The known surface extent of this deposit, referred to as the Centennial deposit, is at least twice the size of the surface expression of the 40-million-pound Schwartzwalder uranium mine in Jefferson County, Colo. (Bailey, 1982).

The uranium is in fissure veins that occupy fractures in the quartzites and slates of the Uncompahgre Formation. In the area of mineralized rock the formation is intensely folded and fractured along east-west trends, and the mineralized zone is confined between two major faults (Bailey, 1982).

The veins range in size from tiny fractures fillings in the quartzites to major fault breccias. The uranium occurs in simple veins associated with pyrite and hematite or in complex veins that contain amorphous sulfide and arsenic minerals (Bailey, 1982). Zoning of the uranium (or) base and precious metals is indicated by the increase of uranium values and a decrease of base and precious metals with depth. Bailey (1982) provided the following examples of metal concentrations found in both types of veins:

| | U | Cu | Mo | Pb | Zn | Ag | Ni | Co |
|----------------|-----|------|------|------|------|--------|------|------|
| | % | % | % | % | % | oz/ton | % | % |
| Simple vein-- | 2.0 | 0.05 | 0.06 | 0.04 | 0.05 | 1 | 0.09 | 0.03 |
| Complex vein-- | 2 | 3.6 | .12 | .09 | .28 | 3 | -- | -- |

Although the Centennial deposit is located outside the WSA, the east-west structures that localized the ore there can be traced well inside the WSA. The Centennial deposit is located on 80 acres at Elk Park that were excluded from the West Needle Wilderness Study Area. No surface indication of mineralization was extensive within the WSA; however, it is reasonable to assume that mineralization may occur at depth along these known faulted fold structures. Exploitation of the Centennial deposit will be difficult because of the very rough terrain and lack of access. The only access to the mine is that provided by the Durango-Silverton Narrow Gauge Railroad which operates only during the summer months.

REFERENCES CITED

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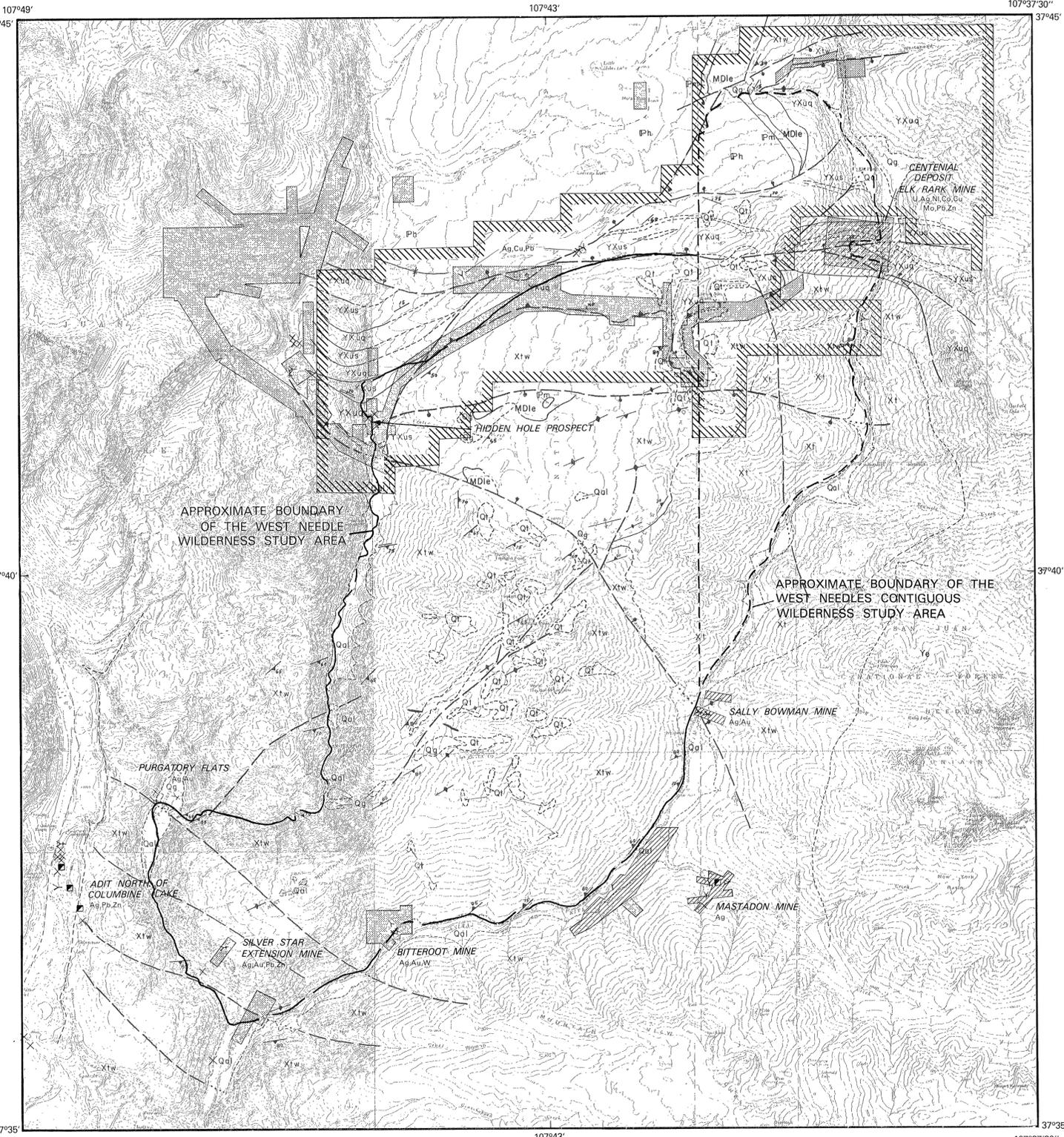
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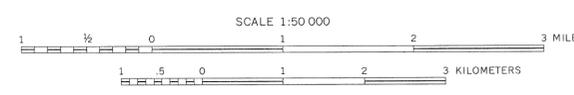
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Base from U.S. Geological Survey, 1:24,000 Columbine Pass, 1973; Electra Lake, 1960; Engineer Mtn., 1960; Mountain View Crest, 1973; Snowdon Peak, 1964; Storm King Peak, 1969

Geology mapped by R. E. Van Loenen, 1982



EXPLANATION OF RESOURCE POTENTIAL

AREA OF MODERATE MINERAL RESOURCE POTENTIAL FOR URANIUM

PATENTED MINING CLAIMS

UNPATENTED MINING CLAIMS

UNPATENTED MINING CLAIMS (EXXON GROUP)

PROSPECT PIT

ADIT

CAVED ADIT

SHAFT

EXPLANATION FOR GEOLOGIC BASE

(Note: The following correlation and description are for the geologic base map shown in gray)

CORRELATION OF MAP UNITS

| | | |
|------|----|----------------------------|
| Qa1 | Qt | QUATERNARY |
| Qg | | |
| Ph | | PENNSYLVANIAN |
| Pm | | |
| MDle | | MISSISSIPPIAN AND DEVONIAN |
| Gi | | CAMBRIAN |
| Yd | | PROTEROZOIC Y |
| Ye | | |
| YXug | | PROTEROZOIC Y AND X |
| YXus | | |
| Xt | | PROTEROZOIC X |
| Xtw | | |

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Qa1 ALLUVIAL DEPOSITS (QUATERNARY)--Alluvium and alluvial cone deposits

Qt TALUS (QUATERNARY)

Qg GLACIAL DEBRIS (QUATERNARY)

SEDIMENTARY ROCKS

Ph HERMOSA FORMATION (PENNSYLVANIAN)--Mainly gray marine limestone with minor sandstones and shales

Pm MOLAS FORMATION (PENNSYLVANIAN)--Nonmarine red conglomerate with chert

MDle LEADVILLE AND OURAY LIMESTONES AND ELBERT FORMATION, UNDIVIDED (MISSISSIPPIAN AND DEVONIAN)--Leadville (Mississippian) and Ouray (Devonian) are dolomitic limestones, locally cherty. Elbert Formation (Devonian) is mainly limestone with shale and sandstone

Gi IGNACIO QUARTZITE (CAMBRIAN)--Quartzite and conglomerate

OLDER METAMORPHIC AND IGNEOUS ROCKS

Yd INTRUSIVE DIKES (PROTEROZOIC Y)--Lamprophyre, diabase, and rhyolite porphyry

Ye EOLUS GRANITE (PROTEROZOIC Y)--Porphyritic biotite-hornblende quartz monzonite

YXug UNCOMPAGHRE FORMATION (PROTEROZOIC Y AND X)--Quartzite and conglomerate

YXus Slate and phyllite

Xt TENMILE GRANITE (PROTEROZOIC X)--Quartz monzonite and granodiorite

Xtw TWILIGHT GNEISS (PROTEROZOIC X)--Quartzose-feldspathic gneiss, biotite gneiss, amphibolite, and quartzite

CONTACT--Dashed where approximately located

FAULT--Bar and ball on downthrown side. Dashed where approximately located; dotted where concealed

THRUST FAULT--Sawtooth on upper plate

ANTICLINE--Showing crestline

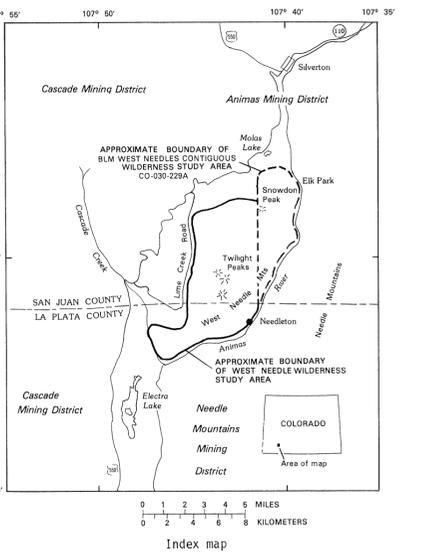
SYNCLINE--Showing troughline

STRIKE AND DIP OF BEDS

STRIKE AND DIP OF FOLIATION

Inclined

Vertical



MINERAL RESOURCE POTENTIAL MAP OF THE WEST NEEDLE WILDERNESS STUDY AREA, SAN JUAN AND LA PLATA COUNTIES, COLORADO

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