CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the Cambior Exploration USA Inc. records

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

Cochise

DRAGOON MOUNTAINS ROADLESS AREA, ARIZONA

By HARALD DREWES,[1] U.S. GEOLOGICAL SURVEY, and

T. J. KREIDLER, U.S. BUREAU OF MINES

SUMMARY

The mineral and hydrocarbon resource potential of the Dragoon Mountains Roadless Area was assessed in 1980–82 and six areas of probable mineral-resource potential were identified. The area may contain metamorphic skarn-type mineralization of copper, lead, molybdenum, and zinc, and some of these may contain silver and gold. More remotely, the area could also contain stockwork molybdenum mineralization and replacement or vein-type mineralization of beryllium, fluorite, thorium, tin, and tungsten. Rock products exist within the area and are discussed due to the proximity of a railroad, but similar materials occur outside the area. There is little promise for the occurrence of energy resources.

CHARACTER AND SETTING

The Dragoon Mountains Roadless Area lies in the northern end of the Dragoon Mountains near the center of Cochise County in southeastern Arizona. It covers an area of about 52 sq mi, lying between the village of Dragoon to the north and the county road through Middle Pass to the south, and between the San Pedro River valley to the west and Sulfur Springs valley to the east.

The area is rugged and is in the Coronado National Forest. Scrubby forests cover the high terrain and grass, shrubs, and cactus cover the lower country. Surface water is scarce, with springs few and watercourses ephemeral. Access is by ranch or USFS roads from the highways in the adjacent valleys, and some of these roads extend well into the roadless area.

Base and precious metals were mined from several sites in and near the roadless area. These deposits are from skarn-type alteration of mixed limestone and shale near granite. Most production probably was lead, zinc, and silver; a little gold and tungsten may have been produced. Production records for the patented claims and mines in and near the study area show that the total value of production was about $2 million. In one canyon, marble has been quarried.

The roadless area is underlain by a wide variety of rocks that are stongly faulted and intruded by several stocks and many dikes (Drewes and Meyer, 1983). A Precambrian basement is made up of schist, arkose, quartzite, sedimentary breccia, metavolcanic rock, and amphibolite, all intruded by granodiorite stocks. These are unconformably overlain by Paleozoic and Mesozoic sedimentary sequences. The Paleozoic rocks are mainly limestone but include some clastic rocks both near the base and top; the Mesozoic sequence is largely of clastic rocks.

The basement rocks and sedimentary sequences are intruded by igneous rocks. A small Oligocene stock lies along the northwest flank of the mountains. The large Miocene to Oligocene Stronghold Granite, a stock, lies in the center of the mountains and extends beyond their west flank. Tertiary or Cretaceous plugs occur near the Golden Rule mine in the northeastern tip of the range. Most dikes in the area are also Miocene, and typically trend northwest across stock and host rock alike. Quaternary gravel deposits lap against the flanks of the range and west of the Stronghold stock they lie upon a pediment.

The Dragoon Mountains are abundantly faulted. Many faults are steep northwest- or north-trending stuctures; others are gently inclined. Many of the faults are thrust faults formed under compressive deformation. A few tight folds or truncated folds occur with the thrust faults. Nearly all of these structural features are cut by the stocks and thus were available as conduits for fluids dispersing from the stocks and plugs, some of which probably carried metals.

[1]With contributions from K. C. Watts, Jr., and D. P. Klein, USGS.

MINERAL RESOURCES

Six areas have probable mineral-resource potential based on observations of geology, geochemistry and geophysics (Drewes and others, 1983).

Area 1 is around the Golden Rule mine, largely outside the northeast corner of the roadless area. The area is underlain by metamorphosed Paleozoic rocks, including the Abrigo and Martin Formations, intruded by the Tertiary rhyolite porphyry plugs. Mining records and analyses of mineralized rock on the dump show the presence of base metals, silver, and gold. Aeromagnetic and gravity anomalies, along with surface observations, suggest the concealed presence of a stock and of a strong northeast-trending fault at the northern flank of the range. The metamorphosed and locally mineralized formations dip southwest and are cut by the northeast-trending fault, as well as by bedding-plain thrust faults. These data suggest that area 1 has a probable resource potential for mineralization similar to that found at the mine, most likely down-dip in the Abrigo and Martin Formations, along the fault, or beneath the gravels north of the range. This implied mineralization would be vein or skarn-type contact deposits like those at the surface.

Area 2 is along the northwest flank of the Dragoon Mountains largely along the southeast wall of the Oligocene stock, where its roof is projected outward at a low angle. The site also extends south along a zone of steep faults and to an upwarped and up faulted, mineralized structural feature. Small mines and prospects lie along steeply inclined to vertical faults along which there are slivers of metamorphosed Paleozoic limestone. Geochemical anomalies appear to be more widespread than the known mineralization. A geophysical anomaly at the stock has a configuration suggesting that body has a shoulder to the southeast, where pods of aplite appear along the fault zone with the limestone slivers. These observations indicate that additional base metal and silver mineralization may exist, most likely along fault zones and in formations typically altered to skarn minerals. There is also a probable resource potential for stockwork molybdenum deposits or tungsten deposits.

At area 3, on the northeast side of the Stronghold stock, a probable mineral-resource potential is inferred because the Abrigo and Martin Formations, and other units of the Paleozoic sequence dip gently northeastward over a shoulder of the stock. The area has some prospects and small mines, containing concentrations of base metals and silver. Area 3 also has favorable geochemical anomalies and a magnetic anomaly penetrating the area from the northeast. We feel there is a probable resource potential in area 3 for small skarn-type deposits of base metals and silver down dip along the favored formations, and perhaps also some enrichment along intersections of faults and dikes at higher stratigraphic levels in the northern half of the area.

Area 4 lies largely outside the roadless area along a prong of sedimentary and metamorphic rocks between two lobes of the Stronghold stock. The Abril and San Juan mines lie in this area, along with many prospects. These mines are on skarn-type replacement deposits in faulted Paleozoic limestone along faults and near the stock. The mines are on a north-trending linear magnetic anomaly. A base metals-tungsten-silver geochemical anomaly trends northwest along the faulted sedimentary and metamorphic rocks, and a thorium-tin-beryllium geochemical anomaly trends northeast across the area, largely following the stock itself. These studies suggest that area 4 has a probable resource potential for additional deposits of base metals and silver, and perhaps also of other metals in vein or replacement deposits. While most of the site is outside the Dragoon Mountains Roadless Area, some zones of faulted metamorphic and sedimentary rock near the stock may extend into the roadless area.

Area 5 covers some of the southwestern part of the roadless area, along a gently outward dipping wall of the Stonghold stock which intrudes the Abrigo and Martin Formations. Skarn-type mineralization appears in scattered prospects near the contact, with enrichment in base metals, silver, and tungsten. The linear magnetic anomaly of area 4 extends across the eastern part of area 5, too. Area 5 has a probable resource potential for occurrences of lead and silver enrichment where the favored host rocks are expected to lie at moderate depth. While the deposits may be small, the area is accessible and would thus be easier to explore than most parts of the other areas of probable mineral-resource potential.

Area 6 is almost entirely south of the roadless area, lying along a zone of northwest-trending faults mostly in Paleozoic and Mesozoic rocks. The Black Diamond mine, south of Middle Pass, is in this belt near the point at which the present study ends. The north end of this area is close to a gently south dipping part of the Stronghold stock. With the exception of this northern end and some slices of limestone along fault zones, the rocks are unaltered. Part of the area coincides with a magnetic anomaly. Geochemical anomalies for silver and tungsten occur in most of the area, and for gold in the southern part of the area. These data indicate that there is a probable resource potential for occurrences of small deposits of base metals, silver, gold, and perhaps tungsten, in replacement bodies in fault slices of limestone or along heavily fractured ground near the larger faults.

Several industrial rock products occur in the roadless

area. Marble for use as crushed rock or as flux may be obtained in several zones in the southern end of the roadless area, with the most promising marble in the Escabrosa and Horquilla Limestones of the Paleozoic sequence. The Horquilla Limestone may also be suitable for use in cement production, as it is near Tucson. A quartzitic variety of Pinal Schist of the basement rocks, near the mouth of Fourr Canyon may prove suitable for flux in copper smelters. Although in each of these instances the rock products are close to a railroad, other areas outside the roadless area also contain an abundance of these commodities.

Conditions for the accumulation of petroleum and natural gas are believed to be negligible. The roadless area does lie in the proposed southern extension of the overthrust belt in which exploration for possible deep targets has been in progress for a few years. The local accumulation through thrust faulting of a thick pile of sedimentary rocks not withstanding, the entrapment conditions near so many young (mid-Tertiary) stocks, plugs, and dikes are probably poor.

SUGGESTIONS FOR FURTHER STUDIES

Further study of several of the areas indicated as having probable mineral-resource potential and of areas containing industrial rock products may be desirable. Extending this study for base metals and silver would probably involve more closely spaced geochemical sampling of alluvium and altered rock chips along fractures in those parts of areas 1, 3, and 5 overlying down-dip extensions of suitable host rocks of mineralization, and a similar check along faults of areas 2, 3, 4, and 6. More detailed geophysical work may also help to indicate the configuration of shoulders or cupolas of concealed parts of stocks.

The simplest single extension of this study would be to check the key rock types like the Horquilla Formation or the metamorphosed northern part of the area for suitability in use for lime rock or cement production.

REFERENCES

Drewes, Harald, Kreidler, T. J., Watts, K. C., Jr., and Klein, D. P., 1983, Mineral resource potential of the Dragoon Mountains Roadless Area, Cochise County, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-1521-B, scale 1:50,000.

Drewes, Harald, and Meyer, G. A., 1983, Geologic map of the Dragoon Mountains Roadless Area, Cochise County, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-1521-A, scale 1:50,000.

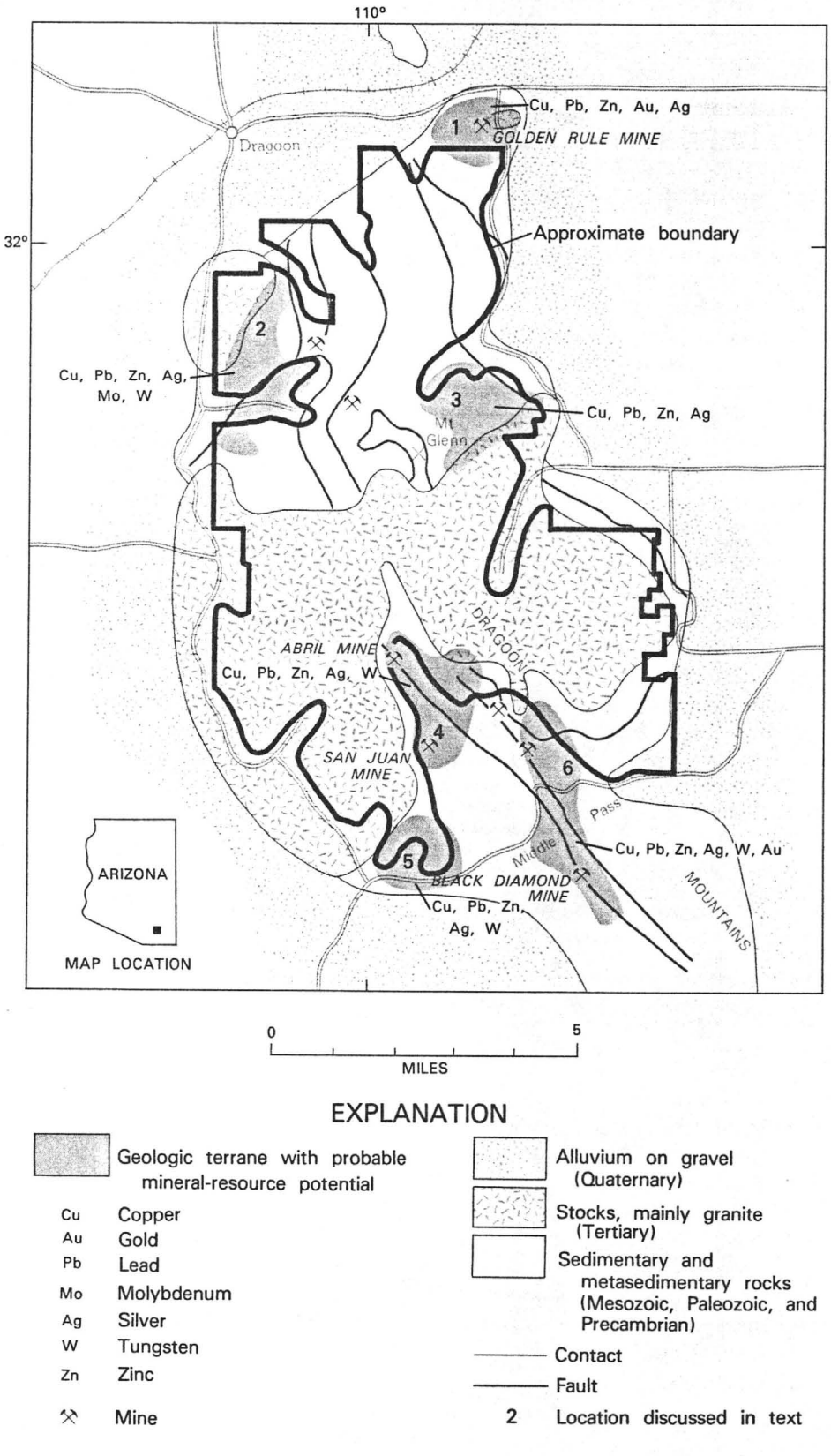

Figure 15.—Dragoon Mountains Roadless Area, Arizona.

Cochise AZ-4

West Pride's Arizona ground features big mineralized zone

6-4-90 No. MINER