DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

TO ACCOMPANY MAP MF-1353-C

# MINERAL RESOURCE POTENTIAL OF THE STANSBURY ROADLESS AREA, TOOELE COUNTY, UTAH

## SUMMARY REPORT

By

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## STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and the Joint Conference Report on Senate Bill 4, 88th Congress, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" 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. This report discusses the results of a mineral survey of the Stansbury Roadless Area, Wasatch National Forest, Tooele County, Utah. The Stansbury Roadless Area was classified as a recommended wilderness during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979. The area was subsequently divided into recommended wilderness (A4757) and further planning (D4757) areas by presidential action, April 16, 1979. This report and accompanying map describe the mineral resource potential of the further planning area (D4757).

## STANSBURY ROADLESS AREA

In April 1979, the Stansbury Roadless Area was divided into two areas: area A4757 (recommended wilderness) and area D4757 (further planning). The geologic map of the Stansbury Roadless Area (Sorensen, 1982a) covers both areas A4757 and D4757. The geochemical map of the Stansbury Roadless Area (Sorensen, 1982b) covers only area D4757. This report is an assessment of the mineral resource potential of area D4757 only, because of its status as a further planning area. Area A4757 and areas adjacent to the entire roadless area are mentioned in this evaluation of area D4757 because consideration of the surrounding terrane helps to determine the mineral resource potential.

## SUMMARY

The U.S. Bureau of Mines and the U.S. Geological Survey have conducted a survey to determine the mineral resource potential of the eastern part (D4757) of the Stansbury Roadless Area, Tooele County, Utah. The results of this survey indicate that a low to moderate potential for copper, lead, and silver mineralization exists in part of area D4757. The balance of area D4757 is considered to have a low potential for metallic mineralization. The oil and gas potential is not known and cannot be assessed without a program of geophysical exploration and exploratory drilling. Limestone and dolomite are exposed over a large part of the roadless area, forming a major industrial mineral resource, but an extensive sampling and testing program is needed to determine the degree of purity of the rocks and, hence, the value of the resource. There are no known geothermal resources within the study area.

## INTRODUCTION

Field investigations of the study area during 1980 and 1981 consisted of geochemical sampling by the U.S. Geological Survey and a survey of mines, prospects, and mineralized zones by the U.S. Bureau of Mines. This report summarizes the findings of those investigations and includes a map showing mineral resource potential in area D4757.

### Location, size, and geographic setting

The Stansbury Roadless Area is located in the Stansbury Mountains of north-central Utah, approximately 40 mi west of Salt Lake City, and approximately 15 mi west of Tooele, county seat of Tooele County, Utah (fig. 1). Area D4757 comprises 11,176 acres on the east flank and near the southern end of the range.

The north-trending Stansbury Mountains are flanked by Skull Valley to the west, and by Tooele Valley, South Mountain, and Rush Valley to the east. The range rises just south of Great Salt Lake, trends southward for approximately 28 mi, has a maximum width of approximately 10 mi, and ends near Johnson Pass on State Highway 199. The range is bordered on the north by Interstate Highway 80 and on the northeast by State Highway 138. A paved road from Grantsville to State Highway 199 parallels the east margin of the range and gives access to North Willow, South Willow, and East Hickman Canyons. State Highway 199 cuts across the south end of the range at Johnson Pass. A paved road between Interstate Highway 80 and State Highway 199 affords limited access to the west side of the range.

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### Geologic setting

The Stansbury Mountains are in the eastern part of the Basin and Range physiographic province and are part of the Sevier orogenic belt (Armstrong, 1968). The Stansburys are underlain by approximately 30,000 ft of Paleozoic sedimentary rocks (Sorensen, 1982a). The lower part of the section consists of approximately 10,100 ft of quartzite, limestone, dolomite, shale, and sandstone of Early Cambrian through Devonian age. A Late Devonian angular unconformity separates these rocks from the rest of the Paleozoic section which consists of approximately 20,000 ft of limestone, shale, sandstone, and quartzite of Devonian through Permian age. Mesozoic limestone, sandstone, dolomite, and siltstone occur in a small area on the east flank of the Stansbury Mountains. Tertiary volcanic rocks, principally latite flows and waterlain tuffs, occur in the foothills east and west of the range. Sills and small plugs of Tertiary monzonite porphyry occur near the crest of the range north of Deseret Peak. Tertiary and Quaternary surficial deposits underlie the lower foothills and the valleys east and west of the range.

The Deseret anticline is the dominant geologic structure in the Stansbury Roadless Area. Lower Cambrian quartzite exposed in the anticlinal core forms the crest and most of the west flank of the range. Rocks as young as Early Pennsylvanian are exposed on the east flank of the fold. The west limb of the fold is terminated by the Stansbury fault, a recently active normal fault. The east limb of the anticline terminates along the trace of the Broad Canyon thrust fault which was active during late Mesozoic or early Tertiary time; the fault dips west and underlies all of the Stansbury Mountains with the exception of the eastern foothills.

### Mining activity

Copper, gold, iron, lead, and silver are the principal metals that have been mined or prospected for in the Stansbury Mountains. No mines are currently producing within or immediately adjacent to the Stansbury Roadless Area. The nearest active operations are approximately 5 mi north near Flux, Utah, where limestone and dolomite are quarried as industrial minerals.

Production of metallic ores is recorded for several small deposits in the Stansbury Mountains 2-5 mi north of the Stansbury Roadless Area. These deposits include the Utah Bunker Hill mine, 2 1/2 mi north of the roadless area, and the Humdinger, Climax, and Last Chance deposits, 5 mi north of the roadless area.

There are many abandoned workings just east of the Stansbury Roadless Area, but only two that have recorded production. The Third Term mine was opened in 1875 and operated intermittently, with production recorded in the 1870's, 1917, and 1939 (Rigby, 1958, p. 124, 126; Heikes, 1921, p. 200; 1928, p. 438; Miller and Luff, 1940, p. 462). The total value of ore shipped from the Third Term mine is about $100,000 (Young, 1950). The Metal Queen mine recorded production in 1939 of an estimated 50 ounces of silver and 6,000 pounds of lead (Rigby, 1958, p. 127; Miller and Luff, 1940, p. 454, 462).

## GEOLOGY, GEOCHEMISTRY, AND GEOPHYSICS PERTAINING TO MINERAL RESOURCE ASSESSMENT

Most of the mines and prospects in or near area D4757 occur within a narrow north-trending zone that is bordered on the west by the Late Devonian unconformity and on the east by the Broad Canyon thrust fault. The majority of the workings are above the thrust in the Gardison Limestone. The proximity of these workings to the underlying Broad Canyon thrust fault suggests that mineral-rich solutions originating from an intrusive body below the thrust may have migrated along the Broad Canyon thrust fault and formed local replacement bodies at favorable sites in the Gardison Limestone. The zone defined by the traces of the unconformity and the thrust fault is considered to have a low to moderate potential for undiscovered mineral deposits. Because the Broad Canyon thrust fault dips steeply to the west, the zone of potential mineralization also dips steeply to the west, extending under the Stansbury Mountains.

The Stansbury fault forms the west boundary of the Stansbury Mountains. Small highly oxidized iron deposits occur locally where the Stansbury fault intersects limestone beds of the Ophir Group (of Rigby, 1958) or Teutonic Limestone.

Semiquantitative spectrographic analyses reporting 31 elements have been made for heavy-mineral concentrates of 29 stream-sediment samples collected from streams that drain area D4757 (Sorensen, 1982b). Gold is not reported in any of these analyses; silver is reported in one analysis at a concentration of 0.7 ppm; copper is reported with a high value of 300 ppm and a mean value for all samples of 28 ppm; and lead is reported with a high value of 70 ppm and a mean value of 16 ppm. Most elements reported in the analyses of the stream-sediment concentrates are present in amounts that are less than the average crustal abundance for that element. These results do not suggest the existence of any undiscovered mineral deposits.

Examination of available aeromagnetic data (U.S. Geological Survey, 1971) shows that most magnetic highs in the study area can be reasonably correlated with unmineralized Tertiary volcanic rocks that crop out east and west of the Stansbury Mountains. Low-amplitude magnetic highs centered on North Willow and Davenport Canyons may be due either to small intrusive masses or to an increased magnetite content in the sedimentary rocks that compose the range (D. R. Mabey, written commun., 1981). Additional geophysical data are needed in order to determine the probable origin of these minor magnetic highs.

## MINING DISTRICTS AND MINERALIZATION

The Stansbury Roadless Area includes most of the Third Term and a small part of the Free Coinage mining districts (fig. 1). An estimated 1,200 mining claims were filed in the roadless area from 1885 to 1980.

The Third Term mining district, originally called the Grantsville mining district, was organized June 15, 1875, for claims reporting lead, silver, and copper (Butler and others, 1920, p. 147, 149). Two claims in the district near the Stansbury Roadless Area have had very limited production over a period of 80 years, with the most recent production in 1950. Mining-location records for the period before 1885 were not available in the Tooele County courthouse.

The Free Coinage mining district was organized May 29, 1895, to include claims for clay and limestone (Butler and others, 1920, p. 146). Later claims in the district have been filed for silver, lead, zinc, and mercury. Five claims in the mining district north of the Stansbury Roadless Area have had a very limited production over a period of 25 years, with the most recent production in 1942.

There are two groups of patented mining claims that are within area A4757. The Iron King claims were patented in 1906 and total 40 acres in sec. 11, T. 3 S., R. 7 W. (unsurveyed). The Consolidated Lela claims were patented in 1928 and cover approximately 42 acres in sec. 6, T. 4 S., R. 7 W.

The U.S. Bureau of Mines studied the mines and prospects in and near the roadless area and analyzed 125 samples by fire-assay, atomic-absorption, and spectrographic methods. Results of the analyses indicate gold in three samples with values ranging from 0.005 to 0.04 oz/ton, silver values ranging from 0.2 to 7.4 oz/ton, lead values ranging from 0.01 to 13 percent, zinc values ranging from 0.1 to greater than 5 percent, and copper values ranging from 0.001 to 1.0 percent.

### Eastern margin of roadless area

Several canyons along the east flank of the range near the central part of the Stansbury Roadless Area have been extensively prospected. Mining Fork of South Willow Canyon and Davenport, North Willow, and South Willow Canyons, together with intervening areas, contain almost all of the major workings, most of which are outside of the boundaries of the roadless area.

Observed workings along the east margin include 24 adits, 9 caved adits, 25 pits, and 3 shafts. Total haulage in the adits was approximately 4,100 ft. A total of 109 samples was collected from these workings.

Many of the mines and prospects from Davenport Canyon and South Willow Canyon are in the Mississippian Gardison Limestone and are in a general north-south alinement.

### Davenport Canyon

The major workings within area A4757 (fig. 2) in Davenport Canyon are the upper and lower adits of the Rose mine. The workings are in Cambrian Tintic Quartzite close to the Tintic-Ophir contact. A northeast-trending shear zone with minor parallel faults is exposed in both adits. The shear zone and parallel faults are highly stained by iron oxide. The lower and upper adits have 420 ft and 234 ft of workings, respectively. No production has been recorded from the Rose mine. Minor workings in Davenport Canyon include 10 pits and a 20-ft adit.

Thirteen samples collected from the Rose adits were analyzed by fire-assay and spectrographic methods. One sample assayed 0.2 ounces of silver per ton. Copper values ranged from 0.003 to 0.03 percent for 7 samples.

The Utah Geological and Mineralogical Survey evaluated a reported platinum discovery during 1968 and 1969 in Davenport Canyon (Whelan, 1969). The Rose mine, creek gravel, and all accessible workings and cuts in the canyon were sampled. Although none of the 14 samples assayed contained platinum, 1 sample from the Rose mine assayed 2.0 oz/ton silver and 2.4 percent lead. Whelan (1969) concluded that no primary platinum mineralization or platinum placer deposits are indicated in Davenport Canyon and that platinum mineralization is incompatible with the geologic terrane there.

### North Willow Canyon

The major workings in North Willow Canyon are the East and West Dragon adits, Dragon shaft, and the Monarch adit, all of which are in the Mississippian Gardison Limestone. Other prospects include six pits, three caved adits, a 24-ft adit, and a 13-ft shaft. The Dragon mine workings are partially within the boundaries of area A4757; the Monarch workings and the 13-ft shaft are outside of, but immediately adjacent to, the area. The other minor workings lie outside of area A4757.

The East and West Dragon adits have approximately 190 ft of workings. The Dragon shaft is 57 ft deep. The Monarch adit has approximately 1,700 ft of workings and is the largest adit adjacent to the Stansbury Roadless Area. No production or resource information has been recorded from any of these mines.

Fire assays and spectrographic analyses of 35 samples from workings in North Willow Canyon indicate values of a trace of gold per ton or less. Twelve samples indicated silver values ranging from 0.2 to 0.6 oz/ton. A selective dump sample from the Dragon shaft assayed 4.0 oz/ton silver. Copper was detected in 16 samples and has a maximum concentration of 0.8 percent. Lead is present in 22 samples at values ranging from 0.01 to 0.21 percent.

### Mining Fork of South Willow Canyon

The major workings in Mining Fork include the Metal Queen, Third Term, and the Third Term (Stansbury?) mines. Lesser workings include eight adits ranging in length from 9 to 62 ft, three caved adits, and seven pits. The Metal Queen and Third Term (Stansbury?) mines are outside of the Stansbury Roadless Area. The Third Term mine is partially within area A4757, as are several of the lesser adits and pits.

The location of the Third Term mine is uncertain. A former lessee, Jack Rholfing, states (oral commun., 1980) that the mine identified as the Third Term mine on the U.S. Geological Survey 15-minute Timpie quadrangle (projected SE1/4 sec. 35, T. 3 S., R. 7 W.) is, in reality, the Stansbury mine; thus this mine will be referred to in this report as the Third Term (Stansbury?) mine. Rholfing states that the actual Third Term mine is located approximately 0.5 mi south of the Metal Queen mine in projected NE1/4 sec. 2, T. 4 S., R. 7 W. Eight samples were collected from the Third Term (Stansbury?) mine. One sample assayed 2.6 oz/ton silver. Values ranged from 0.1 to 10.5 percent lead for five samples and 0.1 to greater than 5 percent zinc for four samples. The Third Term (Stansbury?) mine is approximately 0.4 mi east of the roadless area boundary.

The Third Term mine is one of only two mines near the Stansbury Roadless Area with recorded production of metals. Workings on the Third Term property consist of a glory hole, 116-ft haulage adit, 172-ft lower adit, and two caved adits. The glory hole is approximtely 40 ft wide at the surface and plunges to a depth of more than 80 ft. The Third Term was last worked in the early 1950's. Assays of eight samples collected from the Third Term workings have a maximum value of 0.005 oz/ton gold. Silver values ranged from 0.2 to 7.4 oz/ton. Spectrographic analysis of four samples indicated values ranging from 0.1 to 1.0 percent copper, 0.1 to greater than 1.0 percent lead, and 0.1 to 0.5 percent zinc. Atomic-absorption analysis of two samples indicated 2.05 and 13 percent lead.

The Metal Queen mine, also with recorded production of metals, has about 400 ft of workings, from which six samples were collected. Three samples indicated silver values of 0.4 oz/ton. Spectrographic analysis indicated values of 0.003 to 0.01 percent copper and up to 0.04 percent lead in five samples.

Many pits and small adits in Mining Fork were sampled. A sample from a 20-ft adit assayed 2.0 oz/ton of silver.

### South Willow Canyon

The Silver Drum mine consists of a flooded lower adit and an upper 195-ft adit. It is the only mine in South Willow Canyon and is on the boundary of the roadless area. Within the mine, lenses and pods of soft granular pyrite are concentrated in north-northeast-trending shear zones in fine-grained gray quartz sandstone.

Assay results of five samples from the Silver Drum upper adit indicate one sample with 0.2 oz/ton silver. Spectrographic analyses of three samples indicate a range of 0.001 to 0.003 percent copper and a range of 0.01 to 0.02 percent lead.

### Bear Fork of East Hickman Canyon

The Bear Fork Canyon prospects are in area A4757 southeast of Deseret Peak in the Gardison Limestone near the Cambrian-Mississippian unconformity. Workings consist of three caved adits, an 11-ft adit, and a 24-ft shaft. Spectrographic analysis of four samples detected a maximum of 0.02 percent copper and 0.1 percent lead.

### Southern margin of roadless area

The Ahlstrom mine is located just north of State Highway 199 near Johnson Pass, approximately 2 mi south and 1 mi east of the southern boundary of the roadless area. The mine has approximately 1,300 ft of workings and is the only major working in that area. Assays of seven samples collected from the Ahlstrom mine indicate maximum values of 0.01 oz/ton gold and 0.2 oz/ton silver. Spectrographic analysis of four samples indicated maximum values of 0.005 percent copper and 0.03 percent lead.

### Northern margin of roadless area

The nearest workings north of the roadless area are the Western Star mine and several small prospects, approximately 0.75 mi north along the trend of the Broad Canyon thrust fault.

The Western Star mine is in Silurian Laketown Dolomite, close to the faulted contact with the Pennsylvanian and Mississippian Manning Canyon Shale. The Western Star has approximately 100 ft of workings. Three assayed samples

from the Western Star indicated a maximum value of 0.4 oz/ton silver. No production has been recorded from this mine.

## ASSESSMENT OF MINERAL RESOURCE POTENTIAL

### Method of assessment

The assessment of metallic mineral resource potential was based on the following criteria: structure and stratigraphy of potential host rocks, geochemistry of stream sediments, analysis of samples from existing mines and workings, aeromagnetic data, and occurrence of ore minerals or patterns of alteration associated with ore minerals. Using these criteria, the metallic mineral resource potential can be classified as high, moderate, or low. A high resource potential requires that the above-listed criteria be generally favorable, plus a nearby deposit of economic proportions, past or present, which can reasonably be inferred to extend into the study area. A moderate resource potential also requires generally favorable geologic criteria and suggests that the extension into the district of any nearby deposits be somewhat equivocal. A low resource potential is predicted if most or all of the geologic criteria are unfavorable.

### Mineral resource potential

An examination of the geology, geochemistry, mines, prospects, and claims did not reveal any indications of substantial, near-surface metallic mineral resources in area D4757; the metallic mineral resource potential for most of the area is considered to be low.

One zone with a low to moderate potential for mineralization is recognized (fig. 2). Within area D4757, lands adjacent to and west of the trace of the Broad Canyon thrust fault are considered to have a low to moderate potential for copper, lead, and silver mineralization. Two mines, which earlier produced minor amounts of lead and silver, are in an extension of this zone outside of the roadless area, as are most of the smaller workings observed during the present study. The zone of low to moderate potential is approximately 0.75 mi wide at its widest point and extends from Magpie Canyon to Big Hollow. Results of fire-assay and spectrographic analyses suggest that any near-surface deposits present are probably small and of low grade.

Limestone and dolomite are the principal industrial minerals present in the Stansbury Roadless Area, and have been quarried near Flux (fig. 1) for a number of years. The Deseret and Great Blue Limestones form the best sources of dolomite and limestone, respectively, in the roadless area. The Oquirrh Group is less attractive as a source, as it includes substantial proportions of interbedded sandstone and quartzite. Within area D4757, the Deseret and Great Blue Limestones underlie approximately 50 acres along the north side of Davenport Canyon and near the head of Magpie Canyon. An extensive program of sampling and testing is needed before this industrial mineral resource can be properly evaluated. There is no evidence of current or past quarrying operations within the roadless area.

Thermal springs are not known in the Stansbury Mountains, but a map of the geothermal resources of Utah (Utah Geological and Mineral Survey, 1980) includes the northwest corner of area A4757 (fig. 3) within an area considered to be "favorable for discovery and development of local sources of low temperature (<90°C) water". Warm springs occur at several localities in the valleys that flank the Stansburys, but no geothermal resources are identified within area D4757 and the potential for such is low.

Oil and gas leases have been issued for approximately 73 acres in the southern part of the area near State Highway 199. Applications have been filed for oil and gas leases on approximately 12,800 acres in the eastern and southern parts of the roadless area (fig. 3) and for large tracts in the valleys east and west of the Stansburys. It is assumed that exploration efforts have tested either the Tertiary basins of Skull Valley, Tooele Valley, and Rush Valley, or Mesozoic strata that may underlie the region at great depth and which elsewhere are productive reservoir rocks. However, surface outcrops in the Stansburys do not indicate the presence of oil or gas and the potential for such deposits within the Stansbury Roadless Area cannot be determined without an extensive program of geophysical exploration and exploratory drilling.

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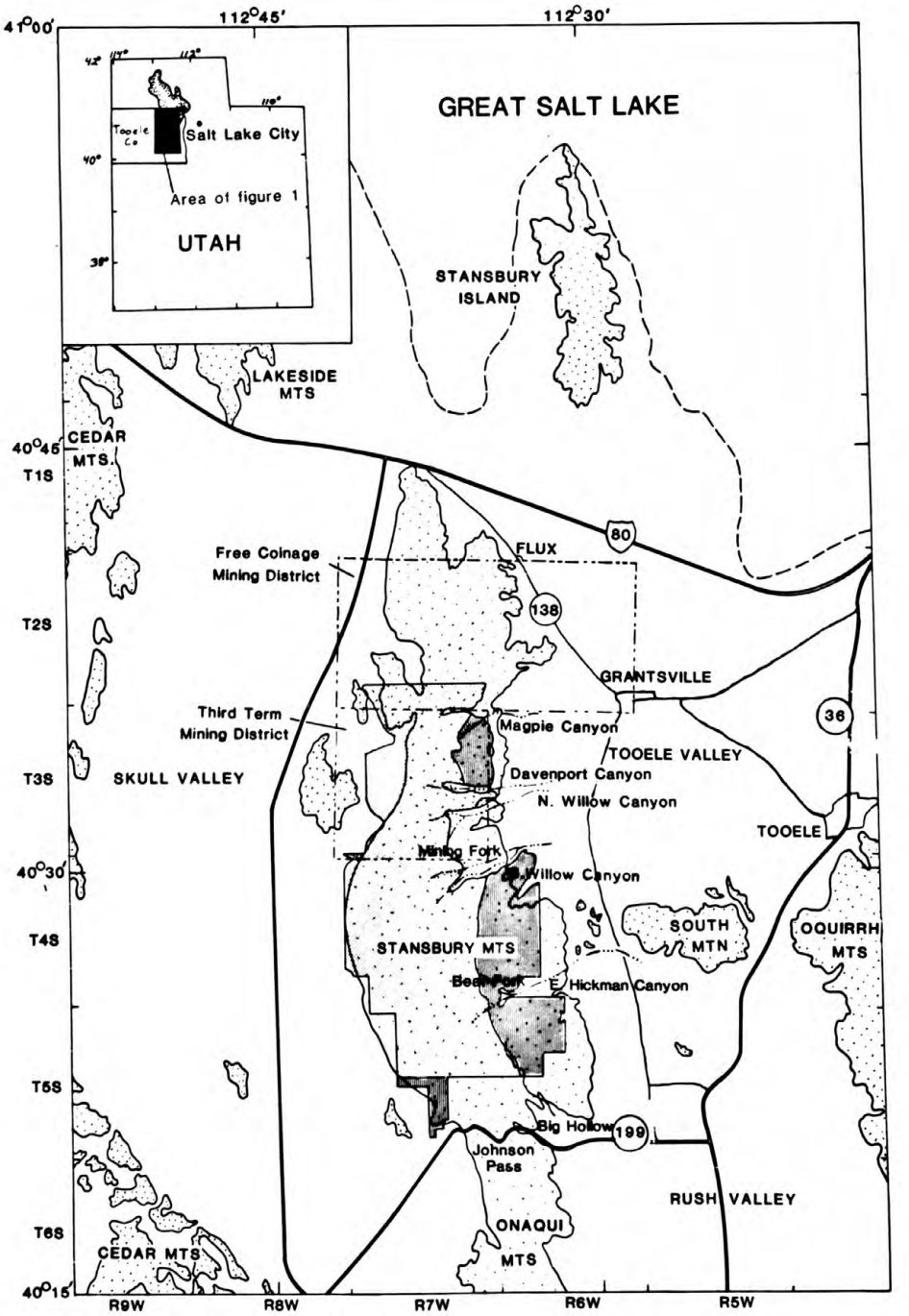


Figure 1.--Index map showing geographic features, mining districts, and location of Stansbury Roadless Area.

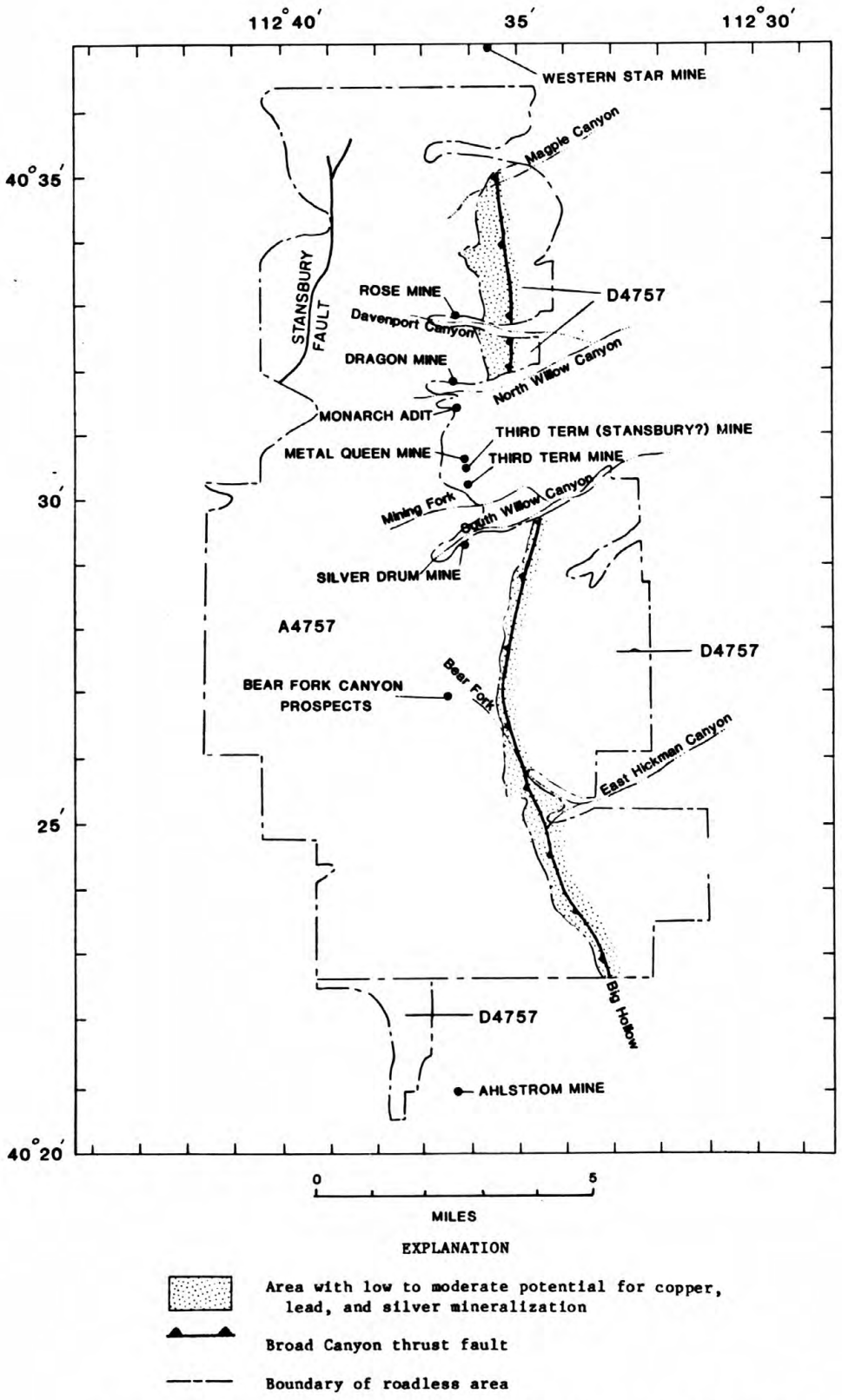


Figure 2.--Stansbury Roadless Area showing location of zone with low to moderate potential for copper, lead, and silver mineralization (area D4757), and locations of mines and prospects near the roadless area.

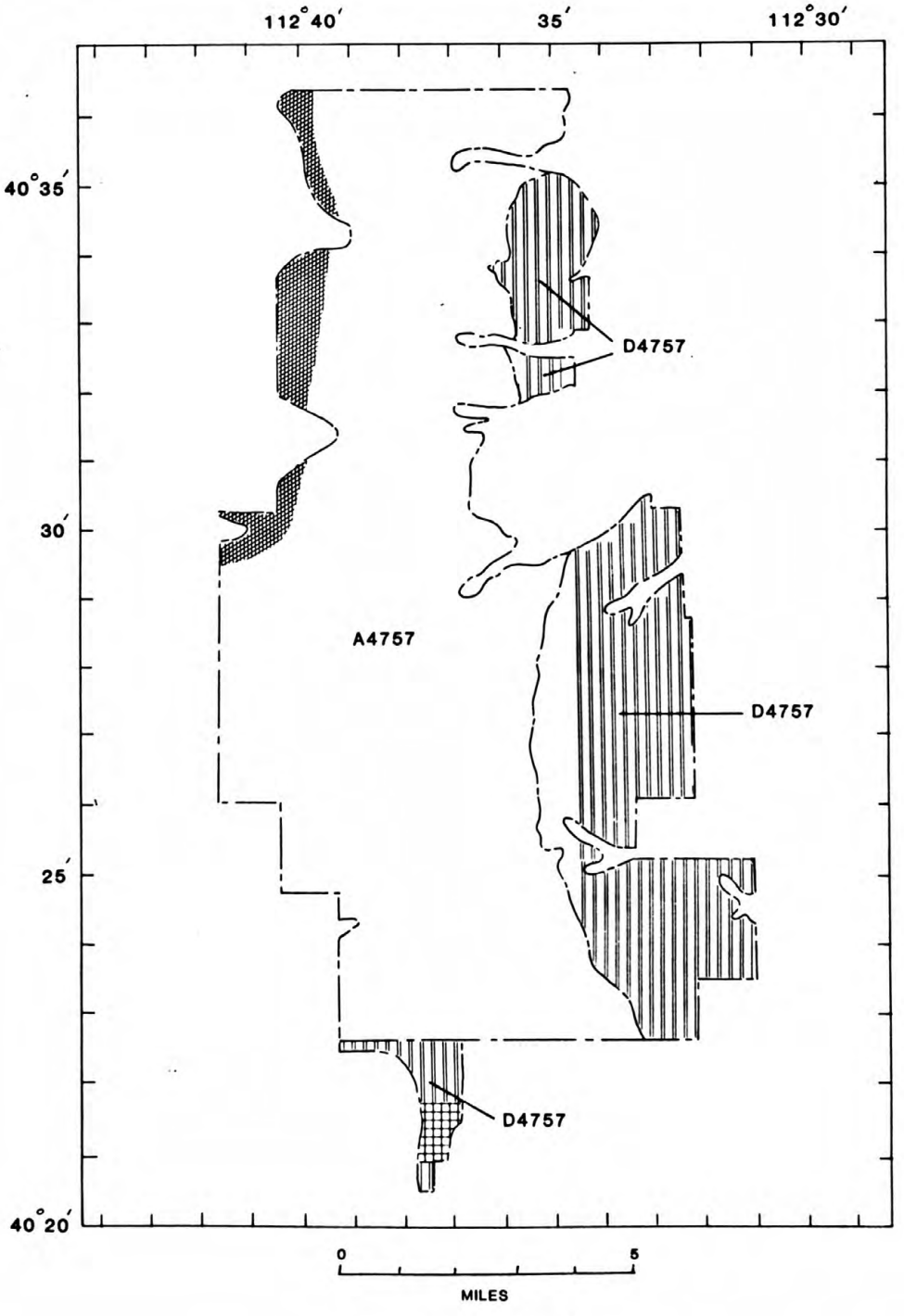


Figure 3.--Stansbury Roadless Area showing lands prospectively valuable for geothermal resources and lands under application for oil and gas leases.