Geology of the Death Valley Region

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Historical review of the economic geology of the Panamint Range and Valley, Inyo County, California

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HISTORY OF MINING

The first mineral discovery made in the Panamint region is attributed to a member of the ill-fated party of Jayhawkers who crossed Death Valley in the winter of 1849-1850. In one version of the discovery a member of the party picked up a metallic rock and carried it with him to civilization. Sometime later, he took it to a gunsmith to have it fashioned into a gunsite, whereupon the gunsmith discovered the rock was silver (Chalfant 1936 p. 114-115). Even though the story drifted throughout the state, there was little interest in re-discovering the source of silver.

Tradition has it that eight years later, in 1858, "Mormons found silver ore in the Panamint Mountains, and produced some bullion from small furnaces at Anvil Springs." (Chalfant 1933 p. 117). One man who has prospected the highest parts of Manly Peak since 1964 feels he has found the source of the Mormon silver.

In May 1860, after the discovery of the Comstock silver mines, a party of men lead by Dr. Darwin French, set out from Oroville to rediscover the Gunsite lode. They did not find it but they did pave the way for others. On Christmas day of the same year a party led by Dr. S. G. George also looking for the Gunsite lode, discovered antimony at Wildrose Spring, and named their discovery the Christmas Gift mine (Spears 1892 p. 22). The Wildrose antimony mine appears to have been worked briefly in the 1860's by a company organized by George (Wheat 1939). Sporatic prospecting continued through the 1860's but it was not until 1873 that there were any results from these endeavors.

With the discovery of silver in Surprise Canyon in 1873, mining began in earnest in the Panamint Range. An estimated two million dollars worth of silver was produced from the Panamint City mines until 1877, with an additional fifty thousand dollars worth of silver produced in 1881 and 1882. At the turn of the century gold was mined throughout the range. The O.B.J., Radcliffe, Suitcase and World Beater mines were the most productive mines, yielding over $200,000 each. Antimony was also mined at this time at Wildrose Spring. By 1910 most of the gold mines were inactive, but gold mining picked up again in the 1930's.

After World War II gold was produced from the Southern Homestake mine. Since 1950 there has been sporatic small-scale mining of gold, silver, tungsten and dolomite from the panamint Range.

Since 1970 large corporations have expressed interest in the gold, silver and uranium deposits of the Range. Many of the gold mines and the Sentinel Peak silver mine have been examined in detail. In 1976 Exxon Corp. located 640 claims for uranium in the Happy Canyon-Surprise Canyon area. Lacana Joint Uranium Venture relocated Exxons claims in 1978, is exploring the property thoroughly and has drilled numerous holes. North American Uranium Corporation located claims on the valley floor in 1978.

Figure 1 shows locations of principal mineral deposits in the Panamint Range.

MINERAL RESOURCES

Antimony

Antimony is reported from BLM land adjacent to the Wildrose Antimony mine. However, the current low price of antimony and remote location of this area will deter immediate development of this commodity.

Gold

All of the major gold producers are found in the early Precambrian basement rocks with the exception of only the O.B.J. and Corona mines. The early Precambrian micaceous schist and quartzofeldspathic gneiss exposed from Redlands Canyon to Happy Canyon contains the largest number of these deposits. Within the exposure, gold occurs in the gouge of Tertiary faults at the Abney, Moly McGuire, and Goldbug mines. Gold, often associated with malachite, occurs in pyritiferous micaceous schist at the Suitcase, Mineral Hill, and Southern Homestake mines.

This same sequence of early Precambrian rocks crop out between Coyote and Goler Canyons. Within this area gold occurs in quartz veins at the Eight Ounce, Panaminia, and Toleta mines. At the Lestro mine it occurs along the core of the anticline that is expressed for the entire length of the range, and at the Lotus mine gold occurs near the Butte Valley Fault.

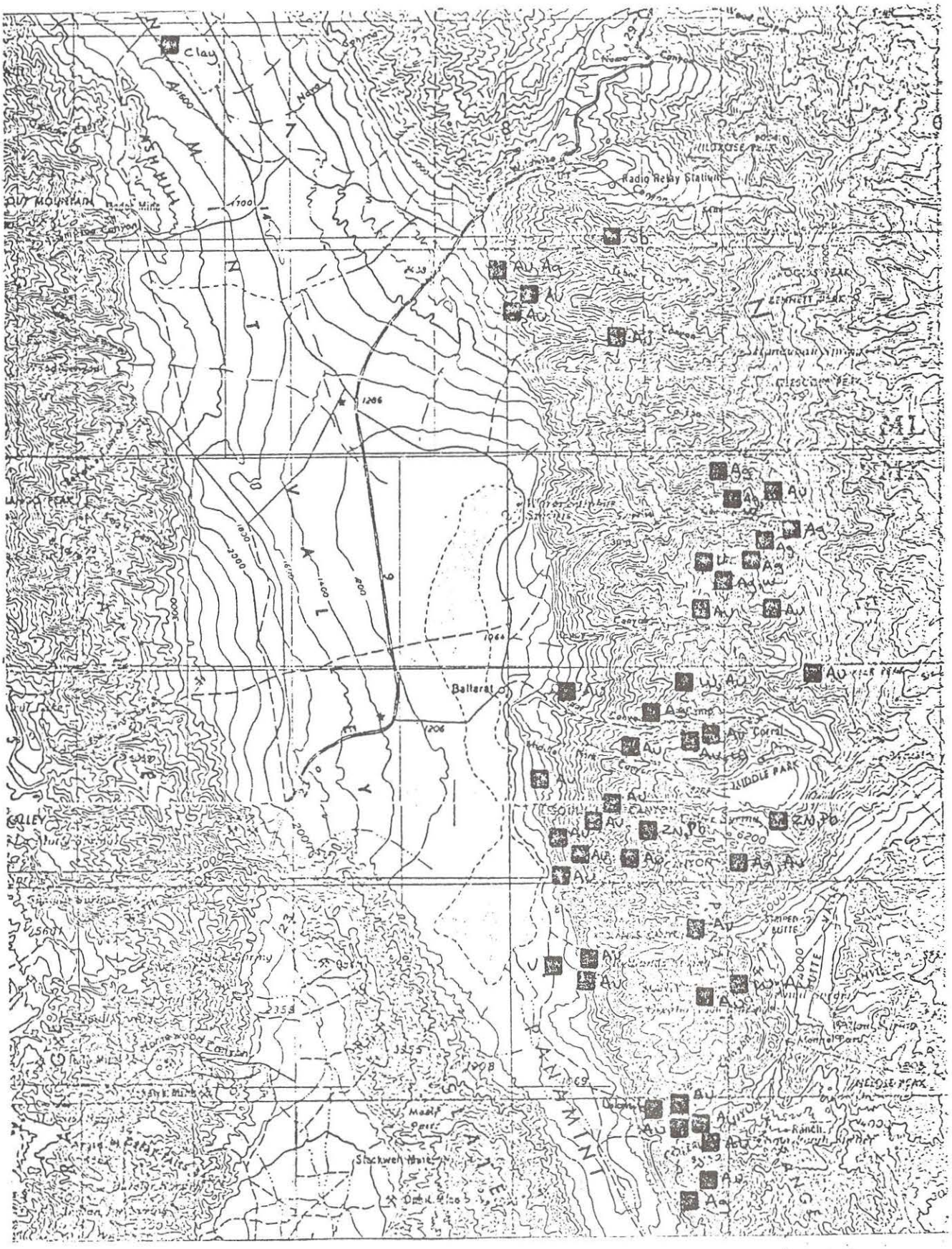

Fig. 1

Mines and Mineral Deposits

In the early Precambrian World Beater Complex, gold occurs in quartz veins or lenses at the World Beater, Pappy, and Radcliffe mines, and is associated with copper mineralization and schelite at the Pappy and Radcliffe. Gold has also been reported from the unnamed mine north of the mill run in Happy Canyon, which is marked on the U.S.G.S. Telescope Peak 15 minute map.

Gold also occurs in quartz veins in metamorphosed late Precambrian sediments, in quartz veins in the quartz monzonite of Manly Peak, in association with the intrusion of the muscovite granite of the Hall Canyon Pluton, and in the Panamint Valley fault zone. Gold occurs in the late Precambrian rocks at the Curran, Thunderbird, Mountain Girl, Redlands, and High Grade Group mines. In the quartz monzonite of Manly Peak gold occurs at the Alta and Broken Bottle mines. The gold occurrences at the O.B.J. and Corona mines is geographically associated with the Hall Canyon Pluton. In the Panamint Valley fault zone gold occurs at the Sylvia, Tom Bonanza, Holy Roller, Yellow Dog, and Gold Tooth mines.

Joralemon (1978), plotted linear trend of Carlin type gold deposits in Nevada and postulated that the Panamint Range may have potential for a similar deposit. To my knowledge, no deposits of this type have been discovered in the range. At the Carlin Nevada deposit arsenic, antimony, barium, boron and mercury (and other elements) are found in anomalous amounts in rocks mineralized with gold. Results of the BLM geochemical sampling program were inconclusive in identifying a Carlin type gold deposit. Due to limitations both in the type of analysis and the number of samples taken, it was impossible to determine if the gold, arsenic, antimony and mercury suite is present in the Panamint Range. Boron and barium are present in anomalous amounts in the range.

Analogy also can be made between the Homestake gold deposit at Lead, South Dakota and the gold deposits in the Precambrian basement rocks of the Panamint Range. In both deposits metamorphosed Precambrian sediments contain disseminated gold bearing pyrite. Although both areas have roughly similar mineralization, the Homestake mine area has been subjected to high pressure and temperature resulting in extremely contorted rocks and garnet grade metamorphism that remobilized the gold. The Panamints have not been subject to this same intensity of metamorphism. However, Labotka (1978, p. 88) observed that in the core of the anticline, folding metamorphosed the rock to garnet grade. In these areas, remobilization of gold and other minerals may have occurred.

Lead-Silver-Zinc-Copper

Lead, silver and zinc occur in quartz veins, in replacement veins and fault zones. In the Panamint City area (Surprise Canyon and Happy Canyon) quartz veins mineralized with tetrahedrite, galena and chalcopyrite, contain silver, copper and lead. Tungsten is reported from three mines in the area. From Pleasant Canyon to Big Horn Canyon, the Silver Star, Red Cloud and Honolulu-Big Horn mines develop lead, silver and zinc-bearing replacement veins in Noonday Dolomite. South of Goler Canyon silver is reported from the Crescent mine in a unit correlative with the Bonanza King formation. Silver also occurs in the Panamint Fault zone at the Sylvia mine.

Zinc has been produced as a by-product from many of the mines in the Panamint Range. However, at the Red Cloud and Honolulu-Big Horn mines in South Park Canyon, zinc is the most abundant element of the lead-silver-zinc-copper ore suite. Minable quantities of ore are reported from these zinc mines.

There are no known mines which have produced primarily copper, even though copper minerals were observed at many mines. Chalcopyrite is reported from the diamictite in the Surprise member of the Kingston Peak formation in the Panamint City area.

Tungsten

Tungsten has been reported from the Stewarts Wonder, Challenge, and Sentinel Peak mines in the Panamint City area, and from the Radcliffe mine in Pleasant Canyon. One ton of high grade tungsten ore was removed from the east side of Manly Peak (inside DVNM) in the 1970's, and 40 tons of ore were mined from the Pappy mine during the same period. All of these mines develop quartz veins. Old mines which develop quartz veins and were worked for commodities other than tungsten, may yield commercial quantities of tungsten.

Clay

The clay in Panamint Valley, 4.5 miles southeast of Panamint Springs, was tested and drilled in the 1950's by the Brown Mud Co. of Bakersfield for a potential source of drilling mud. The deposit is undeveloped.

Limestone-Dolomite

Large quantities of limestone and dolomite exist in the Panamint Range. In 1977 less than one hundred tons of dolomite was removed from Coyote Canyon. Because of the remote location, large scale development of dolomite or limestone is unlikely.

Sodium-Potassium

Approximately 250 feet of halite was penetrated in one drill hole in the southern end of Panamint Lake (Smith 1976, p. 119). Reserves of sodium or potassium are unknown.

MINERAL RESERVES

The Sentinel Peak mine has been examined by St. Joe Minerals Corporation, at least two consultants and the Callahan Mining Corporation. Callahan estimated reserves of 600,000 to 800,000 tons of ore which would yield 22 oz. of silver, 1% copper and 1% lead per ton, with averages of gold up to .05 oz. per ton. At the Southern Homestake mine drilling and sampling has disclosed an ore body estimated by Homestake Mining Company at ten million tons averaging between .02 and .04 ounces of gold per ton. Sampling at the Suitcase Mine disclosed 20,000 tons of ore averaging between .25 and .75 ounces of gold per ton. Drilling of potential uranium deposits in Happy Canyon, Mail Canyon and in Panamint Valley, scheduled for 1979?, may help confirm reserves.

ENERGY RESOURCES

Uranium

There has been no production of uranium from the area, however considerable exploration is taking place. This exploration has primarily been focused on the sediments in Panamint Valley and in the Panamint Range north of Happy Canyon.

Airborne and ground gamma-ray surveys indicate areas of anomalous uranium concentrations in Panamint Valley, south of Redlands Canyon. During 1978 and 1979 exploration north of Happy Canyon has revealed a uranium deposit of commercial potential.

Geothermal Energy

The springs at Indian Ranch are 26.7°C. This area has been designated as a Prospective Geothermal Resource Area (PGRA) by the U.S.G.S. Conservation Division.

Oil and Gas

Panamint Valley has been classified by the U.S.G.S. Conservation Division as being potentially valuable for oil and gas.

SUMMATION AND CONCLUSIONS

Production from the Panamint Range until 1978 has been approximately 83,500 ounces of gold, 2,057,000 ounces of silver, 572,330 pounds of zinc, and 364,084 pounds of lead. Sizable reserves of silver, zinc, and gold have been identified, and will probably be mined as the price of these metals rises.

The highest probability of new gold discoveries is within the Precambrian basement or near the Hall Canyon Pluton. Some possibility exists for the presence of large tonnage Carlin, Nevada and/or Lead, South Dakota type gold deposits in the Panamint Range. Lead-silver-zinc-copper may be found in quartz veins or the diamictite in the Surprise member of the Kingston Peak formation in the Panamint City area or in replacement veins in the Noonday Dolomite or similar units. Tungsten ore has been found throughout the range in quartz veins, old gold or silver mines which develop quartz veins may yield tungsten. Antimony may occur on BLM land adjacent to the Wildrose Antimony mines. Uranium may occur in Panamint Valley sediments. In the Panamint City area the occurrence of uranium is structurally controlled and if quantities are commercially profitable, uranium will probably be mined.

The almost ubitiquous occurrence of quartz veins and local replacement veins and barite is evidence of widespread hydrothermal mineralization. Geochemical evidence (primarily barium anomalies) also point to widespread hydrothermal mineralization. Due to metamorphism there has been at least a minimal amount of gold remobilization in the Precambrian basement.

Quite clearly from the known mineral deposits, favorable geologic environment and geochemical anomalies, the Panamint Range has high potential for new mineral discoveries and mineral development.

Modified from L.M. Vredenburgh 1980. Field verification report of a portion of Panamint Range and Valley, Inyo County, California, Unpublished report for California Desert Plan, U.S. Bureau of Land Management, Riverside, California.

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