



## Prospecting for Gold in the United States

by Harold Kirkemo

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Anyone who pans for gold hopes to be rewarded by the glitter of colors in the fine material collected in the bottom of the pan. Although the exercise and outdoor activity experienced in prospecting are rewarding, there are few thrills comparable to finding gold. Even an assay report showing an appreciable content of gold in a sample obtained from a lode deposit is exciting. The would-be prospector hoping for financial gain, however, should carefully consider all the pertinent facts before deciding on a prospecting venture.

Only a few prospectors among the many thousands who searched the western part of the United States ever found a valuable deposit. Most of the gold mining districts in the West were located by pioneers, many of whom were experienced gold miners from the southern Appalachian region, but even in colonial times only a small proportion of the gold seekers were successful. Over the past several centuries the country has been thoroughly searched by prospectors. During the depression of the 1930's, prospectors searched the better known gold-producing areas throughout the Nation, especially in the West, and the little-known areas as well. The results of their activities have never been fully documented, but incomplete records indicate that an extremely small percentage of the total number of active prospectors supported themselves by gold mining. Of the few significant discoveries reported, nearly all were made by prospectors of long experience who were familiar with the regions in which they were working.

The lack of outstanding success in spite of the great increase in prospecting during the depression in the 1930's confirms the opinion of those most familiar with the occurrence of gold and the development of gold mining districts that the best chances of success lie in systematic studies of known productive areas rather than in efforts to discover gold in hitherto unproductive areas. The development of new, highly sensitive, and relatively inexpensive methods of detecting gold, however, has greatly increased the possibility of discovering gold deposits which are too low grade to have been recognized earlier by the prospector using only a gold pan. These may be large enough to be exploited by modern mining and metallurgical techniques. The Carlin mine near Carlin, Nev., is producing gold from a large low-grade deposit that was opened in 1965 after intensive scientific and technical work had been completed. Similar investigations have led to the more recent discovery of a Carlin-type gold deposit in Jerritt Canyon, Nev.

Many believe that it is possible to make wages or better by panning gold in the streams of the West, particularly in regions where placer mining formerly flourished. However, most placer deposits have been thoroughly reworked at least twice--first by Chinese laborers, who arrived soon after the initial boom periods and recovered gold from the lower grade deposits and tailings left by the first miners, and

later by itinerant miners during the 1930's. Geologists and engineers who systematically investigate remote parts of the country find small placer diggings and old prospect pits whose number and wide distribution imply few, if any, recognizable surface indications of metal-bearing deposits were overlooked by the earlier miners and prospectors.

One who contemplates prospecting for gold should realize that a successful venture does not necessarily mean large profits even if the discovery is developed into a producing mine. Although the price of gold has increased significantly since 1967 when the fixed price of \$35 an ounce was terminated, the increases in the cost of virtually every supply and service item needed in prospecting and mining ventures have kept profit margins at moderate levels, particularly for the small mine operator. In general, wide fluctuations in the price of gold are not uncommon, whereas inflationary pressures are more persistent. The producer of gold, therefore, faces uncertain economic problems and should be aware of their effects on his operation.

Today's prospector must determine where prospecting is permitted and be aware of the regulations under which he is allowed to search for gold and other metals. Permission to enter upon privately owned land must be obtained from the land owner. Determination of land ownership and location and contact with the owner can be a time-consuming chore but one which has to be done before prospecting can begin.

Determination of the location and extent of public lands open to mineral entry for prospecting and mining purposes also is a time consuming but necessary requirement. National parks, for example, are closed to prospecting. Certain lands under the jurisdiction of the Forest Service and the Bureau of Land Management may be entered for prospecting, but sets of rules and regulations govern entry. The following statement from a pamphlet issued in 1978 by the U.S. Department of the Interior and entitled "Staking a mining claim on Federal Lands" responds to the question "Where May I Prospect?"

*There are still areas where you may prospect, and if a discovery of a valuable, locatable mineral is made, you may stake a claim. These areas are mainly in Alaska, Arizona, Arkansas, California, Colorado, Florida, Idaho, Louisiana, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. Such areas are mainly unreserved, unappropriated Federal public lands administered by the Bureau of Land Management (BLM) of the U.S. Department of the Interior and in national forests administered by the Forest Service of the U.S. Department of Agriculture. Public land records in the proper BLM State Office will show you which lands are closed to mineral entry under the mining laws. These offices keep up-to-date land status plats that are available to the public for inspection. BLM is publishing a series of surface and mineral ownership maps that depict the general ownership pattern of public lands. These maps may be purchased at most BLM Offices. For a specific tract of land, it is advisable to check the official land records at the proper BLM State Office.*

Successful gold mining under present conditions is a large-scale operation, utilizing costly and sophisticated machinery capable of handling many tons of low-grade ore each day. The grizzled prospector with a burro is no longer a significant participant in the search for mineral deposits, and the small producer accounts for only a minor share of the total production of metals including gold.

Some degree of success in finding gold still remains for those choosing favorable areas after a careful study of mining records and the geology of the mining districts. Serious prospecting should not be attempted by anyone without sufficient capital to support a long and possibly discouraging campaign of preliminary work. The prospective gold seeker must have ample funds to travel to and from the region he selects to prospect and to support the venture. He must be prepared to undergo physical hardships, possess a car capable of traveling the roughest and steepest roads, and not be discouraged by repeated disappointments. Even if a discovery of value is not found, the venture will have been interesting and challenging.

Locations of important gold-producing districts of the United States are shown in some of the reports of the Geological Survey listed at the back of this pamphlet. Geological agencies of the principal gold-producing States where additional information may be obtained also are listed. Information may be obtained, too, from U.S. Bureau of Mines State Liaison offices located in the capital cities of most States.

### **Placer Deposits**

A placer deposit is a concentration of a natural material that has accumulated in unconsolidated sediments of a stream bed, beach, or residual deposit. Gold derived by weathering or other process from lode deposits is likely to accumulate in placer deposits because of its weight and resistance to corrosion. In addition, its characteristically sun-yellow color makes it easily and quickly recognizable even in very small quantities. The gold pan or miner's pan is a shallow sheet-iron vessel with sloping sides and flat bottom used to wash gold-bearing gravel or other material containing heavy minerals. The process of washing material in a pan, referred to as "panning," is the simplest and most commonly used and least expensive method for a prospector to separate gold from the silt, sand, and gravel of the stream deposits. It is a tedious, back-breaking job and only with practice does one become proficient in the operation.

Many placer districts in California have been mined on a large scale as recently as the mid-1950's. Streams draining the rich Mother Lode region--the Feather, Mokelumne, American, Cosumnes, Calaveras, and Yuba Rivers--and the Trinity River in northern California have concentrated considerable quantities of gold in gravels. In addition, placers associated with gravels that are stream remnants from an older erosion cycle occur in the same general area.

Much of the gold produced in Alaska was mined from placers. These deposits are widespread, occurring along many of the major rivers and their tributaries. Some ocean beach sands also have been productive. The principal placer-mining region has been the Yukon River basin which crosses central Alaska. Dredging operations in the Fairbanks district have been the most productive in the State. Beach deposits in the Nome district in the south-central part of the Seward Peninsula rank second among productive placer deposits of Alaska. Other highly productive placers have been found in the drainage basin of the Copper River and of the Kuskokwim River.

In Montana, the principal placer-mining districts are in the southwestern part of the State. The most productive placer deposit in the State was at Alder Gulch near Virginia City in Madison County. Other important placer localities are on the Missouri River in the Helena mining district. The famous Last

Chance Gulch is the site of the city of Helena. There are many districts farther south on the headwaters and tributaries of the Missouri River, especially in Madison County which ranks third in total gold production in the State. Gold has been produced at many places on the headwaters of the Clark Fork of the Columbia River, particularly in the vicinity of Butte. Placer production from the Butte district, however, has been over-shadowed by the total output of byproduct gold recovered from the mining of lode deposits of copper, lead, and zinc.

Idaho was once a leading placer-mining State. One of the chief dredging areas is in the Boise Basin, a few miles northeast of Boise, in the west-central part of the State. Other placer deposits are located along the Salmon River and on the Clearwater River and its tributaries, particularly at Elk City, Pierce, and Orofino. Extremely fine-grained (or "flour") gold occurs in sand deposits along the Snake River in southern Idaho. Placers in Colorado have been mined in the Fairplay district in Park County, and in the Breckenridge district in Summit County. In both areas large dredges were used during the peak activity in the 1930's.

The most important mining regions of Oregon are in the northeastern part of the State where both lode and placer gold have been found. Placer gold occurs in many streams that drain the Blue and Wallowa Mountains. One of the most productive placer districts in this area is in the vicinity of Sumpter, on the upper Powder River. The Burnt River and its tributaries have yielded gold. Farther to the west, placer mining (particularly dredging) has been carried on for many years in the John Day River valley.

In southwestern Oregon, tributaries of the Rogue River and neighboring streams in the Klamath Mountains have been sources of placer gold. Among the main producing districts in this region are the Greenback district in Josephine County and the Applegate district in Jackson County.

Minor amounts of placer gold have been produced in South Dakota (the Black Hills region, particularly in the Deadwood area, and on French Creek, near Custer) and in Washington (on the Columbia and Snake Rivers and their tributaries).

In addition to these localities, placer gold occurs along many of the intermittent and ephemeral streams of arid regions in Nevada, Arizona, New Mexico, and southern California. In many of these places a large reserve of low-grade placer gold may exist, but the lack of a permanent water supply for conventional placer mining operations requires the use of expensive dry or semidry concentrating methods to recover the gold.

In the eastern States, limited amounts of gold have been washed from some streams draining the eastern slope of the southern Appalachian region in Maryland, Virginia, North Carolina, South Carolina, Georgia, and Alabama. Many saprolite (disintegrated somewhat decomposed rock that lies in its original place) deposits in this general region also have been mined by placer methods. Small quantities of gold have been mined by placer methods in some New England States. Additional placer deposits may be discovered in the East, but prospecting will require substantial expenditures of time and money. The deposits probably will be low grade, difficult to recognize, and costly to explore and sample. Moreover, most of the land in the East is privately owned, and prospecting can be done only with the prior permission and agreement of the land owner.

## **Lode Gold**

Lode gold occurs within the solid rock in which it was deposited. Areas likely to contain valuable lode deposits of gold have been explored so thoroughly that the inexperienced prospector without ample capital has little chance of discovering a new lode worth developing. Most future discoveries of workable lode gold ore probably will result from continued investigations in areas known to be productive in the past. The districts in which such new discoveries of gold may be possible are too numerous to be listed in detail in this pamphlet. Some of the famous districts are: in California, the Alleghany, Sierra City, Grass Valley, and Nevada City districts, and the Mother Lode belt; in Colorado, the Cripple Creek, Telluride, Silverton, and Ouray districts; in Nevada, the Goldfield, Tonopah, and Comstock districts; in South Dakota, the Lead district in the Black Hills; and in Alaska, the Juneau and Fairbanks districts. Deposits in these districts generally are gold-quartz lodes.

Prospecting for lode deposits of gold is not the relatively simple task it once was because most outcrops or exposures of mineralized rock have been examined and sampled. Today's prospector must examine not only these exposures, but also broken rock on mine dumps and exposures of mineralized rock in accessible mine workings. Gold, if present, may not be visible in the rock, and detection will depend on the results of laboratory analyses. Usually, samples of 3 to 5 pounds of representative mineralized rock will be sent to a commercial analytical laboratory or assay office for assay. Obviously, knowledge about the geological nature of gold deposits and particularly of the rocks and deposits in the area of interest will aid the prospector.

There are many publications of interest to those seeking more information about gold. The following list is representative. Anyone contemplating a prospecting venture or mining operation should consult some or all of these and other publications as well to become better informed on this fascinating and challenging subject. Many papers, maps, and articles on gold and related heavy metals were published on the results of investigations conducted in the mid- to late-1960's by the U.S. Geological Survey and the U.S. Bureau of Mines. Titles and instructions for ordering many of these appear in the publication catalogs of each agency. Some may be out of print but may be consulted in libraries of the two agencies, and in many city, college, and university libraries.

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