

THE GEOLOGICAL SURVEY OF WYOMING
HINTS FOR ROCK HUNTING
AND PROSPECTING IN WYOMING

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*Cover: Jack Harmon panning for gold.
Photograph courtesy of the Western
History Research Center, University
of Wyoming.*

INTRODUCTION

Rock hunting and prospecting probably began in the early 1800's when the first fur trappers took time from their work to examine the rocks lying beneath their feet. One such trapper made a small gold discovery in 1842 on the southeastern flank of the Wind River Mountains, but was killed by Indians before he could reach his home in Georgia. In 1867, gold was discovered in the South Pass District about 20 miles south of Lander resulting in the influx of hundreds of prospectors searching for gold and other precious metals. The endurance of these prospectors and rock hunters and their descendents led to the present development of a multi-million-dollar mineral industry in Wyoming.

As you look around in Wyoming, the immense activity of the mineral industry may lead you to believe that all of the valuable mineral and rock deposits have already been found. Such a conclusion could not lead you farther from reality, for Wyoming can still be considered a prospector's and rock hound's paradise, where new rock and mineral discoveries are made almost every day. For example, diamonds were discovered in the southeastern region of the state in 1975; uranium deposits similar to the rich Precambrian uranium deposits of southern Ontario, Canada, were identified in the Medicine Bow and Sierra Madre Mountains in 1977; in 1978, a 14,000 pound boulder of jade was un-

covered north of Rock Springs and in 1981, the author discovered significant gold deposits hosted by quartz veins and iron formations in the Seminoe Mountains north of Sinclair. This discovery developed into one of the largest gold rushes this century in Wyoming. Undoubtedly, many more discoveries will be made in Wyoming in the future.

LAWS OF THE LAND

Before you begin collecting or prospecting, it will be to your benefit to become familiar with the trespass, claim staking, and collecting laws that apply in Wyoming. It should be obvious, but people forget that they must have the land owner's consent before trespassing to collect or prospect. You have the right to walk on most Federal and State land; however, you must obtain permission from the land owner to enter on private property. A general reference to land ownership is the "Land Status map of the State of Wyoming," published by the U.S. Bureau of Land Management. The map can be acquired by writing to:

U.S. Bureau of Land Management
P.O. Box 1828
Cheyenne, Wyoming 82002

Information concerning claim staking on federal land can also be obtained from the Bureau of Land Management. Claims may not be staked on state land, but rather the land must be leased. If you are interested in leasing state land, information about the procedure can be obtained by writing to:

Commissioner of Public Lands
Pioneer Center; 2424 Pioneer Avenue
Cheyenne, Wyoming 82002

Areas where you are strictly prohibited from collecting and prospecting include the National Parks and Monuments. Collecting in these areas carries a stiff fine and possible imprisonment if you are convicted.

The Antiquities Act of 1906 prohibits the collection of artifacts and fossils on public lands without a permit. If you have an interest in collecting objects of antiquity on federal land you should contact the Bureau of Land Management for the requirements for obtaining a permit; and inquiries concerning antiquities or fossils on state land should be directed to the Commissioner of Public Lands. A permit is also required by the B.L.M. if you plan to collect more than 25 pounds of petrified wood in a day. In total, you may not collect more than 250 pounds without a permit.

STAKING A MINING CLAIM IN WYOMING

Each state has its own laws on how a mining claim should be properly marked or located. Information concerning the legal methods of locating a claim in a state can usually be obtained from the state's geological survey, a mining association representing the state, or the U.S. Bureau of Land Management.

The type and size of claims are the same in every state, as designated by Congress. In general, four types of mining claims can be staked on multiple-use public lands: (1) lode claims, (2) placer claims, (3) tunnel claims, and (4) mill site claims. The most common claims staked by prospectors are lode and placer claims.

A lode claim is staked on mineralized veins or

on any valuable mineral or rock occurring in place. This also includes finely disseminated mineralized deposits such as the porphyry copper deposits found in the Absaroka Mountains and the roll-front uranium deposits found in Wyoming's basins. However, placer claims can only be staked on surficial mineral deposits formed by the concentration of valuable minerals from weather debris. The most common placer deposits from a historical view are the sand and gravel gold placer deposits such as those that were staked on the Sweetwater River and Rock Creek in the Atlantic City - South Pass mining districts on the southeastern flank of the Wind River Mountains.

The size of a lode mining claim is limited to a maximum of 1500 feet in length by 600 feet. If a lode claim is staked on a vein, the vein should divide the claim in half, with 300 feet on either side of the vein. A discovery notice is required to be posted on the point of discovery, containing information as to the name of the claim, the discoverer and locator, the date of discovery, the length of the claim along the vein measured each way from the center of the discovery shaft, the general course of the vein, and a description of the claim by reference to natural or fixed objects, or if the land is surveyed, by reference to section or quarter section corners. In addition, six monuments or posts are required to mark the four corners of the claim and the center of each side line. One side of each monument should be marked to indicate which side of the monument faces the claim. A discovery shaft to a depth of 10 feet must be sunk on the discovery lode, or a 1½ inch diameter or greater drill hole or holes must be drilled totaling at least 50 feet depth with no one single hole less than 10 feet in depth. If more than one hole is desired to be drilled, then the locator must designate the discovery hole.

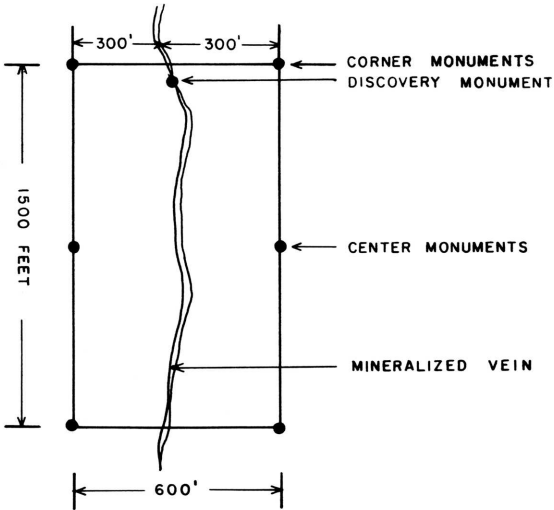
After you have made the discovery and marked it with a notice, you have up to 60 days before sinking the shaft (or drilling) and filing the discovery with the County Clerk, and 90 days to file the claim with the U.S. Bureau of Land Management.

A placer claim is limited, in general, to 20 acres in size, and is located by legal subdivision giving quarter sections, townships, and ranges. If your discovery is on unsurveyed land, it is located by reference to a natural or fixed object. Larger placer claims can be located by an association of locators, and these claims are limited in size to 160 acres for a total of eight locators, or a maximum of 20 acres per individual in the association. The claim must be marked with a securely fixed notice or sign containing the name of the claim (designating the claim as a placer claim), the name of the locator or locators, the discovery date, the number of feet or acres claimed, and a description of the claim with reference to fixed or natural objects. All four corners of the placer claim are required to be marked by substantial monuments or posts.

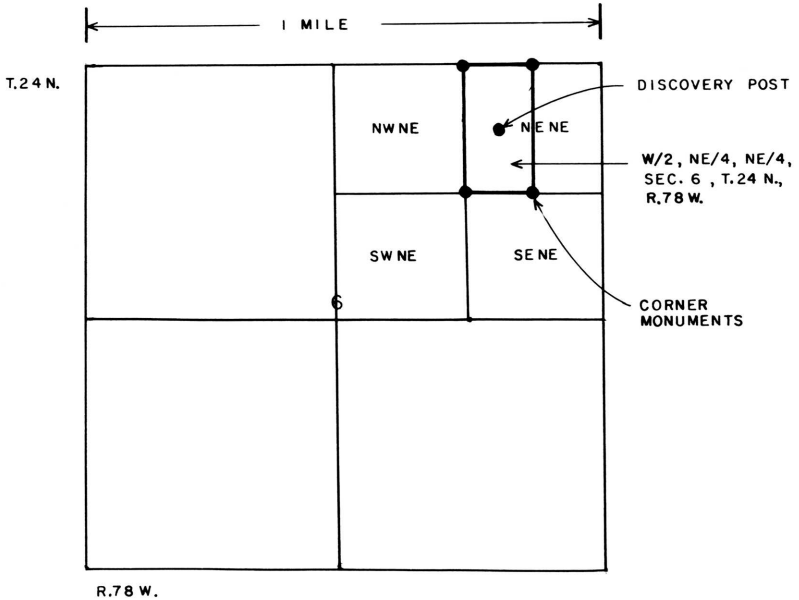
You have 90 days to file a certificate of discovery with the County Clerk and Bureau of Land Management after you have made your discovery.

Information on mill site and tunnel site claims can be obtained through the U.S. Bureau of Land Management. If you are interested in specific information on staking mining claims in Wyoming, a good reference is the "Mineral and Mining Laws of Wyoming," published by the Wyoming Geological Survey.

GENERAL DIAGRAM OF A WYOMING
LODE MINING CLAIM.



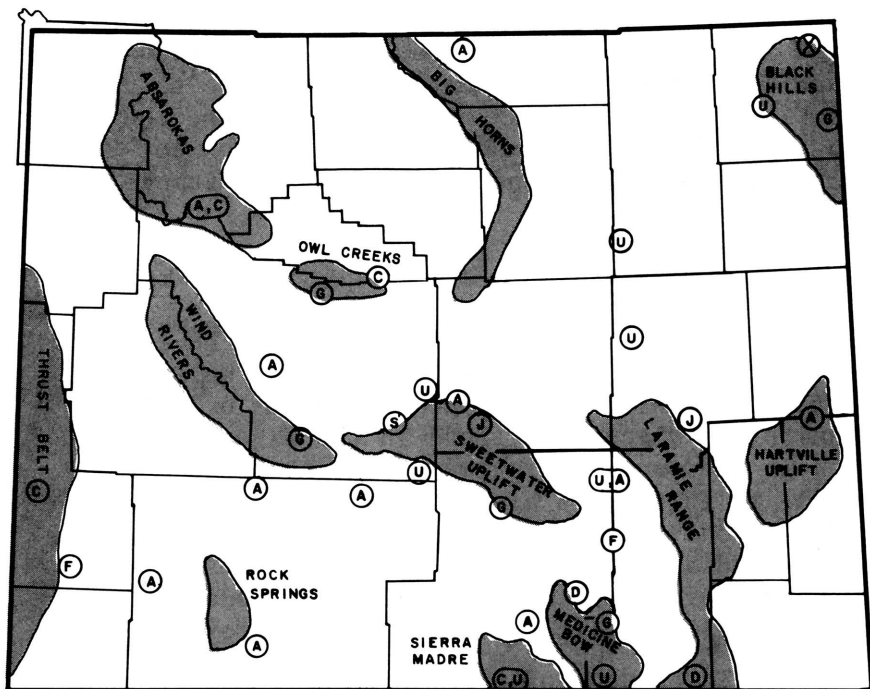
LOCATING A 20 ACRE PLACER MINING
CLAIM BY LEGAL DESCRIPTION



MINERAL LOCALITIES

Now that you are familiar with the laws governing collecting and prospecting, where are some of the better collecting localities in the state?

On the following pages, some general mineral localities are described, and a selected reading list is provided on the last page. A good addition to the reading list would be a descriptive rock and mineral reference book to help you identify some of the more difficult minerals.



LEGEND

<p>(A) AGATES</p> <p>(C) COPPER</p> <p>(D) DIAMONDS</p>	<p>(F) FOSSILS</p> <p>(G) GOLD</p> <p>(J) JADE</p>	<p>(S) RUBIES AND SAPPHIRES</p> <p>(U) URANIUM</p> <p>(X) FLUORITE</p>
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CHALCEDONY (Agates, Petrified Wood)

Chalcedony is a compact form of silica composed of minute quartz crystals and submicroscopic pore spaces. Commonly, it forms by precipitation of silica-rich solutions as veins, as cavity linings, or by replacement in a wide variety of rock types.

Both agate and petrified wood are forms of chalcedony. By definition, agate imparts a distinct color banding resulting from impurities trapped in the silica as it crystalizes, whereas petrified wood results when the original woody material is replaced by silica-rich solutions, usually during rapid burial by silica-rich volcanic ash.

Several distinctive varieties of chalcedony found in Wyoming are given descriptive or geographical names by rock hunters. Some are so distinctive that many rock hounds can give you the geographical location where the sample was collected by merely looking at a penny-size sample.

Banded and Moss Agates

Several varieties of banded agate can be collected within the state. Rainbow agate, which diffracts light into a rainbow spectrum of colors when thinly sliced, is found in the Wiggins Formation in the southern region of the Absaroka Mountains and in gravels along the Wind River, north of Riverton. A red and white banded agate known as Dryhead agate is found along the Bighorn River northeast of Lovell and in sediments eroded from the Hartville uplift northeast of Guernsey.

Moss agates have a distinct dendritic pattern of iron oxide or manganese oxide in white to blue chalcedony. A distinctive agate known as Sweetwater agate contains manganese oxide dendrites in dark blue to dark grey-blue chalcedony. Sweetwater agates are collected along the Sweetwater

River and Sage Hen Creek west and northeast of Jeffrey City, respectively. Other moss agates have been collected along the western flank of the Laramie Mountains in northern Albany County.

Petrified Wood

Petrified wood is collected in the southern Absaroka Mountains, in an area 35 miles north of Medicine Bow, along State Highway 130 between Saratoga and Walcott, and northeast of Farson. The most coveted samples are those collected near Farson.

Goniobasis Agate

Goniobasis agate is a rock composed of silicified fossil snails known as goniobasis gastropods. These rock agates are found in the Green River - Granger area north of Interstate 80 in Sweetwater County.

Copper

Copper mineralization occurs in a wide variety of forms and colors, but most commonly as a deep green to blue staining on rocks, known as hydrated copper carbonates. A yellow-bronze colored metallic mineral known as chalcopyrite (CuFeS_2) is also a common copper mineral in many of Wyoming's abandoned mining districts. Gold, silver, lead, zinc and molybdenum are found in association with many copper deposits.

Presently, copper is not being mined in Wyoming; however, nearly 30 million pounds of copper were produced in Wyoming's past. Most of the production came from the Encampment district in the Sierra Madre Mountains.

The largest deposits of copper in Wyoming are probably the disseminated porphyry copper deposits

of the Absaroka Mountains in northwestern Wyoming, and the veins, replacement bodies, and stratabound volcanogenic deposits in the Medicine Bow and Sierra Madre Mountains of southern Wyoming.

DIAMONDS

The first diamond pipe was discovered in Wyoming in 1960; however, the diamonds themselves were not identified until 1975. The diamonds occur in a brecciated igneous host rock termed kimberlite. The kimberlite host rock occurs in small dikes and pipes in an area extending from west of Boulder, Colorado, to the Iron Mountain District located about 20 to 25 miles northeast of Laramie. Recently, placer diamonds were reported in the Medicine Bow Mountains to the east of Saratoga. Diamonds can be recognized by their hardness (the greatest of naturally occurring minerals).

FOSSILS

Fossils are common in the sedimentary basins of Wyoming; however, the two best known areas are Como Bluffs, located east of Medicine Bow, and Fossil Fish Butte, located 15 miles west of Kemmerer. Como Bluffs is the site of a famous dinosaur quarry in the Morrison Formation, and Fossil Fish Butte is the site of well preserved fossil fish occurring in the Green River Shale.

GOLD

Gold is found in all of Wyoming's mountain ranges as either lode or placer deposits. The South Pass District, south of Lander, contains several abandoned gold mines and prospects which represent much of Wyoming's early mining history

from the late 1800's. Production from this district has been estimated to be between 70,000 and 325,000 ounces of gold. The ore occurs principally as disseminated gold in quartz veins, associated with silver-gray arsenopyrite. Placer gold can be panned in the Wind River, in Rock Creek near South Pass City, in Douglas and Beaver creeks about 10 miles west of Foxpark, in the headwaters of the Little Bighorn River (25 miles east of Lovell), and along the Snake River in the southern part of Jackson Hole.

Gold is often confused with pyrite (fool's gold), chalcopyrite (copper-iron-sulfide) and weathered biotite (a mica). However, it is distinguished from these other minerals because it is malleable; when scratched with a knife, the yellow flake or nugget will have a distinct gold-colored indentation.

JADE

Wyoming jade is a variety of amphibole called nephrite. The more valuable jade commonly found in Mexico and Asia is a variety of pyroxene called jadeite. Even though Wyoming jade is less valuable than the Mexican and eastern Asiatic varieties, a good quality of apple-green Wyoming jade can sell for as high as \$1000.00 per pound. Jade collecting sites are found within an 18 mile radius of Jeffrey City and extend to the southwestern flank of the Wind River Mountains in the west, and as far east as Wheatland.

SAPPHIRES and RUBIES

Sapphires and rubies are varieties of corundum, an aluminum oxide. Corundum is the second hardest known naturally occurring mineral, and can be

recognized because it will only be scratched by diamond. The deep red variety of corundum is termed ruby, and the blue variety is termed sapphire. Some rare varieties of corundum contain small impurities, or inclusions, of rutile aligned in specific crystallographic directions. When light is reflected from the corundum, the rutile, aligned in three lines oriented 120° to one another, will reflect the light to a greater degree resulting in a star effect. These rare gems are termed star rubies, or star sapphires.

Gem quality sapphires and rubies are rare in Wyoming; however, a few crystals have been found in the Granite Mountains to the west and north of Jeffrey City.

URANIUM

In Wyoming, uranium mineralization occurs predominantly as a gray-black to black radioactive mineral known as pitchblende. Yellow hydrated uranium oxides, silicates, and phosphates are also common. These surficial mineral deposits were significant in the early discovery of uranium within Wyoming.

Wyoming's major uranium deposits occur in Tertiary sedimentary basins as stratabound roll fronts. Additional large deposits were recently recognized in the Medicine Bow and Sierra Madre Mountains, occurring as ancient placer deposits nearly 2 billion years old.

Wyoming is presently the second largest producer of uranium in the United States, following New Mexico in production and reserves.

SAMPLE IDENTIFICATION

You may find a rock or mineral specimen in Wyoming that is difficult to identify. The Geological Survey of Wyoming welcomes all inquiries concerning mineral deposits and specimens, and we provide free rock and mineral identification services for the general public. However, we are not capable of providing chemical assays and this service would have to be provided by a commercial assayer.

If you have any questions about mineral deposits in the State of Wyoming, or if you have a questionable mineral, feel free to stop by our offices or write to:

The Geological Survey of Wyoming
P.O. Box 3008, University Station
Laramie, Wyoming 82071

or call (307) 742-2054.

RECOMMENDED SELECTED READING PUBLISHED BY THE GEOLOGICAL SURVEY OF WYOMING

- Bulletin 50 - Mineral Resources of Wyoming, by F.W. Osterwald, *et al.*, 1959. Revised by William H. Wilson, 1966.
- Bulletin 54 - Fossils of Wyoming, by Michael W. Hager, 1970.
- Bulletin 55 - Traveler's Guide to the Geology of Wyoming, by D.L. Blackstone, Jr., 1971.
- Bulletin 56 - Minerals and Rocks of Wyoming, by Forrest K. Root, 1977.

(more)

- Bulletin 63 - Paleontology of the Green River Formation, with a review of the fish fauna, by Lance Grande, 1980.
- R.I. 12 - Diamond in State-Line kimberlite diatremes, Albany County, Wyoming, and Larimer County, Colorado, by M.E. McCallum and C.D. Mabarak, 1976.
- P.R. 19 - Exploration for diamond-bearing kimberlite in Colorado and Wyoming: an evaluation of exploration techniques, by W. Dan Hausel, M.E. McCallum, and T.L. Woodzick, 1979.
- R.I. 23 - Gold districts of Wyoming, by W. Dan Hausel, 1980.
- P.I.C. 15 - Mining Laws of Wyoming, compiled by Wyomind DEPAD and the Geological Survey of Wyoming, 1981.
- P.R. 18 - Geological and geophysical investigations of kimberlites in the Laramie Range of southeastern Wyoming, by W. Dan Hausel, P.R. Glahn, and T.L. Woodzick, 1981.
- P.R. 19 - Ore Deposits of Wyoming, by W. Dan Hausel, 1982.
- M.S. 5 - Mines and Minerals Map of Wyoming, compiled by W. Dan Hausel, Gary B. Glass, David R. Lageson, Allan J. Ver Ploeg, and Rodney H. De Bruin, 1979.
- Reprint 44 - Metallogeny of some Wyoming deposits, by W. Dan Hausel and Ray E. Harris, 1984.
- P.I.C. 19 - Genesis and exploration of metallic and nonmetallic mineral and ore deposits of Wyoming and adjacent areas (extended abstracts), compiled by W. Dan Hausel and Ray E. Harris, 1983.
- Reprint 40 - General geologic setting and mineralization of the porphyry copper deposits, Absaroka volcanic plateau, Wyoming, by W. Dan Hausel, 1982.