THE GEOLOGICAL SURVEY OF WYOMING
Gary B. Glass, State Geologist

GUIDE TO SOME ROCKS AND MINERALS OF WYOMING

by

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LARAMIE, WYOMING

1987

3,000 copies printed by Wyoming Department of Administration and Fiscal Control, Central Duplicating Section.

Information Circular. Published for free distribution.

This and other publications available from:

The Geological Survey of Wyoming
P.O. Box 3008, University Station
Laramie, Wyoming 82071
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Revised July, 1987

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INTRODUCTION

Wyoming is known for its abundance of energy and mineral resources. In addition to vast oil, natural gas, and coal resources, there are many other rocks and minerals occurring in the State. A few of these are briefly examined in this circular. Additional information on the rocks and minerals of Wyoming are contained in publications by Hausel (1986a), Hausel and Albert (1983), and Harris and others (1985).

ANORTHOSITE

Anorthosite is a gray, coarsely-crystalline, intrusive igneous rock consisting almost entirely of plagioclase feldspar. The plagioclase is so aluminum-rich that during the Second World War the anorthosite was seriously considered as a possible alumina source in the event our imported resources had been cut off by enemy activity. Presently, there is some interest in using anorthosite as a source of sodium flux in the manufacture of glass.

Nearly all of the known anorthosite in the State occurs within a large 350-square-mile batholith exposed in the central Laramie Range northeast of Laramie (**Figure 1**). Accessible collecting localities lie along State Highway 34 through Sybille Canyon. While driving through the canyon, light gray anorthosite, and associated dark gray to black syenite rocks are easily recognizable in road cuts because the rocks sparkle as sunlight is reflected off the plagioclase crystal faces.

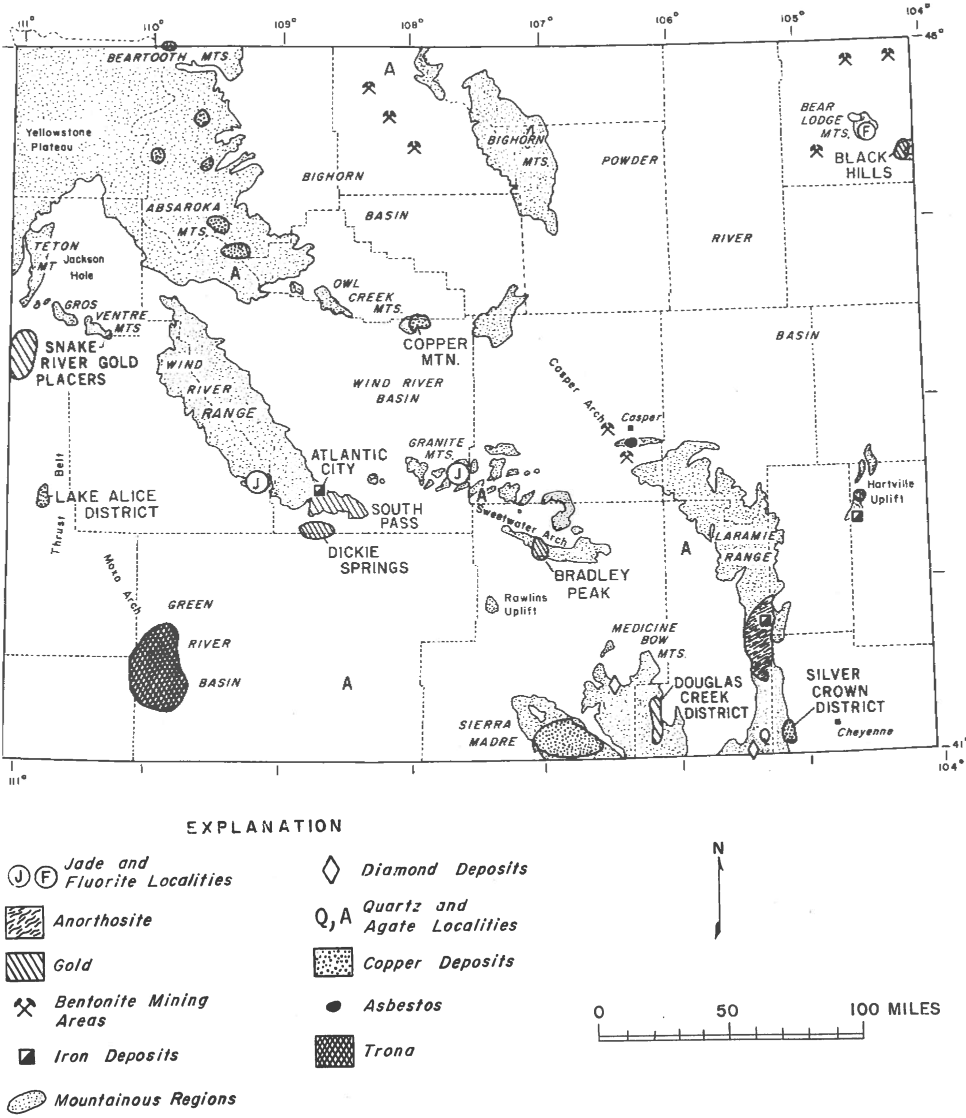

Figure 1. General localities of some common rocks and minerals.

ASBESTOS

In 1891, asbestos deposits on Casper Mountain (**Figure 1**) were proclaimed to rival the best asbestos deposits on the North American continent. Although this status was short-lived, excellent specimens of cross-fiber asbestos can still be collected from the historic quarries.

The Casper Mountain asbestos deposits occur as 1/8- to 1/4-inch-wide, cross-fiber chrysotile veinlets, separated by massive serpentine (Hausel and Glass, 1980).

BENTONITE

Bentonite is a commercial term used for clays that consist of 75 percent or more montmorillonite. Most bentonites in the "Cowboy State" are termed "Wyoming" or "western" bentonites and are different from bentonites located in the southern United States. The Wyoming bentonites uniquely expand up to 15 times their dry volume upon wetting. This characteristic is useful in drilling muds used by the petroleum industry, for pelletizing taconite in the iron ore industry, and for binding foundry sands.

Much of the bentonite in the State is interbedded within Cretaceous shales (Harris and others, 1985). Two important mining regions are the Black Hills and the eastern Bighorn Basin (**Figure 1**).

COAL

Coal is a combustible, brown to black sedimentary rock composed of consolidated, compressed, and chemically altered plant remains. The plants that form coal grew abundantly in ancient swamps, marshes, and bogs located in alluvial plains along coastlines, on river deltas, in lagoons, in and along fresh-water river systems, and adjacent to fresh-water lakes. The dense plant growth slowly accumulated under standing water in these swampy areas (preventing decomposition); the weight of many layers of plant material and other sediments eventually transformed the original plant materials into peat. With additional compaction and increasing temperature brought about by deeper burial beneath sediments, the peat eventually changed to coal. The rank of coal is dependent on the depth of burial, the heat it has been subjected to, and the amount of time it has been buried. Coal rank progresses from peat, the lowest rank, to lignite, subbituminous, bituminous, and finally anthracite, the highest rank.

Wyoming's coal deposits (**Figure 2**) are located in large sedimentary basins surrounded by non-coal-bearing rocks of the State's mountain ranges and uplifts. The coal is found in rocks deposited during Cretaceous and early Tertiary time (140 to 38 million years ago) and ranges in rank from lignite to bituminous.

Most of the bituminous coal is of Cretaceous age and occurs along the margins of the major coal basins as well as at depth in the center of the basins where it underlies great thicknesses of younger Tertiary rocks. Although most Cretaceous coals are less than ten feet thick, beds 30 to 100 feet thick occur locally.

Subbituminous coal and lignite is mostly Tertiary in age and overlies the older Cretaceous rocks. These coals and coal-bearing rocks crop out extensively in all of the State's coal regions and many thick coal beds can be found at or near the surface. Tertiary coals are frequently more than

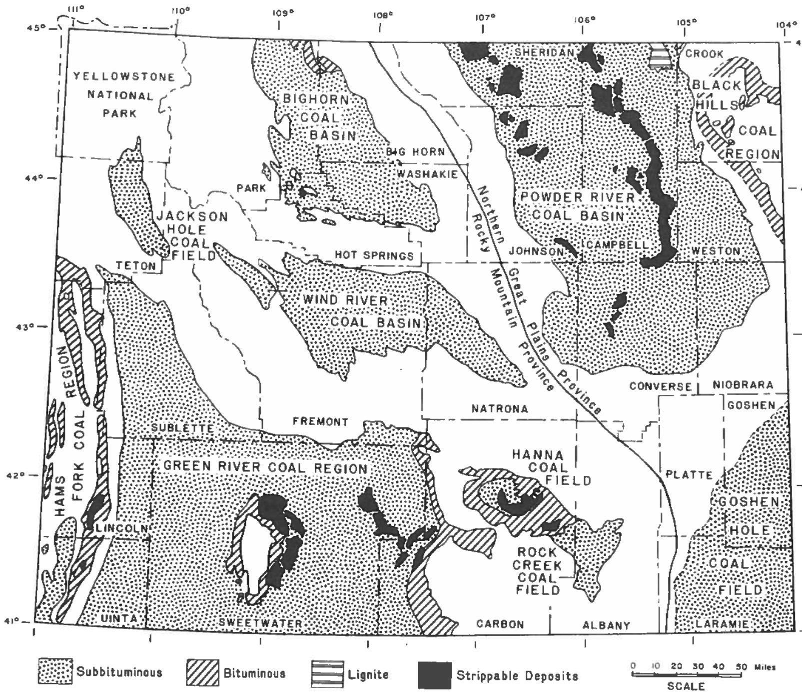

Figure 2. Coal-bearing regions of Wyoming.

ten feet thick, and individual coal beds from 50-100 feet thick are common. The Wyodak coal bed, which is mined extensively in Campbell County, Wyoming, exceeds 100 feet in thickness in many parts of the Powder River Basin. Two coal beds in the western Powder River Basin (near Buffalo, Wyoming and southeast of Buffalo, respectively) exceed 200 feet in thickness and locally may exceed 250 feet in thickness. These coal beds are reportedly the thickest in North America.

Coal has been mined in Wyoming continuously since 1865 and the State now ranks as one of the Nation's leading coal producers. The first ninety years of coal mining in Wyoming was primarily in underground bituminous mines that provided fuel for steam-powered locomotives. Today, nearly all Wyoming coal is mined from large open-pit surface mines that provide low-sulfur subbituminous coal for use as fuel in steam-driven electric generating plants located throughout the United States.

Wyoming's coal resources have been estimated at over one trillion tons. The State ranks second in the United States in coal resources; only Alaska has more known coal resources than Wyoming.

A fresh sample of Wyoming bituminous coal typically has a shiny, lustrous appearance and a low specific gravity (light heft), and it is hard and brittle. Fresh samples of lignite and subbituminous coals, on the other hand, have a dull, earthy or woody appearance. When these lower-rank coals are badly weathered, they look like black shales or very sooty soils. Fresh samples of these lower rank coals will develop dessication cracks as they dry out. Unless they are coated with shellac or other sealers, samples will quickly break apart into small fragments.

Because of weathering and oxidation, it is difficult to collect a good sample of coal from a natural outcrop. The best sampling sites are at coal mines. Most underground coal mine entrances in the State have been permanently sealed and are impossible to enter. Abandoned underground coal mines are extremely dangerous anyway, and those that have not been sealed should never be entered. All of the large coal mines currently active in Wyoming are strip mines, and mine personnel routinely conduct tours of their operations. Samples of the coals that they are mining are often provided during the tours. Most of these active coal mines are located east of Wyoming Highway 59 between Gillette and Bill, in Campbell County (Powder River Basin). Other active coal mines are located at Hanna in Carbon County, just west of

Kemmerer in Lincoln County, north and south of Point of Rocks along Interstate 80 near Rock Springs, and along Wyoming Highway 338 north of Sheridan.

COPPER

During the early 1900s, Wyoming's copper industry ranked as one of the more important in the United States. Copper is no longer mined in Wyoming, and the metal is presently considered unimportant except where it is associated with valuable gold and silver deposits.

Copper is found in nearly every mountain range in the State. Six relatively important copper-bearing regions are the Sierra Madre (Grand Encampment district), the Absaroka Plateau, the Silver Crown district, the Hartville uplift, the Copper Mountain region and the Lake Alice district (Hausel, 1982a) (**Figure 1**).

The Sierra Madre contains hundreds of scattered copper prospects and mines including the historic Ferris-Haggarty mine (Hausel, 1986b). Historical records show that the Ferris-Haggarty Mine operated a 16-mile long aerial tramway in the early 1900s, which carried copper ore from the mine site, up over the continental divide at more than 10,000 feet elevation, and downslope to a copper smelter located at Encampment (Wyoming Recreation Commission, 1976, p. 35).

The copper deposits found in the Absaroka Plateau are similar to the gigantic porphyry copper deposits mined in the southwestern United States (Hausel, 1982b). The largest open pit mine in the world, the Bingham mine outside Salt Lake City, Utah, is also developed on a similar copper deposit.

Copper in the Silver Crown and Copper Mountain districts occurs in quartz veins and mineralized fissures. At Hartville, the deposits are associated with limestone and hematite schist. In the Lake Alice district, copper with some silver and zinc are found in red-bed sandstones of the Nugget and Twin Creek Formations (Triassic-Jurassic).

Some excellent copper-bearing specimens are found in southeastern Wyoming (Hausel and Jones, 1984). The more common of these copper minerals are malachite, azurite, and chalcopyrite, with lesser amounts of tenorite and cuprite. There are simple tests that distinguish these minerals in the field. Malachite and azurite are green and blue copper carbonates that effervesce (give off CO_2 bubbles) when a few drops of dilute hydrochloric acid (10 percent), or muriatic acid, are dropped on them. Vinegar will produce a similar effect although the reaction is not quite as strong.

Chalcopyrite, a copper-iron sulfide, generally occurs in bright, massive, metallic, bronze-colored specimens that produce a black to dull greenish black powder when scratched with a pocket knife. Two other copper minerals, which are commonly associated with malachite and azurite, are tenorite and cuprite (both are copper oxides). While tenorite usually occurs as a glossy black stain, cuprite appears as an earth-red stain. These minerals are identified by placing a few drops of muriatic acid on a suspected sample, and then rubbing a well-used rock pick or pocket knife into the acid-covered specimen. If the sample is a copper oxide, a coating of bright metallic copper will remain on the pick after the acid and residue are wiped off.

DIAMONDS

Not many people are aware that Wyoming, as well as Colorado, has a number of diamond deposits similar to those in the famous Diamond State Park in Murfreesboro, Arkansas, and also similar to those mined in South Africa.

Actually, less than a decade ago, diamonds were accidentally discovered in the Colorado-Wyoming region in a rock called "kimberlite". Ever since this accidental discovery, there has been a fervor of activity to locate new deposits. Presently, about 100 separate kimberlite diatremes and dikes have been found in southeastern Wyoming and Colorado, including one placer diamond occurrence. Both gem and industrial quality diamonds, up to 1¼ carat in weight, have been recovered. Recent exploration and research activities by the Geological Survey of Wyoming, Colorado State University, and the Remote Sensing Section of the Department of Geology and Geophysics, University of Wyoming may lead to the discovery of several more deposits in the the future.

Diamonds in kimberlite

Kimberlite is a relatively rare rock that commonly occurs in conical-shaped diatremes (pipes) that typically merge into dikes at depth. These diatremes are quite small, usually measuring only a few tens of acres in surface area. The largest reported kimberlite occurrence in the world is a little more than one mile in diameter. Kimberlite is demonstrably of magmatic origin and contains nodules of material formed at a variety of depths in the earth's crust and upper mantle. For example, some mantle nodules and individual crystals in the Colorado-Wyoming kimberlites are believed to have been derived from depths in excess of 120 miles below the earth's surface, which provides

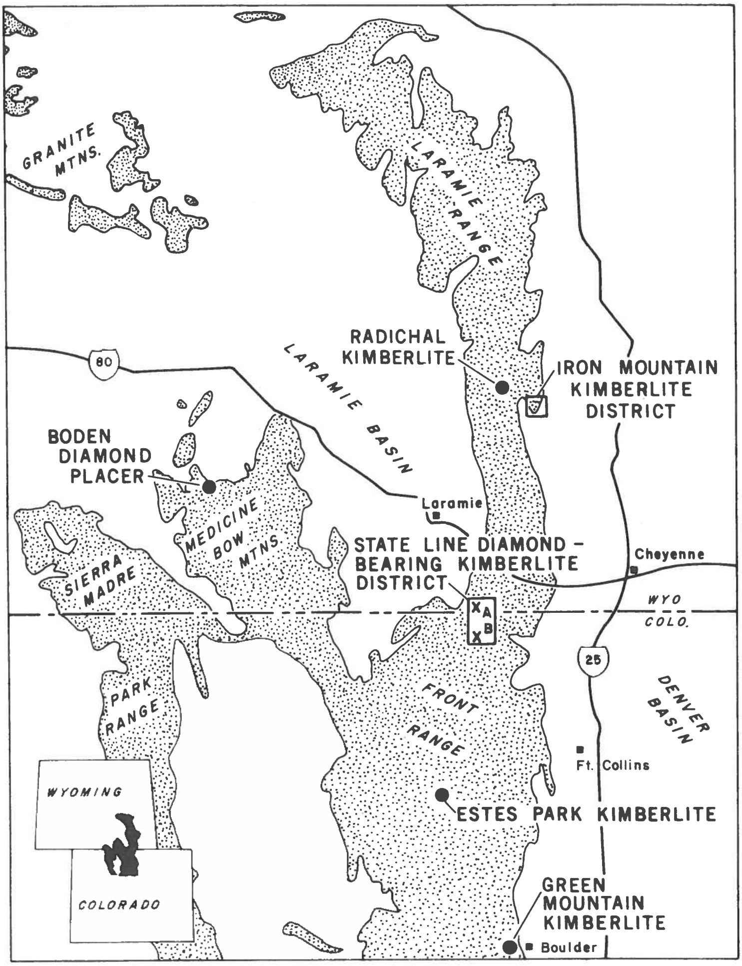

Figure 3. Location map of known kimberlite occurrences and districts. In the State Line district, locality A is the location of the two early Paleozoic outliers, which were later identified as kimberlite diatremes. Locality A also includes the Schaffer 3 kimberlite where the first diamond-bearing rock was collected in 1975. Locality B is the location of the Sloan 1 kimberlite pipe where kimberlite was first recognized in 1964.

evidence that the kimberlite magma originated from similar depths.

According to Lampietti and Sutherland (1978), less than 10 percent of all the known kimberlites are diamondiferous and less than two percent contain commercial amounts of diamond. In those kimberlites that are diamond-bearing, diamond concentration generally is considerably less than one ppm (part per million). Thus, the chances of finding a commercial diamond pipe are indeed small.

History of the diamond discovery

The historical events that led to the discovery of diamonds in Wyoming, and later in Colorado, began in 1960. During that year and in 1961, the discovery of two small outcrops of limestone in southeastern Wyoming presented problems to geologists familiar with the geological history of that part of the country. These two outcrops, located 20 miles south of Laramie, represented an enigma for a number of reasons. First of all, fossils found in these rocks were Ordovician and Silurian in age (400 to 500 million years old). The discovery of these rocks was difficult to explain because no rocks of similar age had been found in this region. The nearest Ordovician rocks are more than 90 miles away, and the nearest exposure of Silurian rock is even more distant. Secondly, these lower Paleozoic limestone outcrops were chaotically distributed in oval shaped areas, 200 to 300 feet in diameter. Thirdly, the outcrops were located in the middle of Precambrian granitic terrain dated at 1.4 billion years old. It was as if someone or something had dumped these rocks at these localities for some unknown reason.

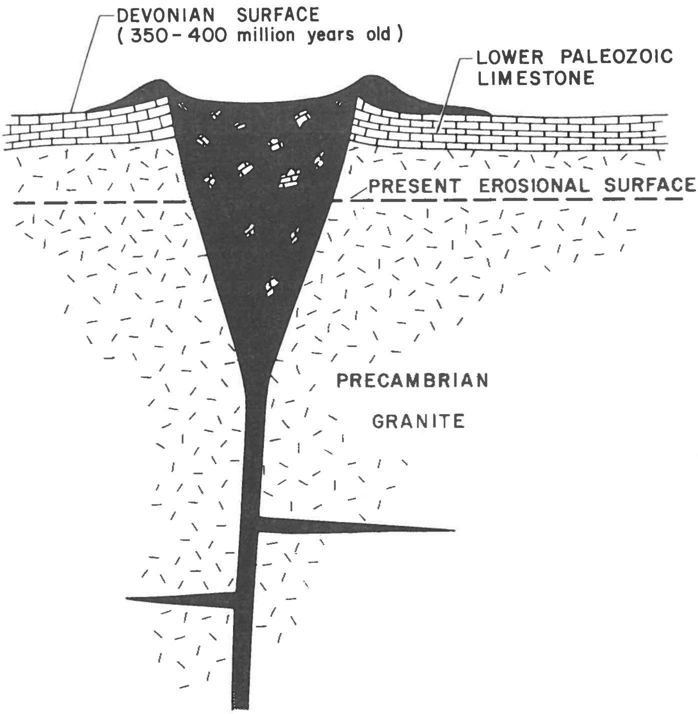

Figure 4. Cross-sectional view of a Wyoming kimberlite diatreme. During the eruption of these kimberlites some 350 to 400 million years ago, blocks of overlying lower Paleozoic limestone became trapped within the kimberlite and sank possibly a few hundred feet. Later, erosion removed all traces of the bedded limestone and portions of the kimberlite. Some of these kimberlites have been discovered because some of the trapped blocks of limestone are now exposed at the surface.

Two papers were written by Chronic and Ferris (1961, 1963) that speculated on the origin of the outcrops and termed them early Paleozoic "outliers". The actual origin, however, continued to elude researchers for some years.

In 1964, a similar limestone outcrop was discovered in Colorado, about 12 miles south of the first two. In addition to the limestone blocks, this outcrop (known as the Sloan 1 Pipe) contained greenish igneous rock. The green rock was identified by M.E. McCallum from Colorado State University as kimberlite (McCallum and Mabarak, 1976).

The presence of kimberlite in association with the limestone led to a viable explanation for these so-called "outliers." When the kimberlite magma erupted 350 to 400 million years ago, the region south of Laramie was covered by lower Paleozoic bedded limestones. The explosive eruption of the kimberlite fragmented the overlying limestone, and blocks of limestone became trapped and sank into the magma. Over the last several hundred million years, erosion has removed all traces of the bedded limestone in this region, and all that remains are these limestone fragments and blocks that were trapped within the kimberlite diatremes.

Following the discovery of kimberlite, a number of research projects were conducted by Colorado State University and the University of Colorado, and several more kimberlites were discovered. Then, in 1975, Dr. McCallum collected some nodules from a Wyoming kimberlite (Schaffer 3 pipe) for research studies. One of these nodules, while it was being ground on a carborundum plate, produced several deep scratches in the grinding wheel. This led to the immediate speculation that the rock fragment contained diamonds, since diamond is the only known naturally-occurring substance harder than carborundum. The rock was dissolved in hydrofluoric acid, and several small crystals remaining in the residue were identified as diamond (McCallum and Mabarak, 1976).

This discovery led to cooperative exploration and research programs involving the Geological Survey of Wyoming, Colorado State University, and more recently the University of Wyoming Department of Geology and Geophysics. Today, we know there are nearly 100 occurrences of kimberlite in the Colorado-Wyoming region, and that at least 16 of these contain diamond (McCallum and others, 1979; Hausel and others, 1979a, 1979b, 1981, 1985; Hausel, 1982a).

Diamond extraction

The known kimberlites are found as far as 45 miles north (Sybille Canyon, Wyoming) and 90 miles south (Boulder, Colorado) of the Colorado-Wyoming border. Most of these intrusives are on private or state land. The one diatreme near Boulder, Colorado, is located in a park west of Boulder along the mountain front on the flank of Green Mountain.

The diamondiferous kimberlites in the State Line district were recently tested for commercial diamond concentrations by two separate mining firms. One company reported low-grade diamond mineralization averaging 0.005 to 0.01 carat per ton with diamonds up to 0.86 carat in size. The second company reported grades as high as 0.2 carat per ton for two kimberlite pipes in Colorado. Gem quality to industrial quality diamonds were reported in similar ratios in many South African diamond mines. The results indicated that the few kimberlites tested contained low-grade diamond resources.

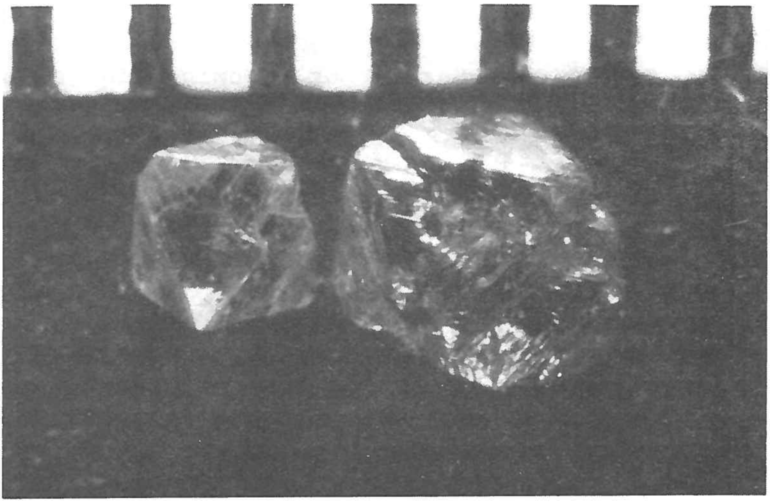

Figure 5. Some Wyoming diamonds -- note the typical octahedral shape (scale division 1 mm apart).

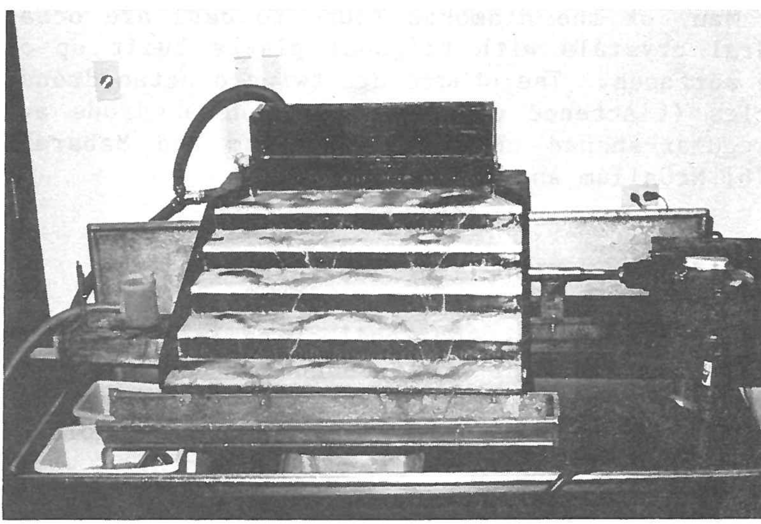

Figure 6. View of a side-shaking grease table in operation at the Geological Survey of Wyoming's diamond extraction lab.

The Geological Survey of Wyoming is also searching for diamonds. Unlike the mining firms, the State Survey is not interested in testing for commercial mineralization, but rather is only interested in determining the presence or apparent absence of diamonds in newly discovered kimberlites. The Survey's diamond extraction lab is very small and handles small samples. At the Survey, small samples of kimberlite (less than 500 pounds) are crushed and concentrated. The final concentrates are processed on a side-shaking grease table and a skin flotation separator (Hausel, 1982a). These two diamond sorters make use of diamond's unique properties of being grease-attractive and non-wettable. Diamonds will stick to the grease on the table and will float on water in the skin flotation separator (Hausel and others, 1985).

Many of the diamonds found to date are octahedral crystals with trigonal plates built up on the surfaces. The others are twinned octahedrons, macles (flattened octahedrons), dodecahedrons and irregular-shaped crystals (McCallum and Mabarak, 1976; McCallum and others, 1979).

FLUORITE (fluorspar)

A number of fluorspar collecting localities are located in the Bear Lodge Mountains north of Sundance (**Figure 1**). The mineral occurs in marbleized limestone as a dark purple mass. Fluorspar will generally fluoresce weakly under long wavelength black light, however most of the Wyoming specimens will not fluoresce.

GOLD

Gold is found at a number of localities in Wyoming (Osterwald and others, 1966; Hausel, 1980). For the weekend prospector, the better places to search for gold are the historic placer (stream transported) deposits, but be careful that you do not trespass on someone else's mining claim or on private property!

Historically, South Pass (which has many characteristics of some gold-rich mining districts of South Africa and Western Australia) was Wyoming's principal gold source (Hausel, 1984). As much as 327,000 ounces of gold, worth about $130 million (at $400/ounce), was recovered from this region (Hausel, 1980). Two mining districts - Lewiston and South Pass-Atlantic City, lie within the South Pass region, and two Tertiary paleoplacers derived from South Pass lie along the northeastern and southern margins. One of these paleoplacers (Dickie Springs) may contain as much as 28.5 million ounces of gold (Love and others, 1978). An unknown quantity of placer gold is panned and dredged by tourists and prospectors each year from South Pass. South Pass lies near the south tip of the Wind River Range (**Figure 1**).

Gold is a soft (hardness 2½ to 3), heavy (specific gravity about 19), malleable, yellow submetallic to metallic metal. Minerals often mistaken for gold include mica, pyrite (fool's gold), and chalcopyrite. Pyrite and chalcopyrite are hard and brittle and will produce a black streak if scratched with a knife.

Mica, which often forms small bronze-colored flakes with flat surfaces, is more often mistaken for gold than is fool's gold. The mica is brittle and will break into pieces under the pressure of a pin point.

IRON

Three types of iron ore deposits have been exploited in Wyoming. Taconite, a black, highly magnetic, banded magnetite and silica rock, is found at Copper Mountain and South Pass (**Figure 1**). Hematite, which occurs as powdery to massive red iron oxide or as a steel-gray nonmagnetic metallic substance, was mined for nearly 100 years in the Hartville uplift (**Figure 1**). Titaniferous magnetite is found in scattered pods in the Laramie Range anorthosite complex and was mined during the late 1950s and early 1960s. This material is steel-gray, metallic, and weakly to strongly magnetic.

JADE

Jade was discovered along the Sweetwater River in southeastern Fremont County about 1936. In the years since, the mineral has attracted great attention as a gemstone.

Mineralogy of jade

The name jade is applied to two distinctly different minerals, jadeite and nephrite, both of which have somewhat similar colors and physical features, such as hardness and toughness. Both will take a high polish to produce gemstones or ornamental stones.

Jadeite is a member of the pyroxene group of minerals and is a sodium-aluminum silicate. It is hard and tough, and the color varies from white to greenish-white to emerald green. The Mogoung district of Upper Burma has been an important source for jadeite, but it is also found in Yunnan in

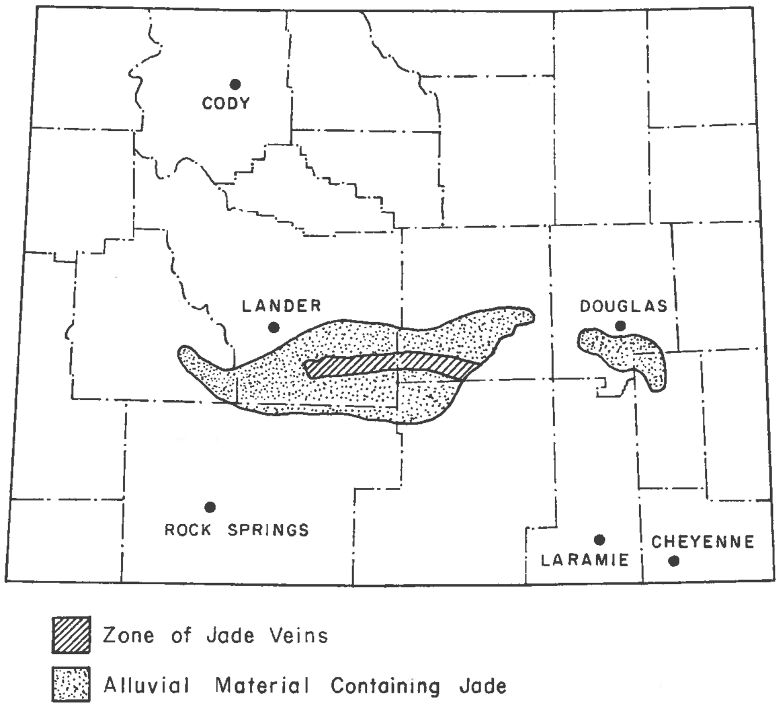

Figure 7. Principal jade occurrences of Wyoming.

southern China, in Tibet, in Mexico, and in South America. No jade in Wyoming has been proven to be jadeite.

The second variety of jade is the mineral nephrite, and Wyoming jade is of this sort. Nephrite belongs to the amphibole group of minerals, and is a lime-magnesium-aluminum silicate. Nephrite has a hardness of 5 to 6 on the Mohs scale; it is not quite as hard as quartz or agate. Nephrite is also very tough. The specific gravity is about 3.0. The color varies from olive-green to leaf-green to dark green to black, and the mineral may be translucent or opaque. Light green nephrite is most in demand for gemstones and commands the highest price. In addition to the Wyoming occurrence, nephrite has been found in parts of China, Turkestan, Siberia, New Zealand, and Alaska.

Wyoming nephrite varies in color from light green and translucent to dark green, to black and opaque. In addition to the color variations, there are differences in quality. Not all specimens will take a high polish. Frequently, the jade contains small dark specks which are softer and leave pits in the polished surfaces. A considerable amount of jade found is of inferior quality because of this feature.

Geological occurrence

The Sweetwater River flows from the southern end of the Wind River Range across a terrain made up of Precambrian granite hills with ancient sedimentary and volcanic rock that protrudes from a mantle of Tertiary sediments. Some of the jade occurs in place in Precambrian rocks. Jade also occurs as boulders in recent alluvial deposits. These boulders are derived from Precambrian rocks that were first eroded and transported by streams and deposited as conglomerates in the Tertiary beds. Later erosion of the Tertiary conglomerates brought about the distribution of jade boulders along the present stream valleys. Jade also occurs as residual boulders on the inter-stream divides.

A number of jade deposits are known in the Precambrian rocks, from the Wind River Range in the west to the Laramie Range in the east. Most of these deposits are dark-green or black nephrite.

The jade is commonly associated with the contact between granite and dark mafic or ultramafic rocks.

Float boulders of dark green or black jade have been found over a rather large area along the Sweetwater River between Crook's Creek on the east and the Wind River Range on the west. The average size of the boulders is from six inches to a foot in diameter although many large boulders have been found.

Boulders of the light green, translucent variety of jade have been found in abundance in only two relatively limited areas. The largest boulder of this type of jade, so far reported, weighed about 3,200 pounds. On the basis of the general geological structure, it appears that the original Precambrian source of the light green jade may have been buried by later sediments, and thus may never be located.

Black jade deposits in the vicinity of Kortes Dam, Carbon County, and Daniel, Sublette County, have been reported. In the 1970s, a 14,000-pound boulder of black jade was uncovered in the Prospect Mountains area of Sublette County. This is the largest known single occurrence of jade reported to date in Wyoming.

Land status

The area over which the jade occurs comprises private and Federal land as well as a small amount of State land. A number of placer claims have been filed, especially in the area where the light green jade is found. Lode claims have been filed on deposits of dark green jade where it occurs in place. Jade on State lands must be leased through the Commissioner of Public Lands.

Future possibilities

Gem quality jade occurs south and east of Lander in an area comprising about 700 square miles. This area has been so thoroughly picked over that today the light green jade of Wyoming is largely depleted. New finds of dark green and black jade have been reported, however, in recent years. Even then, polishing tests must be made to determine the quality of the jade, and a considerable part is of inferior quality.

In addition, there are two other green rocks, serpentine and green quartzite, which commonly occur in the area and which superficially resemble jade. The abundance of these rocks, coupled with the fact that they are so often mistaken for jade, has given rise to exaggerated stories of the abundance of jade in the area. Truckloads of green serpentine have been transported for miles only to be found worthless. A green quartzite is also found in the area and has frequently been confused with jade.

It is possible, of course, that new areas containing gem quality jade will be found, but the entire region has been fairly well combed by prospectors. None of the jade collectors depend entirely on collecting and selling jade as a livelihood for any length of time. The average jade hunter has simply found it to be a pleasant way to spend spare time.

Lapidaries and collectors

The towns of Lander, Riverton, and Rawlins are the centers of jade collecting and lapidary work. Persons interested in purchasing uncut jade, jade jewelry, or art objects may obtain the names of reputable dealers by writing the Chambers of Commerce in those towns.

QUARTZ (agate)

Quartz crystallizes in the hexagonal system and often forms beautiful, clear crystals. Good hexagonal specimens of quartz have been collected from vugs formed within pegmatites in the Laramie Range east and southeast of Laramie. Many of these pegmatites were mined in the 1940s for feldspar, and mining exposed several quartz-bearing vugs.

Specimens of faintly purple or violet quartz crystals (amethyst) have been collected from small cavities formed in volcanic rock in the Absaroka Plateau to the east of Yellowstone National Park.

Cryptocrystalline varieties or quartz, known as chalcedony (commonly called agate), are found as replacements or as cavity fillings. Several varieties of banded and moss agate occur in Wyoming. One popular agate indigenous to Wyoming is the Sweetwater moss agate, a gray-blue agate with black dendrites. Collecting areas for the Sweetwater moss agate are located along Sage Hen Creek in the Granite Mountains north of Jeffrey City and Split Rock. In the same general area, moss agate pebbles also occur along the banks of the Sweetwater River (Love, 1970; Hausel and Glass, 1980).

Dryhead agate, a red and white banded agate, is found along the Bighorn River northeast of Lovell. This area is an extension of the famous Dryhead agate grounds of Montana. Agate-filled casts of tree trunks and branches are found in the Absaroka Plateau (Hausel, 1986a).

TRONA

Trona is a hydrated sodium carbonate and sodium bicarbonate used to produce industrial soda ash. Soda ash is vitally important in the glass, paper, soap, petroleum refining, and textile industries. Baking soda is also a product of soda ash.

The largest known trona resource in the world is buried within 45-million-year-old lake sediments in the Green River Basin west of Rock Springs. Five companies presently mine trona from shafts that extend as deep as 1,700 feet below the surface. The trona industry is vitally important to the economies of Rock Springs and Green River.

URANIUM

Major uranium districts are located on **Figure 8.** The uranium minerals found at the surface are oxidized and form brightly colored radioactive yellowish coatings on rocks and occur as a cementing agent in sandstones.

SUMMARY

Only a few of Wyoming's minerals and rocks have been described. For more information, we recommend the publications listed in **REFERENCES.**

Topographic maps of Wyoming, which are useful tools for locating oneself when collecting, are available from the Geological Survey of Wyoming. Mail orders must be prepaid at $2.75 per map (mailed folded). Many libraries maintain index maps to the topographic coverage of various states. Free index maps are available from the Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, Colorado 80225.

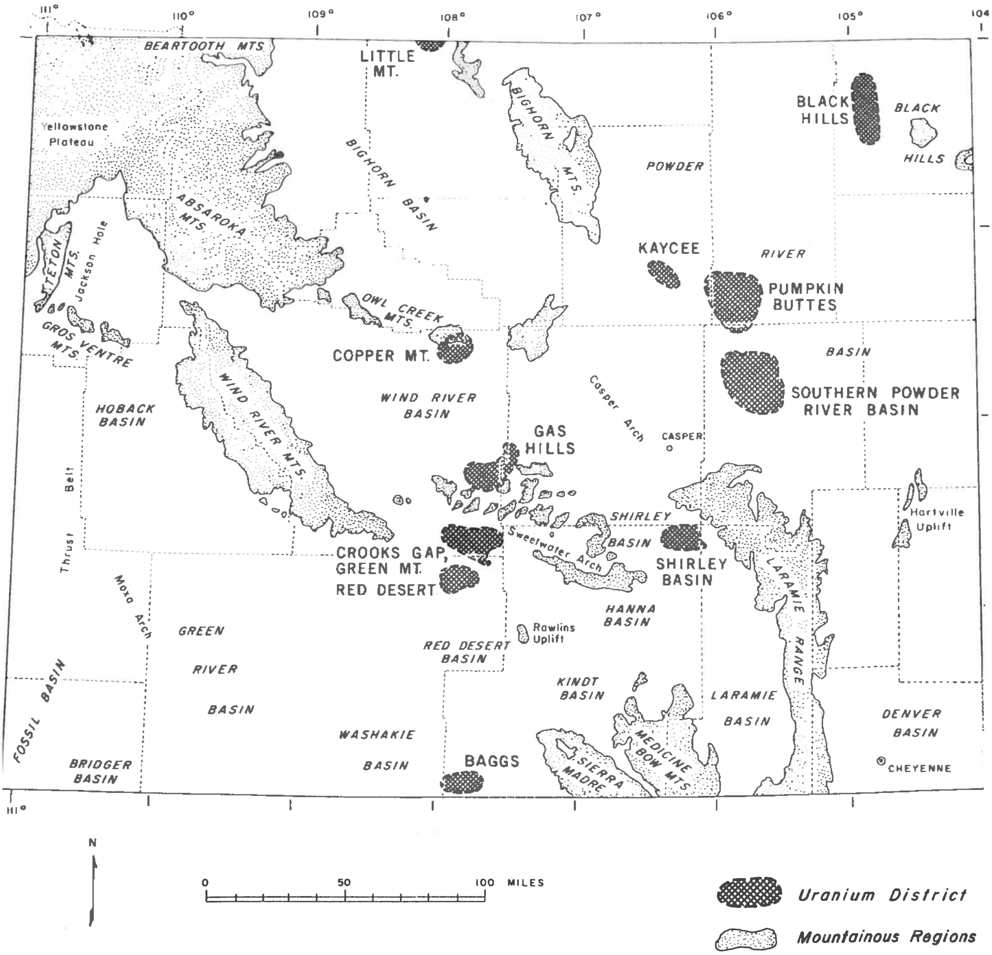

Figure 8. Uranium districts in Wyoming. For many years, Wyoming has been the nation's second leading uranium producer, after New Mexico.

If you are passing through Wyoming, we invite you to stop and browse through the publications of the Geological Survey of Wyoming. Our offices are located in the Wyoming Geological Survey building on the University of Wyoming campus in Laramie. The office is located next to the Geology Museum and the S.H. Knight Geology Building. A topographic index map is also available at our office.

Because many of the minerals found in the State are difficult to identify, we recommend that a person interested in identifying mineral and rock specimens obtain a good descriptive mineralogy book. If you cannot identify a rock or mineral specimen that you have found in Wyoming, the Geological Survey of Wyoming, which is located on the University of Wyoming campus in Laramie, offers a rock and mineral identification service free of charge to the public. Please feel free to stop in:

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

or call 307/766-2286.

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