

WYOMING MINERAL RESOURCES

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INTRODUCTION

Reports on the occurrence of certain mineral resources in Wyoming reach far back into the history of the Rocky Mountain region. Oil springs were noted by Captain Bonneville and described in the writings of Washington Irving in 1833. Coal was discovered in northeastern Wyoming prior to 1834 and gold was reported in the South Pass district in 1842.

Early attempts to develop the mineral resources of the State were mainly attempts to mine gold, silver and copper. These ventures were generally unsuccessful, although a few paying gold or copper mines were developed. Without exception, all were later abandoned.

The production of the non-metallies began in the 1880's and such material as silica sand and sodium sulphate were used in glass manufacture. The first bentonite was mined in 1888. These early ventures were beset with adversities, such as unfavorable freight rates and poor market conditions, and few survived. Gradually, however, the nonmetallic industries became better established and the production and the number of sorts of rocks and minerals mined have shown a steady increase.

Coal mining on a commercial scale began in 1868 with the construction of the Union Pacific Railroad, and mines were opened at three different

points along the line that year. With the entrance of the Burlington and the Chicago and Northwestern lines other mines were opened in other parts of the State, so that coal mining today has grown to be one of Wyoming's major industries.

Although petroleum was produced from wells drilled as early as 1884 and the famous Salt Creek field was discovered in 1908, it was not until 1912 that the State became an important oil producer.

Wyoming's mineral resources may be divided into three main categories, (1) the mineral fuels, such as oil and coal, (2) the metals, such as iron ore, and (3) the nonmetallics, such as bentonite and phosphate rock. They might also be divided into such divisions as (1) those mineral resources now exploited and produced, (2) those which are undeveloped but show great promise, and (3) those which present unsolved problems of beneficiation or are of small size or low grade and whose ultimate development is uncertain.

MINERAL FUELS

Petroleum.- Wyoming ranks seventh among the oil-producing states, with a production for 1947 of 44,500,000 barrels. There are over 100 producing fields located in 18 of the 23 counties. The main producing fields are Lance Creek, in Niobrara County; Salt Creek, in Patrona County; and Oregon Basin and Elk Basin in Park County. These four fields account for about 40% of the total production. The total cumulative production of the State is slightly over 750,000,000 barrels.

The known reserves of the State, as of January 1, 1948, are estimated at about 800,000,000 barrels. New reserves are being added

through the discovery of new fields and of deeper production in old fields.

The future of the oil industry appears bright. Deeper drilling has recently come into practice and this, combined with geophysical exploration, has led to the discovery of new fields at depths ranging from 10,000 to 13,000 feet, indicating that the vast unexplored areas in the centers of the basins are potentially capable of producing large amounts of as yet unbound oil.

Natural gas fields are scattered over the State and about 35 billion cubic feet of natural gas is produced each year. Most communities in the State are served by gas pipelines and much natural gas is exported to neighboring states.

Coal.- Wyoming has the greatest coal reserves of any of the states, whether figured on a tonnage basis or on the basis of heat-producing capacity. The coal reserves of the State are placed at bituminous and sub-bituminous rank. There are five main producing coal fields now operating, the Sheridan, Gillette, Hanna, Rock Springs and Kemmerer areas, but other mines operate in other localities. Strip mining is carried on in the Hanna and Gillette fields and the Wyo-Dak mine, near Gillette, operates on a 90-foot vein of coal. Underground mining is carried on in the other districts and the modern mining methods employed have gained national recognition. The annual production has been about 10,000,000 tons during recent years, all used for heat production. If fully exploited, our coal may be expected to yield synthetic fuels, plastics, dyes and innumerable other valuable substances.

It may be appropriately said at this point that without our tremendous reserve of energy producing substances--coal, oil and natural gas--the industrial future of Wyoming would not be bright.

METALS

Iron.-- The only important metal mine in Wyoming is the Sunrise iron mine, located in Platte County. This mine has operated almost continuously since 1900, all the ore being shipped to Pueblo, Colorado, for smelting. The glory-hole method of mining was practiced until 1941 and the resulting pit has a maximum depth of 650 feet. Today all ore is produced by underground mining and a large reserve of high-grade hematite ore is known to exist. Production during recent years has ranged from 600,000 to 800,000 tons per year.

Precious metals.-- During the early days appreciable amounts of gold, silver and platinum were produced in Wyoming. The ore bodies were early exhausted, or proved uneconomical, and the mines or placer workings were abandoned. Since the turn of the century, Wyoming's gold and silver production has been negligible. In 1947, gold mining was revived in the old South Pass district and 1,556 ounces, valued at 54,460, were produced. The future of gold and silver mining is not bright, although each year some gold and silver will likely be produced from various workings scattered over the State.

Other metals.-- A tremendous reserve of low-grade vanadium ore has been proved to exist in western Wyoming, but its development hinges on the discovery of a cheap treating process in order for the ore to compete with higher grade deposits being worked elsewhere. Large deposits of titaniferous magnetite are present in the Laramie Mountains.

The ore is not susceptible to easy treatment but is a potential source for large amounts of titanium, the most desirable pigment for white paints, and for vanadium, an ingredient in tough steels.

Promising low-grade tungsten deposits are located on Copper Mountain, north of Shoshoni and lead and zinc deposits occur in places. Undeveloped iron ores are known. The development of any of these is contingent mainly on favorable economic factors.

NONMETALLICS

Wyoming's mineral wealth lies mainly in the nonmetallic substances, along with the energy producing substances. A good many nonmetallics are now produced and other promising deposits are subject to development.

Bentonite.- Bentonite is a peculiar clay capable of absorbing many times its original volume of water and possesses colloidal qualities which make it adaptable to many uses. It is used mainly as an ingredient of oil well drilling muds or as a binder for foundry sands, although it is used in many other ways. Wyoming is the largest producer of bentonite and the production has grown from a negligible amount in 1920 to over 200,000 tons in 1947. At present, Weston and Crook Counties, around the Black Hills of northeastern Wyoming, are the major producing counties, but bentonite is known in most counties. Deposits in Albany, Big Horn, Carbon, Natrona and other counties are now being explored or developed, or are now producing.

Vermiculite.- Vermiculite is a member of the mica family and when heated expands into long worm-like shapes, making one of the best known insulating materials. It is used in making lightweight plaster board, acoustic board and in many other ways. Wyoming is one of the seven

states which produce vermiculite and most of the production, which is not large, comes from the Encampment district. Other deposits have been worked in the Wheatland and Glenrock areas.

Sodium sulphate.- Sodium sulphate, or Glauber's salt, is a valuable industrial chemical which is produced at several places in Wyoming. Most of the production at present is used as an ingredient of stock feeds, but the salt is useful in other ways, especially in the glass and paper industries. In Wyoming, sodium sulphate occurs in almost pure form as saline lake deposits. The production is about 7,000 tons per year and comes from Carbon and Natrona counties. There are, however, numerous unexploited deposits in Natrona and Albany Counties.

Sodium carbonate.- A bed of sodium carbonate, or trona, was discovered in 1937 during the drilling of a deep well for oil near Granger, Sweetwater County. The bedded deposit, of almost inexhaustible size, lies at a depth of about 1,500 feet and a subsequent core-drilling program blocked out a great reserve of the salt. During 1947 a 1600-foot vertical shaft, 12 feet in diameter, was sunk to the trona bed and production is now underway. Sodium carbonate is used as an industrial chemical in many ways and local production may be expected to make feasible the processing of other Wyoming mineral raw materials which are not exploited today.

Feldspar.- Feldspar is quarried at a number of places in the Laramie Mountains and is exported for use in the ceramic industry. Large bodies occur as lenses in the granite core of the mountains. Thirteen states produce feldspar, but the Wyoming production of about 20,000 tons per year is small compared with most of the other producers.

Gypsum.- Gypsum is a common rock in Wyoming and although thick pure beds are common over the state, making the supply virtually inexhaustible, the rock is utilized to only a moderate degree, the Wyoming production being about 130,000 tons per year. The gypsum produced in Wyoming is sold in crude form for use as a soil conditioner and is calcined to manufacture plaster, gypsum board, tile, blocks, and other building materials. That produced at Cody and Thermopolis contains about 20% sulfur which makes it more valuable as a soil conditioner.

Cement rock.- Rocks suitable for the manufacture of Portland cement are widely distributed over Wyoming but are utilized only at Laramie where a natural cement rock is used. About 760,000 barrels of cement are produced annually.

Phosphate rock.- Phosphate rock has long been considered as one of Wyoming's most important undeveloped mineral resources. An immense supply of high-grade phosphate rock is available in westernmost Wyoming and large quantities of medium-grade rock have been mapped and tested in the Wind River Mountains. Production of Wyoming phosphate rock began in 1947 on a large scale through the opening of deposits near Sage, Lincoln County, and other deposits are expected to be opened in the general region. The current demand for raw phosphate rock for use in a mineral fertilizer reflects the nationwide phosphate-deficiency in the soils of agricultural areas. Wyoming phosphate rock may be processed to yield concentrated phosphate fertilizers.

Alumina.- In the Laramie Mountains is a body of anorthosite some ten miles wide and twenty miles long which extends to an unknown depth underground. This rock carries about 30% alumina and, therefore, offers

an almost inexhaustible source for that compound. It is known that the rock is susceptible to treatment and a plant has been constructed at Laramie for alumina extraction. The alumina will be sent elsewhere for reduction to metallic alumina.

Potash rock.- In the area about Superior there are masses of a volcanic rock, known as wyomingite, which carries about 11% potash. It is estimated that there are two billion tons of available potash rock which is apparently amenable to treatment which would convert the potash into a form available to plants. Potash, of course, is a valuable mineral fertilizer but the utilization of the deposits depends mainly on economic factors.

Gemstones.- Wyoming ranks first among the states producing gemstones. By far the greatest valuation is attributable to jade found in the Sweetwater River area, although various sorts of agate are collected. Rubies, bloodstone and star sapphires have also been found. The jade varies from light-green to dark-green to black in color, takes a high polish and is in high demand among lapidarists. Raw jade, in quantity lots, sells for as much as \$5 per pound and small lots command higher prices.

Cordierite.- As a result of field exploration by the State Geological Survey, the largest known deposit of a rare mineral, cordierite, has been found in the Laramie Mountains. Cordierite has been manufactured synthetically for use in the ceramic trade to produce porcelains resistant to thermal shock. It is likely that when the information pertinent to the deposit is made public, exploitation of the mineral will follow.

Sand, gravel, crushed stone and building stone.- Sand and gravel and stone suitable for crushing or for building stone are widely distributed over Wyoming and are utilized to a rather great extent. Sand and gravel are used for highway construction and for concrete structures. Crushed granite and quartzite are extensively used as railroad ballast. Limestone is quarried extensively, is of high purity and is used mainly in sugar refining. The production of these materials in 1945 was valued at approximately \$2,000,000.

Miscellaneous nonmetallics.- A variety of nonmetallic substances not now produced are known to be present in Wyoming and many offer good commercial possibilities. These are represented by deposits of magnesium sulphate, or Epsom salts, of high purity; by deposits of talc, graphite, kyanite, nepheline syenite, sulfur, volcanic ash, pumice, and by various other rocks or minerals.