

WYOMING MINING REVIEW FOR 1957

by

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Introduction

Although the mining industry, particularly the base metal operators, in the United States has suffered somewhat from a recession, the industry as a whole has probably never been healthier in Wyoming. Most of the exploration and developments were in uranium and nonmetallic minerals; however, significant studies were made in the development of additional iron ore resources. In addition, limited mining operations were carried on in gold, copper, beryl, and rare earth deposits.

During the last session of the State Legislature, a Wyoming Department of Mines was created, along with the adoption of a State Mining Code for mines other than coal.

Uranium

The Wyoming uranium industry boomed in 1957. Ore reserves increased at least 150 percent in the last year largely as a result of recent exploration and drilling in the Gas Hills and Crooks Gap areas. Proven reserves in these two areas alone are estimated at 18 to 20 million tons. In just four years, Wyoming holds second place (New Mexico is first) among states possessing uranium reserves.

During July, of the past year, Wyoming's first uranium mill, operated by Western Nuclear Corporation at Jeffrey City, commenced operation. Although the mill has a present capacity of 440 tons per day, application is

before the AEC to increase this to 1200 tons per day.

Late in 1957, a contract between the AEC and Fremont Minerals Corporation of Denver was approved for the construction of a 500 ton custom mill at Riverton. This mill, which is expected to be in operation late in 1958, will process various types of uranium ores, including those with lime content. Fremont will also purchase the large government stockpile of ore at Riverton, and as of February 1, 1958, will assume operation of the government ore buying station.

Construction is proceeding with the 750 ton Lucky Mc mill; however, it is understood that Phelps-Dodge has submitted a joint proposal with Lucky Mc to increase the capacity to 1750 tons per day. In addition, it has been reported that three other groups, Vitro Minerals, Union Carbide Nuclear-Globe Mining, and Federal Mining Company, have requested authorization from the AEC to construct mills in this area. The status of these three is rather uncertain at the present time since a limitation has been placed on new mill contracts by the AEC. This presents a problem, particularly in the Gas Hills area, since ore reserves have grown significantly in the district and much of this is in the hands of companies and persons with no milling facilities.

Gas Hills area. Vitro Minerals was the largest producer in Wyoming; shipping to both the Western Nuclear mill and their own mill in Salt Lake City. Currently they are opening a large open-pit mine in the East Gas Hills on the Pix group of claims which were acquired from Veca Minerals Company.

Earlier in the year, Lucky Mc Uranium Corporation applied for

patents on 89 uranium claims in the Gas Hills area. This application is reportedly the first filed for patents on uranium claims in Wyoming. Mining operations were started at the Lucky Mc 1-A open-pit, and stripping has also been recently completed in the 4-A pit with mining operations to follow.

The Bullrush open-pit is Western Nuclear's largest mine at the present time, and the ore is being trucked to their mill at Jeffrey City. Additional large scale stripping operations are in full swing as a prelude to another open-pit mine.

Among others who have carried on mining operations in the area during 1957 were the following: Globe Mining Co., Dale Levi Co., Two States Uranium Co., Ran Rex Mining Co., Savannah Construction Co., and P. C. Mining Co.

Crooks Gap area. Continental Materials Corporation, who was the largest shipper (and currently the only one), was mining from a deep pit just south of Wyoming Uranium Corporation's property. Currently Continental is sinking a vertical shaft on the Gaddis claims in what will be the first large underground mine in central Wyoming.

Exploration and drilling on the Wyoming Uranium claims by the Phelps-Dodge Corporation in this area has reportedly indicated 1,670,000 tons of uranium in nine separate but closely spaced ore bodies.

Black Hills area. Homestake Mining Company, one of the earliest and more prolific uranium producers in Wyoming, is currently sinking a 400-foot shaft to develop a deep uranium deposit located a few miles west of the New Haven post office in Crook County. The shaft is expected to

be complete in April, 1958, and the ore from this deposit will be shipped to the mill at Edgemont, S. D.

Sodak Uranium and Mining Company is the only other active operator reported in this area.

Powder River Basin area. Most of the tonnage mined here has come from both the Globe Mining Company and Loma Uranium Corporation open-pit mines in the Monument Hill-Dry Fork area of Converse County.

The Pumpkin Buttes area was still active with about ten or twelve operators shipping intermittently from small deposits.

Miscellaneous areas. Little Missouri Mining Company, one of the first operators to ship to the buying station at Riverton, was a regular shipper of uranium from its open-pit mine on Copper Mountain, northeast of Shoshoni.

Shawano Development Company produced some yellow cake by adding a new acid leach to their upgrader at their open-pit mine in the Baggs-Poison Basin area of Carbon County. Otherwise they shipped intermittently to the Vitro mill in Salt Lake City.

A significant development in the finding of additional uranium ore reserves is the successful follow-up of recent discoveries in the Little Mountain-Pryor Mountain area of Wyoming and Montana where tyuyamunite is found in the Madison limestone of Mississippian age. Lisbon Uranium Corporation was the most active producer in the Little Mountain area.

Although no mining operations were carried on, considerable exploratory and drilling work was carried on for new uranium deposits in the Shirley Basin area of Carbon County. In three months, approximately

twenty square miles was staked by such organizations as Shoni Uranium, Utah Construction, Tidewater Oil, Kerr-McGee, and Teton Exploration companies. During the latter part of the year Kerr-McGee carried on about 17,000 feet of shallow drilling on 350 claims. Current drilling is expected to go as deep as 400 feet in the area.

Nonmetallic Minerals

Phosphate Rock. A \$750,000 plant to upgrade phosphate ores from Wyoming and Utah is being constructed by the San Francisco Chemical Company at Leefe, Lincoln County. The new plant will have a 1,000 ton per day capacity and will utilize a new hydrometallurgical process which is expected to open up an entirely new approach to the upgrading of western phosphate deposits.

Trona. Intermountain Chemical Company's soda ash plant at Westvaco reportedly will be expanded from 350,000 to 400,000 ton capacity. A third shaft was recently completed to the trona beds in the district and increased output from the mines is largely responsible for the expanded plant production.

Bentonite. Baroid Division of National Lead Corporation installed a new laboratory at Lovell, to test bentonite samples from its claims east of Lovell. Wyoming continues to be the leading bentonite-producing state, and produces more than half the nation's output with the bulk of production coming from Big Horn, Crook, Natrona, and Weston counties.

Sulphur. The production of sulphur from "sour-gas" wells in Wyoming has become increasingly important in the last few years. Six companies, all located in the Big Horn Basin, reportedly produced sulphur

during 1957.

Cement Rock. During 1957, 1,003,000 barrels of cement were produced by the Monolith Portland Midwest cement plant at Laramie. This is the highest recorded production since the plant went into operation in 1929, with a 150 percent increase in production capacity.

Miscellaneous Nonmetallics. Limestone was produced commercially in Albany, Laramie, Teton, and several other counties, and granite continued to be produced for railroad ballast in Laramie County.

Limited rare earth production was reported from a small mine near Encampment, Carbon County. The operators report that about \$10,000 to \$12,000 of a euxenite-monzite-tantalite concentrate was shipped in 1957.

Clay continued to be mined near Lovell for use in the manufacture of vitrified sewer pipe.

Limited amounts of beryl, mined from Copper Mountain, were shipped to Custer, S. D.

Metallic Minerals

Iron. A two-year project to sink a shaft an additional 160 feet at the Sunrise iron mine was announced by Colorado Fuel and Iron Corporation. This shaft is expected to make possible the development of a seventh level. The mine was shipping 3,200 tons of iron ore per day to Pueblo, Colo., but lately operations were cut to a four day work week because of slackening demand for iron ore at the smelter.

Columbia-Geneva Steel Division of U. S. Steel Corp. continued considerable drilling and test work on the Atlantic City iron deposits. A limited tonnage was mined from a 700-foot adit and shipped to Minnesota for test

purposes. Columbia-Geneva expects to decide by April, 1958, if it will develop the area. If the development work is approved, construction of crushing and beneficiating facilities and a fifty mile railroad spur to the main line of Union Pacific Railroad will be the major items. The project would be the highest, large-scale iron mining operation in the United States, since it is located at an altitude of 8,300 feet above sea level.

The Magnetite Products Corporation has been producing magnetite from an open-pit operation in Wheatland Canyon, Albany County. The product is reportedly shipped to Colorado for use in the manufacture of heavy-weight concrete.

Miscellaneous Metallics. For a number of years, the Union Pacific Railroad has conducted exploration on the titaniferous-magnetite deposits of Iron Mountain in Albany County. Lately they have reported that ore reserves, which amounted to 230 million tons, contain 20 million tons of titanium.

Limited copper production was reported from the old Kurtze-Chatterton mine and the Big Creek mine; both near Encampment in Carbon County.

The Duncan mine, at Atlantic City, was the only reported gold operation in the State during 1957.

WYOMING MINING IN 1960

by

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INTRODUCTION

The 1960 Wyoming mineral production (including fuels) was valued at a record \$432 million according to preliminary figures compiled by the U. S. Bureau of Mines. This was a 10 percent increase over the 1959 production.

Significant increases were noted in the production of uranium and sodium carbonate; however, declines were recorded in coal, iron ore, phosphate rock, and sodium sulfate production. Uranium continues as the largest mining industry in the State and is followed by sodium carbonate, bentonite, and coal, in that order. The production of nonmetals was 2 percent higher than in 1959.

METALS

Uranium. Uranium continued to hold the spotlight with the disclosure that Wyoming's production increased 65 percent over that of 1959. In the next six years, over one-fifth of the total U. S. production of uranium will be mined in Wyoming. This will be valued at more than \$330 million.

Most of the uranium continues to be produced in the Gas Hills area of Fremont and Natrona counties. Active companies in the area include Fairfield-Anderson and Beach, Federal-Gas Hills Partners, Globe Mining, Hidden Splendor, Dale B. Levi, Union Carbide Nuclear, Utah Construction and Mining, Vitro Minerals, Western Mining, and Western Nuclear. These operations have moved between 20 to 30 million

cubic yards of rock and have produced more than a million tons of uranium ore.

The fifth Wyoming uranium mill, operated by Globe Mining Company (subsidiary of Union Carbide Nuclear Corp.) at capacity of 492 tons-per-day, went on stream early in 1960. Federal-Gas Hills Partners incorporated an \$180,000 modification program to boost the capacity of their mill from 529 to 800 tons-per-day, and Susquehanna-Western's contract for their 500 ton-per-day mill was extended to December 31, 1966, to allow for the purchase of 450,000 pounds of uranium concentrates from the Petrotomics mine in the Shirley Basin.

In the Shirley Basin, Utah Construction and Mining shipped the first ore from its underground mine early in 1960. Other companies contributing to the development of the multi-million ton reserves in the Shirley Basin have been Petrotomics (a corporate combine of Kerr-McGee Oil Industries, Inc., Tidewater Oil Co., Skelly Oil Co., and Getty Oil Co.) and Federal-Gas Hills Partners. Petrotomics has received permission from the AEC to build a mill there or to make arrangements to have their ore processed at existing mills. The AEC contract with Petrotomics provides for the purchase of 1,024,000 pounds of uranium oxide concentrates before March 31, 1962, and 3,158,800 pounds of concentrates between that date and December 31, 1966.

Elsewhere in the State, uranium was produced from Homestake's underground Hauber mine and Western Uranium Corporation's new, open-pit mine, both in Crook County. In the Crooks Gap area, Continental Materials commenced sinking a second shaft to develop a deep ore body near a depth of 600 feet, and Green Mountain Uranium Corporation shipped ore from its underground mine to the Western Nuclear Mill at Jeffery City. Underground operations were initiated on Little Mo's mine on Copper

Mountain, and large-scale development work was initiated on a similar deposit about one mile north of their present property. In addition, a small ore body was blocked out in the same area by Utah Construction and Mining Corporation. The leading uranium producers in Converse County have been B and H Mines and Vern Mrak.

Iron. Early in the summer of 1960, Columbia-Geneva Steel Division of U. S. Steel Corporation initiated development work on the \$73 million taconite-iron mining project north of Atlantic City in Fremont County. It is reported that exploratory work indicates 300 million tons of ore containing 21.8 to 35.2 percent iron. Initial production is scheduled for 1962. The operation, located 8,300 feet above sea level, will be the highest, large-scale open pit iron mine in the U.S.

Although high-grade iron ore continued to be produced from Colorado Fuel and Iron Corporation's Sunrise mine in Platte County, operations were suspended for short periods in August, November, and December, because of the lack of orders for steel at their Pueblo, Colorado, plant. Production was scheduled to be resumed early in January, 1961.

A small quantity of iron ore was produced from Magnetite Products Cobar mine in Albany County. This was shipped to Texas for use as heavy aggregate in the coating of underwater pipe lines and transmission lines.

Miscellaneous. Vanadium, recovered as a by-product of uranium ores by the addition of a vanadium pentoxide recovery unit at the uranium mill of Mines Development, Inc., at Edgemont, South Dakota, was produced chiefly from mines in Campbell County. Limited gold production of less than \$2,000 was reported from two operations in Fremont County. Beryllium concentrates valued at less than \$2,000 were reported produced from mines in Niobrara and Goshen counties.

NONMETALS

Sodium Carbonate. Intermountain Chemical Company operated their trona mine and processing plant west of Green River near rated capacity during 1960. The company plans to expand facilities to permit the production of 700,000 to 750,000 tons of soda ash annually by 1962.

As a result of a two-year test drilling program, Stauffer Chemical Company started work on a trona mine and processing plant during the latter part of 1960. Production, which is scheduled for 1962, is expected to be between 200,000 to 300,000 tons annually. These deposits, which are in the Green River formation, are reported to occur at depths of 600 to 800 feet.

In addition, it is reported that both Diamond Alkali Company and Allied Chemical Company are considering developing other trona properties in the near future in the same area.

Clays. Wyoming continues to produce more than half of the nation's output of bentonite; however, production for 1960 remained about the same as in 1959. Operations were carried on in Big Horn, Crook, Natrona, and Weston counties.

Clay is also mined in Albany County for the manufacture of cement and light-weight aggregate and in Big Horn County for use in the manufacture of vitrified sewer pipe.

Gypsum. Gypsum is mined in Albany County for use in the manufacture of cement. At Cody, Big Horn Gypsum Company began construction of a \$3,000,000 gypsum board plant which will utilize nearby deposits. Fremont Mining and Manufacturing Company initiated mining and processing of gypsum deposits near Lander. In addition, it is reported that Crystal Creek Gypsum Company will develop a deposit

about 13 miles southeast of Lovell.

Limestone. One of the oldest, yet least-known, mines in the State is the operation of Great Western Sugar Company near Horse Creek in Laramie County. Chemical-grade limestone and aggregate-grade stone are mined at a depth of 300 feet below the surface. Limestone is also mined in Albany County for use in the manufacture of cement and in Teton County for use in sugar refining.

Sulfur. In recent years the recovery of elemental sulfur from "sour-gas" wells in the Bighorn Basin has become increasingly important. In the past, four companies operating in Big Horn, Park, and Washakie counties produced sulfur; however, one of these, the Jefferson Lake Sulphur Company at Manderson reportedly shut down its facilities during the middle of the year.

Wyoming sulfur is utilized in the Susquehanna-Western sulfuric acid plant at Riverton where the production capacity was expanded to 75,000 tons per year during 1960.

Miscellaneous. The output of phosphate rock from Lincoln County and sodium sulphate from Carbon and Natrona counties reportedly decreased during 1960. A small quantity of sheet mica was reportedly produced from two mines in the State. Although coal production decreased 11 percent as compared with 1959, construction of new power plants, transforming of soft coals into coke, and other developments would seem to indicate that production will increase in the future.

CONCLUSION

Although much publicity is directed towards the development and utilization of the State's mineral resources, the value of the preliminary geological study of

these deposits is often obscured to the layman. Many of the recent mineral developments, such as iron, trona, and uranium, have been due to the results of earlier geological studies by the State and Federal geological surveys. Only by such studies, which are under the supervision of these technical agencies, can the mineral resources of the State be intelligently appraised.

WYOMING MINING IN 1961

by

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INTRODUCTION

The 1961 Wyoming mineral production (including fuels) was valued at a record \$471 million, according to preliminary figures compiled by the U. S. Bureau of Mines. This was a seven percent increase over the 1960 production.

Although fuels accounted for 85 percent of the total value, the production of metals exceeded that of nonmetals for the first time in several years.

Increases were noted in the production of uranium, sodium carbonate, bentonite, coal, iron ore, vanadium and gypsum; however, declines were recorded for cement, phosphate rock, and miscellaneous clays.

METALS

Uranium - Uranium production increased 20 percent over 1960; however, there was little, if any, incentive for further exploration because of government market controls. Nevertheless the mining and processing of uranium has become one of the major industries in Wyoming, since 22 percent of the nation's uranium reserves occur in the State.

Five processing plants operated throughout the year and a sixth was under construction. The latter is a 500 ton per day mill that is being constructed by the Petrotomics Company in the Shirley Basin area. Completion

of this mill, which will employ the acid-leach solvent extraction process, is scheduled for April, 1962. Petrotomics has also developed an open-pit mine in the Shirley Basin area.

Most of the uranium continues to be produced in the Gas Hills area of Fremont and Natrona counties. Active mining companies in the area include Federal-Gas Hills Partners, Globe Mining, Hidden Splendor, Dale B. Levi, Utah Construction and Mining, Vitro Minerals, Western Uranium, and Western Nuclear.

In the Crooks Gap area, both Continental Materials and Green Mountain Uranium operated underground mines, while Western Nuclear has developed a new open-pit.

Elsewhere in the State, uranium was produced from Homestake's underground Hauber mine and several other smaller operations in Crook County. Utah Construction and Mining continued to produce ore from its underground mine in the Shirley Basin. B and H Mines and Vern Mrak were the leading uranium producers in Converse County. Some production also came from various small mines in Campbell County.

Iron - The production of iron ore increase 35 percent over last year. Colorado Fuel and Iron Corporation, the State's largest producer, also was in the process of deepening its shaft at Sunrise, in Platte County, from 750 to 900 feet. Magnetite Products Corporation, which ships its production out of State for use as heavy aggregate, nearly tripled the output from its Cobar No. 1 mine in Albany County over that of 1960.

Construction of U. S. Steel Corporation's taconite mill at Atlantic City, in Fremont County, is ahead of schedule. The 76-mile railroad from Winton Junction to Atlantic City was completed during 1961. The first iron ore pellets are to be shipped by rail in late 1962 to Columbia-Geneva Steel Company's works in Utah. These higher grade taconite ores, which are reported to contain 61.99 percent iron, will be added to the ores produced from Utah's Cedar City district to increase iron production.

The Union Pacific Railroad Company is investigating the possibility of establishing an iron ore plant near Laramie to process titaniferous-iron ores from Iron Mountain. The Koppers Company is currently employed to evaluate the Strategic-Udy process for utilizing the ores. Formerly, large-scale furnace tests were conducted at Pioche, Nevada, to determine if the Krupp-Wrenn process was economical for using the material.

Vanadium - Vanadium production increased twentyfold during 1961. This was recovered chiefly from vanadiferous uranium ore that was mined in the Powder River Basin of Wyoming and processed at the Mines Development, Inc., uranium mill at Edgemont, South Dakota. Domestic interest in vanadium has been stimulated by increased foreign demand. By virtue of this, some exploration has been initiated in the vanadiferous Phosphoria formation which crops out in western Wyoming.

Miscellaneous - Beryllium concentrate, valued at less than \$1,000, was produced from two small operations in Fremont County and one in Goshen County. A small amount of copper-gold-silver ore, valued at less than \$1,000,

was shipped from an operation in Carbon County. Exploration for copper-molybdenum and lead-silver was conducted in the Sunlight and Kirwin areas of Park County.

NONMETALS

Sodium Carbonate - The production of trona, which reached an all-time high during 1961, replaced coal as the largest mining industry in Sweetwater County. Intermountain Chemical Company, the only producer in the State, continued a mine-mill expansion geared toward a production rate of 700,000 tons of soda ash a year.

A joint venture by the Union Pacific Railroad and Stauffer Chemical Company indicates a mid-1962 completion date for another soda ash mine and mill. They will mine beds of trona that lie between 800 and 900 feet below the surface of the ground.

Other companies exploring for trona in the Green River area are Allied Chemical, Diamond Alkali, and Kern County Land Company.

Clays - Bentonite production increased four percent in 1961. The leading bentonite producers in northeast Wyoming were American Colloid, Archer-Daniels Midland, Black Hills Bentonite, International Minerals and Chemical, and National Lead Company. The Greybull area shippers were Magnet Cove Barium and Wyo-Ben Products Company. The Benton Clay Company produced from the Casper area. Much of the Wyoming bentonite is being used in the agglomerating concentration of taconite iron deposits.

Other clay production in the State decreased about 52 percent

principally because of curtailed activity of the Idealite Company at Laramie, processors of lightweight aggregate.

Gypsum - Big Horn Gypsum started operations at its Cody wallboard plant which utilizes gypsum from a nearby open-pit mine. Capacity of the plant is reported to be 100 million board feet per year.

Gypsum is also mined in Albany and Fremont counties. Plans for the development of extensive gypsum deposits on the Wind River Indian Reservation are also under consideration.

Sulfur - The production of elemental sulfur from "sour-gas" wells in the Bighorn Basin was 42 percent less than in 1960. This was partly caused by the closing of the Jefferson Lake Sulphur Company plant at Manderson in late 1960.

Phosphate Rock - The output of phosphate rock from the San Francisco Chemical Company's open-pit mine in Lincoln County during 1961 was considerably below that of 1960. Kern County Land Company and Duval Sulphur and Potash Company, however, jointly explored for phosphate rock deposits in western Wyoming.

Miscellaneous - Limestone was mined in Albany, Laramie, and Teton counties. The production of natural sodium sulfate, mainly from the Casper area, was double that of 1960. A small amount of sheet mica was produced from a mine in Niobrara County. The production of cement from the Monolith Portland Midwest Cement Company plant in Laramie dropped slightly. Coal production was up three percent mainly because of the expanded operation of

the Pacific Power and Light Company near Glenrock. A tentative plan for the mining of the lignite deposits near Glenrock has been proposed. The humic acid in the lignite will be used in the manufacture of fertilizer.

WYOMING MINERAL PRODUCTION IN 1963

by

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INTRODUCTION

The 1963 Wyoming mineral production (including fuels) was valued at a record \$506 million, according to preliminary figures compiled by the U. S. Bureau of Mines. This was an increase of \$44 million over the 1962 production.

Mineral fuels accounted for 82 per cent of the total value, while non-metals accounted for nine per cent and metals accounted for nine per cent. Petroleum output ranked first with 72 per cent of the total value, and this was followed by natural gas, uranium ore, trona, iron ore, bentonite, coal, sand and gravel, LP gases, natural gasoline, cement, stone, phosphate rock, limestone, vanadium, gypsum, miscellaneous clays, gem stones, burnt shale, sodium sulfate, vermiculite, and beryl.

METALS

The production of metals increased 35 per cent, largely as a result of greatly increased iron ore output.

Uranium. Uranium ore production increased eight per cent in 1963 with a value increase of three per cent. During the first half of 1963, 26 companies reported ore shipments. Six uranium mills operated in the State in 1963, however, Susquehanna-Western, Inc. closed the Riverton mill in May.

Most of the uranium continues to be produced from the open-pit mines in the Gas Hills area of Fremont and Natrona Counties. Federal-Gas Hills

Partners, now one of the largest uranium mining and milling companies in Wyoming, purchased Vitro's mines in the Gas Hills. In addition, Federal is installing a new Eluex circuit in their mill to permit milling a greater number of ore types with higher uranium recovery.

Utah Construction and Mining began development of solution mining of uranium at their Gas Hills mine. By introducing a nitric acid solution in this mining process, it is believed that a 40 per cent economy will be realized as compared to conventional underground mining.

Western Nuclear, Inc. continues to strip its Day D-1 pit, which will expose ore at more than 300 feet in depth. Mining is expected to be carried on for several years in this pit.

Continental Materials continued to operate its Seismic underground mine in the Crooks Gap area. Green Mountain Uranium also operates an underground mine in this area.

In the Shirley Basin, Petrotonics Co. operated its open-pit mine and ore processing plant. Although abandoning its shaft in water saturated ground, Utah Construction and Mining has continued its research on direct leaching of uranium ore in place at their properties in the Shirley Basin.

In the northeast part of the State, uranium was produced from Homestake's underground Hauber mine. Vern Mrak has been stripping a new mine in the Dry Fork area of Converse County.

Iron. Iron ore output which was 110 per cent greater than in 1962, was largely attributed to the first complete year of operation of the Atlantic City

iron mine by Columbia-Geneva Steel Division of the United States Steel Corp. This mine operated through some very low temperatures, high winds, and heavy snowfalls.

Colorado Fuel and Iron Corp., which operated the Sunrise iron mine through the year, is constructing an iron ore beneficiation plant at Sunrise. This plant, capable of handling 600,000 net tons of concentrate per year, will employ heavy media separation for coarse sizes and jigging for small sizes of ore, thus upgrading and making a more uniform and physically improved material.

Magnetite Products Corp., which produces iron concentrate at Iron Mountain, Albany County, ships their product out of State to be used as heavy aggregate in concrete for underwater pipe coating and for shielding fissionable materials.

Vanadium. Vanadium production in Wyoming decreased about 18 per cent in 1963. This metal was recovered from vanadiferous uranium ore that was mined in the Powder River Basin and processed at the Mines Development Inc. uranium mill at Edgemont, South Dakota.

Beryllium. Small amounts of hand-cobbed beryl were produced in Wyoming in 1963.

NONMETALS

Trona. The production of soda ash from the trona mines west of Green River increased 24 per cent in 1963. This was largely attributed to increased production from Food Machinery Chemical Corp.'s operation and the first

full year's production from Stauffer Chemical Co.'s Big Island mine. In addition Stauffer has started an expansion program to increase production from 200,000 to 400,000 tons annually. One-fifth of the Nation's requirements for soda ash was supplied by these two operations.

Bentonite. Although seven companies operated nine bentonite processing plants in Wyoming, production decreased 13 per cent. Black Hills Bentonite Co., however will build a processing plant near Casper to process bentonite mined near Kaycee. This company now ships most of its production of high swelling bentonite to taconite mills in Canada for use as a binder in pelletizing. They anticipate a greater market for this utilization of bentonite.

Gypsum. Gypsum production increased 12 per cent in 1963. The Big Horn Gypsum Co. sold its gypsum board plant at Cody to The Celotex Corp., however, the gypsum deposits southwest of Cody will continue to be mined by the Taggart Construction Corp.

Gypsum Products of America will construct a plasterboard plant at Lovell. Gypsum, used in the processing of cement, was also mined in Albany County.

Phosphate Rock. San Francisco Chemical Co. operated an open-pit mine and phosphate beneficiation plant near Sage in Lincoln County. Production from ore mined in Wyoming and ore mined in Utah that was processed in Wyoming was 50 per cent greater in 1963.

Sulfur. Although five companies recovered elemental sulfur as a by-product of natural gas processing, output was 31 per cent less in 1963. A new

sulfur recovery unit is being included in Sinclair Refining Co.'s modernization of their refinery at Sinclair, Wyoming.

Wyoming sulfur is used in the sulfuric acid plants at Riverton and Jeffrey City.

Clays. Building-brick clay was mined near Evanston, and brick, clay pipe, and tile was produced from clay mined near Lovell. Lightweight aggregate was produced from clay mined near Laramie.

Cement. The production of cement from the Monolith Portland Midwest Co.'s plant near Laramie, declined two per cent in 1963.

Miscellaneous. Limestone was mined in Albany, Laramie, and Teton Counties. Small quantities of natural sodium sulfate were produced west of Casper. A small production of vermiculite was reported from operations near Wheatland and Encampment. Stone, and sand and gravel production increased eight and four per cent respectively.

MINERAL FUELS

Coal. The production of coal increased an estimated 15 per cent in 1963. The increase in coal production is largely attributed to increased usage in electric power generation. The first unit of coal-based powerplant near Kemmerer was completed by Utah Power and Light Co. while Pacific Power and Light Co. continued their expansion program at the Dave Johnston powerplant near Glenrock.

The experimental coke plant, operated jointly by the Food Machinery Chemical Corp. and United States Steel Corp. near Kemmerer was placed on

a standby basis. Gunn-Quealy Coal Co. at Rock Springs, began producing rotary-kiln coke which was directed toward use in the electric furnace method of processing elemental phosphorous.

Leonardite, a coal-like mineral, was processed into a high humic acid fertilizer by American Humates, Inc. at their plant in Glenrock.

EXPLORATION

Exploration for mineral deposits in 1963 included studies on molybdenum, phosphate rock, and gold. American Molybdenum Corp. reported discovery of a large molybdenum deposit near Scheistler Peak in the Wind River Range of Sublette County. Two other molybdenum deposits in the Absaroka Range of Park County were explored by a major mining company; one of which was diamond drilled.

Kern County Land Co. has options on approximately 1100 acres of land in the Sublette Ridge area of western Wyoming. Together with the Duval Corp., they have been doing experimental mining of phosphate rock. Susquehanna-Western, Inc., also continued studies and exploration on the phosphate deposits south of Lander.

Two portable mills, designed to recover extremely fine gold, were reported under construction in Teton County. These are scheduled for operation in 1964.

WYOMING MINERAL PRODUCTION IN 1964

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INTRODUCTION

The 1964 Wyoming mineral production (including fuels) was valued at a record \$509.5 million, according to preliminary figures compiled by the U. S. Bureau of Mines. This was an increase of one percent over the 1963 production.

Mineral fuels accounted for 81 percent of the total value, while nonmetals accounted for 10 percent and metals accounted for nine percent. Petroleum output ranked first with 71 percent of the total value, and this was followed by other leading value commodities, such as, bentonite, coal, iron ore, LP gases, natural gas, natural gasoline, sand and gravel, sodium carbonate (trona) and uranium ore.

NONMETALS

Trona. The production of soda ash from the trona mines west of Green River increased 16 percent in 1964. This was largely attributed to increased production from Stauffer Chemical Co.'s new facilities at their Big Island mine which increased plant production to approximately 400,000 tons per year. Food Machinery Chemical Corp. completed a new sodium sesquicarbonate-sodium tripolyphosphate facility which was expected to increase plant production by an additional 85,000 tons per year. Allied Chemical Co. began sinking a 12-foot circular shaft near Green River, which was expected to be driven to a depth of 1500 feet. The Green River area is now the principal U. S. producer of soda ash and products from trona. With the

addition of Allied's new mine, the State's annual production of trona ore is expected to increase to two million tons within five years.

Bentonite. Seven companies operated 10 bentonite processing plants in Wyoming and production increased by 21 percent in 1964. Black Hills Bentonite Co. moved its entire mining operation to near Barnum in Johnson County. The ore is shipped by truck to its new 800 ton per day processing plant in Casper.

Gypsum. Gypsum production increased 41 percent in 1964. A three million dollar gypsum plant, 15 miles east of Lovell, was under construction by the Gypsum Products of America Corp. The other gypsum plant in the Bighorn Basin, operated by Big Horn Gypsum Co., added 30,000 square feet to its existing facilities.

Phosphate Rock. San Francisco Chemical Co. operated an open-pit mine and phosphate beneficiation plant near Sage in Lincoln County. Production from ore mined in Wyoming and ore mined from company-owned facilities in Utah that was processed in Wyoming was 23 percent greater in 1964.

Sulfur. Although five companies recovered elemental sulfur from six natural gas processing plants, output was 30 percent less than in 1963. Wyoming sulfur is utilized in the manufacture of sulfuric acid at plants in Riverton and Jeffrey City which, in turn, is used in processing uranium ore and in the petroleum industry.

Cement. The production of cement from the Monolith Portland Midwest Co.'s plant near Laramie, declined seven percent in 1964. Wyoming Construction Co. (Monolith's subsidiary) mined cement rock, gypsum, limestone and sandstone for use in the manufacturing of cement.

Miscellaneous. Brick, clay pipe and tile continued to be produced from clay

mined near Lovell. Limestone was mined from Laramie, Teton, as well as Albany Counties. Small quantities of natural sodium sulfate were produced west of Casper. Stone, and sand and gravel production decreased three and one percent respectively.

METALS

Uranium. Because of the extension of purchase contracts and quotas with the Atomic Energy Commission, uranium ore production decreased 24 percent in 1964 with a value decrease of 15 percent. Twenty-three companies reported shipments of ore which was processed in five mills in the State and two outside the State. The State ranked second in uranium ore production and third in uranium oxide concentrates.

Most of the uranium continues to be produced from the open-pit mines in the Gas Hills area of Fremont and Natrona Counties. Atlas Minerals, however, placed their Lisbon underground mine on standby, and Susquehanna-Western, Inc., closed the Arrowhead (Little Mo) mine, located near Copper Mountain.

Continental Materials and Green Mountain Uranium continued to operate their underground mines in the Crooks Gap area, and Petrotomics Co., operated its open-pit mine and ore processing plant in the Shirley Basin. In the northeast part of the State, uranium was produced from Homestake's underground Hauber mine, and Vern Mrak was stripping a new mine in the Dry Fork area of Converse County.

Iron. Iron ore output and valuation increased 20 and 13 percent, respectively, over that of 1963. This was largely attributed to increased production from Plico-flex, Inc.'s (formerly Magnetite Products Corp.) mine at Iron Mountain, in Albany County, and Colorado Fuel and Iron Corp.'s Sunrise mine.

Late in 1964, Colorado Fuel and Iron Corp. completed their new multi-million

dollar beneficiation plant with facilities designed for an annual capacity of 600,000 tons of iron ore concentrates. Substantial iron production also came from the Atlantic City mine operated by Columbia-Geneva Steel Division of the United States Steel Corp.

Vanadium. Vanadium production in Wyoming increased 31 percent in 1964. This metal was recovered from vanadiferous uranium ore that was mined in the Powder River Basin and processed at the Mines Development Inc. uranium mill at Edgemont, South Dakota.

Miscellaneous. Small amounts of beryllium concentrates and gold were produced in Wyoming in 1964.

MINERAL FUELS

Coal. The production of coal decreased an estimated three percent in 1964, since two mines closed down. Pacific Power and Light Co. completed the third unit of the coal-based Dave Johnston plant near Glenrock during the latter part of 1964. The coke-breeze plant, operated at Rock Springs, by the Gunn-Quealy Coal Co., was completed in 1964. Approximately 100 tons per day of locally mined coal was used in their test program.

EXPLORATION

Exploration for mineral deposits in 1964 included studies on copper, molybdenum, gold, silver, iron, titanium, phosphate rock, and trona. Diamond drilling of a copper-molybdenum prospect in the Absaroka Mountains of northwest Wyoming was continued for the second year in a row by a major mining company.

Kern County Land Co. and the Duval Corp. have continued their experimental

mining of phosphate rock in the Sublette Ridge area of western Wyoming. Susquehanna-Western, Inc. also continued studies and exploration on the phosphate deposits south of Lander.

Texas Gulf Sulphur reportedly obtained 7,500 acres of State and Federal leases in southwest Wyoming in the exploration for trona deposits.

WHITE PINE COPPER COMPANY

A SUBSIDIARY OF COPPER RANGE COMPANY

December 2, 1965

WHITE PINE, MICHIGAN
49971

885-4311
AREA CODE 906


Mr. William H. Wilson
Assistant State Geologist
The Geological Survey of Wyoming
University of Wyoming
Box 3008 University Station
Laramie, Wyoming 82071

Dear Mr. Wilson:

Thank you for the excellent resume of geologic activity for the state of Wyoming.

The response I have received has been excellent, and I hope that I can do the material justice.

Sincerely yours,


Joseph L. Patrick
District Geologist

JLP:ar



November 3, 1965

Mr. Joseph L. Patrick
White Pine Copper Company
White Pine, Michigan 49971

Dear Mr. Patrick:

I regret the delay in answering your letter of October 6, but I have been in the field.

In brief, most of the intensive exploration in Wyoming during 1965 has been conducted in the search for trona, phosphate rock, gypsum, copper and molybdenum. There is considerable production of iron and uranium ore in the State, however, exploration for these commodities is relatively dormant at the present time. One new uranium mine is under development and some limited exploration for uranium has been conducted in the Copper Mountain area of Fremont County. The Wyoming Geological Survey has initiated a study of the Precambrian iron formation in the Copper Mountain area which may have some economic potential.

As you undoubtedly know most of Wyoming's economy is based on oil and gas production. With respect to these commodities geological and geophysical exploration and drilling have been about the same as last year.

Copper and Molybdenum. For the past three years intensive exploration for copper and molybdenum has been conducted by a major mining company in the Kirwin area of the Absaroka Mountains of northwest Wyoming. This work has included geological mapping, geophysical and geochemical studies, and diamond drilling in an area of Tertiary andesite flows and breccias which were intruded by andesite and granodiorite plugs.

During 1965, another major company did some preliminary diamond drilling in the Needle Creek-South Fork of the Shoshone River area which is also located in the Absaroka Mountains, about 22 miles northwest of the Kirwin area. The geological environment here is similar to that of Kirwin. Both of these areas were selected mainly because of the preliminary geological data provided to them from the Wyoming Geological Survey's Absaroka project.

.....

Mr. Joseph L. Patrick

November 3, 1965

Page 2

Gypsum. Wyoming has large gypsum deposits, some of which lend themselves to readily strippable operations. As a result of this, a second gypsum plant is under construction which will utilize the large gypsum deposits in the Lovell area of Big Horn County. These deposits are Jurassic in age.

Phosphate Rock. For several years now the phosphate deposits of the Permian Phosphoria cropping out on the southeast flank of the Wind River Mountains in Fremont County, have been actively explored and drilled by the Susquehanna-Western Corporation. It has been reported that this company intends to convert its former uranium mill at Riverton to process these deposits.

Trona. There are six companies active in trona exploration. Food Machinery & Chemical Company and Stauffer Chemical Company operate trona mines in the Green River area of southwestern Wyoming. It has been reported that Allied Chemical Company is in the process of developing another deposit as a result of their drilling program. The trona beds, which occur in the Green River formation of Eocene age, are currently mined at depths of 500 to 1500 feet.

The Green River area is now the principal U.S. producer of soda ash and products from trona.

Other.

Bentonite production has always been stable in Wyoming and ample reserves are well known. A new processing mill for this commodity was built at Casper recently. All of the known economic deposits of bentonite in Wyoming are Cretaceous in age.

It is rather difficult to be specific about coal exploration in Wyoming, however, the long-term view is certainly optimistic. Several of the coal-fired generating plants have increased their electrical power output and this results in increased consumption of coal. Wyoming has abundant coal reserves. These range in age from Cretaceous to Tertiary.

I hope that the above summary of exploration in Wyoming will be of some assistance to you in your A. I. M. E. review.

Sincerely yours,

William H. Wilson
Assistant State Geologist

WHW:sa

WYOMING MINERAL PRODUCTION AND EXPLORATION IN 1965

by

William H. Wilson
Assistant State Geologist
Geological Survey of Wyoming

INTRODUCTION

The 1965 Wyoming mineral production (including fuels) was valued at \$502 million, according to preliminary figures compiled by the U. S. Bureau of Mines. This was a decrease of one percent under the record 1964 production.

Petroleum output ranked first with 69 percent of the total value and this was followed by other leading value commodities, such as, natural gas, iron ore, sodium carbonate (trona), uranium ore, clays, coal, sand and gravel, LP gases, stone, cement, and phosphate rock.

NONMETALS

Trona. The production of soda ash from the trona mines west of Green River increased 20 percent in 1965. This was largely due to increased production from Food Machinery Chemical Corp.'s expanded facilities. This company plans to increase their production to 1.25 million tons annually, which should make them the largest single producer of soda ash in the world. Stauffer Chemical Company intends to double the capacity of their plant in 1966 to 800,000 tons per year. Allied Chemical Company's mine and plant is expected to be in operation early in 1966. Initial production here is expected to be 300,000 tons of soda ash per year. Because of these developments, the Green River area is now the largest producer of soda ash and products from trona in the United States.

Bentonite. Bentonite production increased by eight percent in 1965.

Wyoming produces approximately 70 percent of the nation's output. American Colloid Co. began constructing a new bentonite processing plant east of Lovell in 1965.

Gypsum. Gypsum production increased 16 percent in 1965. A three million dollar gypsum plant located at Himes, southeast of Lovell, was under construction by the Gypsum Products of America Corp. The completion date is scheduled for early 1966. The other gypsum plant in the Bighorn Basin is operated by the Bighorn Gypsum Co. at Cody.

Phosphate Rock. San Francisco Chemical Co. operated an open-pit mine and phosphate beneficiation plant near Sage in Lincoln County. Production from ore mined in Wyoming and ore mined from company-owned facilities in Utah that was processed in Wyoming was somewhat less than in 1964.

Sulfur. Five companies recovered elemental sulfur from six natural gas processing plants and the output was 30 percent greater than in 1964. Wyoming sulfur is utilized in the manufacture of sulfuric acid at plants in Jeffrey City and Riverton, which, in turn, is used in processing uranium ore and in the petroleum industry.

Cement. The production of cement from the Monolith Portland Midwest Co.'s plant near Laramie decreased in 1965. The plant temporarily suspended operations in December, but will resume again early in 1966. Wyoming Construction Co. (Monolith's subsidiary) mined cement rock, gypsum, limestone, and sandstone in Albany County for use in the manufacture of cement.

Miscellaneous. Brick, clay pipe and tile continued to be produced from clay mined near Lovell. Limestone, used in sugar refining, was mined in Laramie and Teton Counties. Small quantities of natural sodium sulfate were produced west of Casper. Sand and gravel production increased 16 percent; however, stone production decreased two percent in 1965.

METALS

Uranium. Because of the extension of purchase contracts and quotas with the Atomic Energy Commission, uranium ore production decreased 34 percent in 1965 with a value decrease of 37 percent. Twenty-one companies reported shipments of ore which was processed at five mills in the State and two outside the State.

Most of the uranium continues to be produced from the open-pit mines in the Gas Hills area of Fremont and Natrona Counties. Atlas Minerals allowed the shaft of their Lisbon underground mine to fill with water. Western Nuclear started to sink an 800-foot, three compartment shaft on the Golden Goose property. Utah Construction and Mining Co. started stripping the Rex group to reach uranium ore at 90 feet in depth.

Continental Materials and Green Mountain Uranium continued to operate their underground mines in the Crooks Gap area, and Petrotomics Co. operated its open-pit mine and mill in the Shirley Basin. In the northeast part of the State, uranium was produced from Homestake's underground Hauber mine, and Vern Mrak continued to produce from the Dry Fork area of Converse County. Several other operations were reported active in Converse, Campbell, Crook, and Carbon Counties.

Iron. Iron ore output and valuation increased four and 11 percent respectively over that of 1964. Production came from the following operations, U. S. Steel at Atlantic City, Colorado Fuel and Iron at Sunrise, and Plicoflex at Iron Mountain. The operations at U. S. Steel Atlantic City mine reached an output of 1.3 million gross tons of iron agglomerates per year.

Vanadium. Vanadium production in Wyoming increased 58 percent in 1965. This metal was recovered from vanadiferous uranium ore that was mined in the Powder River Basin area and processed at the Mines Development Inc. uranium mill at Edgemont, South Dakota.

Miscellaneous. Small amounts of copper, gold, and silver were produced in Wyoming in 1965.

MINERAL FUELS

Coal. The production of coal increased an estimated five percent in 1965. There were 19 mines operating in the State, and among these were the large stripping operations of the Dave Johnson mine (Pacific Power and Light), Wyodak Resources Development Corp., Kemmerer Coal Co., Big Horn Coal Co., and Rosebud Coal Co.

In September, 1965, Utah Power and Light announced plans to construct a 220,000 kilowatt coal-fired generating plant near Kemmerer to augment its present capacity of 165,000 kilowatts. As much as 2,600 tons of coal per day will be consumed by the new plant.

EXPLORATION

Exploration for mineral deposits in Wyoming during 1965, included studies on copper, molybdenum, gold, silver, mercury, iron, uranium, phosphate rock, trona and coal. Diamond drilling of a copper-molybdenum prospect in the Absaroka Mountains of northwest Wyoming was continued for a third year in a row by a major mining company. Another major mining company initiated diamond drilling of another copper-molybdenum prospect, also located in the Absaroka Mountains.

As a result of their exploration and studies on the phosphate deposits south of Lander, the Susquehanna Corp. planned to start a 150,000 to 250,000 ton per year mining and processing program.

WYOMING MINERAL PRODUCTION AND EXPLORATION IN 1966

by

William H. Wilson
Assistant State Geologist
Geological Survey of Wyoming

INTRODUCTION

The 1966 Wyoming mineral production (including fuels) was valued at 493.4 million dollars, according to preliminary figures compiled by the U.S. Bureau of Mines. This decrease of one percent under the 1965 production was largely due to recent drops in petroleum production. The production of all nonmetal commodities, except gypsum and cement increased; however, the production of metals decreased.

NONMETALS

Trona. The production of soda ash from the trona mines west of Green River increased 23 percent in 1966. This was largely due to increased production from Food Machinery Chemical Corp.'s expanded facilities. This company plans to increase their production to 1.25 million tons annually, which will make them the largest single producer of soda ash in the world. Stauffer Chemical Company intends to increase the capacity of their plant in 1967 to 800,000 tons per year. Allied Chemical Company's operation is expanding its facilities and production is expected to be 600,000 tons annually by 1968. Texas Gulf Sulphur has announced plans for a trona mine and mill in the above area, but no construction date has been set.

Bentonite. Bentonite production increased by 25,000 tons in 1966. Wyoming produces approximately 75 percent of the nation's output. American Colloid Co. constructed a new bentonite processing plant east of Lovell in

1966. International Minerals and Chemical Co. will move its bentonite processing plant from Belle Fourche, S.D., to Colony, Wyo., in 1967. The new plant will be twice as large as the old one.

Gypsum. Gypsum production decreased in 1966. A three million dollar gypsum plant located at Himes, southeast of Lovell, was under construction by the Gypsum Products of America Corp. The completion date was scheduled for early 1966; however, there has been no ^{recorded} ~~recorded~~ production. The other gypsum plant in the Bighorn Basin is operated by the Big Horn Gypsum Co. at Cody.

Phosphate Rock. San Francisco Chemical Co. operated an open-pit mine and beneficiation plant near Sage in Lincoln County. Production from ore mined in Wyoming and ore mined from company-owned facilities in Utah that was processed in Wyoming increased 21 percent in 1966.

Sulfur. Six companies recovered elemental sulfur from seven natural gas processing plants, and the output was 77 percent greater than in 1965. Wyoming sulfur is utilized in the manufacture of sulfuric acid at plants in Jeffrey City and Riverton, which, in turn, is used in processing uranium ore and in the petroleum industry.

Cement. The production of cement from the Monolith Portland Midwest Co.'s plant near Laramie, decreased in 1966. Wyoming Construction Co. (Monolith's subsidiary) mined cement rock, gypsum, limestone, and sandstone in Albany County for use in the manufacture of cement.

Miscellaneous. Brick, clay pipe and tile continued to be produced from clay mined near Lovell. Limestone, used in sugar refining, was mined in Laramie and Teton Counties. The production of natural sodium sulfate from saline lakes west of Casper, increased 25 percent. Marble was mined by Basin's Engineering from a quarry west of Wheatland. Sunset Rock Quarry, Inc., at LaBarge marketed a hard sandstone called Teton Moss Back for building veneer.

Port Landing, Inc., reportedly will build a hydrated and quick lime plant 16 miles southeast of Lovell.

METALS

Uranium. Uranium production increased 2 percent. Twenty-five percent of the total U.S. uranium production came from Wyoming.

Most of the uranium continues to be produced from the open-pit mines in the Gas Hills area of Fremont and Natrona Counties. Utah Construction and Mining Co. will operate their mine and mill indefinitely at an accelerated rate in order to fulfill contracts with General Electric and two ~~European~~^{European} firms. Because of an improved market for uranium, Federal-Gas Hills Partners, has undertaken a double shift operation on their Sagebrush 3, Tablestakes No. 1 pit in order to initiate uranium ore mining in March, 1967.

In the Crooks Gap area, the Green Mountain Uranium Corp. completed its uranium ore allocation and is reportedly phasing out its underground mine which has been in operation since 1960. Western Nuclear completed an 875-foot-deep, three compartment shaft at its Golden Goose mine and also modernized and remodeled their mill at Jeffrey City.

In the Shirley Basin area, the Petrotonics uranium mill, scheduled to cease operations in September, 1966, will continue operations in order to stockpile yellow cake for use by private industry. Tidewater Oil Co., operating partner in the Petrotonics mill, will strip nearly six million yards of overburden to open a new uranium mine.

In the northeast part of the State, uranium was produced from Homestake's underground Hauber mine, and Vern Mrak continued to produce from the Dry Fork area of Converse County. Several other operations were

reported active in Converse, Campbell, Crook, and Carbon Counties.

Iron. Iron ore output decreased six percent in 1966. Production came from the following operations, U.S. Steel at Atlantic City, Colorado Fuel and Iron at Sunrise, Plicoflex at Iron Mountain, and Peterson, Anderson, and Knisely in the Laramie Range.

Vanadium. Vanadium production in Wyoming increased 57 percent in 1966. This metal was recovered from vanadiferous uranium ore that was mined in the Powder River Basin area and processed at the Mines Development Inc. uranium mill at Edgemont, S.D.

MINERAL FUELS

Coal. The production of coal increased an estimated three percent in 1966. Most of the coal production came from the large stripping operations of the Dave Johnson mine (Pacific Power and Light), Wyodak Resources Development Corp., Kemmerer Coal Co., Big Horn Coal Co., and Rosebud Coal Co. Reynolds Mining Corp. constructed a large field coal testing laboratory near Lake DeSmet. Pacific Power and Light Co. will construct an additional steam-electric generating plant, which will be in service by 1970.

EXPLORATION

Exploration for mineral deposits in Wyoming during 1966, included studies on copper, molybdenum, gold, silver, mercury, iron, uranium, phosphate rock, trona and coal. More than 20,000 new uranium claims have been staked in Wyoming, since 1965, and more than 500,000 acres of State leases have been acquired since March, 1966. Diamond drilling of two copper-molybdenum prospects in the Absaroka Range of northwest Wyoming was conducted for the last two and four years in a row, respectively, by two major mining companies. Copper exploration and drilling was also conducted in the Sierra Madre Range of southern Wyoming.

WYOMING MINERAL PRODUCTION AND EXPLORATION IN 1967

by

William H. Wilson
Assistant State Geologist
Geological Survey of Wyoming

INTRODUCTION

The 1967 Wyoming mineral production (including fuels) was valued at a record all-time high of \$530.8 million, according to preliminary figures compiled by the U. S. Bureau of Mines. This was an increase of one percent over the 1966 production of \$524.4 million. Petroleum output accounted for 66 percent of the 1967 production figures.

Wyoming ranks twelveth in the nation in overall mineral production, first in the production of trona and bentonite, second in the production of uranium, and fifth in petroleum production.

NONMETALS

Trona. The production of soda ash from the trona mines west of Green River decreased slightly in 1967. The largest operator, in the trona area, Food Machinery Chemical Corporation, planned on sinking a fourth shaft to improve mine ventilation and handle expanding ore requirements. The new third unit of Stauffer Chemical Company completed in 1966, had an additional 150,000 ton production capacity, however, this was unused in 1967. Texas Gulf Sulphur contracted with Winston Brothers Company for sinking a 16-foot inside-diameter shaft to a depth of about 1,400 feet.

Bentonite. Bentonite production increased by one percent in 1967. Wyoming produces approximately 75 percent of the nation's output. American Colloid Company constructed a new bentonite processing plant east of Lovell. International Minerals and Chemical Company moved its bentonite processing plant from Belle Fourche, S. D., to Colony, Wyo., in 1967. The new plant which is twice as large as the old one, began operating in September.

Gypsum. Gypsum production decreased in 1967. The three million dollar gypsum plant located at Himes, southeast of Lovell, which was under construction by the Gypsum Products of America Corporation, was sold to the Georgia-Pacific Corporation of Portland, Oregon. This company, which completed the plant, began producing at one-third capacity in November, 1967. The other gypsum plant in the Bighorn Basin is operated by the Big Horn Gypsum Company at Cody.

Phosphate Rock. San Francisco Chemical Company operated an open-pit mine and beneficiation plant near Sage in Lincoln County. Production came from ore mined in Wyoming and ore mined from company-owned facilities in Utah that was processed in Wyoming.

Sulfur. Elemental sulfur is produced from natural gas processing plants in Fremont County and several other counties in the Bighorn Basin. Texas Gulf Sulphur closed its Worland sulfur-recovery plant because of gradual depletion of sour-gas reserves. Western Nuclear began constructing a 5-ton-per-day sulfur recovery unit at Sand Draw and purchased the two sulfuric acid plants of Susquehanna-Western, Inc. Wyoming sulfur is utilized in the manufacture of sulfuric acid, which, in turn, is used in processing uranium ore and in the petroleum industry.

Cement. The production of cement from the Monolith Portland Midwest Company's plant near Laramie, decreased in 1967. Wyoming Construction Company (Monolith's subsidiary) mined cement rock, gypsum, limestone, and sandstone in Albany County for use in the manufacture of cement.

Miscellaneous. Brick, clay pipe and tile continued to be produced from clay mined near Evanston and Lovell. Limestone, used in sugar refining, was mined in Laramie and Teton Counties. The production of natural sodium sulfate from saline lakes west of Casper, increased in 1967. Marble was mined by Basin's Engineering from a quarry west of Wheatland. Sunset Rock Quarry, Inc. at LaBarge marketed a hard sandstone called Teton Moss Back for building veneer. Port Landing, Inc., reportedly will build a hydrated and quick lime plant 16 miles southeast of Lovell.

METALS

Uranium. Uranium production decreased one percent in 1967, however, 25 percent of the total U.S. uranium production came from Wyoming.

Most of the uranium continues to be produced from the open-pit mines in the Gas Hills area of Fremont and Natrona Counties. Utah Construction and Mining Company continues to operate their mine and mill at an accelerated rate in order to fulfill contracts with General Electric and two European firms. Federal-American Nuclear Partners will deliver more than \$4.5 million of uranium concentrate to Babcock & Willcox Company of Lynchburg, Va. during period mid-1967 to mid-1970's. Petrotomics will double the size of its uranium processing mill in the Shirley Basin area. A 1000-ton-per-day mill will be built in the Shirley Basin area by Mitsubishi and Rio Algom if exploration for a

large, low-grade ore body is successful. Western Nuclear began production from five levels in its Golden Goose mine.

Elsewhere in the State, important uranium production comes from the Baggs area in Carbon County, the Hauber mine in Crook County, and various operations in Campbell, Converse, and Crook Counties.

Iron. Iron ore output decreased about six percent in 1967. Production came from the following operations: U. S. Steel at Atlantic City, Colorado Fuel and Iron at Sunrise, Plicoflex at Iron Mountain, and Peterson, Anderson and Knisely in the Laramie Range.

Vanadium. Vanadium production in Wyoming decreased 85 percent in 1967. This metal was recovered from vanadiferous uranium ore that was mined in the Powder River Basin area and processed at the Mines Development Inc. uranium mill at Edgemont, S. D.

MINERAL FUELS

Coal. The production of coal increased an estimated two percent in 1967. Most of the coal production came from the large stripping operations of the Dave Johnson mine (Pacific Power and Light), Wyodak Resources Development Corp., Kemmerer Coal Co., Big Horn Coal Co., and Rosebud Coal Co. Reynolds Mining Corp. has constructed a large field coal testing laboratory near Lake DeSmet. Pacific Power and Light Company will construct an additional steam-electric generating plant, which will be in service by 1970. Black Hills Power & Light will construct a 20 mega-watt, coal-fired, electric generating plant in 1968.

EXPLORATION AND OUTLOOK

Exploration for mineral deposits in Wyoming during 1967, included studies by the U. S. Bureau of Mines, U. S. Geological Survey, Wyoming Geological Survey, and several major mining companies on copper, molybdenum, gold, silver, mercury, platinum, iron, uranium, phosphate rock, sulfur, trona, and coal. Many thousands of new uranium claims have been recently located in such areas as Copper Mountain, Poison Spider, Red Desert, Gas Hills, Shirley Basin, and other areas in Converse and Fremont Counties. Present market projections indicate a need for about four times the presently known uranium reserves. The substantial increases in new reserves are necessary to supply raw fuel material for new nuclear reactors. This projected increase in uranium production will undoubtedly increase vanadium production, since this metal is produced as a by-product from uranium ore mined in the Powder River Basin.

Thus the outlook for future exploration, development, and increased production of mineral resources in Wyoming is extremely bright. There will be increased development of fossil fuels, uranium, trona, bentonite, and certain other commodities. Coal production is increasing to supply new and expanded coal-fired generating plants. More coal will be mined in the future for use as a source of synthetic liquid fuels. Oil shale deposits in southwestern Wyoming are another source of fuel that will be utilized in the future, however, there are many problems that have to be eliminated before this takes place.

WGS

1967 WYOMING MINERAL PRODUCTION AND OUTLOOK*

by

William H. Wilson
Assistant State Geologist
Geological Survey of Wyoming

D.B.

The 1967 Wyoming mineral production (including fuels) is rapidly approaching an annual figure of \$510 million. The mineral industry is the State's most important source of income and presently surpasses that of agriculture and the tourist industry combined. Wyoming ranks twelveth in the nation in overall mineral production, first in the production of trona and bentonite, second in the production of uranium, and fifth in petroleum production.

Trona, bentonite, phosphate rock, sulfur, gypsum, cement, limestone, and other clays are the most important of the nonmetals produced in Wyoming. The production of soda ash from trona has steadily increased each year, with the output coming from the following operations, west of Green River: Food Machinery Chemical Corp.; Stauffer Chemical Co.; and Allied Chemical Co. A fourth soda ash facility, Texas Gulf Sulphur is currently sinking a trona shaft to a depth of approximately 1500 feet in the above area.

Approximately 75 percent of the nation's bentonite output comes from plants and mines in Big Horn, Crook, Johnson, Natrona, and Weston Counties of Wyoming. In addition, new plants have recently been constructed near Lovell and Colony.

For many years, elemental sulfur has been produced from plants in the Bighorn Basin and Fremont County. Wyoming sulfur, a byproduct of sour-gas

production, is utilized in the manufacture of sulfuric acid at plants in Jeffrey City and Riverton, which, in turn, is used in processing uranium ore and in the petroleum industry.

The production of phosphate rock from Lincoln County increases steadily, since both Wyoming and Utah-mined ore are processed in Wyoming. Gypsum and cement production have generally remained static or slightly declined.

Uranium, iron ore, and vanadium are the chief metals produced in Wyoming. Uranium production increases steadily from such principal areas as Baggs, Black Hills, Crooks Gap, Gas Hills, Powder River Basin, and Shirley Basin. Many thousands of new uranium claims have been located recently in such areas as Copper Mountain, Poison Spider, Red Desert, and Shirley Basin. Present market projections indicate a need for four times the presently known uranium reserves. A further indication of this is shown by Petrotomics doubling the capacity of their 500 ton mill in the Shirley Basin area. The substantial increases in new reserves are necessary to supply raw fuel material for new nuclear reactors. This projected increase in uranium production will undoubtedly result in an increase in vanadium production, since this metal is produced as a byproduct recovered from uranium ore mined in the Powder River Basin.

Wyoming is one of the major iron ore-producing states in the west, with U.S. Steel at Atlantic City, Colorado Fuel and Iron at Sunrise, and Plicoflex at Iron Mountain.

The outlook for future exploration, development, and increased production of mineral resources in Wyoming is extremely bright. This applies particularly to fossil fuels, uranium, trona, bentonite, and certain other commodities. Generally unknown, however, has been the intense exploration for copper, gold, and other metals in the Wyoming mountain areas by a number of the major metal mining companies. If we should assume that petroleum exploration and production remain static, which is highly unlikely, there will be increased development of other fossil fuels. Coal production is increasing in order to supply new and expanded coal-fired generating plants. Eventually more coal will be mined for use as a source of synthetic liquid fuels. Oil shale is another source of fuel that will be utilized in the future, however, there are many problems that have to be eliminated before this takes place.

* Prepared for Mr. John Cornelison
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Cheyenne, Wyoming

WYOMING MINERAL PRODUCTION AND EXPLORATION IN 1968

by

William H. Wilson
Assistant State Geologist
Geological Survey of Wyoming

INTRODUCTION

The 1968 Wyoming mineral production (including fuels) was valued at a record all-time high of \$565.6 million, according to preliminary figures compiled by the U.S. Bureau of Mines. This was an increase of 7 percent over the 1967 production of \$530.7 million. Petroleum output accounted for 68 percent of the 1968 production figures. Wyoming lead all of the Rocky Mountain States in the number of oil and gas wells completed.

Wyoming ranks twelveth in the nation in overall mineral production, first in the production of trona and bentonite, second in the production of uranium, and fifth in petroleum production.

NONMETALS

Trona. The production of soda ash from the trona mines west of Green River, increased in 1968. This is the largest mining industry in the State. The largest operator, in the trona area, Food Machinery Chemical Corporation, planned on sinking a fourth shaft to improve mine ventilation and handle expanding ore requirements. Stauffer Chemical Company completed an addition to its trona refinery which increased its capacity from 500,000 to 800,000 tons per year. Allied Chemical Corporation has nearly completed its \$25 million trona mining and processing operation. The mining operation is located 1500 feet below

ground. Winston Brothers Company, a contractor to Texas Gulf Sulphur began sinking a 16-foot inside-diameter shaft to a depth of about 1400 feet.

Bentonite. Bentonite production increased in 1968. Wyoming produces approximately 75 percent of the nation's output from operations in Big Horn, Crook, Johnson, Natrona, and Weston Counties.

Gypsum. Gypsum production also increased in 1968. Most of the production came from the operations of the Big Horn Gypsum Company at Cody, and Georgia-Pacific Corporation near Lovell.

Phosphate Rock. San Francisco Chemical Company operated an open-pit mine and beneficiation plant near Sage in Lincoln County. Production came from ore mined in Wyoming and ore mined from company-owned facilities in Utah that was processed in Wyoming. Mountain Fuel Supply Company supplied Wyoming-mined phosphate rock to fertilizer-manufacturing companies in California, British Columbia, and Japan for test manufacturing purposes.

Sulfur. Elemental sulfur is produced from natural gas processing plants in Fremont County and several other counties in the Bighorn Basin. Wyoming sulfur is utilized in the manufacture of sulfuric acid at plants in Fremont County, which, in turn is used in the processing of uranium ore and in the petroleum industry. In order to meet increased demands from Shirley Basin uranium mills, Kennecott Copper Corporation planned to construct a sulfuric acid bulk storage station at Medicine Bow. The acid is to be delivered by rail from Kennecott's Utah Copper Division smelter.

Cement. The production of cement from the Monolith Portland Midwest Company's plant near Laramie, increased in 1968. Wyoming Construction

Company (Monolith's subsidiary) mined cement rock, gypsum, limestone, and sandstone in Albany County for use in the manufacture of cement.

Miscellaneous. Brick, clay pipe and tile continued to be produced from clay mined near Evanston and Lovell. Limestone was mined near Wheatland and Guernsey. Limestone, used in sugar refining, was mined in Goshen, Laramie, Teton, and Washakie Counties. Sunset Rock Quarry at Labarge marketed a hard sandstone called Teton Moss Back for building veneer. Pumice was mined from the Leucite Hills area, north of Rock Springs. Feldspar was mined at Casper Mountain. Jade and other semi-precious stones are mined sporadically from various areas in Fremont County.

METALS

Uranium. Uranium production increased about eight percent in 1968. Approximately 25 percent of the total U.S. uranium production comes from Wyoming.

Most of the uranium production continues to be produced from the open-pit mines in the Gas Hills area of Fremont and Natrona Counties, however, important production also comes from the Baggs area in Carbon County, the Hauber mine in Crook County, Petrotomics mine in the Shirley Basin area, and various operations in Campbell, Converse, and Crook Counties.

Utah Construction and Mining Company will spend about \$20 million in developing a new open-pit mine and building a 1500 a ton per day mill in the Shirley Basin area. Since 1960, Utah has been recovering uranium here by underground solution mining methods.

Kerr-McGee Corporation reportedly has announced plans for mine development and a uranium processing plant in the Powder River Basin area. This firm is currently developing a new open pit in the Shirley Basin area. Petrotomics expanded its mill in the Shirley Basin area to 1000 tons per day.

Iron. Iron ore output increased slightly in 1968. Production came from the following operations: U. S. Steel at Atlantic City, Colorado Fuel and Iron at Sunrise, Plicoflex at Iron Mountain, and U.S. Aggregate Company in the Laramie Range.

Vanadium. No Wyoming uranium ores were processed for vanadium in 1968, however, ore was stockpiled for processing at the Mines Development Inc. uranium mill at Edgemont, S.D.

MINERAL FUELS

Coal. Coal production increased slightly in 1968. Most of the coal production came from the large stripping operations of the Dave Johnson mine (Pacific Power and Light), Wyodak Resources Development Corporation, Kemmerer Coal Company, Big Horn Coal Company, and Rosebud Coal Company. Pacific Power and Light Company will construct an additional steam-electric generating plant which will be in service by 1970. By late 1971, Utah Power and Light Company intends to have completed a 330 megawatt steam generating third unit to the Naughton plant. Black Hills Power and Light will install a 20 megawatt, coal-fired, electric generating plant in 1969.

EXPLORATION AND OUTLOOK

Exploration for mineral deposits in Wyoming during 1968, included studies by the U. S. Bureau of Mines, U. S. Geological Survey, Wyoming Geological Survey, and several major mining companies on copper, molybdenum, gold, silver, platinum-palladium, iron, uranium, phosphate rock, sulfur, trona, coal, limestone, bentonite, gypsum, and glass sand. Many thousands of new uranium claims have been located, and thousands of feet of exploration drilling have been done in such areas as Copper Mountain, Poison Spider, Red Desert, Gas Hills, Shirley Basin, and other areas in Converse and Fremont Counties. Substantial increases in new uranium reserves are necessary to supply raw fuel material for new nuclear reactors.

The outlook for future exploration, development, and increased production of mineral resources in Wyoming is extremely bright. There will be increased development of fossil fuels, uranium, trona, bentonite, and certain other commodities. Coal production is increasing to supply new and expanded coal-fired generating plants. More coal will be mined in the future for use as a source of synthetic liquid fuels.

WYOMING MINERAL PRODUCTION AND EXPLORATION IN 1969

by

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INTRODUCTION

The 1969 Wyoming mineral production (including fuels) was valued at a record all-time high of \$616.7 million, according to preliminary figures compiled by the U. S. Bureau of Mines. This was an increase of 7 percent or \$40.5 million over the 1968 record production. Mineral fuels (exclusive of coal) accounted for 75 percent of the 1969 production figures. Wyoming lead all of the Rocky Mountain States in the number of oil and gas wells completed.

Fifteen of the State's 31 minerals recorded increases in both quantity and value.

Wyoming ranks twelveth in the nation in overall mineral production, first in the production of trona and bentonite, second in the production of uranium, and fifth in petroleum production. Active drilling operations were located in 21 of the 23 counties in the state throughout the year.

NONMETALS

Trona. The production of soda ash from the trona mines west of Green River, increased in 1969. This is the largest mining industry in the State. The largest operator, in the trona area, Food Machinery Chemical Corporation, is the nation's largest producer of soda ash at one plant. Stauffer Chemical Company began expanding its production capacity to 950,000 tons of soda ash per year. Allied Chemical Corporation went on stream with its 1,500 ton-per day

trona mining and processing operation. The mining operation is located 1500 feet below ground. Winston Brothers Company, a contractor to Texas Gulf Sulphur completed sinking a 16-foot inside-diameter shaft to a depth of about 1400 feet.

Bentonite. Bentonite production increased in 1969. Wyoming produces approximately 75 percent of the nation's output from operations in Big Horn, Crook, Johnson, Natrona, and Weston Counties. WyoBen Products Company is building a new bentonite plant just west of Lovell, and American Colloid is expanding its mill for increased production in the same area.

Gypsum. Gypsum production also increased in 1969. Most of the production came from the operations of the Big Horn Gypsum Company at Cody, and Georgia-Pacific Corporation near Lovell.

Phosphate Rock. The production of phosphate rock declined in 1969. Production came from ore mined near Sage, Wyoming, and ore mined from nearby Utah that was processed in Wyoming.

Sulfur. Elemental sulfur is produced from natural gas processing plants in Fremont County and several other counties in the Bighorn Basin. Purvin & Gertz, Inc. began sulfur recovery at the rate of 25 tons-per day from sour gas produced near Worland. Wyoming sulfur is utilized in the manufacture of sulfuric acid at plants in Fremont County, which in turn is used in the processing of uranium ore and in the petroleum industry.

Cement. The production of cement from the Monolith Portland Midwest Company's plant near Laramie, decreased in 1969. Wyoming Construction

Company (Monolith's subsidiary) mined cement rock, gypsum, limestone, and sandstone in Albany County for use in the manufacture of cement.

Miscellaneous. Brick, clay pipe and tile continued to be produced from clay mined near Evanston and Lovell. Limestone was mined near Wheatland and Guernsey. Limestone, used in sugar refining, was mined in Goshen, Laramie, Teton, and Washakie Counties. Sunset Rock Quarry at Labarge marketed a hard sandstone called Teton Moss Back for building veneer. Pumice was mined from the Leucite Hills area, north of Rock Springs. Feldspar was mined at Copper Mountain and processed at a newly constructed mill at Bonneville by the Northwestern Feldspar Corporation. Jade and other semi-precious stones are mined sporadically from various areas in Fremont County.

METALS

Uranium. Uranium tonnage production increased, but decreased in value in 1969. There were less mining operations, but greater tonnage was produced from the remaining mining operations. The State's reserves were estimated at 32 million tons by the U. S. Bureau of Mines, Wyoming is number one in tonnage, but ranks second to New Mexico in tonnage of contained uranium. Approximately 25 percent of the total U. S. uranium production comes from Wyoming.

Most of the uranium production continued to be produced from the open-pit mines in the Gas Hills area of Fremont and Natrona Counties, however, important production also comes from the Baggs area in Carbon County, the Hauber mine in Crook County, Petrotomics mine in the Shirley Basin area, and various operations in Campbell, Converse, and Crook Counties.

Kerr-McGee Corporation reportedly has announced plans for mine development and a uranium processing plant in the Powder River Basin area. This firm is currently developing a new open pit, the Walker mine, in the Shirley Basin area. Petrochemicals will expand its mill in the Shirley Basin area to 1500 tons per day to mill more from Kerr-McGee's new mine.

Iron. Iron ore output increased in 1969. Production came from the following operations: U. S. Steel at Atlantic City, Colorado Fuel and Iron at Sunrise, Plicoflex at Iron Mountain, and U. S. Aggregate Company in the Laramie Range.

Vanadium. No Wyoming uranium ores were reported processed for vanadium in 1969, however, ore was stockpiled for processing at the Mines Development Inc. uranium mill at Edgemont, S. D.

Other. Minor amounts of gold, silver and copper were produced.

MINERAL FUELS

Coal. Coal production increased 20 percent in 1969. Most of the coal production came from the large stripping operations of the Dave Johnson mine (Pacific Power and Light), Wyodak Resources Development Corporation, Kemmerer Coal Company, Big Horn Coal Company, and Rosebud Coal Company. Pacific Power and Light Company will construct an additional steam-electric generating plant in 1971. This 1.5 million kilowatt coal-fired generating plant complex, to be built northeast of Rock Springs, will be the second largest facility of this type west of the Mississippi River. Partial power production will start in 1974. By late 1971, Utah Power and Light Company intends to have completed a 330-megawatt steam generating third unit to the Naughton plant.

EXPLORATION AND OUTLOOK

Exploration for mineral deposits in Wyoming during 1969, included studies by the U. S. Bureau of Mines, U. S. Geological Survey, Wyoming Geological Survey, and major mining companies, on copper, molybdenum, gold, silver, platinum-palladium, iron, uranium, phosphate rock, sulfur, trona, coal, limestone, bentonite, gypsum, and glass sand. Although the uranium market has currently slackened somewhat, Wyoming leads the nation in uranium exploration and development. The Powder River Basin and Shirley Basin areas are two of the country's leading exploration targets. Elsewhere in Wyoming, exploration has been undertaken in the Wasatch Formation in the South Pass area, and seven mile long uranium mineralized zone has been reported south of Green Mountain, Fremont County.

American Metals Climax (AMAX) has completed exploration work in the Kirwin area of Park County on what is hoped to be a commercially exploitable copper ore body.

The outlook for future exploration, development, and increased production of mineral resources in Wyoming continues to be extremely bright. There will be increased development of fossil fuels, uranium, trona, bentonite, and certain other commodities. Coal production is increasing to supply new and expanded coal-fired generating plants. More coal will be mined in the future for use as a source of synthetic liquid fuels and chemicals.