STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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BLUE CHIP METALS

This atomic age is dependent on metals, and their importance is constantly being brought home to us. This is a development hastened by war and war preparation, but in any case, seemingly, it is an industrial evolution along the course set by the demand for more and improved machines and the inventions of new and more intricate instruments. A greater quantity of the common metals is continually demanded; and "new" metals - new in their practical applications - are becoming increasingly necessary in the ever-expanding industrial field. Cobalt, titanium, columbium, tantalum, germanium, and the so-called rare-earth metals are among those which have become essential to modern industry. Because of price, domestic needs, and metallurgical characteristics, they are the "blue chips" of present-day metallurgy.

Cobalt is one of the most useful of the new-old metals. Nearly everyone is familiar with the beautiful cobalt blue color which comes from some cobalt salts, and the main use for the metal for many years was in the arts. Cobalt metal had very little application as a metal until research pointed to cobalt alloys having outstanding characteristics. It was found that cobalt when alloyed with other metals such as nickel, chrome, tungsten, and some others, takes on incomparable qualities, one of which is withstanding elevated temperatures and this quality is now utilized in jet engines. Cobalt forms nearly indispensable alloys for permanent magnets and magnetic steels. Some other industrial uses, besides ceramic, are in forming high speed and other steels, cemented carbides, and hard facing welding rods. Our needs have expanded tremendously in the past few years. Consumption in 1950 was 8,283,408 pounds compared to about 2,893,000 pounds in 1941. Price of the metal is now about $2.40 per pound compared to $1.50 in 1941. Up to the present we have been dependent on imports, principally from the Belgian Congo and Northern Rhodesia. However, one mine in central Idaho owned by Howe Sound Mining Company is now getting into production and will reportedly have a capacity of about 3 million pounds of metal annually. The old silver district of Cobalt, Ontario, is taking a new lease on life and can produce a substantial amount of cobalt along with the silver. If the large demand continues and the market price provides sufficient incentive, new domestic deposits will probably be found and developed.

Titanium is best known in oxide form for use in pigments. However, titanium metal is becoming more and more in demand because of a very desirable combination of qualities of strength and light weight. The application of titanium to aircraft is a natural development and will probably find an expanding demand as the metal becomes cheaper and more available. Because of chemical characteristics, reduction to metal from titanium compounds is attended with much difficulty, hence the current high market price of about $5 a pound. If the history of production of titanium metal runs true to form, and it surely will, there will be a progressive reduction in cost of production which will mean a wider use in industry.

Columbium and tantalum, usually closely associated in nature, are in strong demand for specialized uses, many of which are for military needs. The principal use of columbium is not as a metal by itself but rather in improving the quality of stainless steels and in giving superior strength to alloys used in jet engine and gas turbine construction. Because our own production of columbium is inconsequential and imports are insufficient for our actual and potential needs, concentrated efforts have been made with some success to develop substitutes. However, under present conditions columbium is in insufficient supply to meet both defense and civilian needs and we are trying to increase imports and develop domestic sources.

Tantalum is used mainly as a metal in which form it has a variety of valuable uses. It is corrosion resistant, has a high melting point, and is readily worked. It is used for many surgical supplies and for electronic tube parts. Tantalum carbide is a component of some cutting tools, and cemented carbides of tantalum and columbium have special uses.

U.S. Bureau of Mines Minerals Yearbook reports that in 1949 imports of columbium ores for consumption largely from Nigeria amounted to 1,557,479 pounds valued at $561,945, a large reduction compared to 1,973,728 pounds in 1948 and 2,821,634 pounds in 1947. The decline in columbian production has been due to the exhaustion of the richer tin placers of northern Nigeria from which the bulk of columbite production has been derived. Imports of tantalum ores mostly from Belgian Congo amounted to 136,664 pounds valued at $237,292 in 1949, 127,688 pounds in 1948, and 418,753 pounds in 1947.

Germanium is another metal which has been brought into the industrial limelight during the past few years because of unique qualities. These qualities have caused a great increase in the demand for the metal in the electronics field. A "transistor" has been developed by Bell Laboratories for use in long-distance circuits and rectifiers. The "transistor" is a minute object, smaller than a pea, which operates like a vacuum tube. The rectifying characteristics of germanium have led to the development of a germanium diode, a very small compact device which has allowed construction of tiny wrist-watch type radios having no glass tubes. Many other interesting things about germanium are being developed. Germanium is produced from zinc ores of the Tri-State district which contain 0.01 to 0.1 percent Ge. The market price of germanium is reported to be about $180 a pound.

The rare-earth metals were interestingly described by Barnett Ravits in Barron's, December 17, 1951, and the following is abstracted from his article:

Today the rare-earth metals are increasingly in the news because of their use in atomic energy developments and to a limited extent in the metallurgy of high quality steels and light metal alloys. In order of their relative abundance rare-earth minerals include: cerium (31%); neodymium (18%); lanthanum, samarium, dysprosium, ytterbium, and gadolinium (7% each); erbium (6%); praseodymium (5%); lutecium (1.5%); terbium, holmium, and thulium (1% each); and europium (0.2%).

The main derivative of rare earths is misch metal (mixed metal), consisting mostly of cerium. Misch metal (flints) is the essential element in cigarette lighters, but it also has a number of other uses. It adds intensity and brightness to miners' lamps, gas mantles, carbon arcs for searchlights and motion picture projectors. It is an important ingredient of flashlight powder. Manfacturers of stainless and super-alloy steels employ misch metal to prevent flakes (fine internal cracks) and to remove oxygen and other gases, thereby creating denser steels with improved rollability when heat treated.

Current prices reflect the varying availability of the rare-earth metals. Fairly pure cerium, for instance, is valued at around $50 per pound. Lanthanum, neodymium, and praseodymium fetch prices of $175, $200, and $750 per pound, respectively. High-purity europium oxide and thulium oxalate bring the extremely high prices of about $700 and $1,500 a gram, respectively. Misch metal, the crude and presently main commercial form of the rare-earth metals, currently sells for around $4.50 per pound.

Up until recently, the major raw material from which the rare earths are derived was monazite sand. Low-grade monazite is found in Idaho, Florida, and North Carolina, but these deposits are uneconomic at current domestic prices. Monazite's scarcity has shot import prices up from $245 a ton in 1949 to $360 a ton at present - when it can be obtained.

Recently the Molybdenum Corporation acquired an acreage of several square miles in California containing an exceptionally large and rich deposit of bastnäsite, a new source of rare earths. Drilling on 50 percent of the property already has outlined about 1 billion pounds of the rare-earth minerals. At depth, the company estimates that its deposit contains 3 billion pounds.*

Despite the commercial strides made in the use of the rare earths, the metallurgy and chemical separation and purification of rare-earth metals are still in their infancy. The Atomic Energy Commission is undertaking a most intensive investigation into the history of these minerals and the scientific problems surrounding them, especially in its Ames Laboratory at Iowa State College. Similar experiments are being conducted at the University of Idaho.

From what has been revealed about the AEC's work on and interest in the rare earths, the results of its research mark a considerable advance in knowledge of separating the difficult-to-isolate component metals, and thus stand to enhance their future industrial consumption.

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*E&MJ Metal and Mineral Markets for December 20, 1951, reports that a deposit of bastnäsite owned by William Heim in the Callinas district of New Mexico is being developed by Lindsay Light & Chemical Company and General Chemical Company. The deposit, discovered by Heim while mining fluorspar in 1950, contains 14 rare-earth minerals. Current production amounts to several carloads of concentrate a month. Ed.

F.W.L.

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PETROLIFEROUS GEODE

A. W. Hancock, mineral and fossil collector, Portland, has presented the Department with a slice of a chalcedony geode which shows an irregular segregation of crude oil. This geode was picked up by Mr. Hancock about 1 mile northeast of the Clarno oil test well in sec. 34, T. 7 S., R. 19 E. The outside of the geode showed no evidence of petroleum, although Mr. Hancock had previously found a large piece of gilsonite at this locality.

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NEW MINERAL LOCALITIES MAP

The State Department of Geology and Mineral Industries has just issued a revised edition of its Mineral Localities Map published first in 1946. This map, on a scale of about 1 inch equals 16 miles, is printed on a 22 by 34-inch sheet. Locations of mineral deposits are marked in red. The legend of the map includes brief descriptions of all commercial minerals produced in the State. It also describes some potentially important economic minerals not yet in production, such as the ferruginous bauxite deposits in northwestern Oregon and the nickel deposits in the southwestern part of the State. This map has had a wide demand in schools throughout the State and by investigators who desire to plan examinations of particular mineralized areas. The map is for sale at the Portland office of the Department, 1069 State Office Building, and at the field offices in Baker and Grants Pass. The price is 30 cents.

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PITY THE DOMESTIC GOLD MINER

Statistics taken from reports of the U.S. Department of Commerce and Standard and Poor's comparing changes in the national economy between 1939 and 1951 are given in the January 20 issue of Numismatic Scrapbook Magazine. These figures quoted below were assembled by G. A. Willard, Chicago. They show that, although indexes giving a measure of our national economy have all increased strikingly over the past 12 years, the price of gold in the United States has remained static by government fiat.

Changes in the National Economy

	1939	1951	Percent change
United States Population (millions)	129	154	+ 19
Total Civilian Employment (millions)	44.6	62.5	+ 40
Industrial Production (phys. volume)	100	214	+ 114
Gross natl. production (billions)	$84	$326	+ 288
Disposable personal income (billions)	$66	$223	+ 238
Weekly Earnings (mfg. workers)	$22.42	$ 64.56	+ 188
Commodity prices (wholesale)	81	177	+ 119
Commodity prices (retail)	100	206	+ 106
Farm product prices (wholesale)	76	189	+ 149
Consumers' price index	100	185	+ 85
Money supply (adjusted deposits all banks, and currency outside of banks, in billions)	$57	$174	+ 205
U.S. Gov't debt (billions)	$35	$257	+ 634
U.S. Gov't Price of gold per ounce (dollars)	$35	$ 35	00

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OREGON GEOLOGY DESCRIBED BY FORMER DEPARTMENT GEOLOGISTS

The lead article in the January issue of the Bulletin of the Geological Society of America has the title "Late Cenozoic Geology of the Lower Columbia River Valley, Oregon and Washington" and was written by W. D. Lowry and E. M. Baldwin, both former staff members of the Oregon Department of Geology and Mineral Industries. Dr. Lowry is associate professor of geology at Virginia Polytechnic Institute, Blacksburg, Virginia, and Dr. Baldwin is associate professor of geology at the University of Oregon, Eugene.

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UNCERTAINTY REGARDING APPLICATION OF MINING LAWS TO SOME GOVERNMENT LANDS

January 29, 1952

Senator Guy Cordon
U.S. Senate Office Building
Washington, D.C.

Dear Guy:

I am again suggesting to you and urging the introduction and enactment of a bill to clarify the mining laws of the United States, or more properly the question of the applicability of the mining laws to certain lands owned by the United States.

You will recall that a few years ago I suggested to you legislation which was enacted and which confirmed the applicability of the mining laws as to the O & C revested lands. As a result of this legislation the extensive aluminum deposits in cut-over lands in Washington and Columbia Counties have been made available for entry and disposition under the mining laws.

The United States has acquired through purchase from former owners and in other ways at least thirty million acres of lands under various depression-day and social schemes such as the Emergency Relief Appropriation Act of 1935. See U.S. Code Congressional Service First Session 1947 p. 1661. These lands are generally worthless except possibly for a little grazing and for the mineral wealth thereof.

By the act of August 7, 1947, (61 Stat. 913 c. 513 § 2; 30 U.S.C.A. § 351-359) Congress extended the mineral leasing laws of the United States to these acquired lands, making them available for leasing for coal, phosphate, oil, etc.

The same year the Congress by the act of July 31, 1947, c. 406, 61 Stat.681 (43 U.S.C.A. § 1185-1189) provided that the Secretary of the Interior might dispose of materials such as sand, cactus, etc., on public lands of the United States by sale of such materials. This act, however, apparently applies only to public lands and not to any acquired lands.

Under the present law the right of citizens to locate and develop valuable minerals upon a large part of the lands of the United States is either non-existent or extremely doubtful. The mineral leasing laws have been extended to these lands as above stated but the mineral leasing laws have reference only to such things as phosphate, sulfur, and oil, and have no reference to copper, zinc, lead, and other much needed minerals. Consequently, there is a genuine and pressing need for a law which will extend to the acquired lands the mining laws of the United States. I would urge the early introduction of a bill to take care of this need.

Copies of this letter are being sent to F. I. Bristol, President of the Oregon Mining Association, and F. W. Libbey, Director of Oregon State Department of Geology and Mineral Industries.

With kindest personal regards,

Sincerely yours,
/S/ Irving Rand

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OREGON EXPLORATION LOANS

According to newspaper reports, government loans have been granted to Oregon mining groups as follows: $26,045 to E.E. Stauffer for exploration at the Coyote antimony mine 14 miles west of Brogan, Malheur County; $15,000 to Waite Minerals, Inc., for exploration at the Cowboy copper mine, southern Josephine County; and $15,345 to Owen Pigmon for exploration at the Platner mercury mine 31 miles south of Prineville, Crook County, Oregon. This last amount is the government's share or 75 percent of a $20,460 exploration program.

"FREE" GOLD STEADY

The market for "free" gold was quiet in January. Prices realized in the Far East were moderately higher. In Paris the tendency was easier.

The following prices for "free" gold, per fine ounce, were compiled by Pick's World Currency Report:

	Bars (12.5 kg.)	
	Dec.31 1951	Jan.31 1952
New York, transit	$39.00	$38.75
Manila	39.83	41.75
Hong Kong	42.00	42.75
Bombay	48.00	49.50
Tangier	39.00	38.85
Beyrouth	38.83	39.00
Paris	41.63	40.75
Buenos Aires	43.00	43.25

(From E&MJ Metal and Mineral Markets, February 7, 1952.)

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STRIP-LAND USE RULING

An Illinois Circuit Court, on January 9, ruled a Knox County zoning resolution unconstitutional as it pertained to regulations, restrictions, and prohibitions of the use of land for the mining of coal by the open-cut or strip method. The court held that the resolution violated both the 14th Amendment to the United States Constitution and sections of the Illinois State Constitution.

The circuit court also permanently enjoined the county from enforcing or attempting to carry out any of the provisions of the zoning resolution against the Midland Electric Coal Corporation, which brought the case before the court.

(From The American Mining Congress Bulletin Service, January 21, 1952.)

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OREGON TUNGSTEN PROPERTY ACTIVE

Mining operations have been started by the Ashland Mining Company at the Mattern Tungsten Deposit located on the Southern Pacific Railroad right-of-way one mile northwest of Ashland, Oregon.

Tungsten, as scheelite, is found in contact-metamorphic rocks (tactite) adjacent to a granitic intrusive. The ore zone, as now exposed, has a maximum width of about 12 feet. The initial mining is by open-cut methods. The ore will be concentrated at the company mill on the Ashland mine road one mile west of Ashland.

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OREGON ACADEMY OF SCIENCE MEETING

The annual meeting of the Oregon Academy of Science was held at the Erb Memorial Union, University of Oregon, Eugene, February 22-23. The meeting of the council, council dinner, and a meeting open to the public were held in the afternoon and evening of February 22. At the open meeting a lecture was given by Pierre Van Rysselberghe, professor of chemistry, University of Oregon, on "Sabbatical Activities in Italy and Neighboring Countries under the Auspices of the Fulbright Law." On February 23 section meetings, at which papers were presented, occupied most of the day.

Officers of the Academy for 1952 are: President, John L. Boling, Linfield College; President Elect, Ira S. Allison, Oregon State College; Secretary, F. A. Gilfillan, Oregon State College; Treasurer, A.A.Groening, Lewis and Clark College. New officers of the Geology and Geography Section are Lloyd L. Ruff, Portland, Chairman, and Mrs. Ted Gordon, Salem, membership representative.

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