MINERALOGY

Prospecting for Minerals

Geologists and engineers are combing the crust of the earth from Alaska to Tierra del Fuego for mineral riches. The war makes heavy demands on our supplies.

See Front Cover

➤ THE WORLD'S greatest treasure hunt is one of Uncle Sam's war jobs. Hundreds of federal engineers and geologists are combing the crust of the earth from Alaska to Tierra del Fuego for mineral riches. For minerals, used in staggering amounts to send our tanks, ships, airplanes, radios and guns into combat, must flow ceaselessly to our war plants.

To insure adequate stockpiles of strategic minerals, the Geological Survey and the U. S. Bureau of Mines are cooperating in the most extensive exploration and development program of mineral deposits ever undertaken in the United States. They are systematically investigating all known and potential sources of mineral wealth in this country, Alaska, Mexico and South America. Geologists play the role of detective in this program as they locate and map areas where drilling should be done to uncover concealed sources of metal. The Bureau of Mines follows through with the drilling operations and shaft-sinking that develop the deposit.

At the start of the war, 14 minerals were classified as "strategic" or "critical" by the Army and Navy. Today 53 minerals are placed on this list and the work is expanding.

More Ore Discovered

The swarms of fighters and bombers that are smashing German industrial centers and Jap-held bases in the South Pacific require aluminum, and aluminum comes from bauxite deposits. The tracking down of bauxite-bearing beds in Arkansas, Tennessee, Mississippi, Alabama and Georgia has been one of the most important jobs that has fallen to the geologists.

Drilling in these regions led to the discovery of more than ten million tons of ore of present commercial grade in addition to that already known.

Another mineral high on the strategic list is mica, required for condensers, radio tubes, airplane spark plugs and other electrical equipment. Before the war, the better grades of mica came from India. Today American geologists are engaged in a search for high-quality mica in Brazil, Colombia and Mexico, as well as in many parts of the United States.

The principal mica deposits in this country are in North Carolina, New Hampshire, Connecticut and South Dakota. Members of the Geological Survey are assisting in increasing the output of operating mines in these states, and in developing new deposits.

Tungsten Is Vital

Tungsten, another metal whose importance has rapidly increased in the past 20 years, today occupies a major position among those metals classed as strategic. It is needed in the preparation of alloy steels, of tungsten carbide, which rivals diamond as a cutting and abrasive material, and in certain chemical compounds. Other important uses are for filaments in incandescent electric lamps, radio electronic tubes and other radio parts, as electrodes for hydrogen welding and for electric contacts in automobiles.

Difficulties of transportation in the early part of the war made it impossible to count on continued imports of tungsten from China or other distant lands. An intensive study was made of our own reserves of tungsten ore and those of some of our Latin American neighbors to determine whether they might supply our wartime needs. Domestic ores now supply a substantial part of national consumption, even at wartime levels.

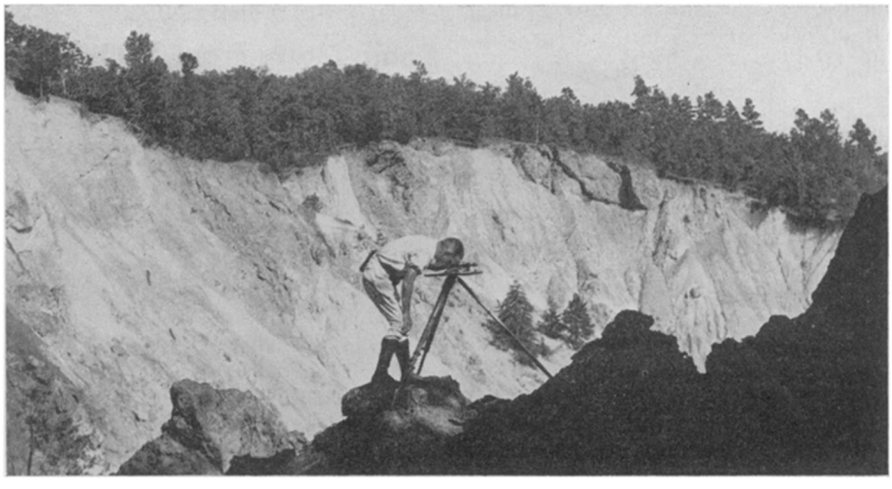
New Uses for Fluorspar

California, Nevada and Idaho are in the front ranks in production of tungsten concentrates. Located high in the Sierra Nevadas in California, the Pine Creek Mine is one of the three foremost deposits in the country. The production of this mine, together with that of the large deposits at the Yellow Pine Mine in Idaho and at Mill City, Nev., furnish approximately 80% of domestic concentrates and high-grade sorted ore.

Fluorspar, a mineral with which few are familiar, is playing an important yet almost anonymous role in helping to shorten the war. Its work is far back in the industrial process.

New uses for fluorspar, resulting from wartime research, are in the production of 100-octane gasoline, in refrigerants and air-conditioning and for insecticides. The development of the Aerosol Bomb, made from freon, a fluorspar derivative, and other materials, helps to maintain the health of our soldiers in the South Pacific by killing malarial-bearing mosquitoes and other insect pests.

Chemically, fluorspar is a fluoride of



SIGHTING ORE—A geologist sights across an open-pit mine of iron-manganese ore in the U. S. Geological Survey's search for strategic minerals.

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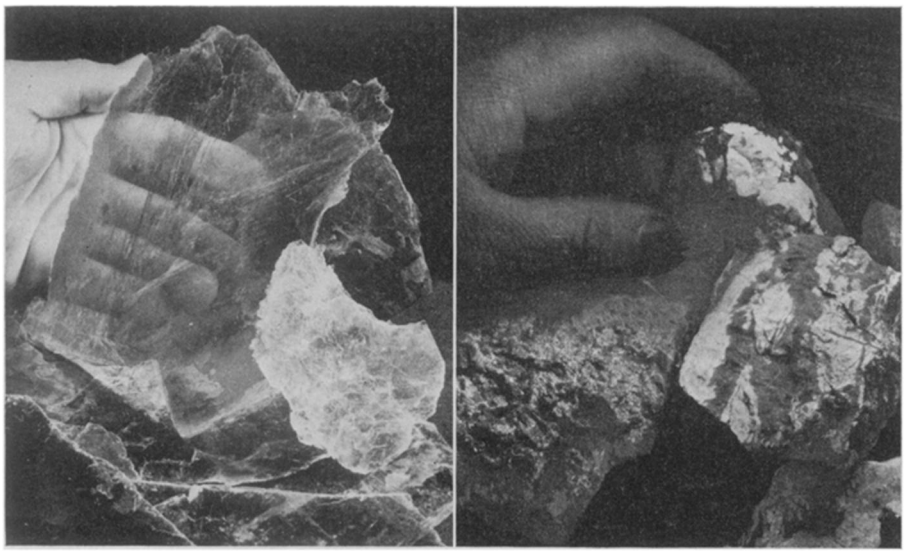

VITAL MINERALS—Needed for radio tubes, condensers and airplane spark plugs, the present supply of mica (left) is insufficient. Scheelite from which tungsten is made shines (right) under fluorescent light.

calcium, and has been used for many years in the manufacture of steel, four to six pounds being required as a flux in the production of each ton of open hearth steel. It is also used in the preparation of artificial cryolite, which is essential in making aluminum.

Natural cryolite is found only in Greenland, and during the height of the U-boat campaign our aluminum production would have been seriously curtailed if we had not been able to replace it with the artificial substance made from fluorspar. This use and the increased need for steel resulted in a serious shortage of fluorspar. Extensive investigations by the Survey led to the discovery of new ore bodies which insure an adequate supply of this war-mineral.

Rich Deposits

The most important fluorspar-producing region in the world lies in a small area that stretches from northwestern Kentucky across the Ohio River to southeastern Illinois. Intensive studies made by the Survey revealed many previously unknown deposits in this region, and drilling by mining companies and by the Bureau of Mines has paid off in important new supplies.

Actual and possible fluorspar-bearing deposits are also being studied by the Survey in Colorado, New Mexico, Utah, Nevada, Texas and other western states. Commercial quantities of the mineral have also been found in the east, particularly in New Hampshire and Tennessee.

Field parties have investigated beryl deposits scattered throughout Argentina, South Dakota, Colorado and Maine. Beryl is the source of the important alloy metal, beryllium. This metal is used in the production of tough copper alloys for calibrated springs in instruments of all kinds where permanence of the spring is vital, in electrical equipment and in safety tools to reduce the spark hazard where dangerous gases or liquids are present.

Search for Manganese

In many southern and western states, and in Cuba, Brazil and Chile the successful search continues for deposits of manganese, a metal absolutely necessary in the production of sound steel.

Deposits of tantalum recently discovered in New Mexico comprise the largest known source in the United States. This rare metal is needed now for radio tubes, steel cutting tools, wear-resistant parts of machines, portable radio transmitters, surgical foil and secret war uses. Although tantalum ore has been mined in small quantities in Wyoming, South Dakota and New Mexico, the principal source is abroad. The New Mexico deposits, if they meet expectations, will serve to supplement the meager sources available during the war.

To fill the needs of a nation at war, scientists are seeking more magnesium, which is lighter and stronger than aluminum, to make airplanes. They're also after moybdenum, antimony, mercury, copper, zinc, iron, indium, industrial diamonds, vanadium and a dozen other metals that go into the tools of war. In Alaska they are prospecting for chromium, coal, iron, mercury, tin, tungsten and zinc-lead.

As the needs of basic minerals for war change, so does the direction of the search. For it is the task of the scientists to keep war production plants supplied with materials for weapons of victory.

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PHYSICS

Rubber Engine Mounting Cuts Vibration in Bombers

➤ A NEW rubber mounting for engines of big bombers, like the Flying Fortresses, reduces vibration from the engines to a minimum. The new mounting makes the operation of the bomber smoother, decreases the strain on structural parts of the plane, lessens the nervous fatigue of pilots and crew, and increases the accuracy of precision instruments, resulting in more accurate bombing and gunfire.

The new mounting, developed under the direction of Dr. S. D. Gehman of the Goodyear Tire & Rubber Company, absorbs vibrations from the powerful radial engines, so that when the engine vibrates, the rest of the plane does not vibrate at the same time.

The mounts are used to attach the 1,200 horsepower engines to the tubular mounting ring which is welded into the plane structure. Each mount consists of two main parts. There is a collar, lined with a rubber bushing attached to the mounting ring with lugs. This collar has a socket in it, which is at right angles to the collar itself. The other half of the mounting, attached to the engine, ends in a ball which fits into this socket.

Vibrations developing in the engine are isolated by the ball-and-socket joint and by the rubber bushing in the collar. The ball-and-socket produces a unique rocking motion, so that the engine has a freedom of motion for every type of vibration that may occur.

While the new mounting is now used only on the Flying Fortress, it can be applied to all types of planes. It is expected that this rubber mounting will contribute greatly to the comfort of flying in postwar luxury airliners.

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Nitrogen fertilizer applied to apple trees in *foliage sprays* is supplementing time-honored methods of soil application of the urea fertilizer.