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STRATEGIC MINERALS.

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Only a few minutes' consideration of the changes in methods of warfare since early times will convince anyone that mineral raw materials play a most important part in any present-day military program. Going back even farther, to the Dawn times as depicted in the current comic strip which shows Alley Oop and his pet dinosaur, it will be noted that Oop's fighting equipment consists simply of a stone-headed war club. The stone is doubtless the hardest Oop could find, probably a piece of obsidian.

Shortly after the stone ax days, some primordial coward devised the bow and flint-tipped arrow - so he could fight his adversary at longer range. Again a mineral was the lethal substance. Later, Caesar, with his Roman legions campaigning against the Helvetii in the area now occupied by the Maginot and Siegfried lines, devised a throwing machine which pinked a bucket-sized boulder a still greater distance to crash the enemy ramparts. At that time, the science of copper, iron and steel metallurgy was in its infancy.

During the Middle Ages the Knight Crusader with his Damascus blade showed that he had a better chance of justifying Peter the Hermit, if his spear and armor were of the finest steel rather than from inferior material.

In the last war-to-end-wars, armies shot complicated projectiles with still more complex machines to greater distances than ever before. Laymen marveled at the intricate mechanical and fighting equipment with which the armies were provided. The situation had changed immeasurably from the dim old days when might was measured by the number of men and the strength of their muscles.

The importance in war of mineral raw materials and the equipment, armament and devices made therefrom has been increasing almost in geometric ratio since men first began quarreling. Lieutenant Commander Harrison, a United States naval expert, is authority for the statement that in the present war in Europe about 30 times the amount of mechanization and accessory equipment are required for a soldier than was the case in the World War. Practically all of this equipment is manufactured from mineral raw materials.

What, then, are those so-called "strategic minerals" which play so important a part in the European war, and what is Germany's position with regard to her supplies of them? Briefly, the most important are iron and steel, the metallic base of almost all types of armament, projectiles, cannons, rifles and ground transportation units as well as of machines for manufacture of such equipment; aluminum, which now is extremely important in military aircraft; chromium, for strengthening and toughening steel; nickel, which is alloyed with steel in making almost all armorplate and cannons and rifles; manganese, most essential in the manufacture of steel and to a smaller extent later in the alloying of special steel; quicksilver, for which no substitute that is both economical and satisfactory has ever been discovered, for making detonators for projectiles, and which is used also for camp disinfectant

and for medicine as calomel; petroleum, to power the war engine, and a few other mineral products - no less essential but of somewhat less critical supply.

Germany has entirely adequate deposits of only two mineral products, potash and coal; she is, on the whole, poorly supplied with minerals. In war time she is estimated to need about 26,000,000 tons of steel each year; she is producing one quarter or, at best, one third this amount, using very low grade ores that require great amounts of fluxes. Her high-grade iron ores - from which her armaments are made - came from Lapland, one third down the Baltic and two thirds down the west coast of Norway. This latter route is now cut off. The Militar Wochenblatt estimates that Germany (without Lorraine which went to France) controls today about one fifth the iron she did in 1914 when she controlled both Austria and Hungary.

In 1938, Germany was the world's largest producer of aluminum (186,000 short tons), about 27 per cent more than the United States, the second largest producer. Yet she mines less than one tenth of her aluminum ore. She now has to resort to using clay as source material - a high cost operation. She has no chromite and presumably is using from stocks shipped in from Southern Africa, a source now cut off. She has no nickel deposits although in 1938 she shipped in 34,000 tons (metric) of ore mainly from India, some from Canada. She has virtually no manganese and has been shipping from Russia - who needs it herself - and from other countries. Her quicksilver deposits are meager, but presumably she could buy from Italy who has plenty, if she has money or credit.

The Deutsche Wehr's estimate of 13,000,000 tons of gasoline as Germany's war-time requirement is about seven times more than her peace-time production from natural wells, coal and all sources. Her production has been upped to nearly one third of her present needs, according to late advice, but the loss to Russia of Southern Poland and the declining production of Rumanian wells, owned mainly by allied interests, make Germany's oil supply extremely doubtful.

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Getting back home, what mineral raw materials do we not produce in sufficient quantities in the United States? What would be covered by the war department's definition of strategic minerals, which is "those minerals essential to national defense, for the supply of which in time of war, dependence must be placed in whole or in part on sources outside of the continental limits of the country?"

The list, so far as the United States is concerned, is as follows:

Aluminum	Nickel
Antimony	Optical Glass
Chromium	Quartz Crystal
Iodine	Quicksilver
Manganese	Tin
Mica	Tungsten

These minerals are of strategic nature for one of three reasons:

(1) They are not known to be present in commercial quantities in the United States. Includes nickel, tin and quartz crystal.

2. They are present but insufficient (so far as is known) to meet needs in time of emergency. Includes antimony, aluminum ore, chromium, mica and possibly iodine.

3. They are probably present in sufficient quantities but are undeveloped because the foreign product is brought in so cheaply there is little incentive to develop domestic deposits. Includes manganese, quicksilver, tungsten and optical glass.

(Some lists of deficiency minerals include the following in addition: Cobalt, cryolite, diamonds (black), graphite, platinum, titanium and zirconium. Most of these have strictly military uses, but even so they are less critical than those in the first list).

The reasons why these various minerals must, in the United States, be regarded as of strategic importance are outlined in the following paragraphs:

Aluminum. - The United States contains some ore, principally in Arkansas, but produces only about one third of its requirements, importing the remainder from South America.

The cost of producing aluminum from clays, as carried out in Germany, is excessive, but we have enough faith in the American metallurgists to feel that some day, perhaps right here in the Northwest with Bonneville power available, we may have an aluminum industry using available Oregon clays as raw material. One research laboratory in Portland is now occupied with this problem.

Antimony. - This material is used mainly for making storage battery plates, in the manufacture of shrapnel, and for bearing material. During the World War Germany found she could substitute calcium in bearings and so used several thousand tons of alloy of this nature.

The United States has few antimony mines and no known deposits of particular promise. China, Mexico and Bolivia - in that order - are the world's principal antimony producing countries. In an emergency it is probable that the United States could maintain its imports of antimony from Mexico and, in time, develop substitutes.

Chromium. - It is used in the so-called rust-resisting or stainless steels and as alloys for cutting tools, ordnance and armor plate, projectiles and refractory brick.

In 1937 the United States produced about 2000 tons of chromite and imported 550,000 tons from foreign countries, mainly Cuba, New Caledonia and South Africa.

Chromite is one of the most important of the strategic minerals because we have limited deposits, and these are mainly undeveloped since foreign ores, mined cheaply by coolie labor, can be brought into this country duty free.

Iodine. - Used as an antiseptic and germicide, it is a most essential drug for which no satisfactory substitute has so far been found. Formerly produced from kelp or seaweed, it is now produced in the United States from brines obtained from oil wells in the Los Angeles and Michigan areas. It is classified as

strategic because it is not known whether or not in war-time the United States could produce its requirements.

Manganese. - This is probably the most important of all strategic minerals. It is essential in making of steel and is used in various alloys. The United States has rather substantial but undeveloped deposits of a lower grade - undeveloped because the ore can be brought in over a low tariff barrier from foreign countries where it is mined by cheap labor. Manganese is a most critical mineral because the cutting off of foreign supplies would soon cripple our steel industry.

Mica. - Its use is principally for electrical insulation where it is found to be practically indispensable. Domestic production is sufficient for the lower grades but not for the high grade, for the mica commonly used in electrical insulation is of the high grade sheet mica variety which comes principally from India and Madagascar.

Nickel. - Used principally for alloying with steel (for armor plate, cannons, etc.), with cast iron, and with non-ferrous alloys, and for electroplating, nickel is indeed a strategic mineral.

The United States has no producing mines or any known commercial deposits. We produce about 200 tons a year as a smelter by-product and import 500,000 tons a year, practically all from Canada, which produces about 90 per cent of the world's nickel. Two United States deposits - one in North Carolina and one near Riddle in Douglas county, Oregon - are regarded by the geological survey as worthy of careful investigation.

Optical Glass. - This is classed as a strategic mineral because it is imported from Europe, even with a 50 per cent duty, more cheaply than we can make it in normal times. Only about half our requirements are made in this country and that by one producing firm. In an emergency the production could be stepped up but not rapidly.

Quartz Crystal. - Brazil is practically the sole world producer of the highest grade quartz crystal, such as is used in delicate instruments and in frequency control radio apparatus.

Quicksilver. - The principal producers among the foreign nations are Italy, Spain and Mexico. Last year Italy produced about 68,000 flasks; the Spanish production is unknown, due to the chaos in that country; the United States produced about 18,000 flasks. So far as we know, neither Italy nor Spain is exporting quicksilver now and may hardly be expected to unless to establish credits in this or some other country.

Oregon is believed to have brighter prospects for the continued and future production of quicksilver than any other state. It now ranks second only to California and its production is increasing rapidly, whereas California's production is decreasing, according to U.S. Bureau of Mines figures. The fact that the price has increased from around \$80 a flask to \$160 recently has given impetus to this important Oregon industry. Inquiries for Oregon quicksilver have come from five foreign countries within the last few weeks. This indicates a healthy condition of the market for the local product, and, unless peace in Europe should be declared at an early date, Oregon quicksilver should enjoy a price of better than \$100 a flask for many months.

Tin. - Tin is not an essential ingredient in armament or military supplies other than that it is used widely in the United States in the canning of food for shipment and storage. There is no production of tin in the United States; all is shipped in from foreign countries, mainly from the Malay States and Bolivia. Some deposits, located near the western tip of Alaska, are now being opened and some production is expected for this coming year.

Tungsten. - Tungsten is used principally for alloying steel and making special cutting tools, dies and machine parts. United States production was nominal up to a few years ago because it could be brought in more cheaply from China where it is mined by coolie labor. Early in the recent China-Japanese conflict a tungsten scare developed at home and many deposits were opened up. We now produce at least half our requirements - could produce more but tungsten is, nevertheless, considered a strategic mineral.

- Earl K. Nixon, Director,
State Department of Geology
and Mineral Industries.

The following properties have been called to our attention as being available for negotiation:

1. Quartz property near Powers, Oregon; assay values stated to run to the tenor of \$12 to \$25 per ton. For particulars write to W.W.Coy, Powers, Oregon.
2. Talc property for sale. Address W. R. Allen, Box 11, Canyonville, Ore.
3. Talc property for sale. Address E. L. Moyer, Canyonville, Oregon.

We heard this story the other day.

Three men - a geologist, a mining engineer, and a mining promoter - were going hunting. They were all dressed up with red hats, checkered shirts, choke-bore breeches, yaller boots, and shiny rifles.

When they had arrived at a point deep in the woods they came upon a series of bear tracks. The geologist immediately started back-tracking in order to find out where the bear had come from. The mining engineer started following the tracks ahead to find out where the bear had gone; but the mining promoter started back on the road to town to bring a truck to carry out the carcass of the bear after it was shot.

The following write-up pertaining to the Department Bulletin No.18, "First Aid to Fossils", appears in the department "The Drift of Things" in the November issue of Mining and Metallurgy, the monthly official magazine of the American Institute of Mining and Metallurgical Engineers. It would seem that the attitude of the editors of Mining and Metallurgy toward technical publications as outlined in the following write-up is worth reproducing here.

We are indebted to Mining and Metallurgy for the text as quoted below:

"WHAT MOST OF US NEED".

"Geological publications, especially those devoted to paleontology, are so uniformly highly technical and dry so far as the general reader is concerned that the appearance of a bulletin on fossils that any one at all interested in geology can read with interest and profit is worthy of note. John Eliot Allen, field geologist of the Oregon Department of Geology and Mineral Industries, is only a Junior Member of the A.I.M.E. and evidently young enough not to write a learned paper that few could understand. He is the author of the Department's Bulletin No.18 entitled "First Aid to Fossils, or What to Do Before the Paleontologist Comes." Earl K. Nixon, director of the department, writes in the foreword:

'Judging by the condition of fossils shown us by amateur collectors, there is a definite need for instruction in regard to gathering, care, and preparation of these interesting and sometimes very valuable bits of geologic evidence. Many laymen have a habit of picking up fossils or parts of fossils, carrying them home and letting them lie about, considering them merely as curiosities, as one would a "funny shaped rock from Mount Hood". This custom is of course unfortunate. It is fair neither to the fossil nor to some geologist or stratigrapher who might come along and make some very valuable use of the specimen if he found it in place.'

The bulletin then tells what you and I should know before we stoop to pick up an unusual piece of rock that looks as though it might contain a piece of a dinosaur. An appendix contains 'Don'ts for Diggers' and the names of some paleontological authorities in the West that one can question in case of doubt. Readers of the 'Drift' can get a copy of the bulletin by sending 20¢ to the department at 329 SW Oak St., Portland, Oregon; to others not so choosy in their reading the price is also 20¢."
