SIBERIAN RESOURCES FOR SOVIET WARFARE[1]

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IN this complicated world, there are many vital areas for the Allies, but few links in our strategy are more essential than the Soviet Union. Should it collapse, Germany and Japan would be joined and would have access to the wealth of northern Eurasia, with unpredictable consequences to America. German geopolitics has long looked eagerly to the Ukraine and the Caucasus, and the current Soviet victories will assuredly not be accepted by Hitler without challenge. The whole outcome of World War II may turn on the Soviet Union's ability to carry on.

This is a war of competitive production, so that access to raw materials is of vital importance. Geology may not be able to prophesy concerning military ability or morale, but it does have evidence on the material capacity of a country to produce basic war needs.

Two nations lead all others in mineral wealth, the United States and the Union of Soviet Socialist Republics. There is not even a good second unless federations such as the British Commonwealth are included.

It must be admitted that Soviet estimates are optimistic and often incapable of verification, but the general outline is now clear. Those unfamiliar with Soviet geological work in the inter-war period should remember that the Five Year Plans have laid great stress upon heavy industry and the underlying mineral production. Few sciences have received such consideration as geology, and as a result the known reserves have been enlarged several fold.

To sum up the military prospects, it appears probable that even though Germany should occupy all Soviet Europe, or even though Japan should seize Vladivostok; the Ural Mountains and central Siberia still have enough mineral wealth to maintain significant military production as long as the Second World War may last. The current prospects that Hitler's troops will overrun Soviet Europe appear poor, but even should that be the case, the Union still has the minerals, and the industrial capacity, to carry on. This applies not only to undeveloped reserves but to actual mines and smelters now in operation.

I shall review the various resources in a moment, but the situation is well in hand with respect to coal, iron, copper, lead, zinc and gold. Problems may arise concerning oil, aluminum and manganese, but there is a limited output of each within Siberia. In addition to Siberian reserves, there is still great productive capacity in unoccupied Soviet Europe. Large resources of oil, manganese, lead and zinc are available in the Caucasus, and Turkestan is also well supplied with minerals, but this paper is limited to Siberia.

The Soviet Union now credits itself with 1,654,361,000,000 metric tons of coal, second to the U.S.A. Ninety per cent. of this reserve lies in Siberia. So far as current *production* is concerned, three fifths comes from the Donetz field in the Ukraine, still largely in Russian hands, but there has been a great expansion in newer areas in Asia. This is notably true in the Kuznetz Basin of central Siberia, where the current production exceeds 20,000,000 tons, the equivalent of the output in Ohio. In this Kuznetz field the bituminous reserves are more than 450,000,000,000 tons, equal to our entire Appalachian field.

Within the Ural Mountains, coal is mined to the extent of 8,000,000 tons, chiefly at Kizel and Chelyabinsk, but none of it is of coking quality. Elsewhere in Siberia is the new Karaganda field, north of Lake Balkhash, with an output of over 4,000,000 tons; near Lake Baikal are the Cheremkhovo mines yielding 3,000,000 tons; other mines near Vladivostok produce nearly 3,000,000 tons; and a new field is developing at Bureya near the Amur River.

The annual yield of coal in Soviet Asia is 40,000,000 tons out of a national total of 146,800,000 (1940). While the total is but a third of American production, it is quadruple the tsarist output. Since the Kuznetz area is more than 2,000 miles from both German and Japanese frontiers, its operation appears reasonably dependable.

Petroleum production is no longer concentrated in Baku or even along the slopes of the Caucasus, although these still dominate. Northeast of the Caspian Sea is the important Emba district with salt dome structures. From the Urals westward to the Volga River is another new oil field, so promising that the Soviets term it a "second Baku." Siberia proper appears to be very poor in oil, but there is a significant production on the island of Sakhalin north of Japan. A pipe line runs from the Emba fields to Omsk in central Siberia. So long as Baku remains in Soviet hands, there will be no shortage, and the Caucasus Mountains present a formidable barrier to invasion.

Iron ore is wide-spread in the Urals, and forms the basis of imposing blast furnaces at Magnitogorsk, Sverdlovsk and Nizhni Tagil. These have a combined annual capacity of approximately 10,000,000 tons of pig iron, and open hearth furnaces turn out almost

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as much steel. The furnaces at Magnitogorsk are said to rank next to those of Gary in capacity. The ore is magnetite and secondary martite, formed by contact metamorphism, with a metallic content of 55 to 66 per cent.

Siberia's metallurgical problem does not concern any shortage of iron ore or of coking coal. The difficulty lies in the long rail haul required to bring them together. In the case of the Ural plants, coal is brought 1,417 miles from Kuznetz in central Siberia, while on the return trip the trains carry ore to blast furnaces near the coal. Steel plants thus operate at both ends of the combine. I have spent five days in the Kuznetz Basin, going through mines and blast furnaces, and found them up to the best American standards. Since the development of Kuznetz, nearby ore has been found which nearly meets the need of the local furnaces, while coal for the Urals has been developed at Karaganda, much closer to Magnitogorsk ore. There is a small iron output east of Lake Baikal, and a blast furnace has recently been built in the Far East at Komsomolsk on the lower Amur River.

In the Soviet Union as a whole, the principal steel production has been in the Ukraine, north of the Black Sea, based on Krivoi Rog ore and Donetz coal, but the Ural-Kuznetz combine has grown to the point where it now supplies one third of the nation's iron.

Manganese has been obtained from two major sources; the larger of the deposits is in the Ukraine, but the highest grade ore is in the Caucasus. The latter is still in Soviet hands. Within Siberia itself, there is a limited production of low-grade manganese in the Urals, in the Kazakh Republic and near Kuznetz. While inadequate, these Asiatic manganese deposits provide an emergency supply.

Reserves of copper have been greatly expanded under the Five Year Plans, but the quality of the ore is poor. There is a small production from pyrite-bearing ores and other types in the Ural Mountains, but the largest mines are north and west of Lake Balkhash. These are porphyritic deposits with about 1.1 per cent. copper. A new smelter at Kounrad has an annual capacity of 100,000 tons of metal, and even larger works are getting under way at Djezkazgan.

Lead and zinc reserves are estimated at 11 and 19 per cent. of the world totals, respectively. Soviet production is from the northern Caucasus, from the important Ridder mines in the Altai mountains and from scattered Siberian deposits. Lead production in 1936 amounted to 55,000 tons, while in the same year, zinc totaled 63,000 tons.

Aluminum was regarded as a deficit metal in tsarist Russia because the known bauxite deposits were limited and poor. Within recent years, the U. S. S. R. has built up a significant output, amounting to 60,000 tons in 1939, which lifted the nation to fourth place. Two deposits in the Urals supply a considerable part of the bauxite: Kabakovsk in the north and Kamensk in the south. Unfortunately the chief reduction plants are in those parts of Soviet Europe currently occupied by Germany.

Siberian mineral production also accounts for enough gold to place the Union next to South Africa in second place. This is secured partly from lode mines in the Urals but chiefly from placer works along the tributaries of the Lena River, notably the Aldan. Other Siberian localities are along the Kolyma and Yenisei Rivers. Modest amounts of nickel are mined in the Urals and Arctic. Within the Urals are large amounts of platinum, chromium, asbestos, potash and magnesite; while small amounts of tin and tungsten are produced east of Lake Baikal.

Soviet Europe has the enormous apatite deposits of the Kola Peninsula, the aluminum ores near Leningrad, the brown coal and hematite ores south of Moscow, and great steel centers in the Ukraine based upon local ore and coal. The Caucusus has oil and manganese. Many of these deposits are still in Soviet hands, but even their complete loss would by no means involve the cessation of defense production.

To turn from specific resources to mining areas, two major districts stand out, along with three lesser areas. By far the most valuable is the Urals, for there are few mountain ranges on earth which produce the variety or quantity of minerals secured here. Iron has been mined since the days of Peter the Great, and there are now 39 localities which produce iron or steel. The total reserves of Ural iron ore are placed at 1,390,607,000 tons. Great metallurgical plants provide the base for scores of industries, notably railway equipment, automobiles, tractors, heavy machinery and chemicals. Coal is mined in the Urals but is not of metallurgical quality. Oil is available on the western flanks and also to the south. Non-ferrous minerals include copper, gold, platinum, silver, nickel, aluminum, manganese, lead, zinc, chromium, asbestos, magnesite, potash and salt. All these place the Urals next to the Ukraine as the Union's number two metallurgical base. There are 8 industrial cities of over 100,000 people, led by Sverdlovsk.

The Altai-Sayan Mountains of south-central Siberia are a region whose mineral significance has scarcely been appreciated by non-Russians. Here is a third of the country's coal, lead and zinc, plus significant occurrences of iron ore, silver, gold, copper, tin and manganese. The coal basin of Kuznetz, southeast of Novosibirsk, dominates this second industrial base of Soviet Asia. The development of the Kuznetz steel

works is one of the triumphs of the First Five Year Plan.

Third in significance is the Kazakh area, north of Lake Balkhash, where coal and copper have been developed in the inter-war years.

The fourth of Siberia's minerally-productive districts lies east and west of Lake Baikal, while the fifth is along the Amur River in the Far East. Reserves are considerable but production is only partly developed. Coal and iron are secured in a number of localities, and there is the beginning of a steel industry at Komsomolsk. Petroleum is obtained on the island of Sakhalin.

While Far Eastern developments are somewhat vulnerable to Japanese attack, production in the Urals and at Kuznetz seems secure from any feasible invasion, whether from east or west.

If mineral production will win the war, the Union of Soviet Socialist Republics has what it takes.

During the past two decades, the American public has been very reluctant to recognize the industrial potentialities of the Soviet Union. From the military record of recent months, it should be clear that any nation which can afford to lose tens of thousands of planes and tanks, and millions of soldiers, and still take the initiative, has far greater productive capacities than commonly appreciated. In the post-war world, it seems inescapable that the Soviet Union's geological foundations will place it in the first rank among industrial nations.

OBITUARY

GLOVER MORRILL ALLEN

SCHOLAR as well as student, an enthusiastic zoologist interested quite as much in the history and background of his subject as in the technical details, patient and persevering, with a most extraordinary fund of information and a capacity for methodical, detailed, accurate work possessed by few, taking keen pleasure in helping others though himself shy and retiring and always so far as possible keeping in the background, Dr. Glover Morrill Allen was one of the significantly outstanding mammalogists and ornithologists of his time. His published works are models of directness, clarity and accuracy. In reading them one instinctively feels his thorough mastery of the subject under discussion, and also one realizes that any statement made by him is authoritative and does not require checking. But his influence extended far beyond his published contributions. All his associates are more or less indebted to him for suggestions, advice or help of one kind or another, and some of them at times leaned rather heavily upon him. His unusual capacity for detailed work and his accuracy went far toward maintaining the high standard of the various publications he edited.

Glover Morrill Allen was born in Walpole, New Hampshire, on February 8, 1879, the son of the Reverend Nathaniel Glover Allen and Harriet Ann (Schouler) Allen, a sister of Rear Admiral John Schouler, U. S. Navy. At a very early age he became interested in mammals and birds. He prepared for college at the Newton High School, and while living at Newton in the winter and at Intervale, New Hampshire, in the summer he busied himself with an intensive study of the local faunas. Even when in high school he had an enviable local reputation as an authority on birds and mammals, although because of his shyness and diffidence he was personally known to very few. An unusually keen observer, he had already acquired a remarkably extensive knowledge of the details of the habits of the mammals and birds of his region, and his ability to recognize birds, particularly the numerous warblers, by their notes was almost uncanny. Like all the young zoologists of that region at the time, he made frequent visits to the natural history establishment of Charles J. Maynard, who always spoke of him as a most promising boy.

While living in Newton he made a large collection of the local mammals, all the skins being beautifully prepared and accompanied by full data. This collection, which included a porcupine, perhaps the last to be captured in Newton, was later presented to the Newton High School. In 1896 when a junior in high school he was elected an associate of the American Ornithologists' Union.

Entering Harvard, he was elected to the Phi Beta Kappa in his junior year, and received his A.B. *magna cum laude* in 1901. While at Harvard, in addition to the more usual courses, he applied himself to the study of Russian, and in the evenings studied Danish. He was awarded a John Harvard scholarship. In the year of his graduation from Harvard he was appointed secretary, and also librarian and editor, of the Boston Society of Natural History. Also in 1901 he published, together with Reginald Heber Howe, Jr., "The Birds of Massachusetts," in the preparation of which he had done the major part of the work.

In 1903 he received his A.M. degree, and in the same year published his book on the "Birds of New Hampshire." His Ph.D. he received in 1904; in June of that year he published a "List of the Mammalia of New England," and in July his doctor's thesis on "The Heredity of Coat Color in Mice." His interest in genetics was maintained throughout his career, and