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RUSSIA'S OIL AND HITLER'S NEED

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IN HIS speech of October 3, 1941, Hitler, as he looked into the future, remarked, 'There is only the problem of transportation.' The statement might have been even more pertinent had he added the two words, 'and oil'—since transportation depends on oil, and oil must be transported.

Opinions may differ on the question of whether or not oil was the decisive motive for Hitler's attack on Russia. But after ten months of the Russian campaign there can be no doubt of Hitler's imperative need of the Caucasian oil fields; he finds himself in the predicament of the alchemist who spent all his gold trying to make gold. To achieve his purpose Hitler must have new oil supplies; and he must deprive the Soviet Union of hers.

Hitler controls at present a supply of from 10 to 12 million tons of oil per year. This figure includes the European natural oil production of 6 million tons, the synthetic production of 4 million tons, and all substitutes—some 2 million tons. Hitler-dominated Europe has a yearly minimum consumption for non-military purposes of at least 8 million tons as compared with 20 million tons before the war. This consumption cannot be reduced further without lowering the productive, industrial, and agricultural potential of the Nazi war machine. This minimum consumption must be maintained if Sweden is to continue to send its ores; Spain, pyrites; France, alcohol, turpentine, and motors; Denmark, eggs; Holland, butter; Belgium,

tin and freight cars; Yugoslavia, copper; Greece, tobacco; Rumania and Bulgaria, Poland and Czechoslovakia, fruit, wood, and industrial products; Switzerland, precision instruments.

There remains, therefore, a yearly supply of from 2 to 4 million tons with which the Axis can wage war on all fronts. The blitzkriegs, based upon considerable pre-war reserves, have kept the oil question from becoming acute, especially since the oil booty obtained from the conquered territory has refilled some of the reserve. But the continued mass consumption of the Russian campaign without any further loot forced Germany to draw heavily upon her stock. The continental supplies cannot keep up with the pace of consumption. In spite of the respite of relatively quiet winter months, Hitler will start the new fighting year with reserves of only 3 to 5 million tons, which will last, at most, from four to six months if war is waged in the tempo of last year. The monthly maximum supply of 1,000,000 tons and the minimum monthly civilian consumption of 700,000 leaves only 300,000 tons for warfare itself. If Hitler does not gain control over the Caucasus by August or, at the latest, by October 1942, he may be unable to wage offensive war and will therefore lose the initiative.

If, on the other hand, he succeeds in conquering the Caucasus, he will starve Russia's motorized armies and her economy. The 'scorched earth' policy will compel him to start drilling again, rebuild refineries and storage facilities,

refine the crude oil, and transport the finished products to the industrial centres and the battlefields. To replace the destroyed material, it will be necessary for him to move the refineries and equipment from France, Holland, Belgium, and Czechoslovakia. The alternative would be to ship crude oil to the idle European refineries, but this would involve greater transport difficulties and greater bombardment risks. At best, oil resources will not be available to Hitler before 1943, at which time the military power of the Allies will have reached its full development.

RUSSIA'S OIL

In 1940, Russia produced about 84 million tons of crude oil (some 11 per cent of world production).

Approximately 85 per cent of Russian oil is produced in the Caucasus, particularly in the region of Baku, where production reaches 24 million tons. Other fields are located between Rostov and Baku — such as Grozny and Maikop, which produce about 5 million tons yielding good lubricants. Sometime in 1935, new oil fields were discovered between the Ural Mountains and the Volga River, around Ishinbajevo, which was called, a little prematurely, a second Baku. While this production centre is considered very promising, it is not likely that it surpassed an annual production of 2 million tons before the German assault on Russia. However, according to reports, large refineries are now in operation there, producing from 10 to 14 per cent of the total Russian gasoline output — a fact of great strategic importance, considering the location of the Caucasus.

The industrialization of Soviet Russia, which proceeded with the formation of a powerful motorized army, and the collectivization of Russian agriculture have contributed to make Russia the second largest consumer of petroleum products in the world. In the early thirties the Russians still exported, for need of for-

eign exchange, petroleum products to the amount of 4 to 6 million tons annually. In 1938, however, the export flow had become a trickle of less than a million tons, with all signs pointing to a complete cessation. The Soviets needed the oil for themselves.

Russian economy is absolutely dependent upon oil, which is needed for industry and railroads, for river and sea fleets, and for the lowly kerosene lamp which lights up millions of homes. The dependence of Russian agriculture on oil is obvious: in 1939, Russia counted 500,000 tractors, 165,000 combines, and 210,000 heavy farm trucks. This motorization of agriculture is today an irreversible fact since the stock of 46 million horses was reduced by one half as a consequence of the collectivization of the farms in the early thirties.

Such a dependence on oil explains the paramount importance of safe transport lanes from the Caucasus to the fighting forces of Russia and to the civilian hinterland. The Germans were in Rostov on November 22, 1941, but if they had pressed on to Astrakhan, or even to the bend of the Volga near Stalingrad, Russia would have been in a desperate position which could have been alleviated only for a few months by the use of the stocks of several million tons of oil in the Urals and on the Volga. The whole military and economic system would have dried up, and the Russian war would have degenerated from modern warfare to a sort of Chinese guerrilla fight. The remaining oil facilities in the Urals are far from adequate. This shows the ever-growing importance of the Arctic communication lines between the United States and Russia. Distances, ice conditions, and lack of ports and railroad communications in those parts of Russia make American help for the fuel situation extremely difficult and limit it to small quantities of special high-quality products.

If the Germans had succeeded in occupying the oil fields of Grozny, they

would have gained another Rumania, with the advantage of a considerable addition of lubricants, since Grozny produces several hundred thousand tons of excellent lubricating oils. The military setback of the Germans in the last days of November 1941 averted this serious threat to Russia and the Allies for many months, and has enabled Russia to replenish her military and civilian stocks in the winter months by rail and now by the vast river and canal system.

The Volga, with its tributaries, is navigable for more than 10,000 miles. In contrast to the United States with its system of 200,000 miles of pipe lines, Russia has only 3000 miles of pipe lines. The famous 500-mile pipe line from Baku through the Caucasus to Batum has an annual capacity of 1.6 million tons of crude oil and gasoline. The problem of transporting 30 million tons of oil from practically one centre to all parts of Russia's immense territory without the use of sea lanes is formidable.

In the last years Russia even imported several hundred thousand tons of oil annually from California to her East Asiatic maritime provinces. The reason for this importation was, of course, the desire to relieve pressure on the trans-Siberian railroad: it should be remembered that the distance from Baku to Vladivostok is about 4300 miles. Let readers bear that in mind before they scrutinize the apparent stalemate between Russia and Japan.

GERMANY'S OIL: PRE-WAR

It is fair to assume that when Germany started the war, in September 1939, she had an inventory of from 5 to 7 million metric tons — mainly of foreign oils. They were accumulated from over-sea imports which rose steadily until the outbreak of the war. Since consumption was satisfied from the increased output of domestic crude and synthetic oils, Germany reserved her imported oils for war purposes.

A conservative estimate of Europe's

production of crude oil is 6 million tons annually. Contributors are: Rumania 4,000,000 tons, Germany 600,000 tons, Poland 500,000 tons, Albania 300,000 tons, Hungary 200,000 tons, Austria 150,000 tons, Estonia 125,000 tons, Franco (Alsatia) 100,000 tons, and Czechoslovakia 25,000 tons.

Production of synthetic oil amounted to 1.5 million metric tons in 1938. This production took place in from 25 to 35 decentralized plants. Before the war, plants were constructed in the Western German coal and Central German lignite districts as subsidiaries of the mine companies. Since the war, new plants have been built in the eastern provinces, on the Baltic Sea, and in subjugated Czechoslovakia.

Germany perfected two improved methods for the production of synthetic oils, disregarding the question of cost, which was higher than that of natural crude oil. One method was perfected by the world-famous chemist, Bergius; the other by Fischer-Tropsch. The Bergius method converts coal or lignite into synthetic crude oil which, after further treatment, yields all types of gasoline, Diesel, and fuel oils. With the Fischer-Tropsch method a synthetic crude oil is obtained which, in addition to the above-mentioned products, yields lubricating oils and waxes. The quality of these products is considered excellent; and even if the gasoline obtained does not rate more than 65-75 octane, the abundant supply of tetraethyl lead makes it possible to improve the octane rating to approximately 87-95.

Hitler succeeded in raising the production of synthetic oil during his pre-war régime by 1400 per cent — from about 100,000 tons in 1933 to about 1,500,000 in 1938. This is a remarkable feat, the more so because construction of such conversion plants is very intricate. This achievement of Hitler in the pre-war period represents the maximum investment in his war machine.

A careful weighing of all pertinent

factors by experts indicates that Germany's present output of synthetic oil is close to 4 million tons. The raw material — that is to say, the coal and lignite — is practically inexhaustible. The output is determined by installation and man-power.

In addition, gas, coal tar, soft coal tar, and benzol have been produced from coal and coke at an increasing rate. So too, alcohol from industrial and agricultural sources. But at the same time new demands for such products came from the various chemical industries — for example, for explosives and synthetic rubber; these absorbed a good deal of the increased production.

GERMANY'S OIL: IN WAR

With the outbreak of war, overseas supplies ceased and oil came only from Rumania and Russia. Prior to the war, Russia's sea-borne exports to Germany amounted to only a few hundred thousand tons of gasoline, gas oil, and high-grade lubricants, shipped from the Black Sea ports, through the Dardanelles and the Mediterranean, to North Sea ports. When the war began, Russia was unable to ship by sea to Germany. From September 1939 up to the invasion of Russia, the supply had to be shipped from the Russian Black Sea ports to Rumanian and Bulgarian ports and from there continue either on the Danube or by rail to Germany. Only a very negligible part was shipped directly by rail, and this had to be reloaded at the Polish border because of the difference in rail gauge. The single-track Rumanian railroads were the chief bottleneck, not only for the land route but even for the short hauls to Black Sea ports.

Rumania's oil production had decreased steadily to only 6 million tons in 1938. Of this total, 4 million tons of finished products were exported, while 2 million tons were used domestically. The comparatively high domestic consumption in a country with poor motorization is due to the fact that oil is used

by railways, in industries, and for heating purposes.

Until the French collapse, Rumania shipped considerable amounts over her regular sea routes to Mediterranean and Western European ports, but Italy probably did not receive more than a few hundred thousand tons, and Germany hardly more than a million tons. From the moment Italy entered the war, in June 1940, all the 4 million tons of Rumanian oil were available only to the Axis. However, the problem of transportation, with its immense difficulties, still remained. Only a maximum of 1.5 million tons can be shipped on the Danube while the balance of 2.5 million tons must be hauled overland by rail to all parts of the continent.

An interesting detail not generally known is that, starting in the spring of 1940 and probably until the German invasion of Russia, thousands of tons of Rumanian oil were shipped from the Black Sea to the Baltic Sea by way of the Russian canal system, in order to relieve the pressure on the German routes of transportation — the Danube and railroads. This is the canal that links the river Pripyat with the Bug and the Vistula, and thereby joins Odessa and the Dnieper with Danzig and the Baltic Sea. This system of canals and rivers is now entirely in German hands. The cutting off of this river transportation system in the summer and autumn of 1942 may become an important task of Russian strategy.

The total capacity of the tank barge flotilla on the Danube is 250,000 tons at most. Because of the low water level of the Danube in summer, and its freezing over in winter, the barges cannot make the return trip of about 1000 miles from Giurgiu to Vienna and Regensburg more often than six times annually. From the total of about 45,000 tank cars of the whole continent, with an average capacity of 15 tons each, the Axis can utilize not more than 20,000 for the service from Rumania. (The United

States uses about 145,000 tank cars with an average capacity of 25 tons each, in addition to its seagoing tankers, river barges, and system of pipe lines.) It is possible that the Axis has increased its fleet of tank cars to 60,000 since it has had the production of Belgium, France, and Czechoslovakia at its disposal.

The magnitude of the task of moving oil mainly by rail and tank barges (the use of seagoing tankers being restricted by Allied control of Gibraltar) becomes evident when one considers that from 10 to 12 million tons must be moved annually, for military and civilian needs, over distances ranging from the German centres of production to Bergen in Norway, Riga in Latvia, and the Gulf of Biscay on the Spanish border; and from the distant Rumanian oil fields to the immense theatre of war in Northern Russia, and to Sicily and Athens for the Mediterranean and North African war. One of the serious consequences of the British loss of Crete and the Greek islands is that, since the spring of 1941, the Axis has been in a position to transport tankers from Rumania through the Dardanelles to ports like Salonika, Rhodes, or Crete without being intercepted by the British fleet.

Another important addition to German supplies was the loot taken in the defeated and vassal countries. While the extent of this loot has often been overestimated, it was considerable. A fair estimate is that the Nazis acquired, in addition to the Western Polish oil fields (which produce about 150,000 tons of crude oil annually, yielding 15 to 20 per cent high-grade lubricants), 850,000 tons from Eastern Poland after the Russian invasion; 75,000 tons from Alsacia; 150,000 tons from Hungary; 250,000-300,000 tons from Albania; 100,000 tons from Estonia; and a stock of 2,000,000 tons of crude oil and finished products from Denmark, Holland, Belgium, and France.

Oil storage tanks and refineries in Denmark and Holland fell intact into German hands; many of those in Bel-

gium and France were destroyed during the fighting.

After Italy's entry into the war, the original reserves of Germany were increased, not only by the Albanian annual production of 250,000 to 300,000 tons of low-grade crude oil, but also by the Italian war reserve stocks, which have been estimated at from 2.5 to 3 million tons. Hitler's delight at this contribution of his minor partner was very short-lived, however. As in every other respect, Italy is deficient in crude oil production. The Italian navy alone consumed a million tons annually in manoeuvres in peacetime. This may well be the explanation for the inactivity of the Italian navy.

LUBRICATING OIL

Civilian consumption of lubricants cannot be reduced. Wherever wheels turn, lubricants are necessary to prevent metal surfaces from running dry. The strain imposed upon industrial machinery by the war has made the saving of lubricants impossible, even though a careful system of reclamation is said to have saved up to 25 per cent of the annual consumption of 600,000 tons in Germany.

Since the beginning of the war the Axis powers have been required to live off their lubricant reserves, production of high-grade lubricants in Europe being possible only to a limited degree. For war activities and high-speed machinery, whether stationary or mobile, lubricants of high viscosity index, high flash point, and low cold test rating are essential. Such lubricants are not available from German or Rumanian crude oil production. German synthetic production, on the other hand, does yield high-grade lubricants, although the quantities obtained are very limited and cannot be increased without curtailing the yield of other important products, like gas oil and Diesel oil, both vital for the navy. Besides the accumulated pre-war stocks, the Axis had at its disposal the Polish

production and the imports from Russia, which probably did not exceed 30,000 to 40,000 tons in 1940 and perhaps an additional 10,000 to 15,000 tons up to the invasion of Russia.

Only high-grade lubricants such as are produced in essential quantities by the Americas and Russia, can be used in exacting war activities. Although, quantitatively speaking, lubricants amount to only 3 per cent of the consumption of gasoline, Diesel, and fuel oils in automotive vehicles, the problem of supplying them during war is much more acute because there is no adequate means of replenishing stocks or of producing new supplies, particularly in Europe. In this connection credence may be given to the news from the Russian battle front that German tanks got stuck because of the freezing of lubricants. This may be regarded as the beginning of Germany's difficulties in obtaining high-quality lubricants.

HITLER'S NEED

In the Polish, Norwegian, French, and Balkan campaigns Hitler did not have to fall back upon his accumulated stocks. In the blitzkriegs, which were of extremely short duration, and in the long intervals between them, it was comparatively easy for him to draw on current domestic production and on Rumanian and Russian imports without tapping pre-war reserves. As a matter of fact, the loot in the overrun countries even swelled his stocks. The war in Africa and the air assaults on England did not increase consumption materially.

Hitler's real need for oil started with the Russian campaign. A battle front of from 1500 to 2000 miles opened up, on land and in the air, and three new seas were added to the theatres of war: the Black Sea, the Baltic Sea, and the Arctic Ocean. Since the beginning of hostilities, the figures of the actual oil consumption remain unknown. It is of no help to know just how many gallons a submarine, a bomber, or a fighter burns

up when it travels a hundred miles. It does not add to our knowledge to learn that a German panzer division consists not only of 400 light and medium tanks but also of 3300 other motor vehicles. The essential question remains: How intensively does each unit fight and how much does it move about? Military experts vary in their estimate of German oil consumption for the seventeen days of the Polish campaign, but it must have averaged between 300,000 and 750,000 tons. The consumption for the French blitzkrieg was about twice the amount used in Poland. The consumption of aviation gasoline by the Luftwaffe in a month of intensified air attacks on England was between 50,000 and 100,000 tons. For example, 500 bombers use up from 60,000 to 80,000 tons per month, at the rate of four hours' flying time per day and from 1 to 1½ tons consumption per hour.

The author does not believe he is exaggerating in estimating German oil consumption in Russia alone, until the beginning of December 1941, at a million tons per month. From December to April, consumption may have been reduced to 600,000 tons. The length of the front is three or four times the length of the front in the Polish campaign. Transports and men-of-war must travel enormous distances on three seas. Thousands of warplanes and tanks are in battle or in movement, followed by motorized artillery and infantry which, in turn, are followed by a supply system of trucks and lorries which must number hundreds of thousands.

The immensity of space that has continually to be traversed must not be lost sight of, nor the necessity for the Nazis to ferry large loads of matériel to the front lines by air. All such requirements consume vital oil.

A Russian communiqué dated January 12, 1942, reported that, from November 16 until early January, not fewer than 2800 German tanks and 30,000 motor vehicles had been captured, and about

1000 warplanes had been destroyed. Even if these figures were exaggerated, they still would furnish us with an idea of the magnitude of the matériel in service, and partly lost, by the Nazis.

Nor is the amount of consumption determined alone by the number of submarines, warplanes, and tanks, but by the hundreds of thousands of supporting transport units which alone make the operation of the combat units possible. The shifting of troops, the bringing up of fresh reserves, and the withdrawal of battle-weary units necessitate maximum employment of all means of transportation. Thus, in a report from Berlin, printed in the *New York Times* on November 21, 1941, the German High Command boasted of having shipped, during the four months of the Russian campaign alone, about 83 million pounds of supplies (about 40,000 tons) in 30,000 flights, over a distance of 13 million miles.

Nor should the consumption in occupied Russia be forgotten. The occupied cities of Riga, Reval, Kharkov, Kiev, Odessa, and Smolensk need certain amounts of petroleum products to sustain urban life. If the Nazis have done any spring sowing in the Ukraine (they could hardly have done any sowing last autumn), they were confronted with the complete lack of Russian horses and their own shortage of animals. They were, therefore, compelled to supply not only tractors but also all the automotive fuel necessary to drive them, which must have amounted to several hundred thousand tons.

BOMBARDMENTS

The question of the effect of damage caused by aerial bombardment is very difficult to determine. The British Command reported about 400 air raids on North and West German oil centres up to the end of 1941, and a Russian spokesman reported the destruction of a large Rumanian refinery and the burning of large oil reservoirs in the Rumanian

port of Constantza. However, this destruction of Axis oil stocks and producing centres should be calculated very cautiously since, in addition to the usual storage tanks on sea and river ports and at the refineries, there are secret storage tanks, coördinated with underground air-fields. It is known that the largest ones are located in the exhausted potash mines around Hanover.

It is strange that a concerted bombardment of the Rumanian refineries and oil fields was never undertaken by the British or the Russians, for the Italians attacked the Haifa oil refinery from bases in Rhodes, and the Bahrain refinery, on the Persian Gulf, from Eritrea in distant Northeast Africa.

On the other hand, it is well known that the Nazis transferred a large amount of their oil stocks from the North Sea ports to the tank farms of the large Czechoslovakian and Danubian refineries after the Polish campaign and before the British air assaults on Germany got going. So far this removal has kept these stocks out of reach of Allied air attack.

Large quantities of oil — for instance, the supplies for North Africa and Northern Norway — must be shipped via combined rail and water routes over thousands of miles and are often lost in transit.

According to Lloyd's registry of June 30, 1939, Italy and Germany had, at the start of the war, a combined sea tanker fleet capacity of 682,000 tons.

The Allies possess a tonnage of about 10,000,000 tons without the Russian tanker fleet, the size of which is not known. Up to April 1942, the Allies were supposed to have lost about 2,000,000 tons and the Axis powers 200,000 tons of tankers by enemy action.

IRAQ AND IRAN

Had Hitler realized the strength of Russian resistance, he might rather have decided to go for the oil of Iraq and Iran. Iraq produces 4 million tons and

Iran 10 million tons a year, but the production of both can be increased. But Bagdad was 150 miles and Basra 400 miles farther away from Berlin than was Baku, and the sea lanes of the Mediterranean were closed by British naval supremacy in the 'Italian lake.' The single-track Anatolian railroad could not have undertaken such tasks even if the conquest of Turkey might have been easier than the march through Russia.

The importance of the Iraq and Iran oil fields is different from that of the Russian oil fields. Not only is their output smaller and their variety poorer (high-quality lubricating oils are produced neither in Iran nor in Iraq), but the communication lines in Russia are safer than those from Iran and Iraq via Turkey and the Mediterranean. The loss of Iraq and Iran would be a hard blow for the Allies, but would not be fatal to their oil situation, provided the Americans are able to replace such a loss despite the great difficulties of transportation.

Hitler's treaty obligations with Japan may force him towards Iraq and Iran. Even if he should be successful there and obtain sufficient oil, this accomplishment would not seal Russia's defeat. He would still have the tremendous task of keeping the transport lanes open in the face of the British forces which exist in the Eastern Mediterranean. The land line from the Caucasus to Middle and Western Europe is much the safer and surer one. Therefore it is questionable whether Hitler will risk the opening of a new front against the Turks and the British before the outcome of the Russian campaign is certain.

Japan is now separated from her Axis partners by Russia in the north and by the British in the south, and no communication by land or by sea is yet available to them. Although the Japa-

nese conquered the Dutch East Indies and Burma, they will have much rebuilding to do in order to obtain oil; this additional source of supply will not relieve Hitler's oil situation in 1942.

Hitler will not be able to retain the initiative, as he has done up to now, unless and until he gains control of the Caucasian oil fields or Iraq and Iran. Even a relative scarcity in oil supplies may lead to the limiting of vital troop movements and activities.

Everything depends on the number of motorized troops and weapons which the Allies will be able to throw against Hitler on land, sea, and in the air, in order to force him to mobile operation which will finally exhaust his limited supply of oil. Then the Allies can compel Hitler to fight where, when, and in what manner they wish.

In 1918 Marshal Foch started successive trial offensives at many points of the western front in order to harass the weary Germans, to force them to make troop movements, and eventually to break through at the weakest points. When Hitler is obliged to shift his air and panzer armadas from east to west, from north to south, at a rate dictated by the initiative of the Allies, then the oil shortage will become a dangerous factor. The farther the fighting front is from the oil production centres, the more difficult will become the oil situation of the Axis. Taking this into consideration, the North African and Arctic war becomes more important as a campaign of movement over vast distances in spite of the fact that, compared with the Russian campaign as a whole, only small numbers of troops and matériel are engaged.

After the First World War was won, Lord Curzon said that 'the Allies floated to victory on a wave of oil.' Will this again be true?