1. How much oil will Germany use in war time?

Estimates of Germany's war-time requirements for petroleum range from those low estimates which forecast a war-time consumption of approximately the same magnitude as recent peace-time consumption — about 60 million barrels — to those which estimate her war-time requirements as double, triple, or even five times greater than peace-time requirements. There are few grounds on which to base an accurate independent estimate of Germany's war-time requirements for oil, since any forecast depends upon so many variables: The intensity of the warfare which will be waged; the number and character of the nations which will comprise the opposing belligerents; the amount of oil which will be available to Germany, taking into account the possible military destruction of her refineries, stocks in storage and the means of transportation to the East; etc.

It is even impossible to obtain precise figures on Germany's peace-time oil consumption: Some of the available estimates include military consumption and some exclude it; some include substantial quantities not consumed at all but diverted to storage; some claim not to include oil diverted to storage; etc. Careful analysis of the available estimates, however, seems to warrant the conclusion that Germany's peace-time oil consumption in 1938 was about 55 million barrels, and that in the first eight months of 1939 it was evidently at an annual rate of about 60 million barrels. Recent peace-time consumption was more than double the level of consumption in the years 1931 to 1933. This great increase in consumption has resulted from increased industrial activity, increased use of gasoline and Diesel motors in agriculture and on railways, and expanding civil motorization, as well as from noneconomic factors such as large scale military maneuvers, the huge military establishment, increasing reliance upon a motorized army and the air force, increasingly frequent mobilizations, construction of fortifications, and, in the last two years, expanding civil population after territorial conquest.
Some essentially journalistic estimates of Germany's war-time oil consumption put it as high as 300 million barrels. A more reputable estimate which has been quoted several times in German military journals forecasts war-time requirements of about 160 million barrels; other reputable estimates which have also been quoted in German sources forecasts a war-time demand of between 95 and 120 million barrels. There are good grounds, however, for accepting the lower forecasts of Germany's war-time requirements which have been made by officers in our Army and Navy Departments, as well as by Mr. Sadler of the Standard Oil Company of New Jersey, one of the best informed private oil men, who was one of the oil men interviewed in connection with this study.

War-time restriction of normal peace-time oil consumption may curtail such consumption as much as 25 percent, or 15 million barrels, over recent peace-time levels. About 10 million barrels of this saving may result from restriction of domestic civilian oil consumption — mainly gasoline; another 5 million barrels may be saved by the compulsory tying up of Germany's merchant marine — mostly fuel oil.

On the other hand, Germany's war-time consumption of oils may not be nearly as large as usually predicted; Germany's fleet will probably not consume as much oil in war time as it did during peace time; the entire 5 million barrels of fuel oil normally consumed by the merchant marine will probably, therefore, be a net saving. If Germany's warfare were carried on at a rate so intense that 100 bombing planes with 1 to 2 tons of bombs each made 1,000-mile round-trip bombing flights every six hours for a whole year, only about 1-1/2 million barrels of aviation gasoline would be consumed. Taking into account the gasoline consumption of pursuit and observation planes and that used in the training of new pilots, it may be estimated that the most intensive air-craft activity by Germany's fleet of 6,000 first-line planes could hardly use more than 5 million barrels of aviation gasoline per year — about one half the possible saving in civilian gasoline consumption.
The largest increase in war-time petroleum consumption will be due to the gasoline, lubricating oil, and Diesel oil requirements of army trucks, tractors, tanks, motorized gun units, etc. Whether war-time army consumption will expand over recent "peace-time" army consumption enough to consume less than, all, or more than the remaining savings of 10 million barrels over normal peace-time consumption, is entirely dependent upon the amount of activity of the army's motorized units. Taking into consideration Germany's extensive network of standard and narrow gauge railways and the character of the warfare thus far in the West, it is quite conceivable that war-time army consumption will not increase by more than the amount of that saving. On the other hand, if there are further campaigns on the scale of the Polish invasion or more intensive operations on the Western front, it is as easily conceivable that war-time army consumption will be two, three, or four times as great as this remaining saving over peace-time consumption.

It may be tentatively estimated, on the basis of the present outlook, that Germany's war-time petroleum requirements during active warfare will range between 60 and 80 million barrels. It is highly probable that Germany's consumption of petroleum in the first three months of this war has been within this range.

2. What oil supplies will Germany have to depend upon in war time?

Germany will be dependent for her war-time supplies of oil on (a) domestic natural petroleum production, (b) domestic synthetic petroleum production, (c) stocks in storage, and (d) importations from Rumania and Russia. A considerable rearrangement of Germany's peace-time sources of petroleum supplies has become necessary because of the war.

In recent peace-time Germany has not obtained as much as 10 percent of her domestic consumption from domestic production of natural petroleum. The German Government has encouraged oil drilling and domestic production of natural crude oil has increased from less than a million barrels annually, a few years ago, to nearly 5 million barrels, in Greater Germany, in 1938.
Rapidly increasing production in a relatively rich new field near Hanover and in an important Austrian field brought the rate of production in the first 8 months of 1939 to between 5 and 6 million barrels, probably nearer 6 million barrels.

About 25 percent of Germany's domestic consumption of petroleum in 1938 was met by domestic synthetic production which may have provided as much as 33 percent of her domestic consumption during the first 8 months of 1939. Germany's production of synthetic petroleum — almost all of which is synthetic motor fuel — has been increasing at a rapid rate: From only a few million barrels in 1933 the synthetic output had increased to nearly 15 million barrels in 1938; in the last two years capacity has been increasing at such a rapid rate — between 33 and 50 percent per year — that the total available capacity at the end of 1939 may be estimated at between 18 and 20 million barrels. The bulk of the synthetic production and the bulk of the increase is accounted for by the production of synthetic gasoline by the two hydrogenation processes. The production of benzene and alcohol has remained relatively stable during the past two or three years at about 4 million barrels of benzene and 2 million barrels of alcohol annually.

Germany's dreams of self-sufficiency in petroleum are far from being realized. From production within her own borders Germany met only about 20 million barrels of her total consumption of about 55 million barrels in 1938; she may have been meeting as much as 26 million barrels of her peace-time rate of consumption of approximately 60 million barrels in the first eight months of 1939. Even at the peak of the self-sufficiency program, during the past two years, domestic consumption increased more rapidly than synthetic plant capacity and natural crude production increased: From 1937 to 1939 total domestic production, natural and synthetic, did not increase by as much as 10 million barrels while domestic consumption increased by nearly 20 million barrels. From 1938 to the first 8 months of 1939 domestic production caught up to domestic consumption to some extent: In 1938 only a third of her consumption was met by domestic natural and synthetic production; after increases in both types of domestic production in the first 8 months of 1939, a larger percentage, but still considerably less than half, of Germany's domestic consumption was met by both types of domestic production.
Two-thirds of Germany's consumption in 1938 and more than half of her consumption in the first 6 months of 1939 has had to be supplied from abroad. Importations have been arriving at a rate at least as high as 40 million barrels a year during the past 18 months or so. During that period Germany's importations of mineral oil products were obtained primarily from the Western Hemisphere; only 10 percent in 1938 and about 15 percent in the first 6 months of 1939 was imported from Rumania and Russia.

War will provide a great stimulus to Germany's domestic production of both natural and synthetic petroleum; it can be expected to increase substantially, but not as much as consumption will increase.

Natural petroleum production can hardly rise by more than 3 million barrels from the 1939 peace-time level, to, say, 6 to 8 million barrels in 1940 and 8 to 9 million barrels in 1941 (including the addition of about a million barrels from those Polish oil fields which went to Germany). Production of synthetic petroleum by the hydrogenation processes may be expected to continue to increase in 1940 by the completion of plants already under construction, possibly to a capacity of as much as 20 million barrels by the end of that year. By the end of 1941 new synthetic plants which are put into construction now, after the outbreak of war, may be completed and put into production, although it is not known whether Germany is now beginning to construct any large new synthetic plants. It seems unlikely that the capacity existing at the end of 1940 could be increased by more than half by the end of 1941. It is unlikely, therefore, that synthetic output in the second year of war will be greater than 30 million barrels; it may be considerably smaller, even as small as 20 million barrels. The quantities of benzene and alcohol available for use as motor fuel will undoubtedly tend to decline in war time since both products are extensively used for munitions and other war uses. It is quite possible, that, during the first year of war, consumption of these two products for motor fuel will be only two thirds as large as the recent peace-time level and, during the second year of war, only one third to one half as large.
In the first year of war, therefore, Germany's total production from domestic sources may be expected to be between about 26 and 36 million barrels; in the second year of war it will probably lie between 30 and 45 million barrels. The deficiency between domestic production of such magnitude and total war-time requirements may be supplied from importations and from stocks on hand. If war-time requirements are no higher than 80 million barrels, and total domestic production no less than the minimum estimates given above, that deficiency would range from about 25 to about 55 million barrels in the first year of war and from 15 to 50 million barrels in the second year of war. The following table summarizes these tentative estimates:

<table>
<thead>
<tr>
<th></th>
<th>1938</th>
<th>1939</th>
<th>First (annual rate of war)</th>
<th>Second (annual rate of war)</th>
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<tr>
<td>(Estimated just before outbreak of war)</td>
<td></td>
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<tr>
<td>Consumption (including military use)</td>
<td>55-60</td>
<td>60-65</td>
<td>60-80</td>
<td>60-80</td>
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<tr>
<td>Domestic production</td>
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<td>Natural</td>
<td>5</td>
<td>6</td>
<td>6-8</td>
<td>8-9</td>
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<tr>
<td>Synthetic:</td>
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<td>Hydrogenation</td>
<td>9</td>
<td>14</td>
<td>16-22</td>
<td>20-32</td>
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<tr>
<td>Benzene and alcohol</td>
<td>6</td>
<td>6</td>
<td>4-6</td>
<td>2-4</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>26</td>
<td>26-36</td>
<td>30-45</td>
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<tr>
<td>Remaining consumption requirements to be supplied from imports and stocks</td>
<td>35-40</td>
<td>34-39</td>
<td>24-54</td>
<td>15-50</td>
</tr>
<tr>
<td>Imports</td>
<td>37-43</td>
<td>39-43</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Estimated stocks on hand</td>
<td>-</td>
<td>10-60</td>
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During the first year of war all or nearly all of Germany's remaining petroleum requirements may be met from stocks of petroleum products on hand in storage at the outbreak of war. It is generally admitted that during the last two years Germany has put large quantities of petroleum into storage. No trustworthy estimates are available, however, concerning the total amount of oil in storage in Germany, since that data is a military secret of prime importance; so far as can be learned there has been no "leak" concerning that amount. On the basis of an analysis of the available guesses, it may be stated that it would be quite unlikely that stocks are less than 10 million barrels, and it may be stated with reasonable assurance that stocks are not more than 60 million barrels -- one year's full peace-time requirements. Germany's stocks are probably nearer 60 than 10 million barrels, and a figure of 40 million seems to be the most reasonable tentative conclusion.

If it be assumed that Germany has about 40 million barrels of oil in storage, then during the first year of war she will have from 66 to 76 million barrels of oil available within her own borders. Under these assumptions importations would not have to be very large and, in fact, if they were even as large as recent importations from Rumania and Russia -- about 10 million barrels, and certainly if they were any larger, Germany would have enough oil for the first year. The chief purpose of the stocks on hand may be said to be to supply Germany from the outbreak of war until the time when importations from the East have been increased about four or fivefold. Stocks may almost entirely take the place of normal importations during the first year or so of war. If importations begin to be increased before the end of the first year, Germany might have available during the first year more oil than she would consume and might, therefore, have some small stocks on hand at the beginning of the second year of war. It may probably be taken for granted, however, that Germany will be compelled to use up most of her stocks during the first year of war and that Germany will then be dependent upon the importation of large quantities of petroleum. Since there are definite limitations to the
war-time expansion of Germany's domestic oil production, and since the total amount of oil in storage can only be decreased once war has begun, importations are the only really elastic source of supply which can be increased several fold to meet expanding war-time demands and to take the place of stocks when they are exhausted.

Most of Germany's peace-time importations have been eliminated by the British and French blockade of overseas shipments, cutting Germany off from the Western Hemisphere and Near Eastern sources from which she has obtained at least 85 percent of her recent importations. Small quantities of oils, possibly as much as 5 million barrels but more likely much less, might be purchased from the stocks on hand in adjacent neutral countries; slight additional quantities of oil may be obtained through the blockade. The bulk of Germany's war-time importations, however, will have to come from Rumania and Russia, which have been providing less than 10 million barrels annually. Two, three, or even five times as much Rumanian and Russian oil will have to be imported during the second year of war as has been imported during the past twelve months.

3. What obstacles must Germany overcome before obtaining adequate war-time oil supplies?

Before Germany can obtain, during war time, the necessary quantities of domestic and imported oil, tremendous obstacles must be overcome with respect both to the increase and protection of the domestic production, and with respect to the increase of importations from the East.

In the first place, there are many obstacles hindering Germany's successful expansion of her domestic production. Although war will remove the usual accounting profit and loss considerations which may have prevented an even greater expansion of Germany's natural production and synthetic plant capacity during the past two or three years when the self-sufficiency program was being pushed to completion, many real economic as well as noneconomic obstacles will still exist.
The problem of labor shortage is particularly important for Germany's petroleum industry since special skills and experience are required of petroleum engineers and workmen. Both natural and synthetic production has increased so rapidly in the past few years that there can be no surplus of petroleum workers or engineers in Germany. Furthermore, as is noted below, Germany will probably have to send a large number of skilled workers and engineers to Rumania and more to Russia, if a substantially increased oil production in those areas is to be made available for export to Germany. The reconstruction of war-time destruction and sabotage in the Polish fields will consume the activities of many skilled petroleum workers; if any Allied sabotage takes place in the Rumanian oil fields, additional German engineers will be required merely to restore output in that region. It is entirely conceivable that the potential 3 million barrel increase of German natural production over the 1939 rate of output will be sacrificed in order that all German petroleum engineers and skilled workmen who can be spared can be sent to Rumania and Russia to concentrate their efforts on increasing production in those far richer fields where the increase in output per German worker or engineer will be many times greater than it could be in Germany.

Germany also faces many problems in increasing her domestic production in war time, as a result of the shortage of specialized equipment of adequate quality. This is true not only of drilling equipment for increasing the output of German wells, but also of refinery equipment necessary for increasing the synthetic petroleum capacity and for building new aviation gasoline plants. To increase synthetic plant capacity within the next two years to as much as 30 million barrels annual capacity would require not only the diversion of large numbers of men, but the production, under conditions of war-time strain in the domestic industrial economy, of large quantities of specialized refinery products using scarce high quality alloys. It is quite probable that the shortages and delays which have become almost a commonplace in Germany in the past year or so will be multiplied many times in war time and that the construction of new synthetic plants will require more than the 18 to 24 months which has been assumed above.
A second important obstacle which Germany must face is the possibility of military destruction of her refineries, particularly her synthetic refineries, and of her stocks in storage. Refineries are peculiarly susceptible to damage by aerial or other bombardment. This is particularly true of synthetic refineries and the modern plants of producing aviation gasoline, where pressures as high as 10,000 pounds per square inch and temperatures as high as 3,000 degrees Fahrenheit are common. Oil in storage is likewise peculiarly susceptible to aerial bombardment, for storage tanks are usually difficult to camouflage effectively and it is unlikely that any great quantity of petroleum products are stored underground. Destruction of refineries or of oil in storage will greatly increase Germany's dependence upon imports.

Many obstacles stand in the way of Germany's obtaining adequate war-time oil supplies from abroad. With the exception of Estonia's small export surplus of heavy shale oil, and Hungary's near self-sufficiency in oil, all the remaining neutral countries in Europe which still have transportation lines to Germany, except Rumania and Russia, have little or no production of oil and are net importers of petroleum. The bulk of Germany's war-time imports, therefore, will have to come from Rumania and Russia. Before that is possible, an adequate surplus over domestic consumption must be available in both countries for export. Then Germany must solve not only the tremendous difficulties of transporting such large export surpluses over transportation routes which have been carrying only about a fifth of the necessary amounts, but she must find adequate means of payment for the oil and, above all, she must hope for the continuance of an international diplomatic situation which is favorable to the shipment of large quantities of Rumanian and Russian oil to Germany.

In 1936 Rumania exported about 35 million barrels of petroleum products and her exports are slightly less this year. Because of declining crude oil output, her export surplus has fallen from nearly 50 million barrels in 1936. This declining output may be attributed to exhaustion of the existing fields and to the disinclination of the predominantly foreign-owned oil companies, because of unfavorable Rumanian laws, to carry out further explorations and an adequate amount of new drilling. Under
ordinary conditions, if Rumanian laws changed in a direction more favorable to foreign ownership and operation of Rumanian oil fields, an increase of 5 to 10 million barrels in Rumanian output within a year or two would be possible. However, about half of the Rumanian output is under British and French control, which introduces the possibility of sabotage in the event that these Allied companies decide to prevent their output from being shipped to Germany. This may well happen if either Germany or Russia extends its control over Rumania, directly through conquest or forced pact or indirectly through threat of such action. Should the Allied owners of Rumanian oil wells decide to destroy the wells, it may take as much as six months to a year to restore Rumanian output to current levels. Under those circumstances, the activities of German engineers might be devoted primarily to reestablishing an export surplus.

Russia's net exports of oil in 1938 were only 8 million barrels; they are even less in 1939. In spite of an increase in crude oil output, Russian consumption of oil products has increased so rapidly and the waste between production and consumption has also increased so rapidly that, although the apparent "surplus" of production over consumption has only fallen from about 60 million barrels in 1932 to about 50 million barrels in 1938, actual exports have fallen from 45 million barrels to 8 million barrels in the same period. In spite of the apparent statistics, it is doubtful if there was an actual surplus of production over consumption of much more than 8 million barrels in 1938. If Russia permits German engineers to attempt to increase her export surplus, they will have to work as hard to overcome waste resulting from faulty equipment, lack of organization, and other inefficiencies, as to increase domestic production by remediating the existing faults in drilling equipment and practices. That German engineers will be able to achieve any substantial additional export surplus in the near future is highly dubious: As pointed out above there are not a great many German petroleum engineers and workers who can be spared from Germany, and they will be a very small number in comparison with the enormous problems facing them in the Russian oil fields; secondly, while the German drilling and other petroleum equipment may be of higher quality than the Russian, it is not generally considered to be of very high quality.
and, in any case, German petroleum equipment plants are not at present on an export basis to any important extent. It is more likely that additional German engineers will have to go to Russia to attempt to overcome the inefficiencies and faulty organization in Russian factories producing petroleum equipment, than that Germany will export any quantity of such supplies to Russia.

Aside from the problems of expanding Russian production and reducing Russian waste, the greatest remaining obstacle facing a German attempt to increase the Russian export surplus is the fact that there is actually a shortage of petroleum in Russia. Domestic consumption has been increased more rapidly than production and if any additional amount of Russian oil is made available, it can easily be consumed at home. If Russia gets into a major war, her consumption of petroleum will increase even faster, and it would then be extremely unlikely that even as much oil would be exported as was shipped abroad last year. If Russia remains "neutral" she can, if she wishes, sacrifice her own needs in order to keep Germany fighting.

Even if the Rumanian and Russian export surpluses are maintained at their present levels or, within a year or two, substantially increased, Germany still faces the problems of payment and of transportation.

Germany will have to import oil worth from $50 to $100 million a year, or even more. "Cash" payment for a single year’s requirements of imported petroleum might use up from one quarter to one half of Germany’s gold, silver, and foreign exchange. If Germany does not pay for her oil imports out of her cash reserves, she must pay with exports or by accumulating debts. In either event, if Germany is to obtain the whole or the greatest part of their export surpluses, Rumania and Russia would have to forego the $50 to $100 million of foreign exchange revenue which they have been obtaining for their oil exports. An interesting report in this connection is that England and France have deliberately increased the foreign exchange price which they offer for Rumanian oil. It is quite likely, since Germany’s normal over-seas export markets have been cut off by the Allied blockade, that she will be able to export more than enough commodities to the East to pay for her oil imports; such exports of German goods, however, must be used to pay for many other necessary war-time commodities as well as oil. In addition,
Germany will have to find commodities (or skills) which Rumania and Russia are willing to absorb in sufficiently large quantities and which can, at the same time, be manufactured or spared in Germany in large enough quantities in spite of war-time conditions there. Should Rumania or Russia furnish substantial amounts of oil to Germany on credit, the payment problem would, of course, disappear, but such a development seems unlikely especially for Rumania.

In order to obtain large quantities of Rumanian and Russian oil, Germany must not only allocate workers to the manufacture of goods for export in payment, and she must not only export skilled engineers and workmen to increase the Rumanian and Russian oil export surplus, but she must allocate large additional resources to the production of new tank car rolling stock and new Danubian river tanker or the conversion of ordinary barges into river tankers; in fact, Germany must probably export skilled railroad engineers to reorganize the Russian railroad system and supervise the building of additional rolling stock for it. Time is in Germany's favor in this respect. The larger are Germany's stocks of oil and the smaller her war-time requirements during the first months of the war, the more time Germany will have to devote to this problem of increasing transportation facilities to the East. By the time her stocks are exhausted and her war-time requirements increased to the full extent, it is more than likely that she will be able to transport sufficient quantities from Rumania and Russia.

Germany obtained less than 5 million barrels of oil from Rumania and Russia in 1938; imports into Greater Germany from these two countries in 1939 have been at the rate of about 10 million barrels a year. A considerable portion of these recent importations from Rumania and all the importations from Russia were shipped to Germany via deep sea routes which are no longer open. The Black Sea, the Danube River, and the three main railroad routes between Rumania and Russia and Germany, which have been carrying oil to Germany this year at a rate of only about 5 or 6 million barrels, must be expanded several fold until they can carry from 3 to 7 or 8 times the present trade. Most of the imports from Rumania will probably continue to move by Danubian river tanker, and the largest part of any Russian shipments
will likewise take this route, after being transported across the Black Sea by deep sea tanker. This will require a great increase in Danubian river tanker capacity. The existing tank car rolling stock in Germany, Rumania, and Russia is quite small and in all three countries has been fully occupied in peace time in the internal distribution of petroleum. From 1 to 10 thousand additional tank cars might conceivably have to be constructed in addition to the enlarged river tanker capacity. Additional problems which must be faced are the fact that the Danube normally freezes for about four months a year, that it traverses Yugoslavia territory for over 150 miles, and that the railroad gauge changes at the old Russian-Polish frontier. There is also the necessity of building large new transfer facilities for transferring oil from Black Sea tanker to river tanker or tank car at Constanta or Odessa or for transferring from river tanker to tank car at the head of the Danube or for transferring from broad gauge to standard gauge at the old Russian-Polish frontier; the fact that the German, Polish, and Russian railroad networks are already overworked and disorganized, and finally, the fact that oil is only one of many products which will have to be transported from the East.

Germany's ability to import adequate supplies of oil during war time and her ability to wage war after the first year are completely dependent upon the international political policies of Russia. If Russia permitted it, Rumania might fall on the side of the Allies, but it is far more probable that Rumania will be forced by Russia and Germany, at best, to maintain a benevolent neutrality, and she may be taken over completely. If Germany and Russia clash over Rumania, the Rumanian oil fields will, because of strategic factors, easily fall into Russian hands rather than German. Whether any Russian oil is shipped to Germany is a matter within the realm of Russia's international political policy. If Russia became a belligerent on the German side, then as pointed out above, she would probably have no oil surplus to export. If Germany should become a belligerent against Russia, she would be deprived not only of Russian oil but also of Rumanian oil.
Sources of Information for the German Oil Study

The investigation into the German petroleum situation in its relation to the waging of war has been based on information obtained from confidential reports submitted to the Treasury, and to the United States Military Intelligence Division; from material obtained from other Government agencies; from interviews with several leading oil men; and from trade journals, economic publications, books and newspapers. These sources are described in somewhat greater detail below:

1. Interviews with private oil men.

Mr. E. J. Sadler, vice president of the Standard Oil Company of New Jersey, was interviewed. Mr. Sadler was for many years in charge of Russianian, and then of European, oil fields for Standard interests. He is now in charge of operations for the Standard Oil of New Jersey and compiles an annual confidential report "Sadler's Annual Review of Foreign Oil". He provided material relating to Germany's consumption and production of oil and her refining capacity, and discussed the problem of Germany's wartime requirements and the obstacles facing her in obtaining Russianian oil.

Mr. Garfias of the City Service Company was interviewed. Mr. Garfias is a petroleum statistician who, for ten years or more, has made estimates of world consumption of petroleum and has also done noteworthy work with other international petroleum statistics. His annual estimates of consumption are widely quoted. Mr. Garfias explained the background and shortcomings of his recent estimates concerning Germany, and discussed one of his recent articles concerning Germany's war-time petroleum requirements.

Mr. Boris Said, who is a consultant to various oil companies on matters concerning Russia, was interviewed. He is very close to the Sooony Vacuum Company, a Standard Oil of New Jersey subsidiary. Mr. Said submitted copies of his 1939 memoranda concerning Russian oil developments; and discussed the problem whether Russia could supply Germany with large quantities of oil. He had a second interview with Mr. Currie in Washington.

Mr. Gustav Egloff, an official of the Universal Oil Products Company (holder of patents on refining processes), came to Washington for an interview with Mr. Currie. He discussed German refining capacity and synthetic production, and the problems connected with the manufacture of modern aviation gasoline.

Mr. Brown, an officer of the Chicago Bridge and Iron Company, was interviewed in an attempt to obtain some information concerning the amount of Germany's storage tank capacity. Mr. Brown said that he doubted whether any American businessman had any significant information along this line.
Mr. F. T. Ostrander, vice president of the National Supply Corporation, was interviewed; he discussed the drilling problems involved in increasing German, Rumanian and Russia oil production.

2. Government sources drawn on.

Material which Captain Puliston had obtained from the Army and Navy Intelligence Divisions concerning German oil was reviewed, in particular a confidential economic report on Germany prepared by the Military Intelligence Division. Certain statistics were also obtained directly from Colonel McCabe of the Military Intelligence Division. Additional material concerning Germany's army and navy war-time fuel consumption is still being prepared in the War and Navy Departments.

Mr. Redfield, an international petroleum expert in the Bureau of Mines, was interviewed. Use was also made of the monthly report of the Bureau of Mines, International Petroleum Trade.

Some information was obtained from the cables to the Treasury Department from the "Treasury men" in Paris and Berlin.

3. Published material.

The Petroleum Press Service, a private English weekly publication, contained a great deal of material. Various articles in the Oil and Gas Journal, in World Petroleum and in the Petroleum Times were useful. Miscellaneous articles were obtained from publications such as the Economist, and a certain amount of material was obtained from articles in the New York Times and other newspapers.
### OUTLINE

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<td>It may be reliably estimated that the total German consumption of oils during the first eight months of 1939 was about 5 million barrels a month, or at an annual rate of between 55 and 65 million barrels.</td>
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<tr>
<td>b. The rate of peace-time consumption in 1939.</td>
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<td>It may reasonably be estimated that Greater Germany's consumption of oils during the first eight months of 1939 was about 5 million barrels a month, or at an annual rate of between 55 and 65 million barrels.</td>
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<tr>
<td>In 1938, less than 10 percent of Germany's total consumption of all mineral oils was obtained from domestic natural production, about 25 percent was obtained from domestic synthetic production, and the remainder, 65 percent, obtained from importation.</td>
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<td>In 1939, it may be estimated that a slightly increased natural domestic production still provided not more than 10 percent of the increased domestic consumption; domestic synthetic production may have provided as much as 33 percent of domestic consumption, and importations were still drawn upon for nearly 60 percent of domestic consumption.</td>
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<td>(a) The production of natural petroleum in Germany</td>
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<td>Germany is estimated to have produced somewhat less than 5 million barrels of natural petroleum in 1938, and 1939 production may be expected to increase to about 6 million barrels.</td>
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<td>(b) Production of synthetic oil in Germany</td>
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<td>In 1938 approximately 12 to 13 million barrels of synthetic oils of all kinds were produced in Germany; this production may be expected to rise to a rate of more than 20 million barrels per year by the end of 1939.</td>
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<tr>
<td>(1) Production of synthetic gasoline and other oil products from hydrogenation.</td>
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</tbody>
</table>
(2) Benzene from Coke ................................................. 18
(3) Power alcohol and tetraethyl lead ......................... 19
(4) Other substitute synthetic fuels ......................... 20

(c) Imports. ................................................................. 21

Net imports of all mineral oils into Greater Germany in 1938 totaled between 37 and 43 million barrels. In the first six months of 1939 these heavy importations continued at an even higher level.

Germany's imports of mineral oil products in 1938 were obtained primarily from the Western Hemisphere and only to a very minor degree from Romania or Russia.

III. How much oil does Germany have in storage? ........ 28

All data on German stocks of oil are secret and all estimates of the amount she has on hand are mere guesses. There would not seem to be much likelihood that Germany would have on hand more than one year's peace-time supply, 60 million barrels, or less than two months' peace-time supply, 10 million barrels; a total of 40 million barrels seems quite probable.

(a) The problem. ......................................................... 28
(b) Some estimates. ..................................................... 31

IV. What are Germany's war-time requirements for oil? .... 34

It is impossible to make an accurate forecast of Germany's war-time requirements for petroleum; they may remain approximately the same as her peace-time requirements, about 60 million barrels, or they may increase to about double the peace-time level, 100 to 120 million barrels, or they might even increase to more than triple peace-time demands, 150 million barrels or more. There are good grounds, however, for accepting the more conservative forecasts.

a. Various estimates of Germany's war-time needs. .... 36

(1) No war-time increase over peace-time. (War-time consumption: approximately 60 million barrels). 36

Regraded Unclassified
(2) War-time requirements increased to as much as double peace-time consumption (War-time consumption: 75 to 120 million barrels)......... 37

(3) War-time requirements increased to three times peace-time consumption. (War-time consumption: 120 to 180 million barrels)........... 39

(4) Higher estimates. ............. 41

b. Wartime reduction of the civil use of oils.......... 41

During war-time Germany may be able to reduce her peace-time oil needs by as much as 25 percent, or 15 million barrels.

c. Wartime increase of the military use of oils ....... 45

Germany's war-time consumption of oils may not be nearly as large as usually predicted.

(1) Air Corps: 5 million barrels of aviation gasoline per year would be sufficient for very intensive aircraft activity by a fleet of 6,000 first line planes. ................. 46

(2) Navy: It is unlikely that German naval ships and submarines will use as much oil as the 6 million barrels formerly used by the German merchant marine. .................. 50A

(3) Army: The heaviest users of oils will be Army trucks, tractors, tanks, etc.; in the absence of further campaigns on the scale of the Polish invasion, and by making full use of her extensive network of broad and narrow gauge railways, Germany can hold this consumption somewhat in check ..................... 51

d. On the basis of the above calculations, which support the position taken by the United States War and Navy Departments, Germany's fuel requirements during active warfare may be conservatively estimated as not much greater than her peace-time consumption, perhaps between 60 and 80 million barrels a year. ........................ 56
V. Has Germany access to sufficient supplies of oil to enable her to prosecute this war without an oil shortage?

Germany must obtain her war-time supplies of oil from stocks, from increased domestic natural and synthetic production, and from increased imports from Rumania and Russia. If her war-time requirements do not exceed 60 to 80 million barrels, Germany will probably be able to obtain enough supplies from these sources to meet her war-time needs. There will always be the handicap of a near shortage, and adequate oil supplies will be entirely dependent on a continuation of Russia's friendly "cooperation".

a. Germany's stocks of oil (10 to 60 million barrels) will probably be largely exhausted during the first year of war. They will perform a vital service, however, in maintaining Germany until imports from Rumania and Russia can be adequately increased.

b. Domestic natural production can hardly be increased by more than 3 million barrels from the 1939 peace-time level. Even this amount of increase may be sacrificed if Germany's petroleum technicians concentrate their efforts on increasing the Russian export surplus.

c. Germany's synthetic production by the hydrogenation process cannot be expected to increase to more than 18 or 20 million barrels in 1940; by the end of 1941 another 10 to 12 million barrels might be added. The use of benzene and alcohol for motor fuel will not increase beyond its present level and may fall below 6 million barrels, since both products are extensively used in the manufacture of explosives.

(1) Hydrogenation process
(2) Benzene and alcohol

d. Even though Germany has stocks of oil in storage adequate for many months' war-time consumption, and even though she may double her domestic production during the second year of war, by the end of 9 to 12 months of warfare Germany's war machine will be dependent upon large importations of foreign oil.
(1) Some supplies of oil, perhaps between 1 and 5 million barrels, might become available to Germany shortly after the outbreak of hostilities by the purchase of existing stocks from adjacent neutral countries.

(2) It is unlikely that Germany will obtain any significant quantities of oil through the Allied blockade.

(3) The bulk of Germany's war-time imports will have to come from Rumania and Russia.

(4) During the next 12 months at least 35 million barrels of Rumanian and 10 million barrels of Russian oil should be available for export. Within a year or two the Rumanian export surplus might be increased to 40 or 45 million barrels and the Russian export surplus doubled or even, under favorable circumstances, increased several-fold.

(5) Tremendous difficulties of payment and transportation and many political uncertainties must be overcome before even the presently available export surpluses of Rumania and Russia, to say nothing of increased surpluses, can be received in Germany.

e. Barring destruction of refineries by Allied air raids, Germany probably has access to sufficient refinery capacity — at home and in Rumania and Russia — to meet her wartime needs for each particular type of mineral oil.

Even sufficient aviation gasoline for intensive aerial warfare will probably be available, although not of as high average octane rating as that available to the Allies.
I. How Much Oil Has Germany Been Using in Peace-Time?

a. Estimates for 1938 and previous years.

It may be reliably estimated that the total German consumption in 1938, military and civil, was between 50 and 60 million barrels and probably not far from 55 million barrels.

Germany's consumption of mineral oils in 1938 was more than double her consumption in 1933. Economic factors—heightened industrial activity, increased use of motors in agriculture and on railways, expanding civil motorization, expanding civil population after territorial conquest—and non-economic factors—large scale military maneuvers, huge military establishment, increasingly frequent mobilizations, construction of fortifications—were jointly responsible for the increase.

All data concerning Germany's peace-time consumption of oils are estimated. Some of these estimates are briefly described and analyzed below:

(1) The Standard Oil Company of New Jersey submitted confidentially an estimate of 56 million barrels, as follows:

<table>
<thead>
<tr>
<th>1938</th>
<th>Million Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor fuel</td>
<td>28.0</td>
</tr>
<tr>
<td>Gas oil and distillate</td>
<td>16.8</td>
</tr>
<tr>
<td>Fuel oil 1/</td>
<td></td>
</tr>
<tr>
<td>Kerosene</td>
<td>1.3</td>
</tr>
<tr>
<td>Residual fuel oil 1/</td>
<td>5.2</td>
</tr>
<tr>
<td>Lubricating oil</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>56.0</strong></td>
</tr>
</tbody>
</table>

In a letter to Captain Paleston, Mr. Sadler, vice president of the Standard Oil Company of New Jersey, stated that these estimates of "domestic demand" are based upon past records of

1/ Including, as deliveries to bunkers of vessels engaged in foreign trade: Gas oil, 4.7 million barrels; Fuel oil, 4.1 million barrels.
Year, exchange from the parent company and so subject to
be treated as the exchange of domestic demands made abroad.

There has come from the German Government, particularly to
the German Government in recent months of this year, a
statement that the exchange of domestic demands made abroad
are now so dependent on the parent company and so subject to
be treated as the exchange of domestic demands made abroad.

There is a statement that the exchange of domestic demands, made abroad
be treated as the exchange of domestic demands, made abroad, and that
throughout they are "voluntary contributions" during an inflation, however,
the restrictions of production, importation and production operations,
are now so dependent on the parent company and so subject to
be treated as the exchange of domestic demands made abroad.
<table>
<thead>
<tr>
<th>Year</th>
<th>1932</th>
<th>1934</th>
<th>1935</th>
<th>1936</th>
<th>1937</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>20.5</td>
<td>26.3</td>
<td>30.1</td>
<td>37.9</td>
<td>41.6</td>
</tr>
<tr>
<td>Motor fuel</td>
<td>12.4</td>
<td>15.8</td>
<td>17.5</td>
<td>21.9</td>
<td>23.2</td>
</tr>
<tr>
<td>Gas oil and distillate</td>
<td>1/</td>
<td>6.3</td>
<td>8.2</td>
<td>11.3</td>
<td>13.7</td>
</tr>
<tr>
<td>Kerosene</td>
<td>1.0</td>
<td>.9</td>
<td>.9</td>
<td>.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Residual fuel oil</td>
<td>7.1</td>
<td>3.3</td>
<td>3.5</td>
<td>3.8</td>
<td>3.7</td>
</tr>
</tbody>
</table>

These Standard Oil Company figures show a steadily upward trend of total consumption (excluding lubricating oil) amounting to 150 percent in the six-year period, 1933-1938. The increase from year to year was 28 percent from 1933 to 1934, 14 percent from 1934 to 1935, 26 percent from 1935 to 1936, 10 percent from 1936 to 1937, and 23 percent from 1937 to 1938. The upward trend was greatest in the case of Diesel oils and nearly as great in the case of motor fuels.

(2) The prominent petroleum statisticians, Garfias, Whiteel and Ristori estimated Germany's domestic civil consumption (including Austria) in 1938 as 53 million barrels, classified as follows:

<table>
<thead>
<tr>
<th>1938</th>
<th>Million Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor fuel</td>
<td>27.3</td>
</tr>
<tr>
<td>Gas oil and fuel oil</td>
<td>15.5</td>
</tr>
<tr>
<td>Kerosene</td>
<td>1.5</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5.2</td>
</tr>
<tr>
<td>Lubricants</td>
<td>3.5</td>
</tr>
<tr>
<td>Total</td>
<td>53.0</td>
</tr>
</tbody>
</table>

( Military consumption | 5.0 )

58.0 )

1/ Included with residual fuel oil.

2/ Consumption of lubricating oil in 1936 added 3.2 million barrels to this total.
It will be noted that this estimate and that made by the Standard Oil Company of New Jersey cited above are roughly similar in the case of motor fuel, gas oil and fuel oil, lubricants, and kerosene; the entry for "residual fuel oil" and "miscellaneous" is nearly identical in the two estimates.

In his paper "World Consumption of Petroleum Products and Related Fuels for Military Purposes" (February, 1938), and in an interview, Mr. Garfias stated that the above estimate of Germany's consumption is an estimate only of civil consumption, and does not include peace-time military consumption.

In the article cited above, he estimated Germany's 1937 military peace-time consumption (army, air force and navy) at 2.5 million barrels, or less than 5 percent of total consumption. Even though this figure does not include any consumption of oil which was military in a secondary sense, i.e., consumed by industry in connection with the rearmament program, it is undoubtedly too low for a military establishment as large as the German.

Mr. Garfias has not made a similar study of Germany's military consumption in 1938, during which year two complete mobilizations must have considerably increased this type of consumption. On the assumption that Mr. Garfias' estimate of Germany's military consumption in 1938 would have been somewhat higher, say, approximately 5 million barrels, we arrive at a total consumption of 58 million barrels in 1938. While this is similar to the figure given by the Standard Oil Company of New Jersey, it is in fact a considerably higher estimate of actual consumption than Standard Oil's,
since Mr. Garfias states that no part of his estimate of domestic consumption could have gone into storage, whereas Standard Oil stated that their estimate must be reduced to some extent by reason of the diversion of an unknown portion into storage.

Mr. Garfias' estimates of German civil consumption in previous years, including lubricating oils, are as follows:

<table>
<thead>
<tr>
<th></th>
<th>1933</th>
<th>1934</th>
<th>1935</th>
<th>1936</th>
<th>1937</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Million barrels)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23.5</td>
<td>29.2</td>
<td>33.7</td>
<td>38.9</td>
<td>45.3</td>
</tr>
<tr>
<td>Motor fuel</td>
<td>12.4</td>
<td>15.2</td>
<td>15.5</td>
<td>17.7</td>
<td>23.5</td>
</tr>
<tr>
<td>Gas oil and fuel oil</td>
<td>6.4</td>
<td>8.6</td>
<td>11.0</td>
<td>15.7</td>
<td>13.0</td>
</tr>
<tr>
<td>Kerosene</td>
<td>.8</td>
<td>.9</td>
<td>.9</td>
<td>2.2</td>
<td>8.8</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1.9</td>
<td>1.9</td>
<td>2.6</td>
<td>2.1</td>
<td>5.0</td>
</tr>
<tr>
<td>Lubricants</td>
<td>2.0</td>
<td>2.6</td>
<td>3.7</td>
<td>1.3</td>
<td>3.0</td>
</tr>
</tbody>
</table>

These figures, including lubricating oil, show an increase of 130 percent from 1933 to 1938. As was shown by the Standard Oil Company figures, the increase was greatest for Diesel and motor fuels.

(3) Dr. Oskar Tokayer, Editor of the Petroleum Press Service of London, gave an estimate of German consumption in 1938 (including Austria and Sudetenland) of 7.14 million tons, or 56 million barrels1/ This estimate was classified as follows:

1/ Precise comparison of estimates in terms of tons cannot be made with estimates in terms of barrels because the conversion factor varies for different petroleum products. For rough comparisons of figures including several types of oil, a conversion factor of 8 is used in this report. For conversion of specific types of oils, the following approximate conversion factors are used, as given by the Petroleum Press Bureau:

<table>
<thead>
<tr>
<th>Barrels per Metric Ton</th>
<th>Barrels per Metric Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oils</td>
<td>6.75 - 7.5</td>
</tr>
<tr>
<td>Gasoline</td>
<td>8.5</td>
</tr>
<tr>
<td>Kerosene</td>
<td>7.75</td>
</tr>
<tr>
<td>1938</td>
<td>Million tons</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
</tr>
<tr>
<td>Light motor fuels</td>
<td>3.15</td>
</tr>
<tr>
<td>Other gasoline</td>
<td>.20</td>
</tr>
<tr>
<td>Gas and Diesel oil</td>
<td>1.47</td>
</tr>
<tr>
<td>Gas and Diesel oil for bunkers (German vessels)</td>
<td>.23</td>
</tr>
<tr>
<td>Fuel oil for bunkers (German vessels)</td>
<td>.64</td>
</tr>
<tr>
<td>Kerosene</td>
<td>.11</td>
</tr>
<tr>
<td>Crude oils and residues</td>
<td>.27</td>
</tr>
<tr>
<td>Lubricants</td>
<td>.57</td>
</tr>
</tbody>
</table>

Total - Old Germany 6.64 52.0

Austria .35 2.8

Sudetenland .15 1.2

Total - Greater Germany 7.14 56.0

Like the Standard Oil estimate of consumption, this estimate includes both military and civil consumption. Also, like the Standard Oil estimate, however, Dr. Tokayer's estimate includes an indeterminate amount which went to the building up of stocks and was not really consumed.

It will be observed that Dr. Tokayer's estimate for light motor fuels and gasoline is roughly similar to the estimates made by the Standard Oil Company and by Mr. Garfias; his estimate for fuel oil, and crude oil and residuals, is also roughly similar to the items for residual fuel oil and "miscellaneous" in the other two estimates. Dr. Tokayer's estimate for gas and Diesel oil (including bunker deliveries) is smaller than the other two estimates, as is his estimate for kerosene consumption.
Dr. Tokayer's estimate of lubricating oil consumption, 4 million barrels, is midway between the other two estimates.

It will also be noted that, while Dr. Tokayer's estimate of fuel oil provided for the bunkers of German vessels, is almost identical with the similar figure given by the Standard Oil Company (see note 1, page 1 above), his estimate of gas and Diesel oil provided for the bunkers of German vessels is less than half as large as the figure given by the Standard Oil Company. It is conceivable, of course, that substantial quantities of gas and Diesel oil were provided to vessels other than German, although this should have increased Dr. Tokayer's estimate of gas and Diesel oil consumption, which, as already pointed out, is less than in the other two estimates.

b. The rate of peace-time consumption in 1939

It may reasonably be estimated that Greater Germany's consumption of oils during the first eight months of 1939 was about 5 million barrels a month, or at an annual rate of between 55 and 65 million barrels.

There are almost no available estimates of Germany's consumption of oils in the first eight months of 1939. Mr. Sadler stated that, inasmuch as Germany's consumption during the last few months of 1938 had had to be estimated in New York, the Standard Oil Company of New Jersey had nothing to indicate what was the trend of consumption in 1939.

In a recent issue of the publication, Oel und Kohle, Germany's consumption of lubricating oil in 1938 was given as 3.990 thousand barrels.
In their paper "Petroleum Supply of Axis Powers Short of Wartime Needs", Messrs. Garfias and Ristori gave a rough estimate of Germany's civil consumption in 1939 as 55 million barrels. To this figure, of course, would have to be added the figure of 'peace-time' military needs, including one mobilization and the occupation of new territory. A total of at least 5 million barrels of oils may be taken as the annual rate of military consumption for the peace-time months of 1939, giving a total of 60 million barrels as his estimate of the annual rate of civil and military consumption in 1939.

Dr. Tokayer, in his Petroleum Press Service, has estimated that the inclusion of Czechoslovakia in Greater Germany increased her annual rate of consumption for the first few months of 1939 to about 7.5 million tons, or 60 million barrels.

One rough estimate of peace-time consumption in 1939 was stated in a recent confidential report on Germany's raw material situation by the Military Intelligence Division of the United States Army. They estimated that Germany's consumption of fuel oil, lubricants and gasoline for 1939 would reach between 5 and 6 million tons—40 to 48 million barrels. If this estimate is intended to exclude other oils, such as gas and distillate fuel oil and kerosene, it would indicate an increase of from 10 to 30 percent in the consumption of these three types of oil from 1938 to 1939—a very high rate of increase. If, on the other hand, this estimate is intended to cover all types of mineral oil, it would seem very unlikely that Germany would consume less petrolatum in 1938 than in 1939.
It is quite likely, on the other hand, that Germany’s consumption of oils increased in the first eight months of 1939 under the impetus of increasing motorisation and increasing industrial activity. As shown above, German consumption of mineral oils has increased one and a half times since 1933, the increase varying from 10 to 28 percent annually. However, measures began to be taken by the German authorities during 1939, in an attempt to reduce civilian consumption of oils. It may reasonably be assumed, on balance, that the rate of German consumption increased by about 10 percent from 1938 to 1939, equivalent to the lowest annual increase since 1933.

The consumption of Greater Germany certainly increased from 1938 to 1939 for an additional reason, due to the seizure of the remaining areas of Czecho-Slovakia in March 1939. Mr. Garfias had estimated the total consumption of Czecho-Slovakia in 1938 as 2,200,000 barrels, comprised as follows:

<table>
<thead>
<tr>
<th>Czecho-Slovakia</th>
<th>1938</th>
<th>Million barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor fuel</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Gas and fuel oil</td>
<td>.4</td>
<td></td>
</tr>
<tr>
<td>Kerosene</td>
<td>.4</td>
<td></td>
</tr>
<tr>
<td>Lubricants</td>
<td>.2</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.2</strong></td>
<td></td>
</tr>
</tbody>
</table>

On the other hand, the confidential Army report already referred to gives the recent Czecho-Slovakian annual requirement as 410,000 tons of all types of mineral oil, 3.3 million barrels; this is 50 percent greater than the other estimate. The Petroleum Press Service estimated Czecho-Slovakian consumption in 1938 as 500,000 tons, or 4 million barrels. Against this additional Czecho-Slovakian consumption can be put a production of only 130,000 barrels in 1938.
Czecho-Slovakian consumption may have declined somewhat after the German occupation in March 1939, but we have no estimate of its level for the year 1939.

It may be tentatively concluded that the annual peace-time rate of consumption of mineral oils in Greater Germany in 1939 might have been expected to increase beyond the 1938 level of consumption by from 5 to 10 million barrels. An increase of this extent would have brought Germany's 1939 peace-time consumption, civil and military, to well above 60 million barrels.

II. How has Germany Obtained Its Peace-Time Supplies of Oil?

Germany's peace-time consumption of oil has been obtained from three sources: domestic natural production, domestic synthetic production and imports.

In 1938, less than 10 percent of Germany's total consumption of all mineral oils was obtained from domestic natural production, about 25 percent was obtained from domestic synthetic production, and the remainder, 65 percent, obtained from importation.

In 1939, it may be estimated that a slightly increased natural domestic production still provided not more than 10 percent of the increased domestic consumption; domestic synthetic production may have provided as much as 35 percent of domestic consumption, and importations were still drawn upon for nearly 60 percent of domestic consumption.

<table>
<thead>
<tr>
<th></th>
<th>1938 (Million barrels)</th>
<th>1939 (Million barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>55-60</td>
<td>60-65</td>
</tr>
<tr>
<td>Domestic natural production</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Domestic synthetic production</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Total domestic production</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Remaining consumption requirements to be supplied by imports</td>
<td>35-40</td>
<td>34-39</td>
</tr>
<tr>
<td>Actual net imports</td>
<td>37-43</td>
<td>39-40</td>
</tr>
</tbody>
</table>
Germany's dreams of self-sufficiency in oils have not been realized and cannot be realized for many years, if ever. And while her total domestic output rose 3 million barrels from 1937 to 1938, her consumption rose by more than 9 million barrels, leaving her even more dependent upon imports than before.

Germany's heavy importations are drawn predominantly from the Western Hemisphere. However, her total importations have not been very much larger than the supplies of oil which Germany might be able to obtain if she absorbed the entire exportable surplus of Rumania.

Germany's dependence upon imported oils is greatest in the case of Diesel oil, of which she provides only about 10 percent of her annual peace-time requirements from her domestic production. Her dependence on imported oils is least in the case of kerosene and motor fuels: in 1938, approximately 60 percent of her domestic consumption of light motor fuel was produced domestically. 30 percent of Germany's consumption of lubricating oils was produced from domestic oils in 1938.

(a) The production of natural petroleum in Germany.

Germany is estimated to have produced somewhat less than 5 million barrels of natural petroleum in 1938, and 1939 production may be expected to increase to about 6 million barrels.

The natural production of petroleum in Germany has more than doubled since 1933 as a result of intensive exploitation and the discovery of new fields. Standard Oil Company data indicate that
the domestic natural production in 1938 was 4.3 million barrels, which included about 500,000 barrels of Austrian production, in contrast with a production in 1933 of only 1.7 million barrels. Other estimates of domestic production in 1938 are slightly higher than the estimates of Standard Oil. Mr. C. H. Ehlers 1 estimated 1938 production, including Austrian production, at about 6 million barrels. Mr. C. W. Wright of the Bureau of Mines 2 estimated 1938 output at 550,000 tons plus 70,000 tons of Austrian output, or about 4.2 million barrels. This estimate is identical with the estimate of the Petroleum Press Service. It has been stated that production figures for certain German fields are kept secret.

At the end of 1938, nearly 6,000 workers were employed in the German oil fields and about 6,700 in August 1939.

The 1939 output of natural petroleum may reasonably be expected to be higher than the 1938 production. Completed wells in the new oil field discovered near Hamburg in late 1937 were partially closed down in 1938 awaiting construction of new refineries and will probably go into full production this year. Production in other fields was also to some extent restricted because of lack of storage and transportation facilities. New exploration is still being pushed, and more intensive exploitation being applied to all fields.

1/ Oil and Gas Journal "Reich Stimulates Oil Production", March 16, 1939.

In the first seven months of 1939 total production of crude oil in Greater Germany was 16 percent higher than during the same period in 1938, including Austrian production in both years. Austrian production increased 23 percent in the first seven months of 1939 over 1938. Total production rose 23 percent in the first three months of 1939 over the same period last year; the rate of increase then slowed down, but more recently the trend of production has been again upwards: the average monthly output in Greater Germany in the first seven months of 1939 was 433,000 barrels, but the production in July 1939 was 481,000 barrels. At this rate the total production for the year should be between 5½ to 6 million barrels.

In a recent issue of the Petroleum Press Service, Dr. Tokayer stated that Germany's natural crude oil output in 1939 might reach as high as 800,000 tons, or 5.6 million barrels. He estimated that German output, even at that level, might be capable of some expansion but not beyond 1 million tons, 7 million barrels, under any conceivable conditions in the near future.

Germany's natural crude oil, according to Mr. Sadler, is naphthenic (asphalt base) with the result that although it is now Germany's policy to reserve her output of natural petroleum mainly for the manufacture of lubricating oils, the domestically produced oils are not of very high quality. Moreover since her consumption of lubricating oils for 1938 was over 500,000 tons, even a total output of 800,000 tons of crude oil would leave her far from self sufficient in this respect, especially in the production of the higher grade lubricating oils for aviation, etc.
Dr. Tokayer estimates that in 1938 only about 180,000 tons, 1.3 million barrels, of lubricants were produced from German crudes (an increase from 110,000 tons in 1936—Standard Oil Company data). In addition, he estimates that the 1938 domestic natural production yielded the following:

<table>
<thead>
<tr>
<th></th>
<th>Tons</th>
<th>Million barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>120,000</td>
<td>1.0</td>
</tr>
<tr>
<td>Gas oil</td>
<td>50,000</td>
<td>0.4</td>
</tr>
<tr>
<td>Kerosene</td>
<td>65,000</td>
<td>0.5</td>
</tr>
</tbody>
</table>

(b) Production of synthetic oil in Germany

In 1938 approximately 12 to 13 million barrels of synthetic oils of all kinds were produced in Germany; this production may be expected to rise to a rate of more than 20 million barrels per year by the end of 1939.

The production of synthetic oil in Germany has expanded very rapidly in the last five years and she leads the world in this development. However, exact figures on the output of synthetic oils or the plant capacity for producing synthetic oils are impossible to obtain. For 1938 the figure of 12 to 13 million barrels, given above, seems to be accepted in a wide variety of published articles and it is substantiated by material obtained from the Standard Oil Company. However, the veil of secrecy thrown over the construction and operation of synthetic plants is so great that all estimates of output are liable to considerable error. There are possibilities of deliberate error in the direction of exaggerating domestic synthetic production figures for propaganda effect; however, there are equally possibilities of underestimating domestic synthetic production from the point of view of military strategy.
Germany's total synthetic production is derived from three chief sources: from the hydrogenation process, from the manufacture of coke, and from the production of commercial alcohol. Synthetic production in 1938 and 1939 may be stated approximately as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Hydrogenation</th>
<th>Benzene</th>
<th>Alcohol</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1938</td>
<td>8.6</td>
<td>4.0</td>
<td>2.0</td>
<td>14.6</td>
</tr>
<tr>
<td>1939</td>
<td>14</td>
<td>4</td>
<td>2</td>
<td>20</td>
</tr>
</tbody>
</table>

(Million barrels)

In the recent paper by Messrs. Garfias and Histori, referred to above, the total production of petroleum and related fuels in Germany is put at 17.3 million barrels in 1938 and 20 million barrels in 1939. Subtracting the 5 million barrels of natural petroleum production in 1938 and 6 million barrels in 1939, we obtain Mr. Garfias' estimate of total synthetic production of 12.3 million barrels in 1938 and 14 million barrels in 1939. Dr. Gustav Egloff, of the Universal Oil Products Company, estimated the total production of synthetic fuels in 1939 at about 17 million barrels.

1/ Production of synthetic gasoline and other oil products from hydrogenation.

The most important synthetic output is that obtained by the hydrogenation of coal, brown coal, coal tar and lignite. There are two processes: the most extensively used, the "I. G. Bergius" process is a high temperature and high pressure process which can only produce gasoline, of about 75 octane rating; the other, the

1/ "Fuel Supply of Axis Powers Short of War Time Needs."
"Fischer-Tropsch" process is a low pressure and low temperature process which produces, in varying proportions, gasoline, benzol, aviation gasoline, Diesel oil, paraffin, light oil, small quantities of lubricating oil, and compressed gas which can be used for motor fuels. The gasoline produced by this process, before cracking or other further treatment, has a very low octane rating of 20 to 40.

Dr. Tokayer, in the Petroleum Press Service, estimates 1938 production of synthetic light fuels at 1.2 million tons, about 10 million barrels, to which he adds approximately 3/4 million barrels of synthetic gas and Diesel oil derived from these same processes.

According to Standard Oil Company data about 7.2 million barrels of light motor fuel and 1.4 million barrels of other oil products were obtained from the two hydrogenation processes in 1938, a total of 8.6 million barrels. In 1933, production of mineral oils by hydrogenation had amounted to only 1.4 million barrels.

Although a medium quality lubricating oil can be produced in small quantities from the Fischer-Tropsch synthetic process, it has recently been stated by a Dr. Hundsforder, chief chemist of the largest German refinery, that research work on the production of synthetic lubricating oil is still insufficiently advanced for commercial output.
Plant capacity has grown to the present levels in five or six years, and this rapid expansion is continuing. It appears that nearly 5 million barrels of new plant capacity came into full operation at the end of an 18-month plan in December 1938. This is substantiated in confidential data submitted by the Standard Oil Company of New Jersey showing a daily rate of synthetic gasoline production in October 1939 of nearly 30 thousand barrels per day, or practically 11 million barrels per year; representing an increase in the output of gasoline alone of 3.8 million barrels over the rate of production in 1938. It likewise appears from the Standard Oil Company data that an additional 3.3 million barrels capacity for the manufacture of synthetic gasoline was to come into operation at the end of 1939. This would bring the annual rate of production of synthetic gasoline at the end of 1939 to 14.3 million barrels, and the annual rate of production of all synthetic oils from hydrogenation processes to as high as 16 million barrels per year. Of course, the total actual output in 1939 would not be as high as 16 million barrels but would be somewhere between 11 and 16 million barrels.

This computation checks quite closely with two other estimates of 1939 synthetic output. Mr. Garfias estimates the synthetic output for 1939 at 14 or 14.5 million barrels, and Dr. Tokayer estimates 1939 output at from 1.7 to 1.8 million tons, 14 to 15 million barrels.
Mr. David Wosk, in the Oil and Gas Journal for October 19, estimated the cost of producing a gallon of gasoline from coal by hydrogenation at about 25 cents. Dr. Eglöf, however, estimates that it costs about 18 cents a gallon, 1/ which figure was substantiated by a British Labor Party report in 1938. This cost compares with a cost of imported gasoline, f.o.b. Hamburg, of about 5 cents per gallon.

The cost of synthetic oil may also be calculated in terms of plant and man power. From English experiments in the production of synthetic fuels by hydrogenation, it has been estimated that it costs about $40 million to produce 150,000 tons of gasoline by the Bergius method, and $15.5 million to produce 60,000 tons by the Fischer-Tropsch method. 2/ At such levels the cost of the German plants which are now operating was approximately half a billion dollars.

It was likewise estimated in England that 150,000 tons of synthetic fuel output required 2,000 men in the plant and 4,000 men in mines, transportation, etc. Present German synthetic output would require, at this rate, 70,000 workers; 23,000 in plants and 45,000 in mines, etc. Furthermore, 1.5 to 2 tons of coal must be processed in the production of 1 ton of synthetic gasoline, plus 3 to 3½ tons of coal which must be used in subsidiary

2/ Committee of Imperial Defense of Great Britain (1938).
processes, a total of 5 tons of coal for one ton of gasoline. Approximately 9 million tons of coal are therefore consumed annually in the production of Germany's present rate of output of synthetic gasoline.

Dr. Egloff estimated that a hydrogenation plant with a capacity of 3,000 barrels per day, or 1 million barrels per year, would take at least 18 months to build, and would cost approximately $30 million.

Data submitted by the Standard Oil Company show that hydrogenation plants produce 2.6 times as much gasoline when kerosene or light gas oil is used as the "feed" instead of coal, lignite, etc., and 1.55 times as much gasoline when petroleum residues are used as "feed". It has been reported that some part of the tremendously increased output of synthetic oils in Germany during the past two or three years has been produced by using imported light distillates and residues instead of coal, etc., as "feed". If this is the case, then the actual "synthetic" output is smaller than has been indicated.

(2) **Benzene from Coke**

The second most important type of German synthetic oil is benzene, a by-product of Germany's commercial production of coke—which is in turn dependent upon her production of steel—and in much smaller degree a by-product of her production of illuminating gas. In the gasification of 1 ton of coal about 3 gallons of
benzene are produced. Because it is a by-product, the production of benzene does not vary greatly from year to year. The American Consul at Bremen and Dr. Tokayer reported an 11 percent increase from 1937 to 1938, to 540,000 tons. The total produced in 1939 would probably not increase by as much as 10 percent over 1938.

Standard Oil Company data estimates the total output of benzene and power alcohol in 1938 as 4.6 million barrels. Several other sources, however, give higher figures. Dr. Egloff estimated Germany's benzene production in 1937 as 430,000 tons, 3.7 million barrels. Mr. Weak gives 1938 production as 550,000 tons, 4.7 million barrels.

Dr. Tokayer estimates Germany's 1938 production of benzene at 540,000 tons, but states that only 80 percent of this was used as motor fuel, or 3.7 million barrels. This is probably the best estimate.

Benzene has a high octane content, rating over 90, and is widely used to mix with other gasoline for improving octane content. It is primarily used for automobiles, however, since, according to Standard Oil Company data, it has a very poor "lead response" and must be given drastic treatment in order to become satisfactory for aviation gasoline. It also has freezing point tendencies which make it unsuitable for use in airplanes.

(3) Power alcohol and tetraethyl lead.

Since 1930 alcohol has been compulsorily mixed with light motor fuel in Germany. The proportion of the mixture has varied, partly as a function of the amount of excess potato crop in the
hands of the farmers whom it was desired to subsidize, partly because the output of potato alcohol was not sufficient to meet high mixing proportions. In some years alcohol was imported, and since 1936, synthetic methanol was also used. Dr. Egloff estimated power alcohol consumption in 1937 at 210,000 tons. Dr. Tokayer estimated 1938 output of power alcohol at 225,000 tons, nearly 2 million barrels. Mr. Weck estimates this consumption at 263,000 tons in 1938, 2.2 million barrels.

In the Spring of 1939 a new plan was announced which terminated the use of alcohol as motor fuel in the southern area of Germany, about 2/3 of the total area. In that area tetraethyl lead was to be used as an anti-knock agent instead of alcohol. In the northern third of the total area alcohol was to be used as before. New plants have been erected for the production of tetraethyl lead which is being used commercially on a large scale in Germany for the first time.

(4) Other substitute synthetic fuels.

Germany, along with some other European countries, has pushed the development of various forms of synthetic motor fuel other than those named above. The use of these fuels, however, is still practically in an experimental stage, and they do not amount to any significant proportion of total domestic consumption. Dr. Tokayer, for example, estimates that possibly 100,000 tons, or less than 1 million barrels, of gaseous and solid fuels was consumed in Germany in 1938.
Various types of compressed gas, such as coal gas, methane, ethane, propane, and butane, are being used for motor fuel. In Germany, in 1938, there were about 22,000 vehicles using "fuel gas", a mixture of propane and butane. Vehicles propelled by gas carry racks and steel cylinders in which the gas is carried under compression. These gases are obtained from coal carbonization, coal hydrogenation, from the Fischer-Tropsch process, from natural gas, from the manufacture of synthetic hydrogen, and from ordinary petroleum cracking operations.

Producer gas, a product of the burning of coal, coke, lignite, wood or charcoal, is very slightly used; it is estimated that Germany had about 2,000 such vehicles in 1937. Synthetic ammonia, acetylene and hydrogen have also been experimented with but are not being used even to the extent of the other two types.

In the Spring of 1939 it was announced that after October 1 of that year all omnibuses in Germany, and after April 1, 1940, all omnibuses in Austria and Sudetenland, if they had a capacity of sixteen persons, would have to be converted to the use of some form of gas as fuel, instead of gasoline.
(c) Imports.

Net imports of all mineral oils into Greater Germany in 1938 totalled between 37 and 43 million barrels. In the first six months of 1939 these heavy importations continued at an even higher level.

Germany has always depended heavily upon imports of oil and although her own domestic production of natural and synthetic oils has tremendously increased since 1933, her domestic consumption has increased so rapidly that total mineral oil imports have continued to increase in every year since 1932.

Precise comparable data concerning imports is difficult to obtain, however. In the first place, imports of crude and other oils which may be further processed cannot be directly compared with consumption figures since the refining process yields some products such as asphalt, paraffin, which are not included in our estimates of consumption of mineral oil. In the second place, customs statistics have been disorganized as a result of the rapid increase of Greater Germany: imports into Austria were not included in the official German trade statistics for a year, from March, 1938 until March 30, 1939. Imports into Sudetenland were not included from October to December 31, 1938. Imports into Bohemia, Moravia and Slovakia are not yet publicly reported. Such omissions are particularly important in the case of a product such as mineral oil which can be imported over any frontier and readily shipped by tank car or barge to any other region within a country. In 1937 Austrian statistics showed imports of over 2 million barrels of mineral oils, and
Czechoslovakian statistics showed 1937 imports of nearly 4 million barrels of mineral oils. In the third place, the German basis of mineral oil import statistics was completely altered on January 1, 1939 in the direction of giving better statistics of actual arrivals; but this means that 1939 figures are not comparable with 1938 figures.

Because of these factors, statistics of total German imports of mineral oils vary when quoted in different sources.

The official German statistics of mineral oil imports in 1938, excluding Austria for the eight months after Anschluss, and excluding Sudetenland for the last three months, show imports of 33.2 million barrels, or including petroleum residues, 37 million barrels. The official import statistics for the first six months of 1939, including Sudetenland and including Austria after April 1, show total imports of 19 million barrels (with practically no imports of petroleum residues) or at an annual rate of 38 million barrels.

These import totals were made up as follows:

<table>
<thead>
<tr>
<th></th>
<th>1938 Thousand Tons</th>
<th>Million Barrels</th>
<th>First 6 months of 1939 Thousand Tons</th>
<th>Million Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>778</td>
<td>5.5</td>
<td>557</td>
<td>3.9</td>
</tr>
<tr>
<td>Gasoline</td>
<td>1,357</td>
<td>11.5</td>
<td>654</td>
<td>5.6</td>
</tr>
<tr>
<td>Gas &amp; Diesel Oil</td>
<td>1,468</td>
<td>10.6</td>
<td>812</td>
<td>5.9</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>406</td>
<td>2.7</td>
<td>350</td>
<td>2.3</td>
</tr>
<tr>
<td>Lubricating Oil</td>
<td>388</td>
<td>2.7</td>
<td>175</td>
<td>1.2</td>
</tr>
<tr>
<td>Kerosene</td>
<td>22</td>
<td>.2</td>
<td>17</td>
<td>.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,419</strong></td>
<td><strong>33.2</strong></td>
<td><strong>2,565</strong></td>
<td><strong>19.0</strong></td>
</tr>
<tr>
<td>Petroleum Residues</td>
<td>528</td>
<td>3.8</td>
<td>31</td>
<td>.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,957</strong></td>
<td><strong>37.0</strong></td>
<td><strong>2,590</strong></td>
<td><strong>19.2</strong></td>
</tr>
</tbody>
</table>
and this must be subtracted from the import totals given above before

A small amount of tobacco is normally imported from Germany

In 1938, 62 percent of German imports were tobacco products, ready for use, and only 38 percent were imported for further processing. Ready for use, and only 38 percent were imported for further

processing. Ready for use, and only 38 percent were imported for further

In 1938, 62 percent of German tobacco products were imported

for oral consumption than the official statistics

For oral consumption, the official statistics

the standard oral consumption is about 6 million packets a year

or 2 million packets in 1937, either they were much greater in 1938,
or in the official statistics, an estimation is given of about 37 million packets a year

altogether be compared with the figure of 27 million packets given

since these figures do not include tobacco products, relationship with grade

<table>
<thead>
<tr>
<th>Year</th>
<th>First Quarter</th>
<th>Second Quarter</th>
<th>Third Quarter</th>
<th>Fourth Quarter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1936</td>
<td>5.7</td>
<td>6.6</td>
<td>7.3</td>
<td>6.8</td>
<td>26.4</td>
</tr>
<tr>
<td>1937</td>
<td>6.2</td>
<td>7.1</td>
<td>7.6</td>
<td>6.9</td>
<td>28.8</td>
</tr>
<tr>
<td>1938</td>
<td>7.0</td>
<td>7.4</td>
<td>7.5</td>
<td>7.1</td>
<td>30.1</td>
</tr>
</tbody>
</table>

estimated as follows:

In 1938, 4.5 million packets. With the exception of tabacchino, all other tobacco products imported into Greater Germany, including cigarettes, however, estimated proportionately by the standard

each

cover imported cigarettes and tobacco products imported for these months

cover the importation figures were not introduced in the published

At least 2 million packets must be added to the 1938 figure to
arriving at the net import contribution to consumption. Official German statistics show exports of 195,000 tons, about 1.5 million barrels, of mineral oils in 1938, and 116,000 tons, nearly 1 million barrels, in the first six months of 1939. The largest commodity of export is high quality lubricating oil; the next most important export product is petroleum residues. Standard Oil Company data show exports of mineral oil products from Greater Germany of 2.8 million barrels in 1938.

It may be concluded, therefore, that imports into Greater Germany in 1938 lay within a range of 37 to 43 million barrels.

Statistics of imports for the first six months of 1939 show a large increase over the figures for the first six months of 1938, although, of course, the figures are not strictly comparable. The official statistics show about a 20 percent increase in the first six months of 1939 over the first six months of 1938. The Petroleum Press Service estimated the rise in the first quarter of 1939 over the same period of 1938 at 41 percent, and the increase in the first six months of 1939 over the same period in 1938 as 20 percent. (The Petroleum Press Service showed imports of mineral oils in the first six months of 1939 as 20.1 million barrels.) Taking into account imports into Sudetenland and the "Protectorate" for three months each, it may be concluded that imports into Greater Germany in the first six months of 1939 were 20 million barrels or more, or an annual rate of at least 40 million barrels.
Germany's imports of mineral oil products in 1938 were obtained primarily from the Western Hemisphere and only to a very minor degree from Rumania or Russia.

Standard Oil Company data gives the following breakdown of the 45.4 million barrels which they show to have been imported in 1938:

<table>
<thead>
<tr>
<th>Country of Origin</th>
<th>1938 Million Barrels</th>
<th>1938 Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>7.9</td>
<td>17.5</td>
</tr>
<tr>
<td>Mexico</td>
<td>4.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Netherlands, West Indies, Venezuela</td>
<td>14.3</td>
<td>31.5</td>
</tr>
<tr>
<td>Colombia</td>
<td>.1</td>
<td>.2</td>
</tr>
<tr>
<td>Peru</td>
<td>.6</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total Western Hemisphere</strong></td>
<td>27.5</td>
<td>60.5</td>
</tr>
<tr>
<td>Iran</td>
<td>1.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Netherlands, East Indies</td>
<td>3.1</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total Near and Far Eastern Sources</strong></td>
<td>2.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Netherlands, Belgium</td>
<td>10.3</td>
<td>22.5</td>
</tr>
<tr>
<td>Great Britain</td>
<td>.2</td>
<td>.5</td>
</tr>
<tr>
<td>Italy</td>
<td>.6</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total trans-shipments from Western Hemisphere and Eastern Sources</strong></td>
<td>11.1</td>
<td>24.5</td>
</tr>
<tr>
<td>Rumania</td>
<td>3.9</td>
<td>8.5</td>
</tr>
<tr>
<td>Russia</td>
<td>.2</td>
<td>.5</td>
</tr>
<tr>
<td><strong>Total Adjacent Eastern European Sources</strong></td>
<td>4.1</td>
<td>9.0</td>
</tr>
<tr>
<td>Others</td>
<td>.5</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>45.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The official German trade statistics, which showed total imports into Old Germany in 1938 of 33.2 million barrels (excluding petroleum residues) and 19.2 million barrels in the first six months of 1939, gives the following breakdown by countries:

<table>
<thead>
<tr>
<th>Country of Origin</th>
<th>1938 Million barrels</th>
<th>1938 Percent of total</th>
<th>First 6 months Million barrels</th>
<th>First 6 months Percent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>8.8</td>
<td>26.5</td>
<td>4.7</td>
<td>24.0</td>
</tr>
<tr>
<td>Mexico</td>
<td>3.1</td>
<td>9.5</td>
<td>4.4</td>
<td>22.5</td>
</tr>
<tr>
<td>Venezuela, Netherlands, West Indies</td>
<td>13.0</td>
<td>38.5</td>
<td>5.2</td>
<td>27.0</td>
</tr>
<tr>
<td>Peru</td>
<td>1.1</td>
<td>3.0</td>
<td>.4</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total Western Hemisphere</strong></td>
<td>26.0</td>
<td>77.5</td>
<td>14.7</td>
<td>75.5</td>
</tr>
<tr>
<td>Iran</td>
<td>1.4</td>
<td>4.5</td>
<td>.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Netherlands, East Indies, British Malaya</td>
<td>1.3</td>
<td>4.0</td>
<td>.5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total Near and Far Eastern Sources</strong></td>
<td>2.7</td>
<td>8.5</td>
<td>1.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Netherlands, Belgium</td>
<td>.2</td>
<td>.5</td>
<td>.1</td>
<td>.5</td>
</tr>
<tr>
<td>Great Britain</td>
<td>.2</td>
<td>.5</td>
<td>.1</td>
<td>.5</td>
</tr>
<tr>
<td>Other Western Europe and Scandinavia</td>
<td>.03</td>
<td>.1</td>
<td>.1</td>
<td>.5</td>
</tr>
<tr>
<td><strong>Total trans-shipments from Western Hemisphere and Eastern Sources</strong></td>
<td>.43</td>
<td>1.0</td>
<td>.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Rumania</td>
<td>3.6</td>
<td>11.0</td>
<td>3.1</td>
<td>16.0</td>
</tr>
<tr>
<td>Russia</td>
<td>.6</td>
<td>1.5</td>
<td>.1</td>
<td>.5</td>
</tr>
<tr>
<td>Other Eastern Europe</td>
<td>.2</td>
<td>.5</td>
<td>.1</td>
<td>.5</td>
</tr>
<tr>
<td><strong>Total Adjacent Eastern European Sources</strong></td>
<td>4.5</td>
<td>13.0</td>
<td>3.3</td>
<td>17.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>33.6</td>
<td>100.0</td>
<td>19.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>
It may be seen from those tables that at least three-quarters of Germany's total imports of petroleum products has recently been obtained from the Western Hemisphere. (Most of the trans-shipments recorded by Standard Oil Company data obviously came from the Western Hemispheres). Five to eight percent is obtained from Persian and Far Eastern sources. Only about 10 percent (9 to 13 percent) of Germany's total imports of mineral oils in 1938 was obtained from Rumania or Russia, Poland, Czechoslovakia and Estonia; only about 1 percent being obtained from Russia. In the first six months of 1939 imports from Rumania increased considerably, to 16 percent of the total, while imports from Russia fell to less than one-half of 1 percent.

Germany's dependence upon foreign sources of supply for her mineral oil consumption is even more marked in the case of some petroleum products than in the case of all mineral oils. She is particularly dependent upon foreign countries for her supplies of gas and Diesel oils and of lubricating oil. Reference to the estimates of German consumption in Part I of this report indicates that Germany's imports of gas and Diesel oil accounted for from two-thirds to three-fourths of her total consumption of this type of oil. Only 800,000 barrels of the imported gas and Diesel oil was obtained from Rumania and Russia, and the remaining 9.8 million barrels was obtained from other sources. Again by reference to the consumption estimates in Part I of this report, it will be seen that Germany imported nearly
80 percent of her total lubricating oil requirements in 1938, of which only about 300,000 barrels were obtained from Russia and Rumania.

III. How much oil does Germany have in storage?

All data on German stocks of oil are secret and all estimates of the amount she has on hand are mere guesses. There would not seem to be much likelihood that Germany would have on hand more than one year's peace-time supply, 60 million barrels, or less than two months' peace-time supply, 10 million barrels; a total of 40 million barrels seems quite probable.

a. The problem.

The quantity of oil stocks on hand in Germany is a military secret of prime importance; important enough to justify any alteration of German statistics. As far as can be learned, after extensive search in publications, in confidential government reports, and from interviews with American oil men who have contact with the European scene, there has been no "leak" and there does not exist any "informed" estimate of the amount of stocks on hand in Germany. Evidently the United States Army and Navy Intelligence Services have not obtained any secret information on this matter. Accordingly, all statements concerning this subject lie within the realm of sheer guesses.

It is even practically impossible to assess significant boundaries to the range within which the total of stocks might lie. In the broadest possible sense, that range might extend from no stocks at all to stocks of two or three years' wartime supply. It is known from confidential data submitted by the Standard Oil Company of New Jersey that on November 30, 1938 German commercial oil firms had on hand 1.5 million barrels of crude oil; in addition, Standard Oil Company data indicate a net increase in German stocks of other petroleum products from 1933 to
the end of 1938 of .8 million barrels, giving a total known stock at
the end of 1938 of approximately 2.3 million barrels. This figure
serves to establish a definite lower limit to the possible range of
stocks on hand. However, it is of no more further usefulness since, in
an interview, Mr. Sadler, Vice President of the Standard Oil Company of
New Jersey, stated that their data concerned only stocks in the hands of
commercial companies in Germany and did not include secret governmental
or military stocks. He was unable to give any estimate of the amount
of such secret stocks other than to state his conviction that a consider-
able amount of the apparent consumption in 1938 was actually not con-
sumption but increase in stocks.

An attempt was made to set some upper limit to Germany's possible
stocks through ascertaining the amount of storage tank capacity available
in Germany. However, this search disclosed no satisfactory answer.
Interviews were obtained with the officers of one of the important
domestic firms in the field of oil storage tank construction for export,
(The Chicago Bridge and Iron Company), but they reported that they had
never been permitted to build storage tanks in Germany and that they
thought Germany's entire storage capacity was of domestic construction so
that no foreign constructing firms would have any idea of the amount
available.

At the Standard Oil Company, Mr. Sadler stated that it was his
opinion that storage tank capacity did not impose any limitation on the
amount of stocks Germany might have on hand, but that foreign exchange
stringency and the rapidly rising domestic demand for mineral oils
imposed more effective limitations. On the other hand, it is known that production in some of Germany's producing fields was curtailed to some extent during 1938 because, among other things, of a shortage of storage capacity. This, of course, may merely mean that large quantities of oils were already stored.

In this connection it may be pointed out that there is storage capacity available in the United States for storing 700 million barrels of oils and that over 500 million barrels is actually held in storage in the United States at the present time. Therefore, it would appear that for a modern industrial nation such as Germany there should not have been any significant limitation on the amount of oil in storage as a result of the inability to provide storage space for one or even two year's supply. Even two years' peace-time supply would not have required more than about 20 percent of the storage capacity now in existence in the United States.

On the other hand, two factors do impose a limitation on the amount of oil Germany can maintain in storage: one is the problem of protection from bombing during war and the other is the problem of protecting reserves against evaporation and deterioration of quality during storage. All the potential belligerants in Europe have for some time been concerned with the problem of how to maintain military stocks of oil in storage and at the same time protect them against the possibility of artillery or air bombardment. According to information obtained from the Chicago Bridge and Iron Company, and discussion of this problem in technical journals, there is practically no protection against direct
hits, especially if from the air. Storage tanks have been sunk in the earth in concrete lined pits, they have been protected against shrapnel, etc., by cement incasements above ground; they have been banked with earth to avoid casting shadows and otherwise camouflaged. But these expedients are highly costly in men and materials and they are still so much in an experimental stage that probably few large scale projects along these lines have been completed.

In the second place, oils kept in storage deteriorate by evaporation and by deterioration of quality. When storage tanks are used as adjuncts to large scale turnover, this problem does not have to be faced in as serious a degree as when, e.g., military stocks are being stored for long periods of time. Similarly, when high quality gasoline, such as 100 octane aviation gasoline, is kept in storage, it deteriorates. These problems are being met to some extent by storage under slightly more than atmospheric pressure, but this likewise is a relatively new development requiring the designing of new types of storage tanks.

b. Some estimates.

The New York Times for September 18, 1938 carried estimates of stocks of crude oil and oil products in Germany at several recent dates. These estimates were given, without reference to source, in an article by Mr. Carmichel of the Times financial staff. They showed that on January 1, 1938 Germany had 10.4 million barrels in stock, and that after the Anschluss with Austria, Greater Germany's stocks were probably increased by Austria's million barrels. In the course of a telephone conversation recently, Mr. Carmichel stated that these estimates were
obtained confidentially from "Standard Oil" and that they did not include military stocks. These figures are therefore significant, but it is hard to understand why they do not compare with the other data on stocks which were recently given to us directly by the Standard Oil Company of New Jersey. (Mr. Carmichel's figures were quoted by Mr. Garfias in his annual article "World Consumption of Petroleum and Related Fuels during 1938".) In the New York Times for October 17, 1938, an article by Mr. Kluckhohn stated that it was reported that not over 5 million barrels went into storage during 1938.

It has frequently been stated that Germany requires commercial companies to maintain stocks equivalent to 50 percent of their annual requirements. We have not been able to verify the existence of any such law, decree or regulation in Germany, although it is known that similar regulations exist in France, Italy, Japan and some other countries. Mr. Sadler stated, in a letter to Captain Fuleston, that he knew of no such law in Germany; but he also stated in interviews that he has heard that commercial companies in Germany maintain stocks equal to 50 percent of their normal business. Writing in the International Petroleum Trade, Mr. A. G. White, of the Bureau of Mines, recently stated that all the major European powers require such 50 percent reserves. The same statement was made by Mr. David Wosk in his recent articles in the Oil and Gas Journal when he stated that in all major European countries the refiners and importers were required to maintain stocks equal to 50 percent of their normal deliveries. If reserves are held on such a basis, they must approximate 25 million barrels.
Somewhat the same report was given by the U. S. Army Intelligence Division, which stated that all commercial companies importing foreign oil and derivatives are required to maintain in storage in Germany reserves equal to half of their normal annual imports. On that basis, the Army Military Intelligence Division, stating that 1938 imports had totalled approximately 4 million tons, computed war reserves at about 2 million tons, or 16 million barrels, of imported oil. Of course, since actual imports amounted to nearly 5 million tons, reserves would total 20 million barrels on this basis.

An article in the London Petroleum Times for September 30, 1939 estimated that Germany's stocks amounted to 3 million tons, or about 25 million barrels.

Mr. Garfias, of the Cities Service Oil Company, in an interview, stated that he had no more knowledge concerning the extent of Germany's stocks than anyone else, but that the most trustworthy guess he had heard put the total of Germany's oil in storage at from 30 to 40 million barrels. He likewise stated that he had heard that Germany's storage capacity had been filled for over a year. It is of interest to note in this connection that Mr. Garfias' annual estimates of world petroleum consumption have shown increasing "net disappearance" of oil for "military consumption and storage outside the U. S. A.". This total world "disappearance" amounted to over 52 million barrels in 1932 and 1933, to 90 to 110 million barrels in 1934, 1935 and 1936, and to 160 million barrels in 1937 and 1938.
Many other estimates of Germany's stocks of oils have appeared in various journal and newspaper articles. They are usually stated in terms of the number of months' supply available, and such estimates usually run from "two months' supply" to "six months' supply" or even "twelve months' supply". Some of them refer to peace-time requirements, others to various arbitrary estimates of war-time requirements.

In conclusion, it may be tentatively estimated that Germany's stocks are between 10 and 60 million barrels, and that a total of 40 million barrels seems quite probable.

IV. What are Germany's war-time requirements for oil?

It is impossible to make an accurate forecast of Germany's war-time requirements for petroleum; they may remain approximately the same as her peace-time requirements, about 60 million barrels, or they may increase to about double the peace-time level, 100 to 120 million barrels, or they might even increase to more than triple peace-time demands, 150 million barrels or more. There are good grounds, however, for accepting the more conservative forecasts.

Even were we in possession of completely accurate statistics concerning Germany's peace-time consumption of oil and oil products, her sources of supply and the stocks of oil on hand in storage, we should still face the problem of estimating the amount of oil Germany will consume in war-time before we proceed to answer the final question, "Has Germany access to sufficient oil to enable her to prosecute this war without being handicapped by an oil shortage?". Not only, however, do we have few accurate statistics on which to base our evaluation of Germany's peace-time oil situation, but there are almost no grounds on which to base an accurate prediction of Germany's war-time requirements. The unknown factors in the situation are too numerous and of such magnitude that prediction is practically impossible.
A determination of Germany's war-time requirements for oil necessitates a knowledge of many factors to which satisfactory answers can not as yet be given. But even a rough prediction requires that many of these unknowns be tentatively evaluated. Of the numerous unknown factors, the following are the most important:

(1) The intensity of warfare: will there be an inactive war of siege and counter-siege, or a war of extensive movement in, say, the Balkan countries, or a war of intensive operations on the Western Front, etc?

(2) The extent to which the modern motorized agents of warfare are actually used: will air raids carried out by single squadrons prove to be superior to air raids carried out by fleets of one hundred or more planes; will anti-tank guns and tank traps make the tank as obsolete in this war as the horse in the last, etc?

(3) The extent to which Germany can reduce her normal peacetime consumption of oil.

(4) The extent to which successful military and sabotage operations by the opposing belligerents increase Germany's oil requirements: will her stocks, refineries and synthetic plants be destroyed; will the vital means of transportation to Rumania and Russia be blocked?

(5) The composition of the belligerent powers: will the opposing belligerents remain the same as now, or will they be joined by new members from the now neutral states, particularly Russia and Italy? Because of these many unknown factors, only one definite
conclusion may be stated, namely, that there can be little validity to
the various estimates and statements concerning Germany's war-time con-
sumption which are now appearing in journal and newspaper articles. Some
of these estimates are summarized below after which some of the more
important factors in the situation are briefly taken up.

a. Various estimates of Germany's war-time needs.

Estimates of Germany's war-time needs range from those which
state that her war-time military needs will increase by not more
than the amount by which her war-time civilian uses are reduced, to
those which estimate that Germany's war-time needs will increase
over her peace-time consumption by 25, 50 or even 100 percent, and
finally to those which conclude that Germany's war-time needs will
be three or four times as high as her peace-time consumption.

(1) No war-time increase over peace-time. (War-time
consumption: approximately 60 million barrels).

Captain Puleston has stated that it is his view that
Germany's war-time needs would be little, if any, greater than
her peace-time needs; that is to say, not much higher than
55 to 65 million barrels during a year of war. Evidently
this same opinion is held by those officers in the War and
Navy Departments who have been studying this problem.

This point of view was also expressed very positively
by Mr. Sadler of the Standard Oil Company of New Jersey. In
substantiation of his view Mr. Sadler stated that even the
United Kingdom would not use as much oil in 1940 as it used
in the last twelve months of peace-time; he said that the
Standard Oil Company of New Jersey was so convinced that
there would not be an increase in consumption on the scales
which is popularly expected that they have postponed their
plans for increasing their production and the capacity of
several plants.

Practically no expression of this view has been found in
journal or newspaper discussions of the German oil situation.
In a recent cable from the American Embassy in Paris, however,
it was reported that Professor Charles Rist, in a confidential
interview, expressed the opinion that there is some exaggeration
in the various published figures of Germany's war-time need
for oil.

(2) War-time requirements increased to as much as double
peace-time consumption. (War-time consumption: 75 to 120
million barrels).

Several estimates of Germany's war-time oil consumption
have forecast an increase over peace-time, but by not more
than 100 percent. For example, Mr. H. Stanley Norman, one of
the editors of the Oil and Gas Journal, wrote in September 1939
that "if the war is prolonged the consensus is that petroleum
consumption in war uses will be increased from 25 to 50 percent
over peace-time requirements". This would imply German war-time
consumption of 75 to 90 million barrels. In the article
"Petroleum Supply of Axis Powers Short of War-time Needs",

Regraded Unclassified
Garfias and Ristori, on the assumption that large scale war continues throughout 1940 and that the present belligerents are joined by no other countries than Russia and Italy, estimated Germany's total consumption of petroleum and related products in 1940 at 90 million barrels, or an increase of nearly two-thirds over peace-time requirements.

Several estimates have put Germany's war-time consumption at about 12 or 12 1/2 million tons, 96 to 100 million barrels; these estimates imply, that is to say, that Germany's war-time consumption will be 70 to 80 percent greater than its recent peace-time requirements. Most of these estimates are probably derived from an article in the "German Armed Power" supplement of the journal, Deutsche Volkskraft, in 1936, in which Mr. H. Steinberger, in an article entitled "Fuel Requirements in War", estimated the oil consumption of any great power in one year of modern war at 12.65 million tons, approximately 100 million barrels. He classified this total as follows:

<table>
<thead>
<tr>
<th></th>
<th>Million Tons</th>
<th>Approximate Million Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Army</td>
<td>5.5</td>
<td>44.0</td>
</tr>
<tr>
<td>Air Force</td>
<td>1.7</td>
<td>13.6</td>
</tr>
<tr>
<td>Navy</td>
<td>2.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Industry, etc.</td>
<td>2.65</td>
<td>27.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12.65</strong></td>
<td><strong>101.2</strong></td>
</tr>
</tbody>
</table>

A similar estimate (possibly from the same source) appeared in the journal, Wehrtechnische Monatshefte, and was quoted by
Mr. Waldemar Kaempffert in the New York Times for October 1, 1939. A similar estimate has also been found in various other articles, e.g., the London Petroleum Times for September 30, 1939, stated that Germany's war-time consumption would be 12 million tons; World Petroleum for October 1939 repeated the 12.6 million ton estimate, increasing it to 15 thousand tons, or 120 million barrels, in order to allow for the inclusion of Czechoslovakia and Austria.

(3) War-time requirements increased to three times peacetime consumption. (War-time consumption: 120 to 160 million barrels).

A common estimate of Germany's war-time consumption is that it will be between 15 and 20 million tons, 120 to 160 million barrels. This estimate has been stated comparatively recently in German scientific journals. For example, in 1937, in Deutsche Volkswirt, Dr. Ferdinand Friedensburg, an outstanding German petroleum authority, in an article entitled "Can the Fuel Requirements for the Conduct of Present-day Warfare ever be Satisfied?", stated that the oil consumption of any belligerent power today would be from 15 to 20 million tons. In 1939, in a study published by the German Institute for Trade Cycle Research (quoted in the New York Times), Dr. Wagenfuhr stated that Germany would need annually between 15 and 20 million tons of oil in any war.

This estimate has also been widely used in other journals, e.g., Mr. Kaempffert, in the above cited New York Times' article,
stated that Germany could not win a long war unless she could obtain 20 million metric tons a year, which assumption, he said, "agrees with that of most military authorities in Great Britain, France and the United States". In his recent articles in the Oil and Gas Journal on "Oil Needs and Supplies of the Warring Nations", Mr. David Wosk, after summarizing several other estimates, stated that it was his "conservative" conclusion that war-time needs would be three times as great as peace-time requirements, or 21 million tons for Germany.

General B. Serrigny, President of the Chambre-Syndical of the French Oil Industry, stated in 1938 that the principle countries of Western Europe would need between 60 and 70 million metric tons of oil and oil products in a year of war, that is to say, 480 to 560 million barrels. Since the total consumption of the four principle western powers in 1938 was about 220 million barrels, or, including Poland and Czechoslovakia, 227 million barrels, and the consumption of all the other 20 presently neutral countries of Western Europe was about 75 million barrels, General Serrigny was estimating the war-time needs of a belligerent power as between 2 and 2\(\frac{1}{2}\) times its peace-time needs. In the case of Germany this would mean 120 to 150 million barrels.
(4) Higher estimates:

Some estimates of Germany's war-time consumption run into considerably higher figures than 160 million barrels, the highest estimate cited so far. For example, in a recent book "Tomorrow's War", Mr. Possny, a German exile, stated that 40 million metric tons, or over 300 million barrels, would be needed by any modern belligerent nation in a year of modern warfare. Senator Joseph Caillaux, writing in the Paris Soir for October 29, 1939, estimated that Germany's war-time needs would lie between 15 and 40 million tons a year. Mr. Possny's estimates, or other estimates of equal magnitude, are frequently quoted in newspaper articles on the German oil situation.

b. War-time reduction of the Civil use of oils.

During war-time Germany may be able to reduce her peace-time oil needs by as much as 25 percent, or 15 million barrels.

One of the important factors determining the extent to which war-time requirements for oil will increase beyond the level of peace-time consumption is the reduction which can be brought about, during war-time, in normal peace-time uses of oils. As in the case of most of the other factors in the German oil situation, no satisfactory figures are available concerning the amount of reduction which Germany can achieve.

As fuel oil is not much used in Germany for heating purposes, the reduction of civilian consumption involves primarily a reduction in civilian use of gasoline. Small additional quantities of lubricating oil can, of course, be saved by the limitation of
civilian use of automobiles, and some reduction of gas and Diesel 
diesel can be brought about in Germany by reduction of passenger 
bus traffic.

In Part I of this report, it was shown that Germany's peace-
time consumption of gasoline was about 28 million barrels in 1938; 
gasoline consumption might have been at the rate of as much as 30 
million barrels in 1939. According to statistics obtained from the 
Petroleum Press Service, Germany had in 1938 a total of 3.4 motor 
vehicles, of which 1.4 million were private cars, 450,000 were com-
mercial trucks and 1.6 million were motorcycles. These figures un-
doubtedly omits the large number of military vehicles — officer's 
staff cars, motorcycles, troop trucks, supply trucks, engineers'
trucks, communication service trucks, etc. — and the many military 
tanks, tractors, aircraft, etc. Therefore it may be estimated that, 
of the 30 million barrels of gasoline consumed in recent "peace-time", 
— which included two full mobilisations — at least half, 15 million 
barrels, was consumed by army automobiles, trucks, tanks, air craft, 
etc., and by Party and other official governmental automobiles. (This 
is considerably higher than the estimate made by Mr. Garfias, showing 
total army, navy and airforce consumption of motor fuel in 1937, as 1 1/2 million 
barrels.) Not all of the private passenger automobiles and private 
commercial vehicles could be entirely dispensed with in war-time; 
particularly the 450,000 commercial vehicles would, for the most 
part, have to continue in service. It may be very roughly estimated,
therefore, that Germany's maximum saving in war-time from the reduction of civilian gasoline consumption would be around 10 million barrels.

Because of the relatively small number of private automobiles in Germany, because of the high proportion of her "peace-time" consumption of gasoline which was devoted to military, naval, air corps, governmental and Party use and because Germany's consumption goods industries have been relatively so underdeveloped, Germany's saving of gasoline by restricting civilian uses will inevitably be much smaller than the saving which can be made in either England or France. Upon the outbreak of war in September, however, Germany, along with the other belligerent powers and most of the European neutrals, immediately imposed restrictions on the civilian use of private automobiles and especially those with high fuel consumption.

A second saving over peace-time consumption can be made during war-time through the virtual elimination of the use of fuel oil and gas and Diesel oil by Germany's merchant marine. Dr. Tokayer's classification of Germany's consumption of oils in 1938, given in Part I of this report, showed that 1.7 million barrels of gas and Diesel oil and 4.3 million barrels of fuel oil were provided to the bunkers of German vessels. As compared to this total of 6 million barrels, the Standard Oil Company showed nearly 9 million barrels of bunker oil, but not all necessarily supplied to German vessels. With the exception of small amounts which still may be furnished to German vessels in the Baltic Sea and on the inland waterways, this form of consumption will be
practically eliminated. It may, therefore, be tentatively estimated that an additional saving of approximately 5 million barrels of heavy oils can be made as a result of the disappearance from the seas of the German mercantile fleet.

It is of interest to recall the Japanese wartime experience, since Japan was motorized to about the same extent as Germany. It was stated by Mr. Garfias, of the Cities Service Company, that Japan was able to reduce its consumption of petroleum for civil purposes by only 25 percent after the outbreak of the war with China, in spite of the strictest kind of restriction on civilian uses. In the article by Dr. Steinberger, which was cited above, he estimated the war-time consumption of "industry, etc." as 3.45 million tons, approximately 28 million barrels. As this article was written in 1936, this figure may be compared with the Garfias' estimate of Germany's total consumption of approximately 39 million barrels in that year. Dr. Steinberger was assuming, therefore, a war-time consumption for civil purposes about three-fourths as large as the entire peace-time consumption at that time.

It may be tentatively concluded that the saving of oil consumption in Germany as a result of war-time restrictions on normal uses will be, at most, 25 percent of the 1939 peace-time level of consumption, or probably not much more than 15 million barrels.

Of course, to the extent that private automobiles are requisitioned for military use, as many German private automobiles have been requisitioned, there will be no net saving of
gasoline since the consumption of fuel under conditions of military
when
requisition will probably be greater than these cars are in the
hands of their private owners. However, this offsetting increase
of consumption properly falls within the scope of "war-time increase"
and will be discussed below.

c. Wartime increase of the military use of oils.

Germany's war-time consumption of oils may not be nearly as
large as usually predicted.

Some estimates concerning the extent to which wartime military
consumption will increase total consumption have been given above.
However, certain technical material may be summarized in an effort
to form some independent conclusions concerning this problem.

We have nowhere been able to find a complete and detailed
statement of the number of Germany's motorized agents of warfare
and their fuel requirements. Furthermore, none of the Western
powers has recently had much actual experience of warfare under
modern conditions on which an estimate of the present wartime needs
of a great power might be based. It is shown in Dr. Friedensburg's
recent book "Das Erdöl im Weltkrieg" that the Allied powers consumed
approximately 8 million tons, or 64 million barrels, of oils for
military uses in 1918. Since the last war, however, modernization
of all armies has increased so greatly that neither the 1914-18
military consumption figures, nor even the 1918 figures, are any
longer a valid basis for calculation. The oil requirements of the
armies which fought in Ethiopia, Spain and China — even were they
known — are not to be compared with the oil requirements of any one
of the major European powers in a major conflict. In default of
the complete information which it would be desirable to have, it is only possible to summarize certain relevant details and to draw a few very rough tentative conclusions.

(1) Air Corps: 5 million barrels of aviation gasoline per year would be sufficient for very intensive aircraft activity by a fleet of 6,000 first line planes.

Although intensive aerial warfare requires large quantities of specially prepared high octane gasoline, these quantities are not large in terms of the total consumption of all oils. Mr. Warner, a member of the Civil Aeronautics Commission, stated to Captain Puleston that a two-motored heavy bomber would require about 1.3 tons (11 barrels, 465 gallons) of gasoline to complete a round trip bombing mission from Hamburg to London, a distance of approximately 500 miles each way, requiring from 5 to 6 hours. At this rate of consumption, the bomber's gasoline consumption would be 2.1 gallons per mile, or 4.3 gallons per mile per single motor. If the trip were made in five hours, the bomber would require 185 gallons per hour; if it were made in six hours, it would require 155 gallons per hour; or from 92 to 77 gallons per hour per single motor.

In an interview, Mr. Garfias stated that he had obtained some statistics on airplane gasoline consumption from George Pomeroy, Chief Pilot for the City Service Company. He said that a Douglas two-motor passenger plane of a size comparable to a heavy bombing plane required 180 gallons per hour, or
90 gallons per hour per motor. He said, however, that a bomber had a somewhat smaller fuselage than a passenger plane and that, therefore, a loaded bomber would require only 140 to 150 gallons per hour, or 70 to 75 gallons per hour per single motor. On the whole these figures check very closely with those furnished by Mr. Warner. Mr. Pomeroy had also stated that a two-motored bomber requires 1 gallon of lubricating oil per hour, or 5 to 6 gallons per thousand-mile flight.

Mr. Egloff used some figures on airplane gasoline consumption which he had obtained from the Editor of Aviation Magazine in Chicago, who estimated that Germany had 5,400 first line planes which would use 10,800 barrels per day if each was in the air one hour. This implied that each plane requires 2 barrels per hour, or 84 gallons per hour. This estimate is obviously too low for two-motored heavy bombers, but probably represents an average of the consumption of light and heavy planes, single-motored and double-motored.

Col. McCabe, of the U. S. Army Military Intelligence Division, submitted some estimates of the fuel consumption of the German air forces. He gave the following figures:

<table>
<thead>
<tr>
<th>Number of Planes</th>
<th>Consumption of fuel per average mission</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,700 medium and heavy bombers</td>
<td>1 ton (8.5 barrels)</td>
</tr>
<tr>
<td>700 dive bombers</td>
<td>½ ton (4.3 barrels)</td>
</tr>
<tr>
<td>800 observation planes</td>
<td>½ ton (4.3 barrels)</td>
</tr>
<tr>
<td>1,800 pursuit planes</td>
<td>1/3 - ½ ton (2.1 - 2.8 barrels)</td>
</tr>
<tr>
<td>6,000 planes</td>
<td></td>
</tr>
</tbody>
</table>
He estimated that if each type of plane made 100 average missions per year — one such mission every third day — they would consume a total of 365,000 tons; he estimated that 35,000 tons of gasoline would be consumed in training, making a total annual gasoline consumption by the German air force, on these assumptions, of 400,000 tons, or 3.4 million barrels.

Col. McCabe made the striking statement that the German air force had consumed no more gasoline in September during the Polish campaign, than during July and August, 1939. By way of comparison, Col. McCabe gave certain statistics concerning the U. S. Army Air Corps. About 2,000 planes were in active use in 1938 and they performed over 700,000 hours of flying — 350 hours per plane. In other words, each plane was used at the rate of one hour per day. Only 72,000 tons of aviation gasoline was consumed by all our Army planes, about 610,000 barrels; this was 36 tons, 306 barrels, per plane per year. 1/ Assuming an average of 200 miles per hour, they consumed about 29 gallons per hour and 6.7 miles per gallon.

Dr. Friedensburg, in his above-cited book on the last war, stated that France had 12,000 planes at the time of the Armistice in 1918, and showed her consumption of aircraft gasoline in that year to have been 110,000 tons, or 9 tons, .72 barrels, per plane. Mr. Steinberger’s estimate of German total war-time oil consumption of 12.65 million tons, cited above, classified the air force consumption at 1.7 million tons of this total. By comparison with the figures provided

1/ In his paper on military consumption of petroleum, above cited, Mr. Garfias estimated 1937 consumption of motor fuel by the German air force of 4,500 planes as nearly 150,000 tons, or about 32 tons per plane per year. (Note continued on next page).
by Col. McCabe, it is evident that Mr. Steinberger assumed a rate of air activity more than four times as intense as that suggested by Col. McCabe. 1.7 million tons would provide enough fuel for over 400 missions per year per plane, or more than one mission per day for an entire air force of 6,000 planes. Such a rate of activity would be not only "intensive" to an extreme degree, but beyond all possibilities of consecutive operation of the planes and pilots.

On the basis of the above-cited figures we can make an estimate of Germany's war-time air force consumption: assuming that each of Germany's 6,000 planes is in the air 2 hours a day, every other day, 3,000 planes are in the air each day with a total of 6,000 hours of flying time per day. Since not all of the planes are heavy bombers, and many are single-motored, we may take as a rough estimate of their gasoline consumption 100 gallons per hour. (This is less than the 150 gallons per hour required by a heavy bomber, somewhat higher than the 84 gallons per hour estimate received from Mr. Egloff, and considerably higher than the 30 gallons per hour average of the U. S. Army air corp in 1938.) At this rate of 600,000 gallons per day, a year's flying would only consume 5.2 million barrels, 600,000 tons. Such a rate of activity would be 50 percent more intense than that assumed

1/ Brought Forward.
Dr. Tokayer showed U. S. aviation gasoline consumption in 1938 as 1.1 million barrels for all military use and 1.3 million barrels for the entire civil and commercial use.
Another calculation will give some idea of the fuel requirements of intense aerial warfare. If 100 bombing planes began 1,000 mile round trip flights every six hours, 100 planes would be in the air every hour during the day; objectives as far from Germany as southern France or any part of the British Isles could be subjected to four bombings per day, involving from 700 to 800 tons of bombs per day. Air bombing warfare of such proportions would be many times more intense than anything which has occurred during the first two months of this war. Yet even at this rate of activity, the bombers, consuming 1.3 tons of gasoline each per thousand-mile flight, 520 tons per day, would consume only 190,000 tons per year, 1.6 million barrels. Over 200,000 tons would still be available for observation planes and pursuit planes before exhausting the 400,000 tons, 3.4 million barrels, which Col. McCabe estimated as a year's consumption.

Wartime consumption of gasoline by Germany's air force will vary with the intensity of air warfare, and with the number of available planes. Some idea has been given above of the fuel consumption of modern planes on various assumptions as to the extent or intensity of their use. If Germany increases its total number of first line planes from 6,000 to 10,000 or even more, her requirements for aviation gasoline will increase correspondingly. On the basis of the intensity of use assumed by Col. McCabe, 12,000 planes would use 800,000 tons, or nearly
7 million barrels. In even more intensive aerial warfare, 12,000 planes might consume as much as 10 million barrels per year.

(2) Navy: It is unlikely that German naval ships and submarines will use as much oil as the 6 million barrels formerly used by the German merchant marine.

Almost no figures are available concerning the German Navy's consumption of oil, although it is understood that the Navy Department is now working on such a study. 1/ The present German fleet is less than 1/3 as large as the German fleet during the last war, and a considerable part of even this small modern German fleet is probably destined to remain idle in safe harbors for the greatest part of the time. It is understood that Germany had only 75 submarines at the outbreak of hostilities and between 1/4 and 1/3 of these have already been sunk in two months of warfare. The consumption of oil by 50 submarines is not great.

Dr. Ferdinand Friedensburg, in his recent book, "Das Erdööl in Weltkrieg", stated that during the last war by far the greatest consumption of oil by the Entente powers was for naval and other forms of water transportation. In the last year of the war the Allied fleets were consuming oil at an annual average rate of 470,000 tons a month, and this rose to nearly 600,000 tons a month for the English fleet alone in the winter of 1918-19. However, such a rate of consumption by the present German fleet is ruled out both by its small size and by the fact of the British blockade.

1/ The Navy Intelligence Director reported on November 13 that the fuel consumption of U. S. naval ships comparable to the German fleet was 2.4 million barrels in 1938, but that the war-time needs of the German navy would be much less than that because of the restrictions on their movement.
In the previously cited article Mr. Garfias estimated the consumption of the German navy in 1937 at only 1 million barrels of gas and Diesel oil.

It is extremely doubtful if Germany's wartime naval oil consumption will be large enough to exhaust the 5 or 6 million barrels of bunker oil formerly furnished to the German merchant vessels, which are now laid up in home or neutral ports. There is thus little reason for Germany's war-time naval demands to cause total consumption to rise above its peacetime level.

(3) Army: The heaviest users of oils will be Army trucks, tractors, tanks, etc.; in the absence of further campaigns on the scale of the Polish invasion, and by making full use of her extensive network of broad and narrow gauge railways, Germany can hold this consumption somewhat in check.

Very little information is available concerning the petroleum requirements of the motorized land units in the German army. It is understood, however, that the War Department is preparing some studies on this subject.

The consumption of oils by motorized army units, both supply units and fighting units, may be expected to be several times as high as the oil requirements of the German air corps. The total number of land motors is many times greater than the number of airplanes; their consumption of oil and gasoline is frequently higher even than the consumption of airplane motors, and land motors, particularly the supply units, are in much more continuous operation than airplanes.
It was pointed out by the U. S. Army Military Intelligence Division, however, that Germany may be able to reduce to some extent the gasoline consumption of its supply units on the Western Front by making intensive use of the German network of railway lines and "Kleinbahn" (narrow gauge railway lines, which traverse most areas of Germany not reached by direct main railway line). The well-known shortage of rolling stock on the German railways will operate in the opposite direction, however.

However, the continual gasoline consumption required for supplying large number of troops will be heavy, even when reduced to a minimum. For example, on October 30, the British Broadcasting Corporation announced over the short-wave radio some statistics relating to the oil consumption of the British forces in France. They stated that 250 tons of oil a day had been required to put the British troops at the front, or over 60,000 barrels a month; they said that it required 1/3 ton of petroleum per month.
to provide supplies to each man — it would require more than half a million barrels per month, or 6 million barrels per year to service a force of 200,000 men; and they stated that it required so many trucks to service the British soldiers already at the front that they would make a single line 40 miles long.

Mr. Heath, the "Treasury man" in Germany, recently reported that he had heard from an informed source in the German bureaucracy that one million tons of oil had been consumed in the Polish campaign. It is not known whether or not this total of 8 million barrels of oil consumed in one month's warfare included naval, industrial and civilian uses of petroleum in Germany proper as well as air and land motor use at the front. If it were correct, this figure would give an idea of the tremendous consumption of oil when motorized forces carry out intensive "Blitzkrieg" over a wide territory and on a scale which is not likely to be repeated during this war.

In an article in the New York Times on October 18, 1939, Mr. Kluckhohn stated (without reference to source) that the
German Army has 10 motorized divisions, each requiring 30,000 gallons of oil for one filling of its tanks, or over 7,000 barrels for a single filling of all the motorized units in the 10 divisions. At the rate of only one filling per day, this would total more than 2 1/2 million barrels per year.

In his recent articles in the Oil and Gas Journal, Mr. David Wosk stated that a single motorized division requires over 3,000 hectoliters per day; 19,000 barrels per day for 10 divisions. Consumption at this rate would total more than 7 million barrels per year.

Furthermore, requisitioned civilian automobiles will undoubtedly use more gasoline in the hands of the Army than when used by their private owners so that there will be but little net saving in Germany's oil consumption by the prohibition of civilian use of automobiles and their requisitioning by the Army.

The heavy oil consumption of motorized land forces was proven during the last war. Dr. Friedensburg's recent book, cited above, gives the following figures for the fuel consumption of the Allied powers in 1918:
The consumption of the individual Allied Entente nations in the year 1918

(In thousands of tons)

<table>
<thead>
<tr>
<th>Country</th>
<th>Gasoline</th>
<th>Kerosene</th>
<th>Aircraft</th>
<th>Motor Oil</th>
<th>Fuel</th>
<th>Gas + Lub.</th>
<th>Oil + Oil</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Britain</td>
<td>500</td>
<td>160</td>
<td>620</td>
<td>4,100</td>
<td>160</td>
<td>400</td>
<td>5,940</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>250</td>
<td>110</td>
<td>-110</td>
<td>100</td>
<td>-160</td>
<td>160</td>
<td>1,030</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>160</td>
<td>40</td>
<td>220</td>
<td>350</td>
<td>-60</td>
<td>830</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>10</td>
<td>60</td>
<td>310</td>
<td>800</td>
<td>-20</td>
<td>1,200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total 920 370 1,560 5,350 160 640 9,000

1/ Including U. S. military consumption in the European theatres of war only.

It may be seen from this table that the consumption of gasoline by motor vehicles was four times heavier than by aircraft for the English and French forces, and five or six times heavier for the United States and Italian forces. This same proportion is shown by the following figures from Dr. Friedensborg's book showing average monthly consumption for all the Allied powers in 1918:

- Trucks 88,000 tons monthly
- Tanks 42,000 tons monthly
- Land motors 130,000
- Aircraft 31,000 tons monthly
- Total 161,000 tons monthly

Dr. Steinberger's article, cited in Part IV above, which estimated the total war-time consumption of a
belligerent at 12.65 million tons, showed that the army would consume by far the largest single portion of this total with 5.5 million tons, whereas the air force would only consume 1.7 million tons and the navy 2 million tons.

We may tentatively conclude, therefore, that the motorized land units will consume all of the 15 million barrels saved from normal civil use which is not absorbed by the air force and the Navy, and considerably more in addition.

d. On the basis of the above calculations, which support the position taken by the United States War and Navy Departments, Germany's fuel requirements during active warfare may be conservatively estimated as not much greater than her peacetime consumption, perhaps between 60 and 80 million barrels a year.

V. Has Germany access to sufficient supplies of oil to enable her to prosecute this war without an oil shortage?

Germany must obtain her war-time supplies of oil from stocks, from increased domestic natural and synthetic production, and from increased imports from Rumania and Russia. If her war-time requirements do not exceed 60 to 80 million barrels, Germany will probably be able to obtain enough supplies from these sources to meet her war-time needs. There will always be the handicap of a near shortage, and adequate oil supplies will be entirely dependent on a continuation of Russia's friendly cooperation.

The single question towards which this report has been directed is the all-important one: is Germany going to have enough oil to carry on the war in which she has become involved, or is her active fighting ability and even the defense of her borders going to be handicapped and finally brought to a full stop in defeat as a result of a shortage of supplies of petroleum of sufficient quantity to enable her to use her mechanized weapons of warfare and supply her troops and industries and civilians.
Obviously, where uncertainties and imponderables are as important as in the German petroleum situation, no final and conclusive answer can be given to this question. In Parts I and II of this report, discussing Germany's rate of peacetime consumption and the sources from which her peacetime supplies were drawn, it was found that it was impossible to pierce the veil of official secrecy concerning all-important statistical data, although reliable estimates were available; in Part III it was found that the veil of secrecy concerning the amount of military storage of oil was so great that almost no significant evaluation of its total could be made. In Part IV it was pointed out that the vital question, how much oil Germany would require in order to wage war, could be given no definite answer because of the many unknown factors to which weight will be given only by the course of future developments.

In answering this final question, by what means will Germany obtain supplies of oil during the course of war, there is a similar array of unknown factors arising out of the necessity of forecasting future developments such as the following: the extent to which Germany's natural and synthetic oil production can be rapidly increased; the extent to which the Rumanian and Russian export surpluses of oil can be increased; the extent to which transportation facilities for carrying Rumanian and Russian oil to Germany can be quickly developed and means be devised for paying for the oil; the extent to which supplies of oil from other countries can successfully evade the Allied blockade; and finally and all-important, the attitude of Russia towards supplying her own and Rumanian oil to Germany.
After tentative evaluation of these factors, some rough conclusions concerning the final question may be hazarded.

a. Germany's stocks of oil (10 to 60 million barrels) will probably be largely exhausted during the first year of war. They will perform a vital service, however, in maintaining Germany until imports from Rumania and Russia can be adequately increased.

As pointed out in Part III above, Germany's stocks may be as little as 10 million barrels or as much as 60 million barrels, or even larger; it was estimated that a total of approximately 40 million barrels would seem quite probable.

It is extremely unlikely that Germany will be able to build up new stocks during wartime. Therefore, the most important wartime questions concerning German stocks are the rate at which they will be used and how long it will be until they are exhausted. It was shown above that in recent peace-time Germany has been importing petroleum at the rate of about 40 million barrels a year. About 35 million barrels of this will be cut off by the Allied blockade. At least this amount must be provided by greatly increased importations from Rumania and Russia. As is pointed out below, however, it will require drastic reorganization of the lines of transportation, diversion from Rumania's and Russia's usual export outlets, the discovery of satisfactory means of payment and, for all of these developments, time, before imports from these two Eastern countries rise from their recent annual level of about 6.5 million barrels to the necessary war-time level of more than 35 million barrels per year.
The oils which are in storage will play their most important role in this situation by enabling Germany to obtain sufficient petroleum supplies during that interval between the imposition of the Allied blockade and the time when large quantities begin to arrive from the East.

The most probable assumption, therefore, is that stocks will be rapidly used up during the first months of the war but that, as larger and larger supplies of oil begin to arrive from the East the pressure on stocks in storage will subside. If stocks are about 40 million barrels, they will probably be nearly exhausted by the end of the first year of war; if stocks approach the higher end of the possible range, and are as high as 60 million barrels, considerable quantities might be left over into the second year of war.

b. Domestic natural production can hardly be increased by more than 3 million barrels from the 1939 peace-time level. Even this amount of increase may be sacrificed if Germany's petroleum technicians concentrate their efforts on increasing the Russian export surplus.

It was pointed out in Part II of this report that Germany's production of natural petroleum has increased rapidly in the past four years, and that this rising trend of production continued at an increasing rate during the first seven months of 1939. The necessities of war can probably bring even further increased production and, with the addition of about 12/2 million barrels of Polish oil, the 1940 output may be raised to as much as 8 or 9 million barrels. (Dr. Tokayer recently expressed his doubt that any expansion of Greater German output — excluding Polish oil — could be carried beyond 7 million barrels.)
War will remove any economic cost considerations which may have held up further exploration for new oil fields in Germany, as it will remove both conservation efforts and cost considerations which have tended to restrict the most intensive exploitation of Germany's natural oil resources. New wells may be sunk in the rich new field discovered in 1937 near Hamburg and in the rich new field in lower Austria. Further exploration may also be carried on in other areas of Germany, former Austria and Czechoslovakia.

Germany's natural output will also be increased by the crude production of the oil fields in that part of Poland which has fallen into German hands. Dr. Tokayer, in the Petroleum Press Service, estimated that about three-quarters of Poland's production of crude oil had gone to Russia and that only about one-third, or, on the basis of 1938 production, about 1.3 million barrels, passed into the hands of Germany. The greatest part of this new German production is from a shallow field near Jaslo, which is the only field in Poland in which production has increased during the past year or so. Further increases in the production from this field can be obtained without drilling difficulties.

There have been many rumors, since the downfall of Poland, that the Polish oil wells and refineries were severely damaged by warfare and sabotage. No verification of these rumors has been discovered, but it may be assumed that it will require some weeks or perhaps months before even the old rate of production of crude oil is restored in the Polish fields.
In 1938, Mr. Garfias estimated total Polish consumption of oil and oil products at about 3.4 million barrels. Production from all the Polish fields was estimated at about 4 million barrels in that year, leaving an export surplus of over 500,000 barrels. At least two-thirds of the total consumption was in territory now in the hands of Germany, but only one-third of the output was in that territory. No matter how drastically Polish civilian use of oils is restricted, the industrial regions of Germany's new territory will probably consume the entire amount of the conquered Polish output. Therefore, while German natural production will be increased by as much as 1.5, or even 2, million barrels in 1940, due to Polish output, no significant portion of this increase will be available for use in the rest of Germany.

An important restriction on the expansion of Germany's natural petroleum output will be the shortage of skilled petroleum engineers and workers. As pointed out in Part III above, there were only 6,700 workers in all the German oil fields in July 1939. The supply of engineers and workers with this type of skill cannot be rapidly increased and it may have been decreased at the outbreak of war if many of them were mobilized. It has been reported, and it is essential if Russian output is to be significantly increased, that Germany plans to provide skilled petroleum engineers and workers for the Russian oil fields. In that case fewer petroleum workers will be left in Germany to conduct the intensive new drilling operations there. Since the
activities of a given number of drilling specialists may be expected to be far more productive in terms of increased oil output in the rich Russian fields than in Germany, it may turn out that Germany will not push the development of her own natural production but, allowing it to increase as best it can on essentially the present basis, will have her engineers concentrate on the increasing of Russian production.

A second restriction on the increase of Germany's natural oil production is her deficiency in certain important lines of modern oil well drilling equipment. The products of the three large German producers of oil well drilling equipment are not of as high grade as the same materials produced by the better United States firms, and the deficiencies in quality are particularly obvious in a few significant "bottlenecks" where special steel alloys are essential. For example, the Germans have not been able to make bits for rock drilling of as fine and hard a steel as the ones produced in the United States even when they deliberately copy American products. This type of deficiency is indicated by the confidential report of an officer of the National Supply Corporation (exporters of oil well supplies) that in February 1938 the German Government purchased 150 Hughes Tool Company bits for medium or hard rock, at a cost of $50,000. He estimated that these would last the Germans for their domestic drilling operations for approximately one year, and he reported that the German producing companies had obtained these bits when they were asked by their Government to double their output and they had been unable to promise such an increase without American bits.
Barring the improbable discovery of new oilfields within the present borders of Greater Germany, it can be estimated that Germany's natural petroleum production will not increase beyond 9 million barrels in 1940 and that it will probably be between 7 and 8 million barrels.

c. Germany's synthetic production by the hydrogenation process cannot be expected to increase to more than 18 or 20 million barrels in 1940; by the end of 1941 another 10 to 12 million barrels might be added.

The use of benzene and alcohol for motor fuel will not increase beyond its present level and may fall below 5 million barrels, since both products are extensively used in the manufacture of explosives.

(1) Hydrogenation process:

It was pointed out in Part II above that Germany is engaged upon an ambitious program of expansion of her synthetic petroleum capacity as an important part of her "Four Year Plan" for achieving self sufficiency by the production of synthetic raw materials. Large new synthetic motor fuel plants are expected to come into operation at the end of 1939 which may increase her total synthetic production of all petroleum products to a rate of as high as 16 million barrels per year. Plans have been drawn up for additional capacity and construction has even begun on some units which will not be completed until 1940 or 1941.

For example, it was reported in the August 15 issue of the German publication, Oel und Kohle, that construction was recently begun on a new hydrogenation plant at Brux, in the vast lignite area of Sudetenland which, it was said, would have the largest capacity
of any German synthetic motor fuel plant. From the confidential data submitted by the Standard Oil Company of New Jersey, it is evident that the largest synthetic plant at the present time is the plant of the I. G. Farben Industrie at Leuna, in middle Germany, with a capacity of 10,000 barrels of gasoline per day from lignite—3.6 million barrels per year. The new Sudetenland plant, therefore, if the German forecast is not over-optimistic, may be expected to add at least 4 million barrels annually or about 25 percent to Germany's existing hydrogenation output. In its same article it was stated that this new plant would consume more than 5 million tons of coal annually. On the basis of English data, it was computed in Part III, above, that Germany's total synthetic output in 1939 consumed approximately 9 million tons of coal. This estimate, being based on English figures, probably assumed an "input" or "feed" of higher quality bituminous coal than the lignite which is generally used in Germany; larger quantities of lignite would probably be required for the production of the same quantity of gasoline.

Now that Germany has become involved in war before the completion of her plans for self-sufficiency, it might be expected that she would make great efforts to push those plans toward immediate completion. From one point of view it might be held that, since war dissolves all economic cost considerations, nothing stands in the way of a successful expansion of Germany's
synthetic petroleum output of tremendous proportions, and that they will be able to produce 60 or 70 million barrels annually within two or three years. On the other hand, even in time of war when ordinary economic cost considerations disappear, it is extremely doubtful if Germany can "afford" a diversion of enough resources of men and materials for the construction of synthetic refineries on such a scale. In any case it requires a long period of time before a new synthetic petroleum plant is completed and brought into operation. Mr. Egloff estimated that it would require at least 18 months to complete a synthetic petroleum plant but stated that it was his opinion that in wartime, in Germany, this would have to be increased to 24 months because of the many shortages which would inevitably occur in the supply of labor, in the provision of vital elements requiring special skills and alloys, in the delivery of all material, etc. Such shortages and delays have become almost a commonplace in Germany, according to all informed reports, even during the past year or so of "peace time".

At the end of September, (1939) the Petroleum Press Service estimated that by 1941 Germany might increase its total synthetic output to 28 million barrels. If this figure does not include benzene and alcohol, it assumes an increase of three-quarters above the present rate of production.

In conclusion, it may be roughly estimated that even after a period of 18 or 24 months the highest level of German hydrogenation output which might be expected would be a doubling of

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the high level which has just been attained at the end of 1939, that is to say, an increase from 16 million barrels per year to 32 million barrels. Some part of this increase might come into production at earlier dates but very little of it during the next 12 months; in the first year of warfare, therefore, Germany's synthetic production of petroleum by this process can hardly exceed 20 to 22 million barrels.

If, as has been implied by certain material submitted by the Standard Oil Company and mentioned in confidential cables from our Embassy in Berlin, Germany has been using other than coal "feeds" for her hydrogenation plants, these estimates would have to be reduced. On the other hand, if Germany has successfully concealed important amounts of hydrogenation capacity, then this tentative conclusion might have to be raised. (2) Benzene and alcohol.

In 1938 Germany consumed about 4 million barrels of benzene and 2 million barrels of alcohol as motor fuel. In time of war, however, the amounts of these products available for this use would have a strong tendency to decrease instead of increase.

In the first place, benzene is a by-product of the production of coke, which is in turn a by-product of steel making. It is doubtful if Germany's steel mills will operate at any higher rate during 1940 than they have operated during the last 12 months or so of peacetime so that there will be little tendency for benzene production to increase. It was recently announced...
in Germany that the potato acreage will be increased by 25 percent for the 1940 harvest, but potatoes will become so important an item of Germany’s wartime food consumption that it is a question whether even increased production will provide enough potatoes to maintain the output of commercial alcohol.

In the second place, large quantities of benzene and alcohol must be allocated to the manufacture of explosives in which both products play an important role. Within the past year the Mining and Power Commission of the French Chamber of Deputies reported that the French production of less than 1 million barrels of benzene would have to be entirely reserved for the manufacture of explosives, and that “in time of national emergency, alcohol would be far too valuable to be used as a motor fuel”. Alcohol is also used for solvents and medicinal purposes. In his article, “Motor Fuel Economy of Europe”, Eglolf stated that the desire to maintain a vital wartime industry at a high peak of activity during peacetime was probably the basic reason for the compulsory admixture of alcohol with gasoline in most European countries. The German alcohol industry is probably not large enough to supply both motor fuel and wartime needs for alcohol.

Therefore, it is entirely probable that the quantities of German benzene and alcohol available for use as motor fuel in 1940 will be considerably less than the 6 million barrels which was available in 1938 and 1939.

d. Even though Germany has stocks of oil in storage adequate for many months’ war-time consumption, and even though she may double her domestic production during the second year of war, by the end of 9 to 12 months of warfare Germany’s war machine will be dependent upon large importations of foreign oil.

Germany’s war-time petroleum supplies must either come from within her own borders or they must be imported across whatever borders are not obstructed by opposing belligerent forces. Germany’s ability to provide herself with oils from her own resources during the first and second years of war has been discussed above. The conclusions which were reached may be roughly summarized as follows:

<table>
<thead>
<tr>
<th>Consumption (Conservative estimate)</th>
<th>First Year of War (Million Barrels)</th>
<th>Second Year of War (Million Barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Estimated increased domestic production:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural</td>
<td>6-8</td>
<td>8-9</td>
</tr>
<tr>
<td>Synthetic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogenation Process</td>
<td>16-22</td>
<td>20-32</td>
</tr>
<tr>
<td>Benzene and Alcohol</td>
<td>4-6</td>
<td>2-4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20-28</td>
<td>22-36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>26-36</td>
<td>30-45</td>
</tr>
<tr>
<td><strong>Remaining consumption requirements to be supplied from importations and stocks.</strong></td>
<td>24-54</td>
<td>15-50</td>
</tr>
<tr>
<td><strong>Stocks</strong></td>
<td>10-60</td>
<td>0-10</td>
</tr>
</tbody>
</table>

Regraded Unclassified
The amount of oil which Germany will have to import during this war is dependent upon three factors which can only be estimated within broad limits: total war-time requirements, total domestic production during war and the amount of stocks in storage at the outbreak of war. Although very little is known concerning the total amount of Germany's stocks of oil, it was concluded in Part III, above, that they were between 10 and 60 million barrels, and that a total of 40 million barrels was not improbable. In Part IV, above, it was concluded that a conservative estimate of Germany's war-time requirements during as intensive warfare as can now be predicted, was 60-80 million barrels, but that it might total 100 million barrels or even more. It is shown in the above table that, under the most favorable circumstances, Germany's total supplies of oil from her own resources can hardly exceed 35 million barrels in the first year of war and 45 million in the second year; her production from her own resources may, in fact, be considerably less than this, as small as 25 million barrels in the first year of war and 30 million barrels in the second. The difference between total domestic production plus stocks in storage and total war-time requirements will have to be obtained from war-time importations.

On the basis of the same assumptions and forecasts which underlie the tentative conclusions stated above, some estimates of the amount of the amount of wartime importations may be made.
In the first year of war:

If Germany's war-time requirements do not increase at all over her peace-time requirements, then increased domestic production would provide, at the lowest, two-fifths of war-time requirements, and, at the highest, three-fifths. Between 24 and 34 million barrels would have to be imported or provided from stocks. If stocks are only as high as 35 million barrels, no importations would be necessary; if they are larger, then some stocks would be left over for the second year of war. Only if stocks are as low as 10 or 20 million barrels would importations of as much as 15 or 25 million barrels be required.

If Germany's war-time requirements increase above her peace-time requirements to, say, 80 million barrels, then her increased domestic production would provide, at the least, somewhat more than one-third of her requirements and, at the most, slightly less than half. Between 44 and 54 million barrels would have to be imported or provided from stocks. Assuming that stocks are as high as 40 million barrels, importations would be called upon to provide from 5 to 15 million barrels and no stocks would be left over for a second year of war. If stocks are higher than 40 million barrels, imports might be less than 5 to 15 million barrels and some stocks might be left over into the next year.
If stocks are less than 40 million barrels, imports considerably higher than 5 or 15 million barrels might be required.

If, however, Germany's war-time requirements for petroleum are higher than 80 million barrels, as high as, say, 100 million barrels, then, on the above assumptions, unless stocks are as high as 60 million barrels, at least 20 million barrels would have to be added to the import requirements stated above. In the second year of war:

Germany's increased domestic production would provide, at the least, one-half of the most conservative estimate of wartime requirements, or, at the most, three-quarters. Even at this low wartime consumption, if no stocks were left over from the first year of war, imports would be called upon to provide from 15 to 30 million barrels; if some stocks were left over into the second year of war, the necessary imports would be reduced to that extent.

If war-time requirements total 80 million barrels, then, at the least, slightly more than one-third and, at the most, slightly less than one-half would be provided by domestic production. If no stocks were left over from the first year of war, importations would be called upon to provide from 35 to 50 million barrels of oil. Any held over stocks would reduce the amounts of necessary imports.
If war-time requirements in the second year of war were as high as 100 million barrels, then the most favorable assumptions concerning the increase of domestic production would still leave a deficiency of 45 million barrels and the smaller increase in domestic production would result in a deficiency of 70 million barrels. Unless some stocks were left over from the first year, importations would have to provide 45 to 70 million barrels.

There are definite limitations to the war-time expansion of Germany's domestic oil production and the amount of oil in storage can only be decreased, once war has begun. Importations are the only elastic source of supply which can be increased to meet expanding war-time demands and to take the place of stocks which have been exhausted. During the first 9, 12 or even 15 months of war, stocks may almost entirely take the place of importations; to the extent that larger importations begin to be received during the first year of war, the exhaustion of stocks can be delayed. But even during the first year, on the basis of assumptions least favorable to Germany, importations of as much as 25 million barrels might be required in addition to an exhaustion of stocks. During the second year of war, Germany's dependence upon imports will be much greater; under an unlikely combination of the most favorable assumptions, imports might be as small as 15 million barrels; under the least favorable assumptions, as much as 50 or even 70 million barrels might have to be imported.

Obviously, war-time importations from Eastern European countries will have to be tremendously increased from their recent rate of
6 1/2 million barrels per year. If such importations cannot be rapidly increased, especially as soon as stocks are exhausted, then Germany faces an oil shortage. Whether Germany can obtain, during the course of this war, greatly increased quantities of oil from Rumania, Russia, or other sources, provides the chief clue, next to the variable of war-time requirements, in answering the question whether or not she will face an oil shortage before the end of the war.

(1) Some supplies of oil, perhaps between 1 and 5 million barrels, might become available to Germany shortly after the outbreak of hostilities by the purchase of existing stocks from adjacent neutral countries.

Upon the outbreak of war one unusual source of petroleum supplies might become available to Germany, namely the stocks of oils in storage in adjacent neutral countries. For example, it has been reported that Italy requires foreign oil companies to maintain six months' supply of oil in storage; half of her 1938 consumption would amount to 10 million barrels. Netherlands is an important entrepot center for oil shipments and probably has considerable quantities of oil in storage. In the New York Times article of September 1938, Mr. Carnochan gave statistics showing Austrian stocks of nearly one million barrels and Hungarian stocks of 1.4 million barrels at the end of March 1938. Hungarian stocks may be as
large today, and if these small countries maintain stocks of around a million barrels, then Netherlands, Belgium, Denmark, and Sweden might be expected to maintain even larger stocks.

The total amount of Rumanian stocks of all oil products at the end of July, 1939, as given in the Rumanian oil publication, Moniteur du Petrole Roumain, was 8 million barrels, about two-thirds being at refineries and one-third at export terminals; Standard Oil Company statistics show stocks of 3 million barrels of crude oil alone in Rumania at the middle of 1939. Mr. Carmichal's statistics showed Russian stocks in the middle of 1938 of 72 million barrels of all oils and Standard Oil Company data show Russian stocks of crude oil alone of 24 million barrels at the middle of 1939.

Without an increase of production in any country and without the problem of evading the Allied naval blockade, all of these stocks of oil might theoretically be considered as available for purchase by Germany, if she offers attractive enough terms of payment. With respect to Rumanian and Russian stocks, the problems of payment and transportation will be taken up below in connection with the discussion of importations from those two countries. With respect to the stocks of oils in Italy, Belgium, Netherlands, and the Scandinavian
countries, probably a large proportion are owned by Allied oil companies which would raise strong objections to their sale to Germany. These neutrals, moreover, may look with disfavor on any move to reduce their supplies on hand, at a time when the dangers of ocean warfare imperil their continued supply to such an extent that they have all begun restriction of the civilian use of oils.

However, excluding Rumania and Russia, 1 or 2, or even 5, million barrels of oil might conceivably become available to Germany, during the next few months, as a result of her purchase of existing stocks from adjacent neutral countries.

(2) It is unlikely that Germany will obtain any significant quantities of oil through the Allied blockade.

If the British blockade of Germany's North Sea coast remains effective, Germany can only obtain Western Hemisphere and Near and Far Eastern oil through neutral countries; through the four Scandinavian countries, especially Denmark; through the three Baltic countries; through Holland or Belgium; through Italy, Jugoslavia, Greece, or Bulgaria; or through Rumania or Russia. It is well known that during the last war, neutral countries adjacent to Germany provided channels through which many commodities reached Germany in spite of the Allied blockade (even, it has been reported, with the knowledge of high quarters in England and France). In the long run, however, the
quantity of supplies going to Germany by such channels cannot be very significant. In his book, Erdoel im Weltkrieg, Dr. Friedensburg came to the conclusion that the British blockade during the last war had been entirely effective in preventing Germany from obtaining petroleum supplies from overseas.

There have already been several indications that the neutral countries may again be used as channels for petroleum supplies for Germany. For example, in an interview on October 17, Mr. Garfias stated that he had knowledge of a contract which had just been concluded in New York City providing for the shipment of 560,000 barrels of United States gasoline to Denmark during the next six months. In 1938 Denmark consumed 2.7 million barrels of motor fuel, 5 times the amount of the recent contract. While it is quite possible that Denmark was merely contracting for a part of its normal consumption of motor fuel, the size of the contract was unusual enough to have attracted some attention in petroleum circles owing to the ease with which Danish oil imports might be trans-shipped to Germany.

It was similarly reported in a New York newspaper at the end of September that Amsterdam firms were seeking to obtain unusually large quantities of American petroleum. At the beginning of October, it was reported in the New York Times and the Washington Evening Star (October 6) that oil for
Germany was being unloaded at Trieste and that about two hundred tank cars had left that city for Germany within two weeks. It was widely rumored in the press at the same time that Mr. W. R. Davis, who had just arrived in Italy from Berlin had made a deal with the Germans to ship oil to them through the blockade.

However, it may be expected that the Allied powers will repeat their practices of the last war, not only keeping a close check on all shipment of oil to neutral countries, but actually rationing the supplies which these neutral countries will be able to receive. Such control can be almost entirely effective with respect to Mediterranean routes to Germany. Tankers entering the Mediterranean through the Suez Canal or Gibraltar, or even the Dardanelles, can be easily controlled. The shipping terminals of the two pipe lines from Iraq at Tripoli and Haifa are under Allied control. Italy, Jugoslavia, Greece, and even Bulgaria and Rumania to the extent that they might receive oil from other countries than Russia, cannot be important channels of blockade evasion.

Supplies of oil en route to North Sea, Scandinavian and Baltic neutrals are presumably also being closely watched and even rationed. In this area, however, the opportunities for successful blockade-running are somewhat greater and a certain quantity of oil may slip through to Germany. However, a single

1/ An American oil man and financier who has done a large oil business with Germany on a barter basis in recent years having sold them a large refinery and considerable quantities of Mexican oil.
tanker carries only about 100,000 barrels of oil and it would require a large number of blockade runners before any significant total of oil was provided to Germany in this summer. An additional factor almost as important as the existence of the British blockade is the unavailability of tankers to engage upon such dangerous activities. Out of a total world registry of nearly 1,800 tank steamers, Germany controls 38 and Russia 31. It is extremely doubtful that the neutral tank fleets belonging to Norway, Sweden, United States, Netherlands, or Venezuela would be available for such hazardous undertakings. The Japanese fleet of 40 vessels is entirely occupied in the Pacific. Italy has about 30 small tankers, a few of which might be conceivably available for blockade-running. 1/

At the end of September it was reported from Moscow by Ewos dispatch, repeated in the Petroleum Times, that it was anticipated there that United States aviation gasoline would be shipped to Germany across Siberia. If it is at all feasible to ship oil a distance of 8,000 miles, then the Russian Asiatic coast is a possible loophole in the Allied blockade. That Asiatic coast constitutes a loophole, in a more important sense,

1/ Statistics on tankers are from data provided by Mr. Garfias.
However, to the extent that the oil requirements of eastern Siberia can be met by importations from the United States instead of by the shipment of oil from central and southern Russian fields, a larger export surplus of Russian production may become available for shipment to Germany.

It may be concluded that it is extremely unlikely that Germany can obtain as much as one million barrels of oil by any manner of evasion of the allied blockade from those overseas sources recently responsible for 35 to 40 million barrels annually of German importations.

(3) The bulk of Germany's war-time imports will have to come from Rumania and Russia.

Nearly 80 percent of the 1938 European oil production of about 60 million barrels was in Rumania; over half of the remainder was produced in Greater Germany or Poland. The only other European countries, excluding the Allied powers, which at the present time have any significant oil production are Italy (including Albania), Hungary, and Estonia. In 1938 only Rumania, Poland and Estonia satisfied their entire oil requirements from domestic production. Russia's production of oil is five times as great as Rumania's, and is about equal to Russian consumption. No oil is produced in commercial quantities in the three Scandinavian countries, in Holland, Belgium or Switzerland, or in Lithuania. Some exploration for oil has been carried on in Bulgaria, Greece and Yugoslavia, and...
it is possible that the Yugoslavian output will assume commercial proportions during the next year or so.

Italian production of oil in 1938 was approximately 500,000 barrels, about three-fourths from Albania and one-fourth from Northern Italy. Her domestic consumption, however, was 21 million barrels in 1938; Italy is now almost entirely dependent upon imports and, although there is some exploration for oil in Ethiopia, there is no likelihood of her dependence decreasing in the near future.

In Hungary, 1938 oil production totaled about 330,000 barrels. Hungarian consumption in that year was estimated by Mr. Garfias at about 2 million barrels, leaving a deficit of 1.7 million to be met by importations, which came entirely from Rumania. Hungarian production began late in 1937 and has increased at a rapid rate. According to Standard Oil Company data, production in the first six months of 1939 was over 800,000 barrels and it was rising so rapidly from month to month, that July production was at the rate of 1.2 million barrels per year. Although this greatly increased production does relieve somewhat Hungary’s dependence upon Rumanian oil, Hungary will have to import over a third of her oil requirements this year, especially since it is estimated that her consumption in 1939 will be 15 to 20 percent above 1938, partially as a result of the acquisition of new territory. It is possible that Hungary will
be self-sufficient in oil by the end of 1940, but there is little possibility of her becoming an exporter of oil.

A small amount of oil is extracted from oil shale in Estonia, Finland and Latvia. The most important shale oil deposit is the German-owned one in Estonia, where the total 1938 production was estimated at about one million barrels of heavy oil. Dr. Tokayer has estimated that 1939 production will be about $1\frac{1}{2}$ million barrels of heavy oil. Mr. Eglhoff estimated that about 150,000 barrels of motor fuel of very low octane content would be produced from the 1938 output of shale oil. Estonia’s total domestic consumption in 1938 was only 400,000 barrels. About half of Estonia’s production is in excess of consumption and is exported. In 1938 Germany purchased 240,000 barrels of this Estonian fuel oil. Finnish production of shale oil was about one-third as large as Estonian but, since Finnish consumption was 2 million barrels in 1938, there was no export surplus. Latvian production of shale oil was about half as much as Finnish, but only sufficient to meet half of Latvia’s 1938 consumption of 400,000 barrels. Approximately a thousand barrels a year of shale oil is being produced from Sweden’s extensive oil shale deposits.

Although oil is produced in two or three neutral countries adjacent to Germany, no oil is available for export from these countries. The only country in Europe proper which can provide Germany with any significant quantity of oil is Rumania whose exports
in 1938 were large enough to have provided all Germany's import needs in that year. Russia might be a far more important source of supply than Rumania, however.

(4) During the next 12 months at least 35 million barrels of Rumanian and 10 million barrels of Russian oil should be available for export. Within a year or two the Rumanian export surplus might be increased to 40 or 45 million barrels and the Russian export surplus doubled or even, under favorable circumstances, increased several-fold.

Rumania:

Rumanian oil production has declined continuously in the past three years. Over 60 million barrels of crude oil was produced in 1934 and 1935, and 65 million barrels in 1936. Production fell, however, to 53 million barrels in 1937 and to less than 49 million barrels in 1938. Rumanian production has continued to decline in 1939: in the first nine months it was about 6 percent less than in the same period of 1938, running at an annual rate of only about 45 million barrels.

(Williams of Barrels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production 1/</th>
<th>Consumption 2/</th>
<th>Surplus Available for Export</th>
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<td>54</td>
<td>13</td>
<td>41</td>
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<tr>
<td>1934</td>
<td>62</td>
<td>16</td>
<td>46</td>
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<td>1935</td>
<td>61</td>
<td>15</td>
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</tr>
<tr>
<td>1936</td>
<td>64</td>
<td>15</td>
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</tr>
<tr>
<td>1937</td>
<td>52</td>
<td>13</td>
<td>39</td>
</tr>
<tr>
<td>1938</td>
<td>48</td>
<td>14</td>
<td>34</td>
</tr>
</tbody>
</table>

1/ World Petroleum.
2/ Garfias estimate.
The Romanian annual consumption of oil has varied between 12 and 16 million barrels. Mr. Garfias estimated it at 14.2 million barrels in 1938 and Dr. Tokayer estimated that Romania's domestic consumption for 1939 would be about 5% higher than in 1938 or about 15 million barrels.

In former years, Romania has exported as much as nearly 50 million barrels in a single year; until 1938 her exports had been greater than 40 million barrels in every year since 1932. In 1938, only 35 million barrels of Romanian oil was available for export. Mr. Garfias shows 1938 exports of 34.2 million barrels; Standard Oil Company data show 32.3 million barrels. Stocks may have increased as much as 2 million barrels in 1938 over 1937. If war had not begun, Romania's export surplus in 1939 would have been between 30 and 35 million barrels.

Now that war has broken out again in Europe will the declining trend of Romanian production be reversed and export surpluses achieved on the old scale? Specifically, what will Romania's export surplus be in 1940 and 1941?

It is generally admitted that the chief cause of declining Romanian production is the lack of new exploration and new drilling, which are not being carried on because the foreign oil companies find the Romanian mining law, especially as it pertains to new exploration, and the Romanian taxation and foreign exchange laws very onerous. Romanian capital is not plentiful enough to be able to carry out substantial new drilling.
operations. About 90 percent of the investment in the
Rumanian fields is foreign: British, Dutch, French, American,
Belgian, and Italian capital is represented. Only a small
part of the investment in the fields is Rumanian. The foreign
ownership is complicated by the fact that there are more than
15 companies and that about half of them are jointly owned by
Allied and neutral interests, or by Allied and Rumanian
interests.\[1/\]The present production is coming predominantly from
old fields which are gradually running dry, and it is therefore
essential that some new exploration and new drilling be carried
on even in order to maintain output at its present levels. For
example, production fell 18 percent from 1936 to 1937; in the
latter year, however, new drilling increased 20 percent to
nearly 400,000 meters. This amount of new drilling was probably
responsible for the smaller decline of only 7.5 percent in pro-
duction from 1937 to 1938. In 1938, however, drilling fell off
nearly 30 percent from the 1937 level, to 285,000 meters;
production is somewhat lower in 1939.\[2/\]New drilling is made more
difficult by the fact that the new oil reserves are being found
at depths of 9,000 feet or more.

If the Rumanian government should alter its taxes and other
laws in the direction desired by the foreign companies, a con-
siderable increase of production might be achieved within a year

1/ A company controlled by the Royal Dutch Shell (Astra Romana)
now has the largest output, a French-owned company (Concordia)
the second largest, and the Standard Oil subsidiary (Romano
Americana) the third largest output.

2/ New drilling in the first nine months of 1939 was 17 percent
below the same period in 1938.
Dr. Tokayer, among others, has stated that geological conditions for increased output are good and that only a modest part of the Rumanian oil-bearing zone has been explored; he estimated, furthermore, that many new fields might be found at relatively shallow depths. During 1939, progress began to be made in the direction of a new mining law.

Although a change in Rumanian legislation during 1938 would probably have resulted in a considerable increase of drilling and therefore of production, an entirely new situation has been created by the outbreak of war. Under the new conditions it is extremely doubtful whether the companies controlled by British and French interests will increase their Rumanian production no matter what legislative inducements are offered. So long as Rumania remains independent, therefore, any substantial increase of production during war-time is unlikely.

Rumania might not remain independent, however; she might be invaded by foreign armed forces or she might succumb to threats of invasion and allow her internal policy to be dictated from abroad. It is also possible that, in order to forestall the possibility of such threats of invasion, she might herself take steps to make a large export surplus available to Germany, by, for example, outright confiscation of foreign properties. 1/ If any of these developments took place without sabotage of the Allied controlled fields, even though Allied drilling engineers might be withdrawn,

1/ For example, it was reported in the New York Times for November 27 that British ownership of important copper and lead mines in Yugoslavia has not prevented that government from promising to sell Germany larger quantities of these minerals than before the war, through introducing a monopoly regime under which the mines must sell their output to the Government.
German and Rumanian engineers could undoubtedly bring about an expansion of Rumanian production to, say, 55 million barrels in 1940 and 60 million barrels in 1941. It may be noted that Mr. Garrett estimated that Rumanian production in 1940, assuming war in Europe, would be about 55 million barrels.

In fact, of course, substantial difficulties stand in the way of even this amount of increase because of the strong probability that Allied interests would sabotage their fields. This would certainly be done, as it was done in the last war, in the event of a military invasion of Rumania by either German or Russian forces; it would probably be done if Rumania succumbed to foreign domination of her external and internal policies.

Mr. Egloff stated that he had learned confidentially that the Allied fields in Rumania were already mined in preparation for sabotage. There is at least a possibility, however, that, by a sudden move, the Rumanian Government could take the foreign oil companies by surprise and successfully confiscate their properties without great damage by sabotage, using Rumanian police and armed forces. That could probably be done at a time when there was no direct threat of foreign invasion; the Rumanian Government would then be in a position to make the entire export surplus available to Germany without any problem of sabotage. 1/

1/ As was pointed out above, in addition to her current production, Rumania has about 8 million barrels of oil in storage. All, or a part of this, might be made available to Germany at any time, with some danger of sabotage, however, and subject to all the difficulties of politics, payment and transportation which are outlined below.
Russia

Russia's underground oil reserves are tremendous. Her production of petroleum in 1938 was over 200 million barrels, slightly larger than the amount which was produced in the whole of Asia, including Iran, Iraq and Netherlands India.

(Millions of Barrels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Consumption</th>
<th>&quot;Surplus&quot; of Production Over Consumption</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932</td>
<td>154</td>
<td>97</td>
<td>57</td>
<td>45</td>
</tr>
<tr>
<td>1934</td>
<td>172</td>
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<td>182</td>
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</tr>
<tr>
<td>1937</td>
<td>203</td>
<td>158</td>
<td>45</td>
<td>14</td>
</tr>
<tr>
<td>1938</td>
<td>212</td>
<td>165</td>
<td>47</td>
<td>8</td>
</tr>
</tbody>
</table>

Russian production has increased tremendously since 1922, when it was only about 40 million barrels, but the rate of increase has fallen off sharply in the past few years. Production doubled in the five years from 1922 to 1927 and doubled again in the four years from 1927 to 1931; in the seven years since 1931 production has increased by only 50%. Mr. Said pointed out in an interview that each 5-Year Plan set a higher goal for oil production than was reached, and only by successive downward revisions of the goal was it brought down somewhere near the actual output. For example, the second 5-Year Plan announced

1/ Standard Oil Company of New Jersey.
2/ Garfias' estimates.
a goal of about 500 million barrels by 1937; this was later revised to 320 million. Actual production in 1937 was only 200 million barrels. The present 5-Year Plan has set a goal of 380 million by 1942; actual production in 1938 was only 60 percent of that amount.

No preliminary figures are available showing the rate of oil production thus far in 1939. Mr. Said concluded, in October, that reports from all the major oil fields indicated that all operations — prospecting, drilling, production and refining — had deteriorated considerably during recent months. That deterioration has also been reported in the oil journals. As a result of the occupation of the Eastern half of Poland, Russian annual oil production will be increased by about 2 1/2 million barrels. If the wells have been destroyed it will take some months before the Polish supply becomes available. It may be tentatively concluded that Russia's present annual rate of production is between 200 and 225 million barrels. About 90 percent is produced in the Caucasian fields and only 10 percent in all other Russian fields.

Russian consumption has grown even more rapidly than production; it has nearly doubled since 1932. Both Mr. Garfias' estimates
and Soviet estimates put 1938 consumption at about 75 percent of production, or about 165 million barrels. Mr. Garfias estimated that in 1940 Russia will have a balanced production and consumption of about 240 million barrels.

In spite of the increased domestic production and the apparent surplus of production over consumption, exports have fallen drastically. Since oil reserves in storage do not appear to have increased sufficiently to exhaust that surplus, there is some mystery as to where the surplus goes and what the explanation is for the remarkable falling off in oil exports.

Mr. Garfias said that the discrepancy was due to three causes: exaggeration of production statistics, understatement of civil and military consumption statistics, and storage. 2/

1/ According to Russian figures obtained from Mr. Said, Soviet production and consumption were as follows, in million of tons:

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Consumption</th>
<th>&quot;Surplus&quot;</th>
<th>Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932</td>
<td>22.3</td>
<td>13.5</td>
<td>8.8</td>
<td>6.1</td>
</tr>
<tr>
<td>1934</td>
<td>25.6</td>
<td>17.5</td>
<td>8.1</td>
<td>4.3</td>
</tr>
<tr>
<td>1935</td>
<td>26.8</td>
<td>18.5</td>
<td>8.3</td>
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<td>1936</td>
<td>29.2</td>
<td>19.5</td>
<td>9.7</td>
<td>2.7</td>
</tr>
<tr>
<td>1937</td>
<td>31.0</td>
<td>21.5</td>
<td>9.5</td>
<td>1.9</td>
</tr>
<tr>
<td>1938</td>
<td>31.5</td>
<td>23.0</td>
<td>8.5</td>
<td>1.5 (est.)</td>
</tr>
</tbody>
</table>

These figures are roughly similar to those stated above in terms of barrels.

2/ Production statistics are always quoted in terms of crude oil and consumption statistics are always quoted in terms of finished oil products, such as gasoline, kerosene, fuel oil, etc. There is always a certain loss in the refining process and the consumption of refinery residuals such as paraffin and asphalt is not usually considered a part of mineral oil consumption.
There is considerable evidence that, in spite of the apparent surplus of production over consumption, consumption is actually as high as usable production and could easily be higher so that there is a shortage of oil in Russia. For example, Dr. Tokayer stated that Russian production has not been able to expand fast enough to keep up with peace-time consumption and that there has been an outright fuel shortage in Russia for many years. Likewise, in support of this contention, Mr. Said cites the fact that many electrical plants and other fuel consumers are being shifted from oil to coal consumption, and that various schemes are in operation in Russia for producing gasoline synthetically from coal and for producing a fuel gas by direct hydrogenation of the coal fields. Mr. C. W. Wright, foreign minerals specialist of the Bureau of Mines, recently stated that lack of oil supplies is having a serious effect on industries which need motor fuel. Both Mr. Said and Dr. Tokayer give much weight to the actual shortage of oil as an explanation of the decline in exports, and as an evidence either that production figures are too high or consumption estimates too low.

Although there is some indication that Russian stocks of oil in storage are very large, they are not necessarily as large as Russian statistics would indicate, and they are not large enough to make up the discrepancy between production, consumption, and exports. In September, 1938, Mr. Carmichael, in the New York Times,
showed Russian stocks as 69 million barrels at the end of 1936, 72 million barrels at the end of 1937, and 73 million barrels in the middle of 1938; Standard Oil Company data show Russian stocks of crude oil alone of 24 million barrels in the middle of 1939.  

Mr. Said points out, however, that a great deal of Russian storage of oil is in large open pools, little more than natural lakes; the waste involved in such methods of storage is naturally very high.  

In the second place, Mr. Said points out, the Russians have been purchasing considerable quantities of gasoline in California for consumption in Siberia; he states that the terms of purchase of this oil are such as to indicate very strongly that there are no sizeable reserves of gasoline, at least not in Siberia. Statistics of stocks might indicate that 3 million of the 1937 discrepancy of 31 million barrels (after exports) may have gone into stocks.  

But they would also indicate that only 1 million of the 1938 discrepancy of 39 million barrels (after exports) could have gone into storage.  

It was the opinion of Mr. Boris Said, stated in two interviews and in his memoranda, that the discrepancy is primarily a result of tremendous waste between production of crude and of finished products. He estimated that at least 20 percent of the crude oil produced is wasted. Such an amount of waste would more than account for the discrepancy of production over consumption and exports. An article in the October, 1939 issue of World Petroleum stated that only 88 or 90 percent of Russian crude oil produced is run to stills; wastage of 10 to 12 percent would account for about two-thirds of
the net discrepancy; refining losses were estimated at an additional 4 percent.

In 1932 Russia exported 45 million barrels of oil. In spite of an increase in production from around 150 million barrels to over 200 million barrels, and a continuing apparent surplus of production over consumption of more than 40 million barrels, Russia's exports have declined in every year since 1932 until, in 1938, they were only 7 1/2 million barrels, about 3 percent of total production. At least 1 million barrels of oil were imported into Russia in 1938, leaving net exports of only 6 1/2 million barrels. (Official Russian figures for imports of crude oil and products for the first eleven months of 1938 show imports of about 115 thousand tons, or about 900 thousand barrels; trade specialists in the Department of Commerce estimated that this was almost entirely high test gasoline imported into Siberia. Information submitted confidentially by Mr. Boris Said checks very closely with this, showing exports of gasoline from the Standard Oil Company of California to Vladivostok of just over 1 million barrels in 1938.)

Russia's exports of oil have always gone chiefly to countries other than Germany. Even in 1932 when Russian exports of oil were at their peak, only a small proportion went to Germany: German statistics showed imports of 3.8 million barrels from Russia, as compared with total Russian exports of 45 million barrels.

German statistics show that Russia shipped to Germany 2.8 million
barrels in 1933 and 2.3 million barrels in 1934 and 1935; 1.7 million barrels in 1936, 1.4 million in 1937 and only 600 thousand barrels in 1938 and 100 thousand barrels in the first six months of 1939.

Most Russian oil exports pass through the Black Sea and the Dardanelles. During the first eight months of 1939 only 3 million barrels of oil products were declared at Istanbul, compared with nearly 4 million in the same period of 1938; as this year's exports are running about 20 percent below 1938, total exports for the year may amount to only 6 million barrels. During the month of August Russia's petroleum exports through Istanbul were 60 percent below their total in August 1938, indicating possibly, that the mobilization of the Russian army had increased consumption to a point where practically no exports could be spared.

If war had not begun this year, total Russian exports during the next twelve months would probably have been at least as low as in 1938 and net exports possibly as low as 5 or 6 million barrels. Without any change in any of the tendencies or trends of Russian oil production, it would have been extremely unlikely that more than 10 million barrels could have been exported. 1/

In view of the outbreak of a war in which Russia, while not involved, is apparently at the present time a neutral friendly to Germany and willing to provide Germany with raw materials, will the falling trend of Russia's exports be reversed and

1/ Russian stocks of oil in storage, estimated by some at as high as 70 million barrels, should be immediately available for export. It is apparent from the previous discussion, however, that only a very small portion of this total really consists of available stocks; their export would be subject to the same difficulties of politics, payment and transportation as the rest.
substantial export surpluses once again be achieved? Specifically, how much surplus oil can be made available for export during 1940 and 1941? The answer to this question will depend upon developments in Russian production and consumption.

In the first place, if the export surplus is to be increased, production will probably have to be increased somewhat over present levels or, even more important than that, the tremendous wastage of crude oil will have to be reduced so that the present level of production will provide a larger amount of useable oil. Such developments will require tremendous improvement in the efficiency and organization of the Russian oil industry. The existing inefficiency and disorganization of the industry is widely commented upon in foreign oil journals and even in Russian official newspapers and journals. For example, in 1938 the drilling of new wells was 40 percent below schedule; the Petroleum Press Service recently stated that drilling in the first seven months of 1939 is only 75 percent of the schedule. In the two largest fields drilling was only 60 percent of the schedule and in some of the smaller fields, as low as 30 percent; in only one small field was it over 100 percent. According to articles in the Soviet press, it takes nearly two years to complete drilling of a well and adjust it for production; wells are drilled in wrong locations and in the wrong way, and then abandoned; even the deepest well drilled in Russia, to a
depth of over 11,000 feet, was abandoned after a breakdown during testing; drilling is often carried out without casing; a great deal of the production which has been achieved has been by virtue of gushers and not as a result of the mechanical operation of the wells, which are frequently shut down as soon as it is attempted to bring them into mechanical operation.

In addition to such problems, there is the ever-present problem of inefficient management and laxity of labor discipline; as a result of the "purge" a great deal of the management of the Russian industry has been replaced with inexperienced engineers.

It is reported in official publications that owing to delays and shutdowns in the oil fields, the labor is not paid on full time basis; that thousands of drillers in the Baku fields change employment each month — 13,000 laborers were hired and 14,500 laborers were discharged in the Baku fields during the first seven months of 1939.

An increase in production, or a reduction of waste in production will likewise require a tremendous improvement in the quality of all oil field drilling equipment, storage facilities, refinery operations, and domestic train and pipe line transportation. Several years ago, the Russian Government decided to stop importing foreign oil well drilling equipment, and to manufacture in their own shops copies of foreign equipment. The opinion is generally held in American oil circles, that the results of this policy have been disastrous, but verification of this opinion can easily be found in the translations of Russian official publications which were submitted by Mr. Said. For example, it
was stated in "Pravda" on September 6, 1939, that, of 215 rotary drilling outfits available at Baku, only 164 are employed, and the others are idle due to lack of spare parts for repairs, and lack of supplies; the speed of drilling had fallen from 900 meters per rotary outfit per month, to 760 meters; and there had been 700 breakdowns in drilling during the first seven months of 1939, consuming 11 percent of all drilling time. It was reported in another official publication, in July, that repairs were completed on only 540 wells out of 2,500 scheduled to be repaired this year, but that almost the same number of wells had broken down since the beginning of 1939.

An article in "Industria" on October 6, 1939, stated that the three main builders of equipment for the oil industry are delivering very poor quality machinery, unfit for the heavy duty required of it; this article continues with as representative a summary of the mechanical problems of the Russian oil industry as could be found anywhere:

"The Kirov as well as the Dzersinski plants of Neftmash which are manufacturing disc bits for drilling in hard ground are not in a position to fill more than 50% of the total bits required and the disc bits delivered during 1939 are of a quality much below standard and below the quality of 1938. The Kirov disc bits are of low quality and the output of the Dzersinski plant is still worse."
The various drilling organizations of the major oil fields have accumulated in 1939 large numbers of disc bits which require repairs. These bits are being sent from one machine shop to another for the necessary repairs and neither of the repair shops has the necessary facilities or the necessary experience to undertake the repairs. Meanwhile, however, the Soviet oil fields experience an acute shortage of the most necessary disc drilling bits.

During the past several months Baku oil fields are short of pipe couplings. The machine shops of Baku have had all sort of difficulties with the cutting of thread on the pipe couplings. Experiments were made to cut the thread on the couplings before they are tempered and this resulted in difficulties, because the tempering required special care. On the other hand the threading of couplings after they were tempered became a difficult operation, because the steel became too hardened.

Closed type rotaries manufactured by the domestic machine shops during recent months have deteriorated in quality against previous standards. The rotaries of 1938-1939 output break down in operations more often and breakdowns occur after drilling to 450-500 meters of continuous drilling. The swivels do not hold out more than 200-300 meters of drilling in continuous operations.

Derricks are being delivered to the oil fields without necessary details such as bolts, rivets, washers, supports, etc. In cases when these details are shipped together with the derricks, they are, invariably, of different sizes, which do not fit to the derricks and this hampers considerably the erection of rigs in due time.

The management of Baku has lodged complaints of shortages of drilling pipe. It is true that Baku drilling operations are short of the plan, owing to a shortage of pipes. At the same time, however, the Baku supply department has in storage over 300,000 meters of drilling pipe, which cannot be used, for the pipe needs threading."

The same disorganization and inefficiency is found in the refineries which, according to one Russian editorial, are as often shut down as in operation. Most of the refineries were
built at one time about ten years ago with the use of second-rate patents; they are now wearing out. The Russians manage to obtain only about 15 percent to 18 percent gasoline from the crude oil, although, according to Mr. Said, they claim to get 22 percent. (In United States modern refinery practice obtains at least 40 percent gasoline from crude oil.) Mr. Said stated that the quality of Russian refinery products had not improved in any way for the past twenty years, during which time United States refinery products have been revolutionised. He also told of a new refinery which was ordered for construction at Baku, for oil of the quality produced at Baku; plans were changed, however, and the refinery was built at Batum; subsequently, in order to make use of the refinery, Baku oil had to be shipped to Batum.

Russia has the only significant pipelines in Europe; about 15 for interior use and about 5 for export use; new pipelines are being built. However, the same complaints of behind-schedule construction, breakdowns, under-capacity operation, etc., are made in the official press concerning the pipeline system. The shortcomings of Russian railroad transportation, both for distribution of oil and delivery of oil machinery, are likewise very evident.
In the second place, if the Russian export surplus is to be increased, some restriction will have to be put on domestic consumption. It was pointed out above how rapidly consumption has grown and how it has constantly pressed against the total available quantity of oil to the extent that oil exports have fallen to one-sixth of their amount in 1932. It is also shown that Mr. Garfias has estimated Russian consumption in 1940 as high as 240 million barrels.

In view of the recognized fuel shortage in Russia, any increase in the production of oil or in the amount of useable oil could very easily be absorbed by increased domestic consumption, even in peace time. At a time when most of Europe's armies are mobilized and when, even though not herself a participant, Russia must maintain an unusually heavy concentration of troops, her military consumption will undoubtedly increase sharply in the next 12 months over the last 12 months. In time of general European war, therefore, the certainty is all the greater that Russian consumption, civil and military, will increase fast enough to absorb any increased amount of available oil.

In the light of these factors, if an export is to be created, it can only be done by a costly national policy of sacrificing potential domestic consumption — industrial, agricultural and civilian — to the end that 10, 20, or even 40 million barrels may be made available for export. Even at the present time some
additional oil might be made available for export if drastic limitations were put on normal Russian consumption. If the useable production is increased, it will be somewhat easier to make a larger quantity of oil available for export; but the necessity of drastic limitation on normal, expanding consumption will continue. 1/

Can German engineers correct these chaotic conditions in the Russian oil industry and aid in creating a larger export surplus? It was pointed out in Part V above that some German engineers and skilled petroleum workers might be spared from German fields if it was considered that the production of oil for Germany's use would be higher if they worked in the richer Russian oil fields than if they attempted to increase German natural oil production. At the present time it seems to be the plan of the German government to send some petroleum engineers and workers into the Russian fields. On September 13 it was reported that a train-load of German technicians was already on its way to Russia to help reorganize Russian industries. However, the important question is, as Dr. Tokayer puts it, can German engineering advisers succeed in doing what American advisers were never able to do and what the Russians are obviously incapable of doing by themselves? The German engineers will certainly face a tremendous problem.

Can German materials be shipped to Russia in sufficient quantities and of sufficient quality to make up the existing deficiency? A dispatch from Moscow to the New York Times dated November 19 reports that the German trade delegation now in that city has obtained a Russian promise to deliver 800,000 tons, about 6 1/2 million barrels, of oil. This is roughly equivalent to Russia's total export surplus at its present level.
shortcomings of Russian oil machinery? It has been pointed out above that even the German manufacture of oil well machinery suffers from certain shortcomings, especially where special alloys are involved. Dr. Tokayer has stated that Germany could not supply oil equipment of much better quality than the Russian in peacetime, but this may be an overstatement and German machinery may in many cases be better than Russian. But the Russian need for machinery is so vast that the German oil well machinery plants can work to full capacity without making any significant quantity of machinery available for export to Russia. Even operating at full capacity there will be a question whether the output can be manufactured in sufficient quantity to meet German needs and at the same time provide a surplus for Russian use. It would probably be found that German engineers could do more by reorganizing Russian industries affiliated to the oil industry and Russian transportation than could be done by the export to Russia of German materials. On the whole the German shortages of materials, of labor and of engineers, and the difficulties of transporting supplies to Russia does not indicate that the Germans can help a great deal. However, if German engineers are given sufficient authority and their efforts are not counteracted by red tape and local jealousies, they may quite conceivably, within a year or two, bring about an increase of usable production of 25 or even 50 million barrels a year. As pointed out
above, whether or not the Russians would make that increased
production available for export is another question which lies
within the larger realm of Russian foreign and domestic policy.

(5) Tremendous difficulties of payment and transportation
and many political uncertainties must be overcome before
even the presently available export surpluses of Rumania and
Russia, to say nothing of increased surpluses, can be
received in Germany.

Even assuming that the Rumanian and Russian export surpluses
can be maintained at their present levels and, within a year or
two, substantially increased, Germany would still face the problem
of obtaining these large quantities of Eastern oil for war-time
use. Three chief obstacles would have to be surmounted: the
problem of payment for the oil; the problem of transporting the
oil from either Rumania or Russia; and, with respect to both
countries, the political problem of obtaining the consent of the
governments for the shipment to Germany of such large quantities
of their oil.

Political problems:

In the case of Rumania, the political problem is tied up
with the question of Rumania's relatively indefensible neutrality.
If, by some as yet unforeseen development, Rumania should become
a belligerent on the Allied side, naturally only by successful
military conquest and subsequent reconstruction of the sabotaged
Rumanian fields, would Germany be able to obtain any Rumanian oil.
If, on the other hand, through international pressure, or by free
will, Rumania should become a belligerent on the German side, then
this political problem would be practically solved. In this latter instance, however, an additional factor would become of paramount importance, namely, the attitude of Russia. By her conquest of the eastern part of Poland, Russia has strengthened the strategic position which she formerly held with respect to Rumania, particularly with respect to Rumanian oil fields which lie predominantly on the side of the Carpathian Mountains nearest to Russia and eastern Poland. As in the last war, the passes of these mountains can easily be held against attempted invasion from the West. (Only by the cooperation of her then allies, Bulgaria and Turkey, was Germany able to take Rumania so easily in 1916, invading from the South.) The eastern frontier of Rumania is so indefensible against Russian invasion, however, that, if, at any time, Russia should decide to prevent Germany from obtaining Rumanian oil, it would probably be in a position to do that successfully, with or without Rumanian assistance. In fact, it is now most unlikely that Russia would permit Germany to occupy, by military conquest, any part of Rumania east of the Carpathian Mountain chain. As Mr. Sadler of the Standard Oil Company of New Jersey said, in an interview with Captain Pulston, "If Rumania is to be occupied, it will be done by Russia, so the oil wells there will fall to Stalin". If Rumania follows a policy of real neutrality or "friendly neutrality"
toward Germany, the Allied ownership of substantial portions of the Rumanian fields introduces the possibility of large scale sabotage, which might prevent Germany, for some time at least, from obtaining any large amount of Rumanian oil.

The shipment of Russian oil to Germany is basically dependent on Russia’s foreign policy. If Russia follows a course of merely passive neutrality, larger supplies of oil might reach Germany. If Russia follows a policy of “active cooperation” short of military intervention on the German side, quite large quantities of Russian oil would probably be made available to Germany after a period of a year or so.1 If Russia becomes a belligerent on the German side, however, her entire production would probably be used up by her own armed forces and there would be practically no surplus for export. If Russia should become a belligerent against Germany, then it would, of course, not only prevent the shipment of any Russian oil to Germany, but it is in a position to prevent Germany from obtaining any Rumanian oil. For this reason, it may be stated that Germany’s active participation in war, after the first year, will be utterly dependent upon a Russian foreign policy of friendly cooperation, or, at the very least, passive neutrality.

For the rest of the discussion in this section of this report it will be assumed that Russia actively "cooperates" with Germany. The problems which Germany will still face in obtaining large quantities of Eastern oil may then be seen on the largest possible scale.

1/ See Note 1/, page 102.
Payment problems:

If, as seems probable, at least after the first year of war, Germany has to depend upon large importations of petroleum from Rumania and Russia, then the problem of how Germany can make payment for that oil is of great importance. Germany can make payment from her reserves of gold, foreign exchange, and silver; she can pay with exports of materials (and skilled personal services), or she can pay by accumulating debts (in effect, borrowing foreign capital). If her importations of oil run between 15 and 50 million barrels annually, Germany must find, from a combination of these three means of payment, a total of roughly $30 to $100 million per year 1/ — in addition to the payments for all other necessary supplies.

Germany can, of course, use all or a part of her reserve of gold, foreign exchange, and silver to purchase all or some portion of her wartime requirements for imported oil. In the middle of 1939 the Reichsbank reported gold reserves of about $30 million; it is usually estimated that Germany's unreported holdings of gold and foreign exchange, including whatever gold was seized in Austria, Czechoslovakia and Poland, would increase this figure considerably. In a recent cable from our Embassy in London the Treasury was given an estimate of $275 million as Germany's total foreign exchange reserves at the outbreak of war. It has been estimated that Germany has an additional amount of more than $35 million of silver, about

1/ The unit value of Rumanian oil exports in 1938 was approximately $2 per barrel.
one-third of which is already in the hands of the Reichsbank. These cash reserves can only be useful to Germany if spent in adjacent neutral countries which can, if they chose, sell the gold and silver in the United States. However, a single year’s total requirements for imported oil might use up from one-fourth to one-half of Germany’s total cash reserves, and oil is only one of several vital commodities which Germany must purchase abroad during the course of war.

According to an Associated Press dispatch from Rumania, on October 11, during the first month of the war, Germany evidently paid cash for most of the Rumanian oil she purchased (approximately 45,000 tons, 360,000 barrels): "Rumanian oil companies are demanding cash and Germany is still paying cash, according to a survey of interested foreign sources, although some barter deals have been made". It was likewise reported by the Chicago Daily News correspondent in The Hague, on November 16, that reports from Berlin and from Dutch oil observers indicated that the Russians are operating "strictly on a cash-and-carry basis".

If Germany does not pay for her imported oil out of her reserves, she must pay with exports — on compensation, clearing, or other barter or near-barter arrangements — or by accumulating debts. But if Germany does not pay for her imported oil with free foreign exchange, an additional problem is created, since the oil exporting countries must then be induced to forego the free foreign exchange for which their oil exports might otherwise be sold.
During recent peacetime Romania has obtained a considerable amount of free foreign exchange for her oil even though almost all of it was sold to countries with whom her trade is regulated by clearing, compensation or payment agreements. In spite of a tendency for Romanian oil exports to be directed more and more towards Germany and Italy—despite the foreign, mostly Allied, ownership of the Romanian oil fields—nearly 30 percent of her exports in 1938, about 11 million barrels, was sent to Great Britain and France and their Mediterranean colonies or mandates. So long as the Dardanelles remain open, Romania may be expected to find even more attractive wartime free exchange markets for her oil export surplus and to utilize her near monopoly position to extract high prices from Germany. A New York Times dispatch of November 27 reported that, in spite of a decline in export shipments and accumulation of oil in storage, Romanian oil prices have risen over 30 percent since the outbreak of war. In addition, the Allies are now purchasing Romanian oil on very attractive terms, as a part of a deliberate policy of preventing Germany from obtaining that oil. For example, a telephonic communication from Bucharest to the New York Times, dated November 18, reported:

"German purchases in Romania have become very difficult in the last few weeks because strong British and French competition has raised the prices so much that Germany would have to pay considerably more for Romanian products than she has been paying in other neutral countries."

So long as Romania is not under direct military threat, therefore, the foreign exchange which she can receive on the sale of her oil to Allied countries and other countries, for example, Italy, will constitute an additional obstacle to Germany's being able to purchase a large portion of
the Rumanian oil export surplus; it will constitute an even stronger obstacle to Germany’s obtaining any Rumanian oil on credit.

It may be pointed out that during recent peacetime Germany had serious difficulties in obtaining oil from Rumania. Oil was so valuable to Rumania for the foreign exchange which it could command when sold to other countries that her trade agreements with Germany provided for a limitation on the proportion of German imports from Rumania which could consist of oil: in the 1938 trade agreement it was provided that not more than 25 percent of her exports could consist of oil; in the new German-Rumanian trade agreement which was announced in March 1939 this percentage was raised to 40 percent; in the recent trade conversations since the outbreak of war the percentage may have been raised still more, but some such restriction undoubtedly still exists. This kind of restriction gives an indication of the reluctance with which Rumania has sent oil to Germany.

Russia exported 7-1/2 million barrels of oil in 1938, only about 500,000 barrels of which was shipped to Germany. Most of the Russian exports went to the United Kingdom, India, Japan, the Scandinavian countries, and other countries which paid in free foreign exchange. If Russia were to ship to Germany her entire present export surplus, 1/ or a large portion of it, she

1/ See Note 1/, page 102.
would have to face an even greater proportionate loss of foreign exchange revenue from the sale of her "black gold" than Rumania would have to face. If Russia's export surplus is considerably increased beyond the 1938 level, and Germany takes most of it, Russia will have to forego the potentially larger foreign exchange income from most of that larger export surplus; if she will not forego the foreign exchange, Germany will be able to obtain only a small portion of the new larger export surplus (unless of course Russia can require Germany to pay in cash).

It was pointed out by Mr. Garfias in the paper which has been frequently referred to in this report 1/, that Hungary, Greece, Bulgaria and Yugoslavia obtain the entire amount of their imported oil from Rumania; in 1938 these importations aggregated 4.5 million barrels. A readjustment of the supply of oil going to these four countries would be difficult, he stated, and might involve the danger of dislocating Germany's purchases of other materials from these nations. He concluded, therefore, that 5 million barrels of Rumania's oil export surplus will continue to be sold to these four countries and will always be unavailable to Germany.

This factor may shed some light on a recent newspaper dispatch from Bulgaria (Associated Press, October 11) in which it was reported that Germany had agreed to buy $19 million of Bulgarian

1/ "Petroleum Supply of the Axis Powers Short of War Time Needs".
foodstuffs and that she would pay for $12 million by shipping
Rumanian oil to Bulgaria and would pay for the remainder in
gold. It was reported that this plan had puzzled observers
in Bulgaria. It is entirely possible, however, that Germany
will be able to make some use of the dependence of these four
Balkan countries on Rumanian oil, when concluding trade agree-
ments with them. It might be pointed out, on the other hand,
that Bulgaria's importations of oil in 1938, all Rumanian, totaled
only about 80,000 tons, roughly 650,000 barrels, which would have
been worth, not $12 million, but about $1,250,000.

Germany may be able to export enough commodities (or skills)
to be able to pay for all or a portion of her necessary importa-
tions of oil. In 1938 Germany's total exports to all countries
were valued at slightly more than $2 billion, of which about $60
million went to Rumania and about $12 million to Russia. At
least half of Germany's 1938 exports to overseas countries can
no longer be shipped, in wartime, because of the British blockade.
If Germany's industrial system can continue during wartime to
produce a surplus of goods for export, about the only outlets
for that surplus will be the adjacent neutral countries, includ-
ing Russia. If Germany is able to produce only half as many
goods for export during wartime as she exported in 1938, she
should still have approximately $1 billion worth of goods for
sale or barter to adjacent neutral countries and Russia, or about the same amount of goods sold to these countries in 1938. Some part of the proceeds of the export of goods can be used in payment for importations of oil. Unless Germany's wartime exports of oil are much less than even half of the 1938 total, these would seem to be large enough to pay for even as much as 50 million barrels of oil, or about $100 million. However, if Germany is to pay for Russian and Rumanian oil by the export of her goods to them, she will have to find commodities (or skills) acceptable to those two countries, which they can absorb in large enough quantities, and which can at the same time be manufactured or spared in Germany in large quantities in spite of wartime conditions there. A transportation problem will be faced in the shipment of unusually large quantities of goods from Germany to the East. The "exportation" of German engineers and skilled workers can probably not be counted for any large aggregate amount of payments. Again, however, oil is only one of many vital commodities which Germany will have to import from adjacent neutral countries during the course of the war; whatever commodities are exported cannot be used solely to pay for oil.

In recent peacetime Germany's commodity transactions with both Rumania and Russia have been about balanced. It may be assumed that her slight surplus of imports from Russia in 1938 was paid for in foreign exchange. (The total of German-Russian trade had
fallen from nearly a billion Reichsmarks in 1932 to about 80 million Reichsmarks in 1938. However, Germany's slight surplus of exports to Rumania in 1938 offset only about one-fifth of the commercial debt Germany had accumulated because of her heavy excess of imports from Rumania in 1937.

It is entirely conceivable that for reasons of national policy either Russia or Rumania, or both, might furnish Germany with the necessary quantities of oil on credit. The payment problem, of course, would then be automatically solved. Such a solution appears somewhat improbable in the Russian case, unless she becomes an active military partner of Germany (but then Russia would probably consume her entire production of oil). In this connection, it is of interest to recall that in the trade agreement between Russia and Germany concluded in August 1939, it was Germany which, on balance, extended credit to Russia. To the extent that Rumania retains its independence, it will probably resist any accumulation of debts owed by a belligerent power in Germany's position. It may probably be said, however, that Rumanian credits to Germany would be granted in direct ratio to the Rumanian fears of imminent German invasion. Even if Germany is able to obtain some credit from either or both of these countries, there are again other vital commodities besides oil on which the credit would have to be spent.
Transportation Problems:

Even if both these obstacles to the receipt of Rumania's and Russia's export surplus — the political problems and the problems of payment — are successfully overcome, Germany will face great difficulties in arranging adequate transportation facilities for importing the necessary quantities of oil. This problem will not become acute until the second year of war, however, giving Germany from 9 to 15 months time in which to construct new tank cars, new river barges, new loading, unloading and transfer stations, etc. In this sense, then, time is in Germany's favor, as it is in her favor with respect to the problems of increasing her own domestic output and the Rumanian and Russian output, and, to a lesser extent, with respect to the problems of arranging payment for imports by increasing her exports to Rumania and Russia.

It was pointed out in Part II, above, that German statistics show imports of only about 4 1/2 million barrels in 1938 and 3.3 million barrels in the first 6 months of 1939 of Russian and Rumanian oil. Rumanian statistics show, in addition, exports of about 2 million barrels to Czechoslovakia in the first six months of 1939. (Rumanian exports to Czechoslovakia had averaged about 25 thousand tons a month during 1938 and 27 thousand tons a month during the first 3 months of 1939; in the 3 months after the occupation of Czechoslovakia by Germany, April to June, 1939, Rumanian exports to Czechoslovakia increased to a monthly average of over 55 thousand tons). Total shipments from these two countries to Greater Germany in recent peacetime were running at the rate of about 10 million barrels per year.
An indeterminate amount of the shipments from these two countries to Germany was being made over routes which are not any longer open; it has frequently been stated that a large portion of the Rumanian oil shipped to Germany was sent by tanks through the Black Sea and the Mediterranean to Hamburg; this was undoubtedly true of most of the smaller Russian shipments. For example, an Associated Press dispatch, dated October 11, from Floesti (center of the Rumanian oil industry) referred to the Black Sea-Hamburg route as the "normal" route for Rumanian oil. On the other hand, Mr. Sadler of the Standard Oil Company of New Jersey stated in an interview that practically all of the oil which was sent to Germany from their Rumanian affiliate (Romano Americana) was sent up the Danube and that only an occasional tankload went via the Mediterranean.

Rumanian oil destined for Czechoslovakia and Hungary undoubtedly went up the Danube. World Petroleum has estimated that 75 percent of Rumania's 1938 exports went out via the Black Sea and only 20 percent, 7 million barrels, went up the Danube; in 1938, about 1 1/2 million barrels of Rumanian oil went to Hungary, nearly 2 1/2 million barrels to Czechoslovakia and about a million barrels to Yugoslavia; it may be computed, therefore, that only about 2 million barrels of Rumania's exports to Germany went up the Danube in that year and that nearly half of her exports to Germany were shipped via the longer sea route. A cable dispatch from Bucharest to the New York Times
on October 13 stated that just prior to the outbreak of war 26 percent of Rumania's oil was being shipped via the Danube River and that only 4 percent of Rumania's oil exports had left by railway. This would indicate that, on an annual basis, about 10 million barrels of Rumania's slightly smaller 1939 export surplus was being shipped West by rail and river, of which about 1 1/4 million barrels was going by rail and the rest by the Danube River; about 800,000 barrels of the total westward shipment was destined to Hungary, about one million barrels to Yugoslavia, and an annual rate of over 4 million barrels was destined to former Czechoslovakian territory. This would indicate that about two-thirds of Germany's reported 1939 imports of Rumanian oil, at an annual rate of about 6 1/2 million barrels, went up the Danube and about one-third went via the sea route; in the summer of 1939, three-fourths of the shipments up the Danube, at an annual rate of approximately 8 million barrels, were going to Greater Germany.

The Associated Press dispatch from Rumania, dated October 11, stated that in the five weeks since the outbreak of the war 90 thousand tons, more than 700 thousand barrels of oil, had been shipped by the Danube River, of which half was destined for Hungary and Yugoslavia. At that rate, Germany was receiving Rumanian oil at a rate of only about 3 1/2 million barrels annually. However, there is some indication that during the first weeks of the war, Germany had little need for imports of oil; for example, Mr. Sadler
reported that in the first six weeks of the war the Standard Oil Company affiliate in Rumania had sold less than normal quantities of oil to Germany, and that Rumanian oil had been accumulating in storage during that period. 1/

In any case, however, the transportation routes between Germany and the East, which have been carrying somewhat less than 10 million barrels of oil annually, must be expanded several-fold to carry from two to five times their present amount, if Germany's wartime needs in the second year of war are to be met by imports from this region. The difficulties in the way of successful enlargement of transportation facilities, on such a scale, are tremendous. The available transportation routes are the Black Sea, the Danube River, and railroads from Rumania to Germany through Hungary or former Poland, and from Russia to Germany through former Poland. The Baltic Sea may be ruled out as a means of transporting from Russia to Germany, since the Russian oil fields are in the extreme southern part of Russia.

As was indicated above, Rumanian oil can be transported into southern Germany via Budapest and Vienna, by either railroad or the Danube River or it can be shipped to northern Germany via the railroad through former Poland. The heart of Germany is over a thousand miles from the Rumanian fields by all of these routes and each of them has its disadvantages. It will be some time before

1/ Subsequent data received from Mr. Sadler on November 27 indicates that during September nearly 550,000 barrels (65,120 tons) of Rumanian oil was shipped from the principal Rumanian oil port on the Danube, Giurgiu, to Greater Germany; this was at an annual rate of about 6½ million barrels, or less than 20 percent of Rumanian total exports.
the main Polish railway line from Cernauti, in Rumania, through Lwow and Cracow to Breslau can be reconstructed and made fit for heavy use. In any case, before any significant portion of the Rumanian oil export surplus could be shipped such distances by rail, the existing fleet of Rumanian, Hungarian and Greater German tank cars would have to be increased many-fold by construction of new cars, and all railroad oil terminal facilities would have to be equivalently increased.

Mr. Garfias estimated in his above-cited paper that the transportation of 35 million barrels of oil a year from Rumania to Germany by rail would require, at a minimum, about 11,000 European tank cars. Under war time conditions tank car trains would not cover more than about 200 miles a day, he estimated, and 12 days would thus be required for the 2,400-mile round trip for each car; since European tank cars have an average capacity of only about 120 barrels — compared with about 400 barrels for American tank cars — each car could carry about 3,650 barrels per year, if in continuous operation. Allowing for a minimum of delay and loading time, therefore, about 11,000 tank cars, or close to 300 trains of about 50 cars each in continuous operation would be required to carry the entire Rumanian oil export surplus, at its 1938 level.

This estimate is overstated, however, at least under the most likely assumptions. In the first place, large quantities of
Rumanian oil will continue to move up the Danube River; the 1939 peacetime annual rate of oil shipments up the Danube River was about 8-3/4 million barrels, of which about 6-1/2 million probably went to Greater Germany. In the second place, as has been shown above, Germany's requirements for imported oil may be less than 15 million barrels during the first year of war; during the second year of war, however, they will probably be at least as large as 15 million barrels and possibly as large as 50 million, or even more. During the first year of war, therefore, if Danubian River shipments to Germany remain at their present level, not much more than 5 million barrels would have to go by tank car, even given imports as high as 15 million barrels; if the present rate of Danubian River shipments to Germany could be increased by 50 percent, practically none would have to go by tank car. At a minimum existing tank car shipments of over 1 million barrels would not have to be increased, and at a maximum they would have to be increased about five times. Using Mr. Garfias' basis of calculation, this would mean that a maximum of only 1,500 tank cars would be required in continuous operation in addition to the river shipments at their present levels.

In the second year of war Germany's need of Rumanian oil may be much larger and, with the exception of about 5 million barrels shipped to other Balkan countries, Rumania's entire export surplus might conceivably be shipped to Germany (i.e. 30 to 40 million barrels). In that case, assuming that river shipments can be doubled from their
present levels, about 20 million barrels might go by the Danube River, leaving up to 30 million barrels to be transported by rail, which would require as much as 9,000 tank cars. If during the second year of war the Danbian River capacity was tripled, only 6,500 tank cars would be required to transport total rail exports up to 20 million barrels.

It was reported in a cable to the New York Times from Bucharest, dated October 13, that Rumania had 8,000 tank cars of about 14 tons capacity each (about 110 barrels). These, it was stated, are now required for internal Rumanian needs associated with its large oil industry and heavy domestic oil consumption (.75 barrels per capita in 1938, compared with Germany's .67 barrels per capita). It was this same dispatch which stated that only about 4 percent of Rumania's peacetime exports have been shipped by rail, indicating that very few of those 8,000 tank cars were being used in international transportation. It is not known how many tank cars Germany now has in operation, but, even more than in the case of Rumania, they are probably now being used to capacity in the internal distribution of Germany's domestically produced oil and her stocks.

Before Germany can import the quantities of Rumanian oil which will be necessary during the second year of war, a minimum of, say, 1,000 and a maximum of 9,000 tank cars would have to be made available for this purpose. Some of these may be obtained
by restriction of alternative normal uses for German and Rumanian tank cars, and even Hungarian cars; the greatest part will probably have to be specially constructed, mostly in Germany. (Hungary has important railroad equipment factories and may conceivably manufacture tank cars for sale to Germany.) It will take a long time before even 1,000, to say nothing of 9,000 tank cars, can be constructed. However, it has been shown in this Report that during the first 9 to 15 months of warfare Germany's stocks of oil in storage can largely take the place of imports. That gives Germany an opportunity to devote a great deal of her energies to the construction of new means of transportation so that, during the second year of war, it is entirely possible that Germany will have provided additional tank cars of the necessary amount — but only as the result of intensive manufacturing activity devoted to that end and with the use of great quantities of steel from her precious stocks of raw ore.

The alternative method of transportation from Rumania to Germany is the Danube River. This is a slower and more circuitous means of transportation, and it is strategically vulnerable in that for over 150 miles the Danube flows directly through Yugoslavia. Either here or along the Bulgarian-Rumanian frontier the Danube might conceivably be cut by an Allied military thrust from the southeast, originating in Turkey, Greece, Italy, Albania, or in Yugoslavia itself. The Danube is subject to an additional
great disadvantage in that it is usually frozen more than a third of the year, beginning in late November. A further handicap to Danube River transportation is the fact that the Danube water level is not deep enough for the usual river tankers to go further into Germany than Regensburg, about 100 miles past the former Bavarian-Austrian frontier. At that point oil coming by river from Rumania has to be transferred either to barges requiring only four-foot draft or to railroad tank cars.

On the other hand a single river barge can carry considerable more oil than a single railroad tank car and there are already enough shipments of Rumanian oil being made up the Danube (an annual rate of about 10 million barrels in the middle of 1939) so that the total river tanker capacity would only have to be increased by 50 percent in order to carry most of Germany's import requirements during the first year of war, and doubled in order to carry more than her minimum requirements in the second year. In the second place, river barges originally designed for other kinds of freight than oil can, within a relatively short space of time, be converted into barges which carry crude oil. In an interview, Mr. Sadler stated that it only requires sixty days to convert other types of river steamers into quite satisfactory tank barges. It has been reported in the press that Germany is shifting shallow draft river and canal boats from her western canals to the Danube.
The problems of transporting Russian oil to Germany are even greater than in the case of Rumania, if only because the distance is greater. Russian oil must either be carried by deep-sea tanker 600 miles from Batum to Odessa on the Black Sea and then trans-shipped to tank car for a more than 1,000 mile trip to Western Germany via former Poland, or carried across the Black Sea to Constanta, in Rumania, for transshipment to or tank car for a railroad journey of similar length/or transshipment to a river barge for shipment up the Danube. It is unlikely that Russian oil would be shipped the entire distance from Baku or Batum to Western Germany by rail. In the event that a combination of Black Sea and Danube River transportation is used, two transshipments would be necessary: one from deep sea tanker to river barge at the mouth of the Danube, and one from river barge of 8 foot draft to river barge of 4 foot draft or to a tank car at Regensburg. In the case either of shipment from Russia to Germany entirely by rail or by deep sea tanker to Odessa and then by rail, a railroad transshipment would be required at the old Russo-Polish frontier, since the entire Russian network of railroads has broad gauge; no Russian rolling stock can be taken beyond the old Russo-Polish frontier where the gauge changes to the normal European (and American) gauge. Oil shipments across the Black Sea are subject to a further handicap in that they can be disrupted by Allied sea forces so long as the Dardanelles remain open to them.
Mr. Boris Said recently stated, in a letter, that there are only 12,000 tank cars of between 10 and 12 tons capacity each in all Russia, and that these are fully occupied in the work of internal distribution of Russia's oil. If a part or all of Russia's present or enlarged export surplus is to be shipped to Germany, either directly by rail from the Caucasus or by transshipment at Odessa to Russian railways, a large number of Russian tank cars would have to be allocated to this task; an equal number of German tank cars would have to be allocated to receive the Russian oil at the former Russo-Polish frontier. If Russian oil exports to Germany pass through Constanta, on the Black Sea, German tank cars would have to be sent there to receive the Russian oil. In either case, these German tank cars would be in addition to the number already computed as the number required for transporting Rumanian oil. Likewise, if any Russian oil is shipped up the Danube it would impose additional burdens on the Danubian oil barge tonnage. Finally, a large number of deep sea tankers would be required for transporting Russian oil from Batum to Odessa or Constanta.

With respect to one small portion of Russian oil production the difficulties of shipment to Germany are not as great as in the case of most of the Russian oil, namely, the oil produced in the fields previously belonging to Poland which have now fallen
into the Russian hands. As has been pointed out above, about two-thirds of Poland's total 1938 output of roughly 4 million barrels, the Galician portion, went to Russia in the partition of Poland.

Although Poland's 32 refineries were divided between Germany and Russia in about the same proportion, the existing lines of distribution of the Galician oil fields are directed toward the west, as this oil formerly was consumed mostly in the industrialized and heavy-populated areas of Western Poland. There will be a strong temptation for the Russians to use this new Polish oil and the output of these Polish refineries in order to provide a part of the necessary oil supplies to the large army which they are maintaining in the occupied areas of Eastern Poland, especially in view of the fact that the Polish tank cars may be transported over the railroads in Eastern Poland, whereas Russian tank cars are of a wider gauge and must stop at the old Russian-Polish border. However, it is entirely conceivable that most of this Galician output of approximately 2 1/2 million barrels may be shipped to Germany; leaving aside the alternative usefulness of this oil in Eastern Poland, this would certainly be one of the easiest ways of providing Russian oil to Germany, and it would provide about one-third of the total which, it was recently announced, Russia will make available to Germany. 1/

1/ See Note 1/, page 100.
During the past 12 months it has become increasingly evident to foreign observers and to Germans that the German railway system is operating less efficiently than formerly, and that it is confronted with a serious shortage of rolling stock. The strain imposed upon the German railway system by five years of increasing industrial activity, with practically no replacements, became obvious during 1938. Shortly after the outbreak of war the German Reichsbahn borrowed 500 million Reichsmarks from the German capital market for replacements and new equipment — the first important railroad loan in Germany for several years. Since the outbreak of war it has been reported in the press that Greece, Italy and Yugoslavia are concerned over the amount of their rolling stock which has not been returned from Germany, and are not allowing additional rolling stock to be sent into that country; it has also been reported that Germany has been using Hungarian rolling stock in obtaining goods from Trieste.

Even Germany's present-day railway network and rolling stock may probably be considered highly efficient by comparison with the Russian railroad system. A recent report issued by the Department of Commerce described the condition of Russian railroads: It reported that during 1938 and 1939 there has been an increasing overloading of truckage, rolling stock and even roadbeds; the amount of necessary repair and reconstruction work has increased rapidly and the repair schedules are seldom fulfilled. Even the internal traffic requirements of peacetime have subjected the Russian railroad system to great pressure.
If large quantities of Russian or Rumanian oil are to be obtained by Germany, she must not only allocate resources to the manufacture of goods for export in payment, and she must not only export skilled engineers and workmen to the Rumanian and Russian oil fields, but she must greatly increase her own tank car rolling stock and probably must export skilled railroad engineers to reorganize the Russian railroad system and to supervise the building of additional rolling stock for that system.

The transportation difficulties facing Germany in obtaining large quantities of oil from the East are so tremendous that many students of the situation have concluded that they cannot be effectively overcome during the war. Very significant in this connection was the report from Mr. Heath ("Treasury man" in Berlin) on September 26, stating that an informant in the German bureaucracy who told him that Germany has successfully negotiated since the outbreak of war for increased deliveries of oil from Rumania, had admitted that "for a considerable time transportation difficulties would prevent a large increase in deliveries from Rumania". Mr. Garfias, in his above-cited study, concluded that transportation difficulties would prevent Germany from obtaining any significant part of Russian exports, at least during 1940; and that the transportation of the Rumanian export surplus to Germany "would be extremely difficult if not impossible". A recent cable from Ambassador Bullitt quoted Professor Rist to the same effect. In a recent study of the
Russian oil situation with respect to the war, Dr. Tokayer concluded that, at best, after considerable time, Germany might get a million barrels a year from Russia. A Department of Commerce report from Germany in August mentioned the German disapproval of Russian transportation methods. In a recent issue of the Economist, it was stated that the problem of transporting large quantities of Russian supplies to Germany could only be solved by years of expensive work on the Russian railroad system.

On the other hand, in an interview, Mr. Sadler of the Standard Oil Company expressed the view that Germany would have no difficulty in surmounting any of the obstacles discussed above: payment was not much of a problem, nor was foreign ownership of Rumanian fields, since, he said, there would be no other place to send Rumanian oil than to Germany; transportation was no problem, he said, because only two months were necessary to convert any river barge into a tanker.

In any case, however, the larger are Germany's stocks of oil, and the smaller her wartime requirements during the first months of the war, the more time Germany will have to work on the problem of increasing transportation facilities to the East. When her stocks are exhausted and the requirements of her war machine increase, it is more than likely that she will be able to transport a sufficient quantity from Rumania and Russia.
e. Barring destruction of refineries by Allied air raids, Germany probably has access to sufficient refinery capacity — at home and in Rumania and Russia — to meet her wartime needs for each particular type of mineral oil.

Even sufficient aviation gasoline for intensive aerial warfare will probably be available, although not of as high average octane rating as that available to the Allies.

In all the above consideration of Germany's wartime oil situation not a great deal of attention has been paid to the problem of whether the total quantity of mineral oil which Germany can obtain in wartime will be of the particular types and grades required. A very brief discussion of this matter follows.

It was shown in Part II, above, that about 60 percent of Germany's recent peacetime requirements for motor fuel was provided from domestic natural and synthetic production; in spite of the greatly increased synthetic production of light motor fuel which may be expected during the war, Germany's wartime motor fuel requirements will also increase so that at least one-third of her motor fuel needs will continue to have to be met from stocks or imports. Germany's dependence upon imports has been greatest in the case of gas oil and Diesel oil, of which she produced only 10 percent of her requirements in 1938. Most of her requirements for this type of oil will have to be met from stocks or will continue to have to be imported, unless gasoline and lubricating oil is sacrificed in order to produce heavier oils. It is probable, since higher quality mineral oil products deteriorate in storage, that a considerable part of Germany's stocks consists of these heavier oils (and they would be much more valuable products to
put into storage than plain crude oil). Germany can meet about one-half of her requirements for lubricating oil from her own production and has refinery capacity sufficient for meeting most of her lubricating oil needs; she may easily have as much as one or two years' supply of lubricating oil in storage.

In analysing Germany's total refinery capacity, it must be held in mind that the products which can be produced from modern refinery processes can be so controlled that varying proportions of gasoline, Diesel oil, lubricating oil, etc., may be obtained from any given "input" of crude petroleum, fuel oil or kerosene. Also, as was mentioned in Part II above, Germany's synthetic gasoline hydrogenation plants can be operated on an "input" of kerosene or heavy petroleum residues as well as coal with, respectively, nearly three times and nearly double the gasoline output which is obtained from coal.

Germany's total refinery capacity, including that in former Austria and Czechoslovakia and in the captured area of Poland, is large enough to treat Germany's total natural production and a large additional amount of imported crude petroleum, fuel oil or kerosene.

At the beginning of this year, according to data furnished by the Standard Oil Company, Germany, including Austria, had a total refinery capacity for processing about 20 million barrels of crude petroleum and one million barrels capacity for cracking gasoline. At that time, as pointed out above, Germany had additional hydrogenation capacity for producing about 8 1/2 million barrels of synthetic
gasoline which had increased to at least 14 million barrels capacity upon the outbreak of war. With the occupation of Czechoslovakia, Germany obtained 9 additional petroleum refineries, including at least two large new plants; with a total annual capacity for processing crude petroleum of about 5 million barrels, and about 1/2 a million barrels capacity for cracking gasoline. In that part of Poland occupied by Germany there are 14 small refineries, some of which are probably almost obsolete; their total capacity is about 2 million barrels per year. During the first year of war, therefore, Germany should be able to process in her own refineries nearly 30 million barrels of crude petroleum in addition to obtaining between 16 and 22 million barrels of synthetic petroleum products from the hydrogenation process, and 4 to 6 million barrels of benzene and alcohol from special refineries and distilleries. Over two-thirds of her war-time requirements could be processed in her own refineries.

Most of Germany's refining plants are very efficient; it was stated by Standard Oil Company officials that they are in all respects equal to our American refineries. According to Mr. Egloff, however, the recent construction of new refineries, for natural and synthetic production, has been faced with serious shortcomings because of the poor quality of certain materials.

This Report has indicated that Germany's war machine, particularly after the first year of war, will be dependent upon large importations. That dependence may be greatly increased, however, as a result of wartime destruction of refineries. It requires little imagination
to conceive of the damage which can be done to a petroleum refinery by aerial bombardment. Refineries, in fact, are such delicate instruments that even the reverberation of the earth as a result of falling bombs which do not directly strike the refinery may cause enough strains and breakages to cause complete breakdown of refining operations. Mr. Egloff pointed out that any refinery which receives a direct hit would add to the force of the bomb explosion, the force of explosion of large quantities of oil at high pressure and high temperature. (Modern refining operations, especially the Fischer-Tropsch synthetic process, operate under pressures as high as 10,000 pounds to the square inch, and temperatures as high as 4,000 degrees Fahrenheit.) In his articles on Germany's oil situation, Mr. Mosk stated:

"Most military authorities feel that after a brief period of intensive warfare, every German, British and French refinery would be either completely destroyed or made inoperative."

If this opinion is substantiated, then, as war proceeds, Germany will become more and more dependent upon the importation of finished oil products rather than crude petroleum, kerosene, or heavy oils. The bombardment of a synthetic refinery, since the raw material, coal, cannot be shipped to Romania or Russia for processing, would tremendously increase Germany's dependence upon imported oils.

In any event, after the first year of war, Germany must import large quantities of oil; in the event of a successful destruction of her refineries her dependence upon imports will be increased.
In either event the type of mineral oil imported is an important factor, determined primarily by the type of products which are available for export from Rumania and Russia. In the event that German refineries are destroyed, the refinery capacities of Rumania and Russia assume great importance for Germany.

Rumanian exports of mineral oil products in the first six months of 1939 were classified as follows:

(Million Barrels)

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil</td>
<td>1.3</td>
</tr>
<tr>
<td>Gasoline</td>
<td>7.2</td>
</tr>
<tr>
<td>Kerosene</td>
<td>3.2</td>
</tr>
<tr>
<td>Gas oil</td>
<td>2.2</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>2.9</td>
</tr>
<tr>
<td>Lubricating oil</td>
<td>.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16.9</strong></td>
</tr>
</tbody>
</table>

Under normal circumstances, therefore, Rumanian oil exports consist primarily of the light fuels, gasoline and kerosene; very little lubricating oil and not much crude oil is exported. Rumania's export surplus includes the products Germany requires. Rumania has very large refinery capacity. Her 30 or more modern refineries have capacity sufficient to process about 85 million barrels of crude petroleum and to crack about 17 million barrels of gasoline annually. Less than half of this capacity has been utilized in the last few years.

Russia's exports of mineral oil products were classified as follows in 1937:
Russian exports have consisted about half of gas and fuel oil and half of low-grade gasoline and kerosene.

The quality of Russia's exports of finished oil products has frequently been complained of. Mr. Said stated that "fuel oil" is often a mixture of crude and kerosene; that Russian "lubricating oil" is frequently a mixture of gasoline, crude and paraffin; and that Russian "gasoline" is a very low quality product, almost kerosene, more aptly described as ligroin. Similar complaints have been made in Germany. For example, a report by our Assistant Trade Commissioner in Berlin, dated August 26, 1939, stated that the condition of Soviet shipments which had been received in Germany in the past was such as to dampen German optimism concerning the importation of large quantities of Russian oil during the war; the same mixing of superior oils with oils of lower quality had been noted by German commentators.

Because of the shortcomings of Russian refining, it would be probably most useful to Germany if the supplies of oil obtained from Russia were in the form of crude, heavy fuel oil or kerosene. These products could be further processed in the Rumanian refineries.
before shipment to Germany, or further processed in German refineries — assuming of course that the problems of payment and transportation are overcome.

On the whole, barring successful bombardment of her refineries, it may be concluded that Germany's needs for specific types of oil products can be met either from her own refinery capacity or from the refineries in Rumania and Russia. If Germany's refineries are destroyed by aerial bombardment, she could depend upon Rumanian and Russian finished products, except for lubricating oil. In this case, however, Germany would need so much larger quantities from those countries that all the problems discussed above would be intensified to the point where her situation might easily become precarious.

**Aviation gasoline:**

It was shown in Part 4 above that an estimated German air force of 6,000 first-line planes would hardly consume more than 5 million barrels of gasoline a year and might not consume more than 3½ million barrels, under conditions of extremely intensive aerial warfare.

A final problem may now be analysed: Can Germany obtain such quantities of aviation gasoline? It has been concluded by a number of journalistic studies of Germany's war-time petroleum situation that a shortage of high-octane gasoline will cause her final defeat. Mr. Gustav Egloff, in his interviews with Treasury officials in Washington, considered that this factor would be an extremely important one in Germany's final inevitable defeat.
It has been indicated above that the quality of the gasolines available within Germany is not high. The synthetic gasoline produced by the two hydrogenation processes is not of high-octane content, particularly the Fischer-Tropsch gasoline; within the past 12 months, new regulations have required that practically all German automobile carburetors and engine heads be designed for no higher than 75-octane gasoline; substantial quantities of alcohol and benzine and, more recently, tetraethyl lead, have had to be mixed with gasoline in order to obtain a product even as high as 75-octane; the shortage of high quality aviation gasoline has been severe enough to lead to experimentation and use of Diesel airplane motors.

It has been impossible to ascertain the quality of gasoline which has been used by the German air force in its training activities during the past 2 or 3 years, or the quality that has been used in its war-time flights in Poland, on the Western Front and over the North Sea. It is generally assumed, however, that very little gasoline of more than 90-octane has thus far been available for German aviation use.

Very little 100-octane aviation gasoline has been used in the United States, however. Only two commercial air transport operators in the United States had yet found it feasible to use the new high quality aviation gasoline: the American Air Lines uses 100-octane gasoline on the takeoff from Los Angeles, and the Pan American Airways uses 95 or 100-octane gasoline on its Atlantic Ocean flights. Practically all American commercial air transport at the present time
use 80-, 87- or 90-octane gasoline, with a trend away from the lower and towards the higher quality gasoline. The United States Navy air force is still using 87-octane gasoline. The United States Army Air Corps, however, uses only 100-octane fuel (containing not more than 3.5 cubic centimeters of tetraethyl lead), and requires all Army airplane motors to be designed for that fuel.

The total amount of aviation gasoline consumed in the United States in 1938 was only 2.4 million barrels. Of this amount 1.3 million barrels was used by commercial and civil aircraft; half a million barrels was used by the Navy. Only about 600,000 barrels was used by the Army Air Corps — all, presumably, 100-octane. Until recently, the available supply of 100-octane gasoline has been so small that the Army faced more of a problem in obtaining sufficient quantities of 100-octane fuel than in paying the higher price. (After dropping nearly 4¢ per gallon in the past 12 to 18 months, 100-octane gasoline still costs 16¢¢ per gallon at the refineries — three to four times more than ordinary gasoline.)

After a great increase during the past year or two, the present United States capacity for the manufacture of 100-octane motor fuel is estimated at about 270 million gallons, 6.4 million barrels, per year. The present actual output is probably not as large as that. By the end of 1940 the completion of plants under construction will increase the domestic capacity to about 340 million gallons, 8 million barrels; and it is estimated that by the end of 1941 domestic capacity may reach a total of over 400,000 gallons, nearly 10 million barrels.
gasoline at more moderate cost. There are in fact at least
8 different processes by which 100-octane aviation gasoline can
be manufactured, although not all of them are yet in commercial
use in the United States. According to data furnished by Mr. Egloff,
who is an officer of the Universal Oil Products Company, which has
done pioneer work in the development of these new processes, this
gasoline can now be produced in the following ways: about
10 percent of all straight-run gasoline amounting to 2 percent of
the crude petroleum has an octane rating as high as 74; natural gas
will yield about 12 percent iso-pentane of 91-octane; by a process
of obtaining iso-octane from the gases which result from the
cracking of gasoline, small quantities of 95-octane and 85-octane
gasoline are obtainable; a new sulphuric acid alkylation process
produces 92-octane gasoline; a new dehydrogenation process produces
85-octane gasoline; the catalytic cracking of gas oil has a yield of
50 percent of 77-octane gasoline; the catalytic re-forming of
straight run gasoline can produce large quantities of 80-octane
gasoline; and the hydrogenation of fuel oil has a yield of about
50 percent of 75-octane gasoline. Base stocks of such high octane
rating are raised to 100-octane by the addition of tetraethyl lead
as a blending agent. Mr. Egloff estimated that if the United States
production of crude oil were increased 50 percent, by the abolition
of proration, etc., to about 1.8 billion barrels a year, and if all
these eight known processes for making 100-octane gasoline were utilized to the utmost regardless of cost, a maximum of about 500 million gallons of 100-octane gasoline could be produced.

Higher octane rating is obtained by adding tetraethyl lead to gasoline of fairly high octane rating. For example, three cubic centimeters per gallon of tetraethyl lead added to gasoline of 77-octane rating yields 87-octane gasoline. This is the manner in which most aviation gasoline in the United States is now obtained. 6 cubic centimeters of tetraethyl lead added to 75-octane base stock would produce 93-octane gasoline. The second 3 cubic centimeters results in an increase in octane rating of only 6, whereas the first 3 cubic centimeters increases the octane rating by 12 octanes. The blending of 9 cubic centimeters to base stock of 75-octane raises the octane rating by only about 3, to 95 or 96 octane. There is not only a tendency for the additional octane rating to diminish after the third or fourth cubic centimeter, but the use of gasoline carrying more than 3 cubic centimeters of tetraethyl lead to the gallon has very harmful effects. The tetraethyl lead blending agent increases the heat of combustion, and therefore shortens the life of engines; there is also a deleterious effect from high proportionate blendings of tetraethyl, when planes are flown in formation, in that the presence of larger amounts of unexploded lead particles in the exhaust of the advance machines is injurious to the pilots in following machines. Mr. Egloff stated
that it has been suggested in German military circles that
12 cubic centimeters of tetraethyl lead be used as blending agent
in order to get 95 to 100-octane gasoline from 65 to 75-octane base
stock, and that this be done with the deliberate knowledge that
the airplane engines would last only about one-third of the normal
number of flying hours when operated with only 3 cubic centimeters
of tetraethyl lead.

In analysing the situation of the German air force with respect
to its supplies of 100-octane gasoline, three important factors must
be kept in mind. In the first place, aviation engines with com-
pression chambers which have not been specially constructed for use
with 100-octane gasoline cannot be readily and advantageously used
with that quality gasoline. Presumably, therefore, nearly the
entire German air fleet is equipped with engines which have been
designed for aviation gasoline of, at the highest, 87-octane rating.
In the second place, the German air force is at the present time
operating quite efficiently with gasoline of lower than 100-octane
rating, of which it presumably has sufficient supplies. In the
third place, only the most recently constructed airplanes in the
British and French air force have been planned for use with
100-octane gasoline.

Upon the outbreak of war, Germany certainly did not have access
to large quantities of 100-octane gasoline. Any 100-octane aviation
gasoline which was received in Germany during the year 1939 may have
been stored. However, the higher the octane rating of gasoline, the more quickly it deteriorates in storage and loses its high octane caliber. Mr. Sadler of the Standard Oil Company of New Jersey stated that about 3.7 million barrels of aviation gasoline had been sold by the Standard Oil Company of New Jersey to all European countries in 1938, which amounted to 90 percent of the total aviation gasoline imported by those countries. He did not say how much of this was 100-octane, nor how much went to Germany.

Mr. Egloff stated that there is no present production of 100-octane gasoline in Germany, but that the installation of a few new refinery processes could easily result in a production of about 70,000 barrels a year.1/ According to data provided by the Standard Oil Company of New Jersey, all the new processes which have been worked out, particularly by the Universal Oil Products Company, of which Mr. Egloff is an official, are known to the Germans. For example, a Standard Oil Company confidential memorandum of October 3, 1939 stated:

"Knowledge certainly is available in Germany as to polymerization, dehydrogenation, isomerization and hydrogenation, which would make possible immediate design of any number of units for the production of blending agent."

This memorandum also stated that the technique of hydro-forming of virgin naphtha is fully understood in Germany, and that the

1/ At the outbreak of war, the Universal Oil Products Company was constructing 3 general polymerization plants in Germany: One with an annual capacity of about 250,000 barrels to be completed in October, 1939; two with annual capacities of 200,000 barrels to be completed, one in January, 1940, and one at an indefinite future date. Not all of this output would be 100-octane aviation gasoline, however.
the production of 76 to 80-octane base stock from catalytic cracking, and that they have finished a complete process design for a rather large catalytic cracking plant. It pointed out that the catalytic cracking and the hydro-forming operations involve relatively low pressures, so that there should not be the bottle necks in construction which arise in present day Germany from the lack of steel mill equipment and raw materials to produce certain special alloys for high pressure operation; it estimated that a number of catalytic crackers and hydro-formers could be completed within Germany within 10 to 12 months, but there would be some difficulty in the operation of many small installations. On the other hand, it stated that the I. G. Farben research specialists had developed new catalysts which give higher conversion to gasoline, of higher lead response, than any previously known, with by-product gases from which aviation blending agents can be simply produced.1/

Only very limited quantities of high-octane aviation gasoline can be produced from the small German natural petroleum output. Likewise, only small quantities of blending agents can be produced from the German synthetic fuel processes, whose gasoline output has a low-octane rating. If large plants are built within Germany to produce high-octane gasoline and blending agents, they would have to use, for the most part, imported oils as "feed". There is some question, therefore, whether the Germans will choose to build such plants within Germany or will build them in Romania and Russia as parts of the

1/ Since 1929, the Standard Oil Company of New Jersey and the I. G. Farbenindustrie A. G. have had a permanent contractual merger of interests in the development of hydrogenation processes. (Standard I.-G. Co. and Hydro-Patents Co.)
refineries there from which most of their war-time oil supplies will have to be obtained — after the first year or so of war. To build large new aviation gasoline plants in those two countries would not make the German situation much more precarious than it now is; if for any reason the Rumanian and Russian oil supplies are cut off the Germans will not obtain aviation gasoline from the new plants; but if the new plants were built in Germany and the supplies of Rumanian and Russian heavy oils or ordinary gasoline were cut off, the Germans would not be able to make use of their high-octane plants within Germany.

The large gasoline production in Rumania and in Russia might form the basis for the production of substantial quantities of aviation gasoline which might be supplied to Germany. According to data furnished by Mr. Egloff, Rumania is now producing 20,000 barrels a year of 100-octane gasoline in a new low pressure hydrogenation plant just completed for a small, but wholly Rumanian-owned, oil company. Upon the completion of a second plant in February 1940, for selective polymerisation, Rumania's output of high-octane gasoline should increase to over 100,000 barrels annually; with the construction of additional plants her output of aviation gasoline could be increased to as much as 500,000 barrels annually, Mr. Egloff estimated.

A Standard Oil Company memorandum recently estimated that the three countries — Poland, Rumania and Russia — now have a capacity for producing high octane blending agent totaling about 365,000
barrels a year; these plants were not believed to be yet in operation, however, because the hydrogen producing equipment had not yet been installed. As only a small part of this total could be produced in Poland and not more than 20,000 is yet in operation in Romania, it was evidently estimated by the Standard Oil Company that the Russian capacity, when completed, will be about 300,000 barrels. The Universal Oil Products Company is now constructing three iso-octane (selective polymerization) plants and one low pressure hydrogenation plant in Russia. Mr. Egloff estimated that these plants, when completed, would produce nearly a million barrels a year of high octane gasoline.

The confidential "Monthly Status Schedule" of the Universal Oil Products Company for September 1939, which was submitted by Mr. Egloff, shows contemplated total capacity of nearly 3 million barrels per year in the three iso-octane plants, and one-half million barrels a year in the hydrogenation plant. This report showed the completion date for all four projects as October 1, 1939; Mr. Egloff stated that they have already been under construction for 2-1/2 years, are now 80 percent complete, and will not be finished for another six months, at least. Mr. Egloff stated in an interview with the Director of Procurement that his company's technicians who were supervising the construction of the plants had been withdrawn and there is now no one to supervise the completion or operation of the plants; under these conditions, he said, they will surely break down before they have been long in operation.
It may be concluded that no large quantities of aviation gasoline will be produced in Rumania and Russia in the near future. It was estimated by the Standard Oil Company's memorandum that it would require at least 18 months for any substantial new quantity of aviation gasoline capacity to be brought into production in these two countries, although it was estimated that German technicians and engineers might shorten this time somewhat. If the production of aviation gasoline in Rumania and Russia could be rapidly increased, and if all the increased Russian output of 100-octane gasoline is not entirely consumed by the Russian air force (as it undoubtedly would be if Russia goes to war), a considerable portion of the oil which will be transported from the East into Germany might come to consist of aviation gasoline. Existent transportation facilities between Germany and the East could probably carry all the aviation gasoline which could be produced in these countries during this war.

It has been reported by Mr. Boris Said that the Russians have recently contracted for the purchase of two 10,000-ton tanker cargoes of American 93-octane aviation gasoline (170,000 barrels). This is to be shipped from California in American tankers, in January. Possibly owing to the fact that, as reported by Mr. Sadler, the British Government has contracted to purchase all aviation gasoline which will be produced in this country beyond domestic needs during the next six months, the Russians were in the market for two months before they were able to complete the purchase of these two cargoes of American aviation gasoline; they were unable to purchase any 100-octane gasoline. It is possible, of course,
that this aviation gasoline will be shipped 8,000 miles across Siberia from Vladivostok to Germany. It is more probable, however, that if the Russians intend to furnish some aviation gasoline to Germany, they will use the American gasoline imported at Vladivostok to replenish their Siberian stocks, and ship aviation gasoline to Germany from whatever quantities they are now producing in south-western Russia. It is more conceivable yet that this American aviation gasoline is merely being purchased for the requirements of the Soviet Siberian air force, without any relation to the German situation.

It was estimated by Mr. Egloff that the use of 100-octane gasoline in place of 82- or 87-octane gasoline increases airplane efficiency by about 20 percent in every respect — rate of climb, maneuverability, speed, etc. In out-and-out combat, therefore, the use of 100-octane gasoline in the newer British and French machines may give them a decided advantage over the German planes. In any case, not only is the production of high octane gasoline now undergoing a substantial increase in the United States, but in France, Great Britain and the South American and Near Eastern territories from which they draw their oil supplies a tremendous effort is now being made to bring into production as quickly as possible substantial quantities of 100-octane aviation gasoline. Mr. Egloff provided confidential information that the Universal Oil Products Company is building plants in France which will
increase that country’s output of 100-octane gasoline to about
500,000 barrels a year by July 1940; France also plans to have an
additional output of 650,000 barrels a year of 92-octane gasoline
within nine months. In the United Kingdom, the Universal Oil
Products Company expects to complete plants to produce about
200,000 barrels of 100-octane gasoline per year by March 1940, and
to have an additional 600,000 barrels by July 1940. A tremendous
new plant is being constructed in Iran, from which 700,000 barrels
annually of 100-octane gasoline is now being produced which will be
increased within six months to 1.7 million barrels. About
200,000 barrels a year capacity is being constructed in Bahrein
and nearly 3 million barrels a year capacity in the Caribbean —
in Trinidad, Curacao and Aruba.

At the present time, the Allied Governments have access to many
times more current production of higher than 90-octane aviation
gasolines than the Germans have access to. At the end of 12 months,
the production available to the Allies will be proportionately even
greater than that available to Germany, in spite of any increased
production in Germany and Russia; and, in spite of the maximum
conceivable amount which Germany might obtain from an increased
Russian production.
December 8, 1939.
4:50 p.m.

H.M.Jr: Hello

Operator: Mr. Hochschild.

H.M.Jr: Thank you.

O: Go ahead.

H.M.Jr: Hello.
Harold
Hochschild: Hello, Henry?

H.M.Jr: Yes, Harold.

H: How are you?

H.M.Jr: Fine.

H: Have you got a couple of minutes.

H.M.Jr: Got four and a half.

H: All right. Well it's O.K.

H.M.Jr: Oh really.

H: I spoke to Kenneout and they agreed, and I spoke to - I put the thing before the Climax Board this morning.

H.M.Jr: Yes.

H: And its President Mr. Schott and they agree.

H.M.Jr: Wonderful.

H: Now there's a couple of other points that I'd like to refer to.

H.M.Jr: Please.

H: First place there is one other small producer whose name you will see on that list I gave you. They are very unimportant compared to the other two.

H.M.Jr: Yes.

H: But we have also spoken to them.

H.M.Jr: Oh fine.

H: And they have agreed. That is the Molybdenum Corporation of America.
H.M. Jr: I see.

H: Now I don't remember whether I mentioned to you, I think I did, I presume that steps are being - that similar steps are being taken with regard to Nickel for both of those countries, Russia and Japan.

H.M. Jr: No. I didn't know that we were close to the United States, of nickel.

H: I beg your pardon.

H.M. Jr: I didn't know we produced nickel in United States.

H: No we don't produce nickel in the United States, it's produced in the British - the British Empire, and in the French Colony. The big producer is in Canada, that's the International Nickel Company and what I meant was that I presume that the British Government was making a similar request of them regarding sale of nickel to Russia or to Japan.

H.M. Jr: Now you see what I - no you didn't say that. We didn't discuss that Harold.

H: I mentioned nickel, you remember, and you said that they wouldn't let nickel go to Germany as they did in the last war.

H.M. Jr: Yes. Now, let me just put it this way. What you -

H: Hello.

H.M. Jr: Hello.

H: Yes.

H.M. Jr: Can you hear me?

H: I can hear you now Henry.

H.M. Jr: What you ought to do for me is this. I take it what you have in your mind is that nickel is a substitute for molybdenum. Well now how can I educate myself on nickel, molybdenum and I take it tungsten.

H: Yes.

H.M. Jr: You see.

H: Yes.
H.M. Jr.: Now I had Mr. Purvis here today and he is very enthusiastic about this idea.

H.: Yes.

H.M. Jr.: He said he was going to talk to the President of International Nickel, but I didn't have it in mind because I didn't know just how much a substitute nickel is. Now -

H.: It's nickel and molybdenum worked to some extent together in steels - in alloy steels and to some extent they are competitors.

H.M. Jr.: I see.

H.: So that, for instance, if the Japanese didn't get molybdenum they would buy - try to buy nickel to replace it.

H.M. Jr.: Well now Harold, is it too late to get some kind of a semi-technical document down to me tomorrow?

H.: Uh - uh

H.M. Jr.: We have a man leaving on the plane Sunday, who's a member, Treasury representative in London and he's coming down tomorrow morning to see me at the house at eleven on this thing and I want to fill him full of this you see.

H.: Yes.

H.M. Jr.: Now I have nothing to back up the statement how much nickel is a substitute for molybdenum.

H.: Yes.

H.M. Jr.: You see.

H.: Well now Henry, how would - how would this be? Would it be convenient to you if the President of the Climax Company and I should come down there tomorrow morning.

H.M. Jr.: Yes.

H.: And try to give you what more information we can.

H.M. Jr.: It would be very important because Butterworth, who
is going is coming down and Mr. Purvis wants him to take this story back.

H: Yes.
H.M.Jr: You see?
H: Yes.
H.M.Jr: See?
H: Yes.
H.M.Jr: So it would be important.
H: Well now, what time do you want us to be there?
H.M.Jr: Well I think if you could be at my house at eleven-thirty, do you know where I live?
H: I used - you've moved since I was at your house last, Henry.
H.M.Jr: It's 2211 - 30th.
H: 2211 - 30th Street.
H.M.Jr: And tell the driver that it's just off Massachusetts Avenue.
H: Just off Massachusetts Avenue.
H.M.Jr: And just below the British Embassy.
H: Just below British Embassy.
H.M.Jr: And off - because 30th Street goes all over Washington.
H: Yes. Well now Henry, may I talk to the - to Mr. who's President of Climax and if you don't hear from me in another fifteen minutes you can expect us.
H.M.Jr: Right. Now what I'm going to do is this. As soon as I hang up I'm going to call up Mr. Purvis.
H: Yes.
H.M.Jr: And tell him because he was going to see the nickel man, that you've raised this question, you see?
H: Yes.
H.M. Jr.: And also that these companies are ready to go along.
H.: Yes.
H.M. Jr.: So that when he sees the President of Nickel - what's his name?
H.: Stanley.
H.M. Jr.: Stanley - that he has this in mind, that you people are going to raise this question.
H.: Yes.
H.M. Jr.: You see Purvis, you know, is a Canadian.
H.: Yes.
H.M. Jr.: So I'll call him at once.
H.: Henry.
H.M. Jr.: Yes.
H.: When you talk to Purvis, I would prefer it if you mentioned that Climax Molybdenum Company is raising this point because it so happens that the American Metal Company is the selling agent to the International Nickel Company's copper, you see.
H.M. Jr.: Now wait a minute. What do you want me to do?
H.: When you say that this point has been raised, say that the Molybdenum Company, I mean I prefer if you use the name of Climax rather than mine personally.
H.M. Jr.: Well I'll just put it this way that - I'll put it that the manufacturers of molybdenum -
H.: Yes, that's right.
H.M. Jr.: That the three companies are raising this question.
H.: That's right.
H.M. Jr.: How's that?
H.: Perfectly O.K.
H.M. Jr.: That the three -
H: That's the real point.
H.M.Jr: That the three companies are raising this.
H: Yes.
H.M.Jr: Question - that if they go along what will the British Empire do about nickel.
H: That's right.
H.M.Jr: How is that?
H: That's fine.
H.M.Jr: Now, on this thing, you're not raising the question about tungsten.
H: Well tungsten is something that can't be controlled from this country or from Great Britain as far as we can see, that is of course, that is something that they will try to get, that comes from China and I suppose the Japanese can get hold of some tungsten there.
H.M.Jr: Well I've already started with Chen. The question - the Government in China controls the sale of tungsten.
H: I see.
H.M.Jr: And I've already asked him to cable what disposition they make of that and everything else.
H: I see.
H.M.Jr: Now that takes care of the Chinese but I don't know where else one gets tungsten from.
H: Well offhand - offhand I should say that some of it probably comes from the Japanese control part of China.
H.M.Jr: Well you might have your -
H: I can get you - Climax has all the dope on that.
H.M.Jr: Well you might have the people look into that.
H: Yes I will.
So I will expect you at the house if I don't hear from you at eleven-thirty tomorrow.

All right, Henry.

And I will tell — I'm going to call up Purvis and say that you people are ready to cooperate. By that I take it that you — while this thing is pending, you're not going to enter any contracts.

Absolutely. That's absolutely definite.

I mean with either Russia or Japan.

Absolutely definite, Henry.

Well I can tell you, Purvis was very excited about this, and he thinks we're absolutely on the right track.

I see.

See?

I see.

And with this messenger of mine leaving Sunday for England, I mean, within three days the British Treasury will have the whole story direct from me.

Yes, I see.

And so will the French Treasury.

I see.

And I'll introduce you to Butterworth, he'll be there when you're there.

Oh that's fine.

See.

All right, Henry.

I'm delighted.

All right, well, I'm very glad to be able to be of any help and unless you hear from me to the contrary we'll be there at eleven-thirty.
H.M. Jr: Thank you.
H: All right Henry.
H.M. Jr: Goodbye.
H: Goodbye.
December 8, 1939.
9:00 p.m.

Arthur Purvis: Good evening, Mr. Secretary, Arthur Purvis speaking.
H.M.Jr: Oh, is this Purvis?
P: Yes.
H.M.Jr: Can you hear me?
P: Yes, I can hear you, Mr. Secretary.
H.M.Jr: I'm talking through my switchboard, so it may not be so distinct.
P: It isn't quite so distinct, but I can hear you I think.
H.M.Jr: Good. The reason I'm calling you at this hour is that quite late my friend called me up to say that all three companies in America who make molybdenum - hello?
Hello.
P: Yes.
H.M.Jr: Had agreed that they would not sell to those two countries.
P: Excellent.
H.M.Jr: But - I agree with you it's excellent - they raised this point that if - they've agreed now not to sell.
P: Yes.
H.M.Jr: But that the competitive metal which would most likely immediately take the place would be nickel.
P: I can't quite hear that, Mr. Secretary.
H.M.Jr: They say the competitor to molybdenum is nickel.
P: Yes.
H.M.Jr: And you told me that you were going to see Mr. Stanley.
P: I did and I'm glad to be able to inform you -
H.M.Jr: Yes.
P: That so far as Russia is concerned -
H.M. Jr: Yes.
P: No sales are being made.
H.M. Jr: Yes.
P: So far as the second one is concerned, second country, I think the situation too has to be cleared up.
H.M. Jr: I see. Well now these gentlemen are coming to my house tomorrow morning.
P: Yes.
H.M. Jr: Now, could I tell them that?
P: Certainly. If you could tell them that so far as No. 1 country is concerned.
H.M. Jr: Yes.
P: No sales are being made except by permission of the British Government and that that excludes country No. 1.
H.M. Jr: That excludes it.
P: Now country No. 2.
H.M. Jr: Yes.
P: Which as you know would naturally arise from this end rather than from the other end.
H.M. Jr: Yes.
P: I could tell immediately that there was no prohibition there.
H.M. Jr: I see.
P: On the other hand I am perfectly sure that if we handled the situation properly.
H.M. Jr: Yes.
P: And it was important to you as I imagine it would be.
H.M. Jr: Yes.
P: That it would be arranged. It would be something however that we would have to start on and make sure was arranged.

HM Jr: Well then I could tell them that, could I?

P: I think so. I think, on the other hand, that I would feel that I had no authority on behalf of the people on the other side to say so, that is only my feeling it would be possible and therefore I don't think I - it should be a definite undertaking. I think it would just have to be something that had to be arranged.

HM Jr: Well I'll just -

P: 

HM Jr: Well I'll simply say that I've mentioned it and you're going to bring it to the attention of your Government.

P: Correct.

HM Jr: How is that?

P: I think that's the best way.

HM Jr: Now in the case of Mr. Stanley, when he talks - is there any other nickel except in Canada, in the British Empire.

P: Any other supply of nickel?

HM Jr: In the British Empire.

P: No.

HM Jr: There is not.

P: Now Mr. Secretary, I think there are one or two important things though that I developed.

HM Jr: Yes.

P: And I would like to give you the picture. I talked with Mr. Stanley and he got into his room -

HM Jr: Yes.

P: The man who knows most about this side of the alloy business.
H.M.Jr: Oh yes.
P: That's Mr. Merica - M-e-r-i-c-a.
H.M.Jr: Oh yes.
P: An extremely knowledgeable, a nice type of individual whom I've known for some years.
H.M.Jr: Yes.
P: Mr. Merica, I think, would appreciate enormously if you could do it, the opportunity of having ten minutes with you some time, to give you a sort of background idea of the whole alloy situation.
H.M.Jr: I'd like to have an hour with him.
P: Now in the meantime he has undertaken for me tonight -
H.M.Jr: Yes.
P: To prepare a very preliminary memorandum, touching the high spots because I told him that I thought it would be much easier for you if you could read a page or two page memorandum before you talked with him.
H.M.Jr: Right.
P: That is merely judging from my own experience it is easier.
H.M.Jr: Well I - I - that would be very helpful. I could see him either Monday - well Tuesday I could see him.
P: Tuesday.
H.M.Jr: Yes.
P: I think that would fit in very well because Walter Stewart and Bob Stanley, Merica and myself are going to meet at ten-fifteen on Monday.
P: Yes.
H.M.Jr: Well then, how would he come down Tuesday?
P: He will come down on Monday night to see you on Tuesday, I am sure.

H.M. Jr: Fine.

P: Now Mr. Secretary, another thing which I think may be of interest to you, which he would bring up in more detail, but which I think might be well to have in your mind.

H.M. Jr: Yes.

P: Mr. Merica, who as I say is a very good type of individual.

H.M. Jr: Walter Stewart mentioned him to me.

P: Yes. Now he makes a suggestion which sounds to me to be very sound.

H.M. Jr: Yes.

P: He said that he believed that rather than that the Nickel Company, which in a way is one of the alloy people, and therefore you might say part of a competitive picture, rather than that they should make the detail study which would be put on your table to show you the accuracy, the relations of the various alloy metal.

H.M. Jr: Yes.

P: It would be better if he, in talking with you, and suggesting from his personal knowledge, the names of those people in the consuming industry, which is the steel industry.

H.M. Jr: Yes.

P: Could best make that study, they could arrive at some one individual that would be acceptable to you from all viewpoints. Do you understand what I mean?

H.M. Jr: Quite.

P: Who would be commissioned quickly to put before you a study from the consuming viewpoint showing the way that molybdenum and all the other alloys could be juggled around in the industry by anybody who would try to substitute one for another.
H.M.Jr: Well that's very important because I understand tungsten is important.

P: And not only tungsten but he points out that manganese is very important.

H.M.Jr: I see.

P: And he says that, for instance, the International Nickel Company.

H.M.Jr: Yes.

P: Would be only too happy, and Mr. Stanley promised their complete cooperation to put before such a man, in the steel industry, all the facts pertaining to therein.

H.M.Jr: I see.

P: As would all the others and you would therefore get the study made by those people who actually use the alloys.

H.M.Jr: Well, that sounds very intelligent.

P: It sounded to me correct and proper.

H.M.Jr: Well I would like to see him Tuesday morning.

P: I'll arrange that.

H.M.Jr: And if --

P: Any particular time?

H.M.Jr: Well I haven't got it here, but when you meet together Monday why don't you let Stewart call me up and I could give him a time.

P: I'll do that. Would you like us to get in touch with Mrs. Klotz or with you personally.

H.M.Jr: Well, Mrs. Klotz would be fine.

P: I'll -- we'll get in touch with Mrs. Klotz as soon as we're through on Monday, wait on your time that would be convenient.

H.M.Jr: Yes.
P: And in the meantime I will send down to you.
H.M.Jr: Yes.
P: The very preliminary memorandum that Merica is making out tonight so that you would have a chance to peruse it. It will be very short but it will only touch the high spots.
H.M.Jr: And in sending it, have you got my home address?
P: No I haven't got that.
H.M.Jr: Well I tell you the easiest way is if they just - my mail is opened.
P: Yes.
H.M.Jr: So if they would address it to Mrs. Klotz.
P: Yes.
H.M.Jr: Care of me. Her mail is not opened.
P: Care of -
H.M.Jr: Mrs. Klotz you see.
P: Yes, care of what?
H.M.Jr: No, just - the office of the Secretary.
P: Office of the Secretary.
H.M.Jr: Yes.
P: That is right. I will see that that goes to her tomorrow.
H.M.Jr: Yes, because her mail isn't open and mine is.
P: Exactly.
H.M.Jr: I have - I live in a fish bowl.
P: I can - pretty imagine it Mr. Secretary.
H.M.Jr: Right.
P: Well now I think we've made a little progress and I
am sure that Mr. Stanley and Mr. Merica's suggestion there is the intelligent one.

H.M.Jr: Now, I think we've made an amazing progress. Now, did you see Butterworth?

P: I had an hour with him tonight and had the satisfaction of feeling that he fully understood what we wanted to achieve on the other side. I was really glad to get the chance to talk with him.

H.M.Jr: Well that's fine. He's coming down to see me tomorrow morning.

P: Yes. That is right.

H.M.Jr: And I'm going to have him here while the Molybdenum people are here.

P: Yes. I think we've made good progress so far, now it's up to me to get across to our people on the other side the necessity of giving me a picture of their requirements.

H.M.Jr: That's right.

P: And that I shall get busy on immediately.

H.M.Jr: Do you think it will be difficult with the second country?

P: I don't think so.

H.M.Jr: You don't think so.

P: But on the other hand it's something that I'm not sufficiently posted on to be authoritative in any way and therefore I'd prefer that you accept it with reserve meantime.

H.M.Jr: Right.

P: And I shall simply do my best.

H.M.Jr: Right.

P: I did feel very grateful to you for the informal discussion today because I really felt that we could make some real progress.
H.M. Jr: Oh yes. Well I'm quite thrilled about it.
P: Thank you very much indeed, Mr. Secretary. It's quite a privilege to work with you on it.
H.M. Jr: Well I enjoy working with you.
P: Thank you very much sir.
H.M. Jr: Goodnight.
P: Goodnight.
My dear Mr. Sauras:

From the hands of my good friend, your Ambassador Castillo Mejia, I have received with genuine appreciation the invitation which you so cordially extended to Mrs. Morgenthau and myself to visit your country.

Last month my wife and I enjoyed a week of sunshine in Southern Arizona and had a few glimpses of Sonora across the Border. This only served to increase our interest in your country, and I know of nothing that would give us greater pleasure than a holiday in your hospitable land. Unfortunately, however, I see no early opportunity of being able to travel to Mexico, and I must consequently express my sincerest regrets.

Please accept the assurance of my highest esteem, my dear Colleague, and present my compliments to Senora Sauras.

Cordially yours,

The Honorable Eduarado Sauras,
Secretary of Finance and Public Credit,
Mexico, D. F.
December 4, 1939.

Hon. Henry Morgenthau,
Secretary of the Treasury
of the American Government,
WASHINGTON, D. C.

My dear Mr. Morgenthau:

Thinking about your overwhelming activities and the sound rest which your work demands, I am writing these few lines to you in order to take the liberty of inviting you and Mrs. Morgenthau to visit my country as its very distinguished guests.

Mexico's climate and its interesting historical characteristics and folklore would evidently cooperate toward an attractive environment and would perhaps render your stay among us especially pleasant for both of you, I hope.

I am availing myself of the good offices of our Ambassador Castillo Nájera to hand this letter over to you, and in case you should care to accept my invitation he will be glad to furnish you with every kind of information connected with a probable route for your trip to Mexico.

With the assurances of my highest esteem to you and my respects to Mrs. Morgenthau, I am

Very truly yours,
At 5:30 yesterday evening, Mr. Knoke telephoned me that a cable had been received from the Reichsbank instructing the Federal Reserve Bank of New York to charge their account and pay $1,305,090.17 to A. O. Becker and Company of New York, by order of the Deutsche Gold Discount Bank. Mr. Knoke stated that he did not know the purpose of this payment. I reminded him that Becker had been connected with certain flotations of German securities and that it was my recollection this concern had also been named a paying agent in connection with the funding bonds which were issued a few years ago to take care partially of defaulted interest on outstanding German loans. Mr. Knoke stated that he would have his research section check up and see whether there were any such maturities now for which Becker and Company would need these funds, or whether any other clue could be found to explain this transaction.

Mr. Knoke told me by telephone this morning that it was his understanding that part of the Indian speculation on silver in recent days had developed from the fear that Russia might move into India, in which circumstances the frontier people would insist on all silver rather than paper currency. This, the speculators anticipated, would increase the demand for silver. Incidentally, the Indian authorities have provided 32,000 bars of silver to satisfy the recent speculative buying.

According to the Chase Bank, the balance of the Russian State Bank as of Thursday morning was $10,000,000, as compared with $11,000,000 at the date of the last report. There were in addition $2,000,000 of confirmed credits. The only items of importance entering this account have been the receipt of $260,000 from the Rotterdam Bank and $65,000 from Sweden. The Antwerp balance with the Chase Bank yesterday morning was $1,200,000.

Mr. Knoke also let me know this morning that instructions had been received by the Federal Reserve Bank of New York to pay out from the dollar account of the Finlands Bank $2,000,000 to the Finnish Minister in Washington.

Yesterday morning at 10:00 o'clock, I phoned the Swedish Minister to let him know of the sale of $5,900,000 of Swedish gold from their earmarked account at the Federal Reserve Bank of New York on December 5, and the transfer of $5,000,000 from the account of the Bank of Sweden in New York to the account of Finlands Bank in New York. At 1:00 o'clock this noon, the Minister called me back to let me know that he had received a cablegram from Stockholm to the effect that the Bank of Sweden could not undertake the guarantee which had been required in the proposition from the Treasury Department which the Minister had communicated to Sweden in answer to the inquiry from Governor Booth. The Minister was informed that the Bank of Sweden had bought the gold directly from

Regraded Unclassified
Finland and had then sold its own gold in New York and credited $5,000,000 of the proceeds to the dollar account of Finland at the Bank of New York.

The Swedish Minister told me that he had received a further inquiry from Governor Booth of the Bank of Sweden as to whether the United States Treasury would be prepared to buy Swedish or Finnish gold delivered at the South African Union Reserve Bank in Pretoria. I reminded the Minister that it had been our policy, as explained to him some days ago and to Governor Booth previously, not to buy gold abroad since the war began, but only upon delivery in New York. I explained that the consideration which we gave to the Swedish-Finnish request this week was quite exceptional. I believed that the answer to the present inquiry would necessarily be negative, but I preferred to speak with the Secretary before giving such an answer, considering the Secretary's special interest in the Scandinavian problem.

After talking with the Secretary at 4:30, I telephoned the Swedish Minister and confirmed that, in the absence of such a guaranty as the Swedish Central Bank was not able to give in the case brought up earlier this week, the Treasury was not willing to accept gold anywhere outside of the United States, in Europe or elsewhere.

At 4:00 o'clock this afternoon, Mr. Knox telephoned me that the Norges Bank had cabled from Oslo stating that the Bank of Sweden and the Norges Bank were cooperating in a shipment of $4,500,000 of gold from Bergen on the S.S. Bergensfiord December 15, and wanted the assistance of the Federal Reserve Bank of New York in effecting insurance. Consequent shipments were contemplated for the S.S. Tidalsfiord from Bergen on December 16 and S.S. City of Flint December 20. Inquiries in regard to insurance on these two vessels were also made. When I gave the Swedish Minister the Secretary's answer, above mentioned, I also let him know in strict confidence of this message. I told him that it appeared that both the Swedish and Norges Banks were proceeding with the direct export of their gold from Scandinavia to the United States.
At 11:00 o'clock this morning the Secretary received Mr. Purvis, head of the Allied Purchasing Missions in the United States. Mrs. Klotz and Mr. Cochran were present.

The Secretary explained that the matter which he desired to speak of with Mr. Purvis in strictest confidence involved a responsibility which had been imposed on him by the President. No one else was familiar with the matter, except that the State Department had been advised. The Secretary then came directly to the point. (Mrs. Klotz took complete notes of the Secretary's statement, which should be depended upon for the accurate account. The following is just a rough summary). He stated that Prof. Rist, the distinguished French economist, had on November 13 brought to the attention of our Embassy in Paris the fact that molybdenum constituted the vulnerable point in the German armor. The Secretary then showed to Mr. Purvis a cablegram of December 4 in which our Ambassador at Paris reported his conversation with Mr. Jaoul, a French expert upon chemical materials. Mr. Purvis was permitted to take notes from this cablegram, particularly with respect to figures of possible British and French consumption of molybdenum.

The Secretary told the visitor that he had received yesterday in the Treasury the President of American Metals. He had obtained from this gentleman the promise to recommend to the Board of Directors of Climax Molybdenum a promise not to renew their sales contract with Amorg which is just now expiring, and not to make further exports of molybdenum to Japan, which have been heretofore carried out through the Mitsui Company, but for which there are no outstanding contracts. It was explained by the New York business man that stopping of these orders would shortly cause unemployment in molybdenum production unless other purchasers for the commodity were found. He admitted that Germany was definitely out of the market, but realized that her needs could be taken care of for some time through Russia, particularly if a 10,000 ton shipment recently arranged for Russia actually got through. The Secretary made the point that a quid pro quo would be afforded the molybdenum exporter if the British and French purchased therefrom molybdenum to the extent suggested in Ambassador Bullitt's cablegram. For this reason, the Secretary had taken the matter up directly with Mr. Purvis as head of the Allied Purchasing Missions.

Mr. Purvis was genuinely appreciative of the position which the President and the Secretary of the Treasury had taken, and realized fully the significance that such a step as was envisaged might have. He commented upon the efficacy of such a direct measure of stopping a country from obtaining a needed material as contrasted with the cumbersome and usually ineffective method of endeavoring to get a number of different countries or people by an agreement to refrain from some action or to take some joint step. The example of fats was cited.
The Secretary stressed the point that this measure would not have a significant effect if there are other metals which may be substituted for molybdenum and if measures are not taken to stop the export of such metals to Russia, Japan and Germany. The Secretary admitted that he was not familiar with the extent to which nickel or tungsten might be substituted for molybdenum. It was suggested that Mr. Purvis consult his own experts on this subject, and it was also agreed that he might properly obtain the advice of Mr. Robert Stanley of International Nickel. Incidentally, the Secretary very pointedly inquired as to whether Canada had taken steps to control exports of Canadian nickel, which he believed had not been controlled during the World War. Mr. Purvis promised to look into this.

Continuing this line, Mr. Purvis told of his plans to endeavor to have the British authorities keep him fully informed of their purchases of commodities identical with or related to those which he is buying. In this connection, he mentioned the fact that London was now buying toluol, while he in the United States is trying to buy trinitrotoluol, a derivative of the former. He thought a most effective step would be for the British to agree that all United States dollar payments, irrespective of the source of the goods purchased, be made through one account with the Federal Reserve Bank of New York, so that a check could be had thereon. The Secretary raised the question as to whether Mr. Purvis was in agreement with the idea of the special account of the Bank of England just now set up with the Federal Reserve Bank of New York, and obtained the reply that Mr. Purvis was enigmatically for it.

In this connection, the Secretary told Mr. Purvis that the President and he had yesterday completed definite arrangements for the setting up of the committee, consisting of representatives of the Treasury, War and Navy Departments, with the Chief of the Treasury's Procurement Division as chairman, to serve as liaison with foreign purchasing commissions. The Secretary stated that Mr. Purvis could now have access to this committee, but that this present matter is to be handled directly by the Secretary, under the President's instructions, and Mr. Purvis. The question of better coordination of orders for airplane engines was discussed and Mr. Purvis realized the mutual benefit of the liaison committee.

The Secretary told Mr. Purvis that his representative in London, Mr. Butterworth, was leaving on Sunday by Pan American Clipper. Acting under the Secretary's instructions, I got in touch with Mr. Butterworth and arranged for him to call on Mr. Purvis at 25 Broadway, Room 1126, (telephone Bowling Green 9-4800) at 4:00 o'clock this afternoon. Mr. Butterworth was further instructed to come by the Treasury tomorrow morning to see pertinent telegrams, and then to be at the Secretary's house at 11:00 a.m. I explained to Mr. Butterworth that he was to return to New York after the conference with the Secretary and take his plane Sunday morning as scheduled. Mr. Purvis had been sympathetic with the idea of taking the situation over with Butterworth so that the latter could be of some assistance in London after his arrival there. The Secretary added that he would instruct Butterworth to consult with Prof. Rat in France. Mr. Purvis himself may shortly make a flying trip to London if there is not some improvement in the direction and coordination of allied purchases.

When I spoke with Mr. Butterworth in New York at 2:45 this afternoon, I learned that he had been present part of the time yesterday afternoon when Ambassador Kennedy visited Mr. Whigham. The Ambassador had confirmed Butterworth's understanding that Phillips of the Treasury favored the utilization of gold, while Governor Norman was favoring the retention of gold and the disposal of securities. The question of vesting the securities apparently was still worrying the British authorities. Mr. Butterworth did not remain through the entire conversation, so could not report fully.
The following items in our exports to U.S.S.R. increased in volume during September and October, compared with the preceding fourteen months:

(In thousands of dollars)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Average Exports per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Period September-October 1939</td>
</tr>
<tr>
<td>Total exports to U.S.S.R.</td>
<td>$3,620</td>
</tr>
<tr>
<td>Molybdenum ore and concentrates</td>
<td>1,069</td>
</tr>
<tr>
<td>Gasoline in bulk</td>
<td>583</td>
</tr>
<tr>
<td>Aluminum ingots and alloys</td>
<td>409</td>
</tr>
<tr>
<td>Wheat</td>
<td>108</td>
</tr>
<tr>
<td>Diesel and semi-Diesel engines</td>
<td>94</td>
</tr>
<tr>
<td>Abrasives</td>
<td>70</td>
</tr>
<tr>
<td>Radio apparatus</td>
<td>48</td>
</tr>
<tr>
<td>Nonferrous metals, except aluminum ingots and alloys</td>
<td>44</td>
</tr>
<tr>
<td>Electric motors, starters, and controllers</td>
<td>44</td>
</tr>
<tr>
<td>Electric generators, parts and accessories</td>
<td>28</td>
</tr>
<tr>
<td>Ferro-alloys</td>
<td>28</td>
</tr>
<tr>
<td>All other commodities</td>
<td>1,095</td>
</tr>
</tbody>
</table>
By appointment, Mr. Leroy-Beaulieu, Financial Counselor of the French Embassy, called on Secretary Morgenthau at 10:15 this forenoon. Mrs. Klots and Mr. Cochran were present. Mr. Leroy-Beaulieu took pleasure in telling the Secretary officially that he had received instructions from his Government that a special account was to be opened by the Bank of France with the Federal Reserve Bank of New York from which all expenditures for war materials in the United States should be made from January 1, 1940. If at all possible, this arrangement would be made effective December 15. Mr. Rousseau, one of the Bank of France officials who accompanied the important shipment of French gold to the United States via Canada, is now in New York and will remain there to sign checks on the new account. Another French official, who will remain here to manage the account, is due to arrive in New York about next Tuesday on the Rex. It should, therefore, require only a few days to work out all of the technical details with the officials of the Federal Reserve Bank of New York.

Leroy-Beaulieu gave the following narrative with respect to the gold shipment. He said that the French officials had given us on this side no advance notice of the shipment of gold by war ships, realizing that all methods of communication were undoubtedly tapped by the Germans. The gold had been placed on an old war ship, the Lorraine, a vessel carrying heavy guns, which could defend itself against a pocket battleship. The ship had been escorted by destroyers which could match the Deutschland with speed. It is understood that when this convoy was off northeastern Ireland it was attacked by German submarines and two of the latter were sunk. Much to the amazement of the French officials in charge of the gold, Canadian officials were on hand at the Halifax docks to welcome them and assist in landing the gold. In answer to the inquiry of the surprised French as to how the Canadian officials knew that the gold was enroute, the reply was given that the British admiralty had notified the Canadian officials.

In talking with me later in the day Leroy-Beaulieu requested definite figures as to the debt of Finland to the United States. He was inquisitive as to the prospect of the United States granting a credit, either directly or through one of its agencies, to finance Finnish imports from this country or from Sweden. I gave him about what had been carried in the press with respect to this situation, but let him understand that export credits would necessarily be for exports from this country and not from any Scandinavian country to Finland.
At 10:30 this morning the Secretary received Messrs. Chen and Lochhead of the Universal Trading Corporation. Mrs. Klots and Mr. Cochran were present. The Secretary asked Mr. Chen for information as to tin shipments which could be expected from China. Mr. Chen stated that these should reach 10,000 tons per year the next ten years, thus providing 100,000 tons. The Chinese tin is Grade C and is at present worth around $1,000 a ton, being slightly under the Grade A tin, but still marketable in this country. After meeting certain demands, this tin would have to be refined to Grade A quality, and a special refinery for this purpose is under consideration in this country, but would be subject to the condition that China guarantee to have a minimum amount of tin refined.

In answer to the Secretary's inquiry, the visitors stated that the Universal Trading Corporation had up to the present drawn approximately $15,000,000 on its credit from the R.F.C. Orders to date have been placed to the extent of approximately $21,500,000, and not including freight. By turning over 50% of the proceeds of tung oil sales, the corporation has repaid the R.F.C. about $1,600,000, which figure should reach $2,000,000 by the end of this calendar year. By the end of December contracts will have been entered into committing practically the entire $25,000,000, and these contracts, with one or two exceptions, should be filled within the first quarter of the new year. Mr. Chen estimated that 500 tons of tin was now being brought out from China to the United States by way of Haiphong and Hongkong. Mr. Lochhead related some of the difficulties with respect to keeping tung oil dealers in New York in line on the price question.

The Secretary raised the question as to Chinese Tungsten and asked Mr. Chen, who was not in a position to give information without making reference to his records in New York or inquiries to China, to make a survey of the Chinese Tungsten situation and give it to the Secretary at the earliest possible date. The Secretary wanted to know what part of the Tungsten output was already mortgaged. He desired that this commodity be handled separately from tin, and given priority over tin, irrespective of the small amount thereof that might be available, as compared with tin.

The Secretary brought up the subject of zinc. The Universal Trading Corporation had contracts for zinc in Canada, but has been unable to obtain deliveries since the war broke out. The Secretary had spoken to an American zinc producer, but the 1 1/2% import duty on American zinc, the visitors explained, made the American price of 65 just that much higher than the market price ordinarily paid outside of the United States. Mr. Chen was, however, pursuing the question further of purchasing the American zinc.
Mr. Chen handed a memorandum to the Secretary which, I understand, gave data with respect to Chinese imports and also listed Chinese needs. When asked to indicate the priority in which consideration for the items was desired, the visitors stated that Items #2 and #3 were most urgent.

During the conversation the question of transportation of purchases to China was discussed. Mr. Lochhead explained that many of the motor cars on the docks at Haiphong were not purchases of the Universal Trading Corporation, but stocks which had been shipped there by interests in Hongkong when the Japanese armies were moving toward that city. Progress, they reported, was being made in clearing up of the stocks of goods on hand at Hanoi, and present imports are being entered almost exclusively through Rangoon.
The foreign exchange market was uninteresting with the volume of sterling transactions about the same as that of yesterday. In New York, sterling opened at 3.91. Shortly after the opening, the rate receded slightly and subsequently fluctuated in a narrow range. Commercial concerns were buyers of sterling all day, and towards the close the rate strengthened to and closed at 3.91-1/8.

Sales of spot sterling by the four reporting banks and the Federal Reserve Bank of New York totaled £477,000, from the following sources:

By commercial concerns............................... £14,000
By foreign banks (Europe and Far East)............... £313,000
By Federal Reserve Bank of New York (for Norway)..... £50,000
Total........ £477,000

Purchases of spot sterling amounted to £563,000, as indicated below:

By commercial concerns............................... £407,000
By foreign banks (Europe)............................ £156,000
Total........ £563,000

Cotton bills totaling £18,000, were sold to the British Control at the official rate of 4.02 by the following reporting banks:

£ 10,000 by the Guaranty Trust Company
£ 8,000 by the National City Bank
£ 18,000 Total

The other important currencies closed as follows:

French francs .0221-3/4
Guilder .5308-1/2
Swiss francs .2242-1/2
Belgas .1649-1/2
Canadian dollars 13% discount

The Federal Reserve Bank received a cable from the B.I.S., requesting it to obtain a license to transfer approximately $1,120,000 in gold from its Account #2 to its Account #4. Account #2 is the B.I.S.'s own account and Account #4 is gold owned by the Central Bank of Turkey. This transaction represents the sale of gold by the B.I.S. to the Turkish Bank which is, in turn, held by the B.I.S. as collateral for commercial credits granted by it to the Central Bank of Turkey.
We sold $1,500,000 in gold to the Central Bank of Argentina, to be added to its earmarked account.

We purchased the following amounts of gold from the earmarked accounts of the banks indicated:

$1,500,000 from the Netherlands Bank
618,000 from the National Bank of Belgium
$2,118,000 Total

The Federal Reserve Bank of New York reported to us the following shipments of gold:

$2,821,000 from the Netherlands, shipped by the Netherlands Bank, consigned to the Federal Reserve Bank of New York, to be earmarked for the account of the Netherlands Bank.
56,000 from Canada, shipped by the Royal Bank of Canada, Ottawa, to the Chase National Bank, for sale to the U. S. Assay Office at New York.
$3,074,000 Total

The London prices for both spot and forward delivery were both off 3/16d.
The spot price was fixed at 23-1/8d and the forward price at 23-5/16d, the U. S. equivalents being 40.68¢ and 40.55¢, respectively.

The price for silver in the Bombay market continued to decline. The U. S. equivalent, less the Indian import tax, was 41.61¢, as compared to yesterday's equivalent of 42.93¢.

In New York, we made five purchases of silver totaling 300,000 ounces, under the Silver Purchase Act. All of this silver was new production from foreign countries and it was purchased by us for forward delivery.

We also purchased from the Bank of Canada 500,000 ounces of silver, under our regular monthly agreement. This makes a total of 560,000 ounces purchased from Canada during December.
TO  Secretary Morgenthau
FROM  Mr. Cochran

DATE  December 8, 1939

CONFIDENTIAL

At 5:15 P.M. I received a telephone call from Mr. Pinsent, then at
J. P. Morgan's, New York. He told me that our Scotch friends (Messrs.
Whigham and Gifford) had received a cable today stating that London had
decided to postpone action. Consequently these two gentlemen are sail-
ing for home tomorrow on an Italian ship. Either they or a suitable
substitute will come back later if action is decided upon. Pinsent will
be back in Washington Saturday evening, and will be glad to give the
Secretary or me further information, which he preferred not to communi-
cate over the telephone, whenever we desire to see him. The visitors
desired to thank Secretary Morgenthau for the courtesies extended them
during their stay here.

Mr. Pinsent said that he had tried to get the Secretary this after-
noon, and I explained that Mr. Morgenthau had been steadily in conference.
Pinsent said he had also asked for me but had been informed that I was
out of town at some indicated place. I told him that I had been in my
office constantly. I checked with our telephone operators. Miss Carr
told me that she had personally received all of the several calls which
Mr. Pinsent had made this afternoon. He had asked for the Secretary each
time, and not for me. Only when Miss Carr finally stated that the
Secretary was not available, and inquired whether Mr. Pinsent would speak
to me, did he mention my name.

I gave the foregoing information to the Secretary at 5:15. He asked
that I have Mr. Butterworth dictate a memorandum tomorrow giving such in-
formation as he procured during his visit to New York upon this subject,
and particularly recounting the interview between Ambassador Kennedy and
Mr. Whigham, which Butterworth attended.

I told the Secretary that Ambassador Kennedy desired that Mr.
Butterworth be back in New York on Saturday. The Secretary instructed me
to reserve a place on the 1 o'clock plane to New York, which has been done.

[Signature]

Regraded Unclassified
PARAPHRASE OF TELEGRAM RECEIVED

FROM: American Embassy, Paris, France

DATE: December 8, 1939, 3 p.m.

NO.: 2928

PERSONAL FOR THE SECRETARY AND THE SECRETARY OF THE TREASURY.

This morning Professor Rist called on us again to discuss some of his blockade problems "informally and personally". The Blockade Ministry had received recent information, he said, that desperate efforts were being made by Germany to obtain additional quantities of soya beans with Russia as the purchasing agent. The soya bean consumption by Germany, he said, was between 800 and 900 thousand annually, and that normally almost 800 thousand tons of this was obtained from Manchukuo and the Suez was the usual means of transportation; Rumania and Bulgaria were the source of the remaining 100,000 tons. Now the Trans-Siberian Railway will have to be used for purchases through Manchukuo.

Rist said that the additional quantities of soya beans (which product is an element in producing glycerine) to be purchased in the United States through Russia would doubtless be shipped to Vladivostok too, and across the Trans-Siberian Railway. He asked whether we knew (1) whether Russia is in fact purchasing substantial quantities of this product in the United States for shipment to Vladivostok or any other place; for Germany (2) whether adequate quantities of soya beans from Manchukuo and/or the United States could in fact be transported by the
Trans-Siberian Railway.

We expressed surprise that additional quantities of soy beans should be sought by Germany from the United States if her needs could be supplied by Manchukuo and the Balkans. Rist replied that the shortage of fats in Germany is apparently more serious than had been anticipated at first.

Professor Rist asked whether there was any likelihood of any "general embargo" being placed on all exports to Russia. He also asked whether, in view of the use of soy beans in making glycerine and other war materials, the "moral embargo" would be applied to this product. We said that on these matters we had no information.

Incidentally, he remarked that the blockade authorities of Great Britain and France were not being as "severe" with Italy as is desired by some. As an example, in connection with exports of coal from Germany to Italy by water, it might be necessary to permit some quantities to go through the blockade, at least until completion of arrangements for using British coal in Italy in place of German coal. Italy is cooperating only up to a point he said, and it was difficult to know how Italians should be treated, whether they should mollify them as far as possible or whether they should be extremely severe.

END OF MESSAGE.

BULLITT.

EA: LWV
December 9, 1939.

My dear Mr. Secretary:

I enclose for your confidential information a copy of paraphrase of telegram No. 2928 of December 8 from the American Embassy, Paris, transmitting a report on a conversation with Professor Rist.

Sincerely yours,

Herbert Feis
Adviser on International Economic Affairs

Enclosure:

Paraphrase, No. 2928 of December 8 from Paris.

The Honorable
Henry Morgenthau, Jr.,
Secretary of the Treasury.
Subject: Report of conferences held at the Federal Reserve Bank of New York on December 8, 1939, with regard to the method of refunding the 1 5/8 percent Treasury notes maturing March 15, 1944

The following people were interviewed by appointment:

Salomon Brothers and Hutzler
Mr. Levy

Discount Corporation
Mr. Mills
Mr. Repp
Mr. Belmer

New York Hanseatic Corporation
Mr. Rich

Present during the interviews:

Federal Reserve Bank of New York
Mr. Rouse
Mr. Miller
Mr. Sproul (during part of the discussion)

Treasury Department
Mr. Bell
Mr. Haas

Mr. Randolph Burgess, National City Bank, was interviewed at his office.

Mr. Levy

Mr. Levy recommended a three-way refunding operation which would include a 5 year 1 percent note, a reopening of the 2 percent 1948-1950 bonds, and a new 2 1/4 percent Treasury bond of 1959-1962 (20 to 23 years). He would offer the note at par, which, he calculated, would sell at a little under one point
premium, and indicated that both issues of the bonds should be offered at a premium which based on the then market would equalize the prices of both issues so as to minimize the arbitrage transactions.

Mr. Levy estimated that there were about $200 millions of the 1 5/8 percent notes in the hands of individuals who are interested in tax exemption and who would want a note in exchange. He personally knew of two individuals who have $50 millions of the 1 5/8 percent notes, which, he said, emphasizes the importance of including a note in any exchange offering which may be made. He thought the banks generally would prefer the 2 percent bond rather than a 2 3/8 percent bond of longer maturity, but that some of the insurance companies and possibly a few banks would take the longer bond.

In response to a question as to what would be his preference if the refunding were limited to two issues, Mr. Levy said that one of the issues must be a note because of the tax exemption feature he mentioned previously, and that for the second issue he would suggest a 2 3/8 percent issue in the area of 20 years.

In response to a question, he considered the possibility of offering a 2 3/8 percent bond along with the note, but indicated that this issue would not appeal to him and that he preferred the 2 3/8 percent 20 year issue. Upon further reflection, he said that a 1944-1956 2 3/8 percent issue may work out okay.

In answer to a question, Mr. Levy said that his guess on the turn-in of a three-way offering, contingent upon the market being good, would be: notes - $200 millions; 2 percent bond - $700 millions; long-term bond - $400 millions.

Mr. Mills and Mr. Reppe

Mr. Mills indicated his preference for a three-way refunding offering, to consist of: (1) a 1 percent note - reopen the March 1944 notes or offer a new note of September 1944, (2) reopen the 2 percent 194-1950 bonds, and (3) a 2 3/8 percent bond in the 1952-1960 area. Mr. Mills suggested that if the March 1944 note is reopened it should be offered at par and the reopened 2 percent 1948-1950 bond offered at a premium of about 3 point.

He said that there were three reasons why the Treasury should include a note issue in the refunding: (1) that it provided a margin of safety for the Treasury in the event of adverse circumstances abroad, (2) it represented cheap financing for the Government, and (3) it would be fair to
the holders of rights who want tax exempt securities. He felt that the 2 percent 1948-1950 would have a strong bank demand and that a longer issue in the 1955-1960 area would be taken by some of the insurance companies, some of the savings banks, and some of the banks.

In response to a question, Mr. Mills' guess as to the probable turn-in in the three-way offering is as follows: notes - $500 millions; 2 percent 1948-1950 bond - $500 millions; long bond - $300 millions. Mr. Repp thought that probably $700 millions would go into the 2 percent bond with a corresponding reduction in the amount which Mr. Mills estimated would go into the note.

Mr. Repp was not in agreement with Mr. Mills' three-way proposal for the refunding offer. He would confine the refunding to a two issue deal, a 1 percent and a 2 percent money offering, i.e., he would reopen at March the 1 percent notes and reopen the 2 percent 1948-1950 bonds. He felt that the Treasury should play safe, particularly in view of the foreign situation. He felt that the notes should be priced to withstand a reasonable shock. He would not issue long bonds but would leave such demand as there is for the support of the long issues now outstanding.

Mr. Devine

Mr. Devine said that the demand in this market is in the area between 1948-1950-1952, and that he would fit the new offering to the market demand.

He said that there is little volume in the long-term market and that when the new issue of 1948-1950 came out the insurance companies wanted some longer bonds and bought about $80 millions of them in the market, pushing the market up about a point. Following this, the market sold off about a point and since then the market as a whole has recovered, whereas intermediate maturities have practically recovered their losses and longer term bonds have been sluggish. In illustrating the "thinness" of the long-term market, he cited as an example that at times his volume of the 1948-1950's and the 1950-1952's has amounted to $100 millions whereas his volume in the 1960-1965's has only amounted to about $5 millions.

In view of this, Mr. Devine recommended that the refunding offering consist of a 1 percent note and a 2½ percent 1951-1954 bond. He advised against reopening the 2 percent 1948-1950 bond. This he felt was something that could be saved to be reopened at any time. As to the note offering, he suggested that the March notes might be opened and offered at no premium. If a new note were offered he felt it might result in a very small issue, but he did not feel very strongly about this, and upon further questioning he thought a 1 percent September 1944 note at par would be all right.
With regard to the long bonds he thought the insurance companies generally would prefer buying the outstanding issues of the 2 3/4 percent bonds at a premium rather than a new 2 3/8 percent bond. He thought a new 2 3/8 percent bond would result in a lot of "shuffling" in the market with the market "jumping around like a jack rabbit".

Upon further questioning, Mr. Devine said he thought a 2 3/8 percent 1952-1955 issue was not too long to go, but that a 2 3/8 percent 1953-1956 bond was a little too long.

Mr. Morris

Mr. Morris said that there were $100 millions of the rights in his bank, including investment accounts, etc., and that unusually large amounts of the rights were held by wealthy individuals who had taken the notes because of their tax exemption feature. Any refunding offering, he said, should make provision for this tax exemption demand.

Mr. Morris favored a three-way deal with the premium on each of the three issues equalized as far as possible. Otherwise, he indicated, the holders of rights would be likely to do their own refunding. He thought that the 1 percent notes of March 1944 should be reopened for the benefit of those who desired tax exempt securities; that the 2 percent bonds of 1945-1950 should be reopened, at a premium of about 7 point, in order to satisfy investment demands of banks who are unwilling to take bonds with maturities in excess of 10 to 12 years; and that a new 2 3/8 percent bond should be offered with a maturity somewhere in the area of 1957-1961 to 1959-1962.

Upon questioning, he ventured a guess as to the amount which might go into the long bond: $300 millions to $350 millions. He indicated that there was no broad demand for the long bonds and that these issues were run up on the basis of two large orders and later declined.

Upon further questioning with regard to a two-way offering, he said that if the refunding were restricted to two issues it would have to be a note and an intermediate bond, as he did not think the demand for bonds with maturities in excess of 10 years was large enough to do otherwise. He again repeated he favored including a long bond so as to have an issue to meet the long buyer demand.
Mr. Garner

Mr. Garner recommended a three-way refunding operation. He indicated that individuals hold relatively large amounts of the rights and these holders prefer a tax exempt note in exchange.

Mr. Garner suggested that the three-way offering include:
(1) either a new 1 percent note at par or a reopening of the 1 percent March 1944 notes at par, (2) a reopening of the 2 percent 1948-1950 bonds at a premium of ½ or ¾ point based upon market conditions at the time, (3) two possible alternative long term bonds, namely, a 2½ percent December 1955-1960 bond or a 1957-1962.

In response to a question, he guessed that the turning-in on a three-way offering might be as follows: notes - $200 millions; 2 percent 1948-1950 bond - $600 millions; long bond - $400 millions. He said that the demand for long term bonds was limited and that the strength in the long section of this market was due to lack of supply and the aid of the strong market in the intermediate bonds. He advised against putting pressure in the pricing favoring the long bonds, which, he felt, would make a bad secondary market.

When questioned with regard to a two-way proposition, Mr. Garner suggested a 1 percent note and the reopening of the 2's of 1948-1950. He felt that using a longer bond would force banks into something they did not want and which they would later switch out of. In response to a question, he said a 2 3/8 percent 1953-1958 issue might go but he thought it inadvisable to use it in the two-way offering.

Mr. Rich

Mr. Rich said that the refunding of the March notes was a large problem, the largest since the Liberty refundings. The market, he said, was still "thin", and a small volume of buying puts the market up. He thought that a fairly large number of the March note holders wants a tax exempt security. He would price equally the issues offered in the refunding.

As a first choice, Mr. Rich would recommend a three-way offering which would include: (1) reopening the 1 percent March 1944 notes, (2) reopening the 2 percent 1948-1950 bonds, and (3) a 2½ percent 1957-1961 bond. He guessed that $300 millions to $400 millions would go into the long bond, and that this issue could be used later to build on.
He expressed considerable apprehension with regard to unfavorable developments which might occur abroad. He said that his company, probably different from some of the others, thinks there is a war on. He thought it important to keep the market technically strong, and would advise against offering any issue which would require a great deal of secondary distribution. Notwithstanding he would try a long bond but price it equally with the other issues offered so as not to force refunding in that direction.

He ventured the following guesses as to the distribution:
1 percent note - $450 millions; 2 percent bond - $650 millions;
and long bond - $300 millions.

His second choice would be a two-way proposition: reopening the March 1944 1 percent notes, and reopening the 2 percent 1948-1950 bonds. He would advise against putting out another new issue in connection with the two-way proposition.

Because of the distribution of the 1 5/8 percent notes, he strongly advised keeping the books open for at least three days.

Mr. Burgess

Mr. Burgess would make a two-way offering: reopening the 1 percent March 1944 notes, and reopening the 2 percent 1948-1950 bonds. This, he said, would build up the 2 percent 1948-1950 issue into a good trading issue. He felt that longer than 1948-1950 was too long for the banks and too short for the insurance companies. He emphasized that with this arrangement there would be practically no secondary distribution which would leave the capital markets free for private capital issues so necessary for a continuation of the business recovery. He also felt that this offering would leave the market less vulnerable to any adverse situation which may develop abroad, as the market would have a minimum of secondary distribution to handle.

He would advise against putting out a new note issue as he felt it would result in too small an issue.

If a long bond were to be offered, he would suggest opening up at a premium the outstanding 1960-1965's for such demand as might come from the insurance companies, etc.
MEMORANDUM FOR THE SECRETARY:

I have had the files checked but am unable to locate any instruction from the President as to savings under the Coast Guard-Lighthouse consolidation. Mr. McReynolds advises me that he remembers discussing the matter with Admiral Waesche, particularly with reference to a possible reduction in force, following which the Bureau of the Budget was advised that a saving of $500,000, or 5%, would be realized under the annual cost of the operation and maintenance of the Lighthouse Service. As a matter of fact, Admiral Waesche recently advised me that the saving would be about $600,000, or 6%. On top of this, in the White House blue penciling of the Coast Guard estimates for 1941, an additional cut of $350,000 was made on the theory that by consolidating all of the Coast Guard appropriations a further saving in this amount should be possible. This consolidation of appropriations if tied into the Coast Guard-Lighthouse consolidation would reflect a total saving of $960,000, or about 10%.

The Coast Guard-Lighthouse consolidation was a part of Reorganization Plan No. 2. This plan involved some 18 bureaus of the Government and the President stated that the combined savings under all of these consolidations were estimated at $1,250,000. The Coast Guard-Lighthouse consolidation is contributing nearly 50% of this total estimated saving on the basis of $600,000, or 76% on the basis of $960,000.
May 23, 1939.

MEMORANDUM FOR THE SECRETARY OF THE TREASURY

I hope you are giving your personal attention to the important matter of putting the Reorganization Plans into effect insofar as they affect you. I have directed the Bureau of the Budget to place its facilities at your disposal in helping to work out any organization or fiscal problems you may encounter.

F. D. R.
TO THE SECRETARY:

We have seen Levy, the Discount Corporation, Devine, Bankers Trust, Guaranty Trust and the New York Hanseatic Corporation.

With two exceptions all agree on a three-way option, namely, a note; reopen the 2's of 1948-50; and a long bond of 2-1/2% coupon somewhere in the 1957-62 area.

In view of the fact that the maturing notes were taken in exchange for the 3-1/2% Liberties to the extent of about fifty-five per cent and are no doubt still held by individuals in large amounts because of their tax exemption features, all recommend that you include a note, either reopen the 1% of March 1944 or issue a new 1% of September 1944 (September 1944 is an open date but December 1944 is the call date for the 4's of 1944-54). The 2's of 1948-50 were consistently recommended because of their popularity in the market. It is suggested that they be reopened with a premium charge of from 1/4 to 1/2 point. In the long bonds the recommendations were for a 2-1/2% coupon around the 1957-62 area. Those who recommended the long bond do not feel that we would get a large conversion into this issue, but look upon it more as a test, and to be available to reopen in future financing. Estimates indicate that the insurance companies hold less than $100,000,000 of the rights and about the only subscribers to these long bonds would be insurance companies and possibly savings banks. Some of the persons we interviewed
vented guesses of $300,000,000 to $400,000,000 in the long bonds. None of them seemed to be particularly concerned about the small volume of exchanges we might get in this issue, but of course this would concern you.

Repp and Devine both recommend a two-way issue, namely, a note and an intermediate bond. Both would reopen the 1% note of March 1942. Repp would reopen the 2's of 1948-50. Devine would not reopen this issue but would put out a new 2-1/4% bond in the 1950-54 area. We were impressed by some of the arguments of these two gentlemen. Repp says that the 2's are very popular and their strength has, to a large extent, carried the whole market forward. Many others agreed with this statement. Because of the tremendous demand now available for this issue he would reopen it and save whatever demand there is in the long market and he feels it is not so much for the support of the bonds already outstanding in that area. He says that a 2-3/8% 1952-54 might go fairly well, possibly getting both banks and some insurance companies, but points out that there would be some danger of it being just a little too long for the banks and not long enough for the insurance companies.

Devine says there is a heavy demand in the 1950-54 area. He makes the statement that when the 2's were put out the insurance companies were in the market for the long bonds. They purchased over a period of about six weeks $85,000,000, which satisfied their demands, and then the market went off. (It is possible that the invasion of Finland by Russia may have had as much or more effect upon the market than the withdrawal
of the purchases of the insurance companies.) To show the difference in the demand for the securities in the intermediate area and those in the long area he said that there were times over a two weeks' period when he would sell as much as $100,000,000 of the intermediate bonds and only $5,000,000 of the long bonds. He also feels that a 2-3/8% 1952-55 might be a little too long.

Practically everyone seems to be apprehensive about adverse developments which might come from abroad.

Telephoned by Mr. Bell from New York.
1 p.m.
Memorandum to the Secretary

From: Messrs. Riefler, Stewart, Viner

Subject: Molybdenum.

We have so far obtained, from the Tariff Commission expert on molybdenum, from Tariff Commission internal memoranda which have been made available to us, from material in Mr. White's files, and from other minor sources, the following relevant information:

(1) Only minor amounts of molybdenum are produced outside the United States and of even these amounts some part is under American control.

(2) Used molybdenum is not in practice salvageable.

(3) No information has yet been obtained as to the availability of stocks abroad, but there are indications that Germany and Russia imported abnormally large amounts in the past three years.

(4) Molybdenum is not separately classified in the American official trade statistics, so that information as to the definite amount and value of the exports would have to be obtained either directly from the trade or from an examination of the export manifests in customs houses. How large a task this would be we cannot say without some further inquiry.

(5) Restriction on export might prove of no importance for Germany and Russia if they have ample stocks on hand and might prove of minor importance if tungsten is an effective substitute for war purposes. On this last point the information we have seems contradictory and needs amplification.

(6) Mr. Stewart will make contact with metallurgists with whom he is personally acquainted in New York on Monday. He will not make arrangements, however, to bring anyone to Washington until we hear further from you.

(7) We have learned that a special report on molybdenum, and another on tungsten, were made for the Munitions Board by a Mr. Tyler, now with the Bureau of Mines. We do not think we should ask for copies of these reports without special authorization from you, but we do think that it would be foolish for us to go much further with this topic without the opportunity to consult these reports.

(8) We await further instructions from you.
December 8, 1939

Present:

Mr. Loring G. Christie, Minister from Canada
Mrs. Klotz

Minister: Colonel Ralston would like to come in to see you the afternoon of Friday, December 15th, or some day of the following week.

HM, Jr: Friday afternoon is Cabinet and, therefore, I cannot see him then. But Wednesday, the 20th, of the following week is convenient for me. Is it going to be a secret or open meeting?

Minister: It is a meeting about which he wrote you.

HM, Jr: If it is not a secret meeting, I will expect you and Colonel Ralston to have lunch with me in the Treasury and if he does not want to be seen by anybody, we will have the meeting at my house.

OoO-OoO
TREASURY DEPARTMENT
WASHINGTON

December 8, 1939.

REPORT FOR SECRETARY MORGENTHAU:

In regard to closing agreements which have been requested, the following applies:

De Laval Steam Turbine Company:

There have been no developments and no action this week.

The Midvale Company:

Action is suspended during consideration of policy matters, following the mailing of a letter to the company from this office, stating that serious doubt is entertained as to the propriety of entering into a closing agreement in view of the appropriation to the Navy of $6,000,000 for facilities for armor plate contractors. A conference was held today with Navy personnel in regard to this case and the general armor plate situation.

Camden Forge Company:

Action is suspended to give opportunity for further developments between the Navy Department and the contractor. It is understood that the Navy has advised contractor a closing agreement is impracticable.

Consolidated Aircraft Corporation:

A conference, in accordance with your directions, was held on December 8, 1939, and was fully reported in a conference memorandum. Two conferences were held today with Mr. Shannah, Treasurer. The matter is under active consideration.
New matters developed as follows:

Electric Boat Company:

Representatives of the company called on the Treasury Interdepartmental Committee men on Tuesday, December 5, 1939, in regard to filing a request for a closing agreement. Such a request was handed to Appel in your office on December 6, 1939, just prior to your conference with the Acting Secretary of the Navy and various personnel of the Navy and Treasury Departments, (with Mr. Sutphen of the Electric Boat Company also in attendance).

The request has not yet been answered in writing. Mr. McLain of the Navy stated to Appel today that the contractor has stated to the Navy that a contract will be executed without entering into a closing agreement.

Other matters:

This report, as previously explained, is limited to matters in regard to closing agreements involving contract operations under the Vinson-Trammell Act and the National Defense Act.

Interviews are being held by the Treasury Interdepartmental Committee men with contractors who have contracted for or are contemplating bidding on either domestic or export sales of munitions and are interested in the treatment for income tax purposes of the prospective transactions, particularly with respect to additional facilities. In this field the following concerns have been heard from during the week:

Colt’s Patent Fire Arms Manufacturing Company
Atlas Powder Company
Hercules Powder Company
Report for Secretary Morgenthau:

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Colt's Patent Fire Arms Manufacturing Company
Atlas Powder Company
Hercules Powder Company

(Signed) Gay T. Havens
Commissioner.

CAA/NEA
Secretary of State,
Washington.

2570, December 8.

FOR TREASURY.

(1) In reply to the Liberal amendment on the King's address regarding the urgency of developing export trade and coordinating government regulations affecting it, the President of the Board of Trade last night announced that the export figures for November will show an increase of about 50 percent on those of October which will bring the figure to approximately that of August when the total was £37 million (this will be however 14 percent below the November 1938 figure which was £2.9 million). In a long speech Stanley stressed the help which trade associations can render and cited in particular the automobile industry which has recently issued an optimistic statement regarding export prospects, the linen industry for which raw materials have been procured, and the cotton industry regarding which a statement is expected in the near future. He revealed that "some three
three weeks or a month ago" a sub-committee of the Economic Policy Committee (described in telegram No. 1981 of October 9) was formed being a ministerial committee presided over by Cross and including representatives of the Board of Trade, Treasury and the Ministries of Supply, Food and Shipping. "Below this is a committee on the official level" presided over by Leith-Ross which considers purchases and sales to neutral countries where the element of economic warfare arises. Pressed to cite instances of the achievements of this committee he pleaded that it would not be in the national interest to divulge details but mentioned the presence of the Turkish delegation in London, the agreement with Italy (see despatch No. 3844 of November 14) the arrangement with the Argentine and the visits of British Government representatives to a number of foreign countries. With regard to the demand for the appointment of a Minister of Economic Coordination he said that was a matter for the Prime Minister and added:

"Having round the table all the departments with both interest and power in this respect, we are able to get a united policy with regard to a particular transaction or a particular country. It is then possible, when that has been done, for executive action to be taken by the various departments with whose power it is in accordance with the decision arrived at by the committee as a whole."
Though much interested to learn of the existence of the Leith-Ross committee, speakers continued to press for more drive behind export expansion, greater coordination and a Minister of Economics.

(2) The Treasury bill rate at today's tender was £1.4s.6.48d. as compared with £1.3s.10.21d. last week. The total of £65 million was allotted. Applications totalled £95 million and bids dated 91 days £99.13s.10d. received 57 percent allotments. Next week's tender will be for £65 million which will be £15 million above maturities and if fully allotted will bring the total tender issue to £760 million on December 15.

JOHNSON

CSB
Partial Paraphrase of Telegram Received

From: American Embassy, Berlin, Germany
Date: December 8, 1939, 6 p.m.
No.: 2282

Contrary to general expectation the German Treasury has published a statement of the Reichs debt for the end of August and September. The Government acknowledges net borrowings of 4467 million marks during these two months, 2143 million in August 2324 million in September, and a total debt September 30 of 39,749 million marks.

The unknown must be added first to the acknowledged borrowings; however, in September presumably relatively little debt resulted from the authorization of the Army to issue promissory notes for supplies. In the second place, there must be added the borrowings of the Reich from the Reich Kreditkasse, which is the provisional central bank established in the part of Poland occupied by Germany. To the total of the disclosed debt must be added the proceeds of the operations mentioned above, and the old hidden debt - mainly sonderwachse - which was issued in the earlier years of the regime; greatly varied estimates of the latter range from 10 to 18 billion reichsmarks.

Of the disclosed debt on September 30, 14,083 million marks consisted of short term debt of which 9,721 million was in the form of treasury bills, 4,029 million in new finance plan.
plan tax certificates, 108 million in old tax certificates, 218 million owed to the Reichsbank and the balance in miscellaneous debt.

The short term and floating debt therefore increased some 1763 million marks in September during which month there were issued 904 million of new finance plan tax certificates and 1320 million marks of treasury bills. This increase in short term debt through the issuance of bills and tax certificates was partly offset by a reduction in the operating credit of the government with the Reichsbank which fell from 680 million of August 31 to approximately 219 million on September 30.

The long term debt on September 30 stood at 25,666 million marks an increase during the two months of 709,000,000.

The long term debt increased relatively little - 119,000,000 marks during August, the main increase - 590,000,000 marks - occurring during September. A new and principal item in the September increase was the direct borrowing of 400,000,000 marks on long term but with no specified maturity from the Renten Bank, the second subsidiary of the Reichsbank.

Repeat to Treasury.

KIRK.

EA:LMW
PARAPHRASE OF TELEGRAM RECEIVED

FROM: American Embassy, Paris, France
DATE: December 8, 1939, 7 p.m.
NO.: 2933

FOR THE TREASURY DEPARTMENT.

A check has been made by the Embassy with the partners and managers of several American banking houses in Paris, and find that the recent changes in the exchange control regulations are quite satisfactory to them - reference: telegram No. 2882 of December 1 from the Embassy. It is their belief that these new measures have been well worked out, and their operation made as simple as it is possible to make them. I am told by one of the partners of Morgan that it is quite a relief to find that there is to be no restriction on the use of foreign franc accounts - at least not for the present - provided only that the francs deposited therein were properly acquired. Satisfaction was expressed that the French have granted authority to transfer francs from one foreign, i.e., nonresident to another foreign account, provided that when there is such a transfer the receiving institution be notified by the transferring institution that a foreign account and not a French one is the source of such franc deposit. Under the present regulations banks are permitted to accept franc deposits for foreign account in three cases; first, when the francs are from another foreign account; second, provided they were acquired before the first of December; third, provided they result from the sale of foreign exchange.
exchange to the Foreign Exchange Office. However, care must be taken by banks in accepting francs from French sources for foreign account; the responsibility rests with the accepting institution.

When Professor Rist visited us this morning - reference: confidential telegram of today's date, No. 2928 - he told us in reply to our inquiry that they had not yet reached a definite agreement with the British about the proportion to be borne by the two allies in purchases growing out of the blockade - that is, purchases which are made to prevent foreign products falling into the hands of Germany. He said their present discussions were on the 60-40 basis, 60 percent being borne by the British, and 40 by the French, which basis seemed to be reasonable to him. Frequently, he said, it would be difficult to distinguish between normal requirements and "blockade" purchases, the normal requirements being paid for depending on the respective needs of the two allies. It would be particularly hard to work this out, especially where a certain percentage of purchased products was purely a "blockade" purchase and a certain percentage bought to fill real needs. Rist said that as to the other phases of inter-allied financial coordination he had no information.

END SECTIONS ONE TWO AND THREE.

BULLITT.

EA:LMW
2933, December 8, 7 p.m. (SECTION FOUR)

The general report of the Chamber Finance Committee on the 1940 budget made available today embodies the survey of the financial powers enjoyed by the government during the war of 1914-18, those contemplated under the law of July 11, 1938 (organization of the nation in wartime) effected by the policy under war conditions, the situation of the 1939 budget, and budgetary estimates for 1940.

The report shows that between January 1 and July 31 the Treasury had been called upon to pay out 27,500,000,000 francs over and above budgetary revenue and that it had borrowed 29,000,000,000 francs during this period (from the Caisse des Dépots et Consignations 500,000,000; loans issued by the Autonomous National Defense Board 8,500,000,000; loans issued abroad 6,000,000,000; Treasury bond issues 3,500,000,000 and the issue of 5% 1939 rentes 10,500,000,000)

Early in September credits totalling 70,000,000,000 francs had become available and since that time several billions of
-2- #2933, December 8, 7 p.m. (350 FOUR) from Paris

of additional credits had been approved. Summarizing the various means open to the Treasury to provide for these gigantic expenditures the report recalls that the total of short-term obligations in circulation at October 31 amounted to 68,400,000,000 francs.

BULLITN

NPL
It is pointed out, however, that the Treasury was obliged to seek additional resources to meet requirements of the first months of the war and thus arrange for the advance of 25,000,000,000 francs from the Bank of France and 1,000,000,000 from the Bank of Algeria (telegram No. 1727, September 2, 2 p.m.). The view is expressed that recourse to such borrowing should be avoided as much as possible and that the Treasury's requirements should be met through the "normal functions of the circulation of capital".

The report concludes by stressing the uncertainty which necessarily surrounds the estimates of receipts and expenditures of the 1940 budget - a warning which is certainly not inopportune in wartime.

As the 1940 budget bill left the committee proposed budgetary appropriations amount to 79,260 million francs which is 265,000,000 more than the government's estimate and revenue 76,568,000,000 which 335,000,000 more than the government's estimate.
2933, December 3, 7 p.m. (SECTION SIX)

Under the simplified procedure adopted for the examination of the 1940 budget the Chamber yesterday rapidly approved more than 68 of the 79 odd billion francs of credits for the different government services. The debate offered no special interest other than an expression of doubt voiced by Deputy Grumbach on behalf of the Socialist group that Daladier as Premier, Minister of War and of Foreign Affairs could possibly efficiently and effectively carry out such a formidable task. Deputies Fernand Laurent (Independent Republican) and Elbel (Radical Socialist former Minister of Commerce) expressed concern regarding the depression in private industry and commerce which they claimed was being fettered by hasty and improvised fiscal measures and numerous and complex decree laws. Fernand Laurent claimed that there are at present 400,000 unemployed in France as against 302,385 on August 26 of which, however, the majority are unemployable.

A decree published in the Journal Officiel of today increased
increased the price of matches by about 30%.

The Amsterdam court has approved the agreement reached with the Mandelsohn creditors granting a moratorium until August 15, 1940 (our telegram Number 2882, December 1, 6 p.m., last paragraph). It is indicated that the creditors approving the arrangement represent 50,033,000 florins out of 50,924,000 florins.

In spite of profit-taking the securities market was firm again today. Rente issues showed little variation except the 1937 dollar exchange guaranty issue which advanced 2.25 francs.

END OF MESSAGE.

BULLITT

KLP

RECEIVED

DEC 2 1939

[Stamp: Received in open letter]

[Stamp: Received in official letter]
Present:

Mr. Purvis
Mr. Cochran
Mrs. Klotz

HM, Jr.: Nobody except the State Department knows about this. This thing that I am going to talk to you about opens up an entirely new avenue. The President gave me this today knowing how difficult it was, but said, "Do it."

Now, I have had down here one of the principal officers and stockholders of Climax Molybdenum Company. He gave me a memorandum of the exact situation of the whole production of molybdenum in this country, a copy of which I will give you to take along. (This is Harold Hochschild's memorandum which is filed with record of his conversation with the Secretary under date of December 6.) They are having a meeting of their Board of Directors today and, without any promise from me, he is going to recommend to his Board that they do not make another contract with Amtorg. Their contract expires now.

They have not asked for a definite quid pro quo, but I told him that this originally came from the French and that I would talk to the Allies and put up to them what we could do so that we would not be asking them to do something that was unfair. He is going to let me know tonight. He called me back and was worried about the fact that if they lose the business to Russia a number of workmen at the mine would be let off. I said that I could see that this was a reasonable worry and that I would talk to the French and English and do everything that I could, following their own cables to see what we could do.

Of course, last summer, we felt that it would be far less expensive for the so-called Democratic...
nations to control the essential raw materials so that no aggressor could obtain them so that they could not go to war.

I realize perfectly, when I am talking to you here, that I am starting something that may be terribly important. The amount of money is really insignificant. In going into this thing, I am very ignorant that if we withdraw molybdenum does tungsten become a substitute, or nickel? I was talking to Walter Stewart and I asked him who was the best metallurgist and he said that the best man was with International Nickel and that he was in New York, also that he would get in touch with him. We don't want to go to the trouble and risk on molybdenum and find that by withdrawing it we do not accomplish what we want or if you people would say "We will make a deal for molybdenum and pile it up here or ship it", whatever you want, that that would not accomplish the purpose.

I am very enthusiastic about the possibilities, because we are doing something that looks to me as though we are on a path that has great possibilities.

Mr. Purvis: It is a compact way.

HM.Jr: There is a definite relationship, I think, if you cannot get molybdenum.

Mr. Purvis: It is up to us to become authorities on this immediately. I will get right on that.

HM.Jr: If I find that the American producers are not going to go through with it, I will call you. If you do not hear from me, you will know that they will not ship to Russia and Japan. What they are selling them now is the clean-up of the present contract.

I asked whether it would be possible to do a job on copper and he said it is very difficult, but it is not impossible. What we are taking about opens up the whole thing. There is a thing called quartz crystal which you can only get in Brazil.

Mr. Purvis: I will ask them to list the key points and let us know.
Mr. Purvis: Everybody says that Germany will be short of fate. You cannot control that, but here are two or three essential things that we can stop entirely. The disposition of the President is to do it.

Mr. Purvis: It is very fortunate for us that he is willing to do this.

HM, Jr: A thing like this is -- you and I acting for the President. It has nothing to do with the other things we have talked about.

Mr. Purvis: This will get to the heart of the thing and the United States is willing to cooperate. It seizes ones imagination very definitely.

It ought to go very fast and it occurs to me that it may be necessary, if we find any hold-up, it might be necessary for someone to get into an airplane and present the picture to them.

HM, Jr: Butterworth, who is the Second Secretary in our Embassy in London and is detailed entirely to the Treasury, is going back within the next few days and I thought I would fill him full of this so that he can tell Ribbentrop how I feel and also tell the people in the English Treasury. He sees Waley and Sir Frederic Phillips.

Mr. Purvis: Before he went, could I talk to him? Is that advisable?

HM, Jr: I was not going to ask him to see you unless you thought it would be helpful.

Mr. Purvis: Yes; it would be, very much.

(At this point, HM, Jr tried to reach Mr. Butterworth in New York by telephone.)

Mr. Purvis: This is so important that I want to re-arrange my appointments and will take the one o'clock plane back to New York.

HM, Jr: I will have Butterworth meet you at the
Newark airport and ride back with you.

Mr. Purvis: That would be just fine!

May I go to Stanley, of International Nickel, and get to the heart of this?

HM, Jr: Yes; by all means. Please feel that I consider this so important that you can talk to me at any time on the telephone. How do we get you on the telephone?

Mr. Purvis: At the present time, my office number is Bowling Green 9-4800 and I am staying at the Hampshire House.

HM, Jr: You talk to anybody whom you have confidence in. I believe that nickel is an alternative.

Mr. Purvis: It is like everything else.

(The following remarks of Mr. Purvis are not a verbatim report, but are an extract from Mr. Cochran's report of the meeting.)

"Continuing this line, Mr. Purvis told of his plans to endeavor to have the British authorities keep him fully informed of their purchases of commodities identical with or related to those which he is buying. In this connection, he mentioned the fact that London was now buying toluol, while he in the United States is trying to buy trinitrotoluol, a derivative of the former. He thought a most effective step would be for the British to agree that all United States dollar payments, irrespective of the source of the goods purchased, be made through one account with the Federal Reserve Bank of New York, so that a check could be had thereon. The Secretary raised the question as to whether Mr. Purvis was in agreement with the idea of the special account of the Bank of England just now set up with the Federal Reserve Bank of New York, and obtained the reply that Mr. Purvis was enthusiastically for it."

HM, Jr: I will also have Butterworth see the French and give Ambassador Bullitt the same information.
Subject: Utilization of Freight Capacity of Indochina-Yunnan Railway.

The Honorable
The Secretary of State,
Washington.

Sir:

I have the honor to refer to my despatch no. 22 of December 4, 1939, in regard to the plans of the Indochina-Yunnan Railway to increase its freight capacity, and to outline, as of possible interest to the Department, the allocation of this capacity to the various shippers.

The Department has no doubt been informed that some months ago the railway officials and Mr. T. L. Soong, representing the Southwest Transportation Company, agreed that the Chinese Government would have 4/9ths of the capacity, that 2/9ths were to be allocated to petroleum products, that 1/9th was to be given to cement shipments, and that the remaining 2/9ths were to be utilized by private commercial interests.

Up to the first of the present month, the above distribution was made on the basis of freight cars leaving Haiphong and did not include those leaving intermediate stations such as Hanoi, Visti, et cetera. In determining total traffic, from which the various shares were allotted, the railway did not include service needs, such as cars of ballast, coal, sleepers, et cetera, parcel post, urgent Chinese Government requirements, and certain locally produced merchandise, such as rice, corn, et cetera.

From the first of November, the total traffic will include not only the freight cars leaving Haiphong but also those leaving intermediate stations. It will also include part car loads made up of miscellaneous cargo. As before, the items mentioned in the preceding paragraph and cars sent to Yunnan by the Indochina Government Railway from such places as Saigon, Tourane, Hanoi, et cetera, will be excluded from the total.
The inclusion of these cars from Saigon, et cetera, will not affect the total carrying capacity of the railway to Yunnan as the Indochina Government Railway provides the necessary locomotives. Up to the present the tonnage of these cars has averaged at about 500 tons per month and should not exceed 1 thousand tons per month in the future. Shipments from Saigon and intermediate stations to the south help relieve the congestion at Haiphong.

At a recent meeting between the railway officials of the Indochina-Yunnan Railway and shippers of petroleum products it was agreed that a closer watch over the distribution of cars should be kept. This agreement is the result of the more or less openly acknowledged fact that certain Chinese officials, in collusion with certain railway employees, have been selling cars to private commercial shippers in excess of the 2/9ths. Shippers of cigarettes and other valuable cargo are said to have taken full advantage of this situation, paying from I.O. $1,000 to I.O. $1,500 for cars.

I am given to understand that for the next few months the greater part of the Chinese Government's 4/9ths, as well as the 2/9ths, will be used primarily for shipments of petroleum products to the exclusion of tires and other cargo.

Respectfully yours,

CHARLES S. REED II,
American Consul

Original and 2 copies to the Department
Copy to Embassy, Chungking and Peiping
Copy to Consulate General, Hong Kong
Copy to Consulate, Saigon

$15.4
CSR: oor
The Honorable,

The Secretary of the Treasury.

Dear Mr. Secretary:

This will acknowledge receipt of your letter of December 4, 1939, forwarding a copy of your memorandum of December 1, to the President, with reference to closing agreements in relation to the national defense.

The matter will receive further consideration of the War Department and I shall be glad to consult with you again should it appear necessary.

Thanking you for your proffered good offices,

I am

Sincerely yours,

[Signature]

Secretary of War.
The Honorable,

The Secretary of the Treasury.

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Sincerely yours,

(Signed) Harry H. Woodring,

Secretary of War.
In accordance with your telephone instructions I called on Mr. Purvis at the British Purchasing Commission's office in New York yesterday afternoon. Mr. Purvis, after talking with you yesterday morning, and before seeing me, had met with Mr. Stanley of the International Nickel Company and Mr. Merica, the Company's chief metallurgist. Mr. Purvis asked me to inform you that Mr. Merica is preparing a brief factual report for you which Mr. Purvis will mail, to reach you Monday morning. Mr. Merica made the suggestion to Mr. Purvis that you might care to see him for a brief talk and that he was prepared to come to Washington at your convenience. He is meeting with Mr. Purvis and Mr. Walter Stewart at 10 A.M. Monday.

Mr. Merica also made the suggestion that a steel man was the most competent person to prepare a report on the use and substitution of molybdenum and allied alloys. He made the point to Mr. Purvis that although he, as the International Nickel Company's head metallurgist, knew a great deal about the question, it was mainly from the point of view of nickel, and that other metallurgists employed by producing companies likewise tended to concentrate on the particular products that their companies marketed. In Mr. Merica's opinion a steel man was the suitable person to prepare a report on the use and substitution of such products as molybdenum, manganese, etc. because he was the actual consumer and fabricator. Mr. Purvis stated that Mr. Merica felt that someone like Mr. Earl Smith of the Republican Steel Company would be in a position to make the type of report which he had discussed with you. Mr. Purvis added that Mr. Merica, in putting forward this name, had indicated that he had no knowledge as to whether Mr. Earl Smith would be personally acceptable to the administration, and Mr. Purvis entered a similar caveat on his own behalf. Mr. Merica had also mentioned Mr. Fritz Riga, but himself raised the point that whereas he was a naturalized American citizen, he was of German origin. Mr. Merica felt that he could put forward the names of other competent steel men in the course of a talk with you.

Mr. Purvis asked me to convey the above to you to let you know that he had taken such action as he could immediately after seeing you.

As instructed, I arrived in Washington this morning and came immediately to the Treasury.
TO Secretary Morgenthau  
FROM Mr. Cochran  

CONFIDENTIAL

The foreign exchange market was dull with a very small turnover in sterling transactions. In New York, sterling opened at 3.90-5/8 and the rate gradually moved upward to 3.91-1/4. It subsequently closed at 3.91.

Sales of spot sterling by the four reporting banks and the Federal Reserve Bank of New York totaled £185,000, from the following sources:

- By commercial concerns ........................................... £ 26,000
- By foreign banks (Europe and Far East) ........................ £ 107,000
- By Federal Reserve Bank of New York (for Norway) ........ £ 50,000
  Total .......................... £ 185,000

Purchases of spot sterling amounted to £ 40,000, as indicated below:

- By commercial concerns ........................................... £ 10,000
- By foreign banks (Europe) ......................................... £ 30,000
  Total .......................... £ 40,000

Cotton bills totaling £141,000, were sold to the British Control at the official rate of 4.02 by the following reporting banks:

- £ 85,000 by the Guaranty Trust Company
- £ 50,000 by the Chase National Bank
- £ 5,000 by the National City Bank
  £141,000 Total

The other important currencies closed as follows:

- French francs .......................... .0221-3/4
- Guilders ...................................... .5309
- Swiss francs ................................... .2242-1/2
- Belgian ...................................... .164-1/2
- Canadian dollars .......................... 13½ discount

We purchased the following amounts of gold from the earmarked accounts of the banks indicated:

- $10,000,000 from the Bank of France
- 140,000 from the National Bank of Belgium
- 75,000 from the National Bank of Nicaragua
  $10,215,000 Total
The State Department forwarded to us a cable sent by the American Legation at Cairo, Egypt, stating that the Comptoir National d'Escompte de Paris, acting for the Egyptian Government, shipped gold valued at $401,000 to Johnson Matthey & Co., New York. This shipment will be sold to the U. S. Assay Office at New York. It is interesting to note that this shipment is the first of its kind by the Egyptian Government which has come to our attention.
December 9, 1939.

MEMORANDUM

TO: Secretary Morgenthau
FROM: Mr. Gaston

The Bureau of Aeronautics of the Navy Department has informed Admiral Waesche's office that they have every reason to believe that the Lockheed No. 18 land plane ordered for the Coast Guard will be delivered by February 11, 1940, the delivery date fixed in the contract. Progress reports will be submitted every two weeks and the first of them is expected to come through in a day or two.
Gray

BERLIN

Dated December 9, 1939

Received 9:52 p.m.

Secretary of State

Washington

2292, December 9, 7 p.m.

Several Berlin papers this morning carried a despatch under a New York date line reporting that the British Government will set up a Canadian corporation in the United States to which will be turned over American securities acquired from British nationals. According to the despatch the Canadian corporation will not dispose of these securities on the American market but will use them as security for its own bond issues to the American public and is planning to issue up to one billion dollars of bonds so secured.

The BOERSENG ZEITUNG devotes its leading editorial to the alleged plan stating that it would constitute an evasion of the Johnson Act and an attempt to make the American public share in the financing of British and French war expenditures. In this connection it is to be noted that the December issue of the Journal of the Academy for German Law contains an article alleging that there are possibilities of the Neutrality Act forbidding loans
loans or sales of war materials on credit to warring governments or their agents. The writer asserts that such war materials may either be sold on credit to a private individual who thereupon could resell on credit to a warring government or credit can be given for the purchase of ordinary goods which can be sold by the foreign government and the proceeds used to purchase war materials.

Inform Treasury.

KIRK

HPD
H. E. Embassy

BERLIN

1057.

The Secretary of the Treasury desires that Heath come to Washington via Italy for a fortnight of consultations at the earliest date convenient to the Embassy and to Heath. Travel at Treasury expense by Italian steamship is authorized unless Manhattan or Washington available.

HULL

(GSM)
TREASURY DEPARTMENT

INTER OFFICE COMMUNICATION

DATE December 9, 1939
(Close)

TO Secretary Morgenthau

FROM W. H. Hadley

Government Security Market

The market today was unchanged on the average with a firm tone. The attached estimates indicate the various possible issues. The majority market opinion continues to favor a three-way offering. However, arguments for two-way offering are rather convincing. If only a two-way offering is made, it appears inadvisable to issue anything longer than a 2-1/4% bond. Such a bond would be about 12-14 years.
TREASURY DEPARTMENT
INTER OFFICE COMMUNICATION

TO  Secretary Morgenthau
FROM  W. H. Hadley

BOND ISSUES

<table>
<thead>
<tr>
<th>Coupon</th>
<th>Terms</th>
<th>Yield</th>
<th>Offering Price</th>
<th>Market Price</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1/2%</td>
<td>11%-%121/2% yrs. (9/15/51-53)</td>
<td>2.10</td>
<td>100</td>
<td>101.17</td>
<td>1 pt. 17/32</td>
</tr>
<tr>
<td></td>
<td>12-14 yrs. (12/15/51-53)</td>
<td>2.12</td>
<td>100</td>
<td>101.12</td>
<td>1 pt. 12/32</td>
</tr>
<tr>
<td></td>
<td>12-15 yrs. (12/15/51-54)</td>
<td>2.13</td>
<td>100</td>
<td>101.9</td>
<td>1 pt. 9/32</td>
</tr>
<tr>
<td>2-3/8%</td>
<td>13-16 yrs. (12/15/52-55)</td>
<td>2.20</td>
<td>100</td>
<td>101.31</td>
<td>1 pt. 31/32</td>
</tr>
<tr>
<td></td>
<td>13%-%16% yrs. (3/15/53-56)</td>
<td>2.22</td>
<td>100</td>
<td>101.24</td>
<td>1 pt. 24/32</td>
</tr>
<tr>
<td></td>
<td>13%-%161/2 yrs. (6/15/53-56)</td>
<td>2.24</td>
<td>100</td>
<td>101.25</td>
<td>1 pt. 25/32</td>
</tr>
<tr>
<td></td>
<td>13%-%17% yrs. (6/15/53-57)</td>
<td>2.26</td>
<td>100</td>
<td>101.17</td>
<td>1 pt. 17/32</td>
</tr>
<tr>
<td>2-1/2%</td>
<td>17-22 yrs. (12/15/56-61)</td>
<td>2.38</td>
<td>100</td>
<td>101.21</td>
<td>1 pt. 21/32</td>
</tr>
<tr>
<td></td>
<td>17%-%22% yrs. (3/15/57-62)</td>
<td>2.39</td>
<td>100</td>
<td>101.20</td>
<td>1 pt. 20/32</td>
</tr>
<tr>
<td></td>
<td>17%-%221/2 yrs. (6/15/57-62)</td>
<td>2.405</td>
<td>100</td>
<td>101.11</td>
<td>1 pt. 11/32</td>
</tr>
<tr>
<td></td>
<td>17%-%23% yrs. (9/15/57-61)</td>
<td>2.41</td>
<td>100</td>
<td>101.19</td>
<td>1 pt. 19/32</td>
</tr>
<tr>
<td></td>
<td>18-21 yrs. (12/15/57-60)</td>
<td>2.41</td>
<td>100</td>
<td>101.10</td>
<td>1 pt. 10/32</td>
</tr>
</tbody>
</table>

* Most Satisfactory Premiums.

Regraded Unclassified
TREASURY DEPARTMENT
INTER OFFICE COMMUNICATION

TO: Secretary Morgenthau
FROM: W. H. Hadley

DATE: December 9, 1939

TREASURY NOTES

<table>
<thead>
<tr>
<th>Coupon</th>
<th>Terms</th>
<th>Yield</th>
<th>Offering Price</th>
<th>Market Price</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>5 yrs.</td>
<td>0.76</td>
<td>100</td>
<td>101.5</td>
<td>1 pt. 5/32</td>
</tr>
<tr>
<td></td>
<td>(12/15/44)</td>
<td>0.80</td>
<td>100</td>
<td>101.</td>
<td>1 point</td>
</tr>
<tr>
<td></td>
<td>4 yrs. 9 mos.</td>
<td>0.73</td>
<td>100</td>
<td>101.8</td>
<td>1 pt. 8/32</td>
</tr>
<tr>
<td></td>
<td>(9/15/44)</td>
<td>0.77</td>
<td>100</td>
<td>101.1</td>
<td>1 pt. 1/32</td>
</tr>
<tr>
<td>1-1/8%</td>
<td>5 yrs.</td>
<td>0.76</td>
<td>100</td>
<td>101.26</td>
<td>1 pt. 26/32</td>
</tr>
<tr>
<td></td>
<td>(12/15/44)</td>
<td>0.80</td>
<td>100</td>
<td>101.19</td>
<td>1 pt. 19/32</td>
</tr>
</tbody>
</table>

RE-OPENING OUTSTANDING ISSUES

<table>
<thead>
<tr>
<th>Issue</th>
<th>Amount Outstanding (millions)</th>
<th>Present Price</th>
<th>Offering Price</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% Treas. notes (3/15/44)</td>
<td>$ 515</td>
<td>101.8</td>
<td>100</td>
<td>1 pt. 8/32</td>
</tr>
<tr>
<td>2% Treas. bonds (1948-50- New)</td>
<td>$ 571</td>
<td>101.27</td>
<td>100½</td>
<td>1 pt. 19/32</td>
</tr>
<tr>
<td>2-3/4% Treas. bonds (1956-59)</td>
<td>$ 982</td>
<td>105.9</td>
<td>104</td>
<td>1 pt. 9/32</td>
</tr>
<tr>
<td>2-3/4% Treas. bonds (1958-63)</td>
<td>$ 919</td>
<td>105.8</td>
<td>104</td>
<td>1 pt. 8/32</td>
</tr>
</tbody>
</table>