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THE OIL FIELDS OF UKRAINE

(THE UKRNEFT)

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THE OIL FIELDS OF UKRAINE

(THE UKRAINE).

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THE OIL FIELDS OF UKRAINE

(THE UKROEFT).

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THE OIL FIELDS OF UKRAINE

(THE JADOLET).

I. INTRODUCTION.

Ukraine, with its population of over 40,000,000 inhabitants and the territory reaching about 550,000 square kilometers, is second only to R.S.F.S.R. among the federal republics of the Soviet Union. If it occupies only 1/40 of the Soviet territory, about 1/5 of the total population of the U.S.S.R. is concentrated in this part of the Union.

The natural resources of Ukraine - the main producer of wheat and other cereals of the U.S.S.R. - include; rich coal mining district of Donetz, iron ore are, where manganese ore is also mined, of Krivoi Rog, and the oil-producing region of the Western Ukraine.

With an average annual production of over 86,000,000 tons of coal and an output of 9,700,000 tons of pig iron and of 8,900,000 tons of steel, the crude oil production of Ukraine reaches only some 350,000 tons per year, what is, naturally, far from satisfying the needs of the country. The Ukrainian economy depends, therefore, on the Caucasian oil, which is being transported by tankers from Batum and Tuapse to Odessa, Kherson, Berdiansk, and other ports of Southern Ukraine.

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Oil is being produced, so far, in Western Ukraine (Drogobych -Borislav and Stanislavov areas), and a small production is also being obtained at Romny [redacted] The total crude production is still very small in this part of the Soviet Union, and according to the post war Five Year Plan it should be of 325,000 tons in 1950; however, this target has been already exceeded in 1949, and now the pre-war figure (375,000 tons) is expected to be reached this year.

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The exploitation of the Ukrainian oil fields is being carried out by the Ukrneftedobycha organization (Ukrainian Oil Production) with the head office at Drogobych. The Ukrnefteperera-botka (Ukrainian Oil Refining) groups a number of various refining and cracking installations situated mainly at Drogobych [redacted] The Ukrnefterasvedka (Ukrainian Oil Exploration) has its centre at Lvov. The industrial exploitation of Natural gas ressources of the Western Ukraine is controlled by the Ukrneftegas organization.

Prior to the incorporation of the Western Ukraine into the U.S.S.R., the Soviets did not possess any oil fields of industrial importance within the limits of the Ukrainian S.S.R. All the efforts which were being made by the Soviet geologists in order to find a rich oil-producing area in Ukraine were, so far, unsuccessful, as the small Bomny field, which has been brought into production in 1940, did not justify earlier expectations, and still gives only a very small oil production of purely a local interest.

To remedy this unsatisfactory situation, the Soviets had undertaken investigations for petroleum in different localities of Central Ukraine. Despite the fact that, this exploration work was resumed since the end of the war in the most promising of these areas, no positive results were, as yet obtained by the Soviets in this part of the country.

Meanwhile, considerable efforts are also being made in view of a further development of the old oil fields of Western Ukraine [redacted] 50X1-HUM
In spite of an intensive geological and geophysical research work, which is being continued in a number of localities, situated in Eastern Carpathians (Western Ukraine), since 1946, no new discoveries of any importance were made in this region.

The development of the Natural gas production was also continued by the Soviets in the Western Ukraine.

The actual producing situation in the oil fields of the Western Ukraine shall be briefly examined in the Chapter II, (Western Ukraine) of the present study, whereas the industrial utilization of natural gas shall be described in the Chapter III(The Natural Gas Industry).

Regional Geology.

Geologically, the hilly country of the Eastern slopes of Carpathians is formed of well-developed saltbearing Miocene deposits. There formations, generally strike as a very complicated syster of folds, usually stiff and dipping at abrupt angles. The anticlinal uplifts of this tectonic line are separated one from another by narrow synclines, in which strata are broken into small and also well-determined folds, the last ones being frequently interrupted by unconformities of the overthrust or throw type. The above syster of folds is spread in the area of about 20 to 25 kilometers from the edge of Carpathians.

Powerful folding movements, coming from the Carpathians, had contributed to a very intensive dislocation of plastic rocks (clays and clayey shales of saltbearing formations) and to the smashing of hard rocks (sandstones), composing their interruption beds,- what had finally led to the appearance of breccias, which formed the dyapiric kernel of these anticlines.

Such a process produced in the thickness of Tertiary deposits of the Eastern slopes of Carpathians a well-expressed unconformity of dyapiric folds, which are also known in Rumania, where the folding movement took a more moderate form.

Well-developed Miocene formations - in some places over 1,500 meters thick,- which outcrop to the surface along the river beds, are predominent in this geological regions. Saltbearing rocks are composed of pressed saltbearing clays, in which debris of sandstones and gypsums are being encountered.

Above the saltbearing deposits are successively found: 1.Slobodsky conglomerates (partly absent); 2. Dobrotovsky Series and Stebnitsky Series (Sarmatian stage of Miocene).

Oil occurences, generally, correspond to Sarmatian (Upper Miocene) horizons in the Western Ukraine, whereas the underlying Oligocene, Eocene and Mesozoic formations have not as yet been tested in this region.

II. WESTERN UKRAINE.

The oil fields of Western Ukraine are situated in the Subcarpathian region, namely in Drogobych-Borislav and Stanislavov districts. This is a very old oil-producing region. Crude oil production was started in Eastern Galicia (Western Ukraine) as early as in the middle of the XIXth century, and the first refining installation was built here in 1853. The industrial exploitation of Bobrka field dates of 1860, whereas the Skhodnitz oil field has been brought in in 1895 and the Borislav producing area has been discovered in 1896.

A. PRODUCTION.

Crude oil production developed favourably in the Western Ukraine until 1909, when it reached a total of an order of 2,000,000 tons of oil per year, but it decreased to only about 1,400,000 tons in 1913. Further decline followed with a total production of 743,000 tons in 1928, whereas the yields of the

Carpathian oil fields did not exceed 375,000 tons in 1938. The gradual exhaustion of exploited horizons continued in this region, and, in spite of their efforts to increase the dwindling crude production of nine small oil fields of the Drogobych and Stanislav districts, the Soviets did not, so far, succeed in the development of this oil area, and the actual annual crude production of the Western Ukraine still remains at a very modest level of an order of 350,000 to 375,000 tons.

Nine small fields are now exploited in Western Ukraine, seven of which are located in the Drogobych-Borislav district and two in the Stanislavov district. These are: 1. Borislav; 2. Skhodnitza; 3. Tustanovitse; 4. Mraznitza; 5. Volianka; 6. Vankovo; 7. Charny; and 8. Mitkov; and 9. Rypne, respectively. Altogether 2,407 producing wells had been drilled in this oil region by the end of 1940.

1. Borislav oil fields.

To this group belong four small exploited fields, namely: 1. Borislav; 2. Tustanovitse; 3. Mraznitza; and 4. Volianka. At Borislav, which is the largest oil producing area of the Western Ukraine, and is located at a distance of 15 kilometers in the South-Western direction of the town of Drogobych (See the Map of the Oil Fields hereto attached), 815 producing wells were under exploitation late in 1940. The total yields of these fields varied from 18,000 to 20,000 tons of oil per month in 1940. During the same year twenty-four new wells had been completed and gave small industrial production.

Considerable numbers of temporarily suspended wells were brought back into production in 1940 and about 20 new exploitation wells were being drilled in 1941 in this area. Nevertheless the production quota for 1940 was not fulfilled in the oil fields of the Western Ukraine. This unsatisfactory situation was mainly due to the lack of modern technical equipment and to a very slow progress of drilling operations, which can be partly explained by the fact that churn drilling was still applied on a large scale in this region.

During the years of war the crude production was almost entirely suspended, and the reconstruction work was undertaken in this region since 1946. By the end of 1947 the normal exploitation of the Borislav oil fields was resumed and their yields began to increase.

Rotary drilling method replaced that of churn drilling, which had been predominent earlier in this area. Turbine drilling is also being gradually introduced into the oil fields of Western Ukraine. Production methods are, generally, being developed in accordance of modern technique, and technical equipment is being supplied now by the specialised Soviet oil machinery works.

The average depth of producing wells does not exceed in the Borislav fields some 1,000 meters; but test drilling is continued to deeper lying Series (Tortonian stage of Miocene). Test wells are being drilled to a depth of 1,500 to 2,000 meters at Borislav.

2. Skhodnitza field.

The Skhodnitza oil field, which has been discovered in 1895 and for a number of years remained the leading oil producing area in the Eastern Carpathians, is located at a distance of 17 kilometers to the South-East of the town of Borislav.

As the most part of the oil fields of this region, Skhodnitza is being gradually exhausted; and at the present time the Soviets are making efforts in order to find new oilbearing horizons in the deposits underlying the exploited thickness. Deep drilling operations were undertaken at Skhodnitza since 1947, but no new discoveries of any importance were, as yet, reported from this area. The average depth of producing wells is under 1,000 meters. To remedy the decline of yields, secondary methods of exploitation are being applied in this field.

3. Charna field.

This field is lying in 45 kilometers to the West of the town of Borislav. At Charna, as well as in other small oil fields of the Western Ukraine, the crude production was limited to a few thousand tons per month. Test drilling was carried out in this locality in 1947, when industrial quantities of oil were obtained from a small depth. A few wells, which have been completed in the vicinity of the old wells Nos 35 and 39, gave an initial yield of up to 30 tons of oil per well and per day. Exploitation drilling is being continued in the Charny field, and test drilling was started in the area situated at a distance of 10- 15 kilometers in the North-Western direction of Charny, where oil seepages are being encountered.

Rypne Field.

4. This small oil field is located in the Stanislavov district at a distance of about 40 kilometers in the South-Western direction of the town of Stanislavov. Industrial accumulation of oil has been discovered in this area at a depth of 320 meters in 1946, and the new field has been put on regular production in 1947. Contour drilling was continued at Rypne in 1948. Small crude production is now being obtained in this area, where deep test drilling is also being carried out in a few localities adjacent to Rypne.

5. Bitkov field.

At Bitkov also lying in the Stanislavov district ir some 25 kilometers to the South-East from Rypne, drilling operations were undertaken since 1947 with the purpose to increase the depths of producing wells, which heretofore did not exceed 2/3 of their planned footage. The most part of these wells are now being exploited by means of deep pumps and individual pumping-jacks. The equipment of exploited wells with modern machinery resulted in a slight improvement of the producing situation at Bitkov. Secondary exploitation methods, such as gas injection, for instance, are also being applied in this field. Test drilling is being carried out in the vicinity of the actually exploited area.

6. Secondary Exploitation Methods.

In order to intensify the crude production in old oil fields of the Western Ukraine, which are being gradually exhausted, the Soviets technicians are employing secondary exploitation methods on a wide scale. Thus, the injection of air was being carried out in five oil fields of this region during the years 1947-1948. At Skhodnitza over 20,000 cubic meters of air are being pumped daily, what brought a small increase of yields in this area.

At Borislav, in an area where 2 injection and 9 exploitation wells were operating, about 3,500 cubic meters of air were being pumped daily, with the result that the yields of small area increased by 1,137 tons in 1947. In other three fields the injection of air gave but insignificant results and bore rather an experimental character.

Altogether, about 10,000,000 cubic meters of air have been pumped in a number of injection wells spudded in in various oil fields of the Ukrneft in 1947. In addition, about 40,000

cubic meters of gas were also daily injected in Western Ukraine during the same period.

These modest results are explained by the inadequacy in the number of injection wells, which are scattered over large areas. Special compressor stations were built at Skhodnitsa and Borislav in 1948, and a further extension of the secondary methods of exploitation was continued.

A new installation for secondary production was designed by a Soviet constructor, Zakharov; it was experimented with success in the oil fields of the Western Ukraine. The industrial utilization of the new installation in the fields of the Ukrneft, as well as in the other oil regions of the U.S.S.R., is expected. Very satisfactory results were obtained with this unit in the waterless areas and with viscuous crude.

b. Explorations Areas of the Western Ukraine.

In view of the continuous exhaustion of the old oil fields of the Ukrneft and the failure to obtain during the last four years (1946-1949) any considerable increase of crude production in Carpathians, the Soviets, apparently, concentrate their efforts on the research for oil in new areas, lying within the belt of saltbearing formations. Geological and geophysical study of deep structural tectonics and the exploration for anticlinal folds of the Borislav type is being carried out in a number of areas (Volja Blazhennaya, Monostyretz, Strelbische etc.).

In addition test drilling to the deeper lying structures is being continued within the limits of the oil producing areas of Borislav, Skhodnitsa and Rypne, as well as in the adjoining localities of Mazuevitza, Maniava, Lomiarki, Nebylov and others.

Furthermore, deep test wells (of an order of 2,000 to 2,500 meters) are under drilling at Dashava, Kalush, and Opary for the purpose of exploring for oil the strata underlying the gasbearing formations of these areas. The research work seems to present a special interest in the zone where saltbearing Miocene deposits are strongly developed, and where gas and oil surface seepages are being encountered. In the opinion of the Soviet geologists the existence of saltbearing structures - similar to those of Rumania - may be discovered within this belt of formations.

Finally, test drilling was undertaken at Dolina and Mitkov in order to determine the connection between the oil occurrences of the upper layers and those of the deeper striking horizons in these areas. At Starynia, located at a distance of 12 kilometers in the Northern direction of the Mitkov oil field, the existence of an anticlinal fold was discovered by means of geophysical method. This anticline extends along over six kilometers in the valley of the Starynia river. Oil shows were met in test wells which were drilled in this area in 1948. Oil seepages were also found in a water well located in a ravine adjacent to Starynia. [redacted] the Starynia area appears to be very promising for oil research. Geological exploration work and test drilling is being continued here since 1947. 50X1-HUM

Geological and geophysical investigations for new oil-bearing structures in the area where Tortonian layers (Miocene) are well developed and where folds are, generally, gently sloping, were undertaken. A powerful gas gusher was obtained from a well drilled to Tortonian deposits in the Uzerskaya area. This discovery seems to be of a particular interest, as Tortonian horizons contain rich gas accumulations at Dashava and Opary, situated to the South of Uzarskaya.

Notwithstanding these intensive investigations for petroleum, the Soviets did not succeed, so far, in discovering "the Big Ukrainian Oil" in Carpathians. Although, deep test drilling - to depth in some cases exceeding 2,000 meters - is being continued in various exploration areas of this region. [redacted] the progress of the research work was heretofore much delayed in view of the lack of modern drilling equipment in Western Ukraine, where churn drilling was the usually employed method until very recently. However, with the gradual substitution of rotary drilling practice to that of churn drilling, and the introduction of turbine drilling, it is believed that the search for new oil areas would progress more satisfactorily in the future, as the average speed of test drilling has almost trebled in 1949 as compared with 1946. 50X1-HUM

If the exploration for petroleum did not result in any important discoveries since the end of the war in the Western Ukraine, the Soviets were more successful in the development of the exploitation of the natural gas resources of Carpathians.

III. THE NATURAL GAS INDUSTRY.

Great efforts are being made by the Soviets in order to develop the exploitation of the natural gas ressources of the country, and thus to remedy the relatively slow increase of crude oil production in the U.S.S.R. Indeed, the demand of domestic consumption for various petroleum products grows much quicker than the output of these products in the home market. According to the fourth Five-Year-Plan (1946-1950) the production of natural gas should reach in the Soviet Union a total of 8,400,000,000 cubic meters in 1950.

Western Ukraine possesses rich natural gas ressources: the gas reserves of Eastern Carpathians were estimated in 1940 to be of an order of 17,500,000,000 cubic meters (in Drogobych and Stanislavov districts). Natural gas is being now produced in a number of exploited oil fields of the Ukrneft, including Borislav, where 177 gas wells were operating in 1940; Bitkov, and other fields. Before the war about 145,000,000 cubic meters of gas were produced in Western Ukraine, and the Soviets planned to obtain up to 900,000,000 cubic meters of natural gas in 1940. The Borislav gas contains 20 grammes of gasoline per cubic meter.

The main gasbearing areas of Eastern Carpathians are the following: 1. Dashava; 2. Opary; 3. Kalush; and 4. Kossov [redacted] 50X1-HUM

1. Dashava.

At Dashava, situated at a distance of 38 kilometers to the East of the town of Drogobych, an intensive industrial exploitation of natural gas ressources was started by the Soviets after the second world war, when they have laid a gas pipe-line about 470 kilometers long for the purpose of supplying the capital of Ukraine- the city of Kiev - with gas fuel. The construction of this pipe-line has been completed in November 1948. Following the laying of Dashava-Kiev gas pipe-line, 51 industrial plants of Kiev have been equipped during 1949 to use natural gas for fuel. In addition, over 70,000 Kiev flats are now using natural combustible gas. [redacted] 50X1-HUM [redacted] the supply of the Kiev industry and municipal services with natural gas resulted in an economy of 2,000,000 tons of fuel in 1949. 50X1-HUM

The exploitation of the Dashava-Kiev gas pipe-line also led to an increase in the number of motor vehicles converted to run on gas fuel in the Ukraine. Gas filling service stations were opened in Kiev, Zhitomir, Tarnopol and Drogobych. The serial output of converters was organised in view of further equipment of motor vehicles. The services of the municipal natural gas supply are being extended in the city of Kiev to a considerable number of houses and flats. The exploitation of the Dashava-Kiev gas pipe-line resulted also in an important reduction of the number of freight cars used for the transportation of the Donets coal to Kiev. The supply of natural gas from the Western Ukraine to a number of other important urban centres of Ukraine is being planned.

Another gas pipe-line, about 65 kilometers long, links Dashava with the city of Lvov, where industrial works and factories use natural combustible gas and a considerable number of flats and houses are being supplied with gas by the municipal gas service.

2. Opary.

This gas-producing area is located in 18 kilometers to the North-East of the town of Drogobych,- the refining centre of the Western Ukraine,- The natural gas ressources of Opary seem to be not so rich as those of Dashava. A gas pipe-line conveys Opary natural gas to Drogobych, where it is being used for fuel in local refineries, cracking plants and other industrial entreprises. From Drogobych this gas pipe-line was extended to the town of Borislav, situated in the middle of the oilproducing district. The Opary-Drogobych-Borislav gas pipe-line has been completed in 1940.

3. Kalush area.

Strong gas shows were known since a long time in this area, which is lying at a distance of 26 kilometers in the North-Western direction of the district town of Stanislavov.

However, the industrial exploitation of the natural gas ressources of the Kalush area still remains in its initial phase.

4. Kossov area.

In the locality of Kossov, situated in 56 kilometers to the West of the town of Chernovitsy, natural gas seepages are also frequently encountered. Exploration work was organised

at Kossov in 1947, in order to establish the industrial importance of this gasbearing area, but, so far, no industrial exploitation was started at Kossov.

5. Other Gasbearing Areas.

In addition to the four above described areas, natural gas shows are being encountered in a number of localities of Western Ukraine, where research for oil and gas is being carried out since 1946. Thus, for instance, at Uzerskaya and at Nebylov gas indications were discovered during drilling operations. Potentially, the entire 350 kilometers-long zone, extending in the North-Eastern slopes of Carpathians along the course of the Dniestr river, is believed by the Soviet geologists to be gasbearing. Naturally, under the Soviet conditions, a long period of time would be necessary in order to develop the industrial exploitation of natural gas ressources in new areas of Eastern Carpathians.

IV. CENTRAL UKRAINE.

There is hardly any other region of the Soviet Union where the exploitation of a new oil-producing area could be organized more rapidly and more profitably than in Central Ukraine. Transport conditions are satisfactory; there are large power stations in the Donetz basin and at Dnieprogess; a large part of the Soviet drilling, lifting and refining equipment is being manufactured in the Ukrainian metallurgical works (at Nikopol, Dniepropetrovsk, Makeyevka, Zhdanov (ex-Mariupol), etc.); finally there is an adaquate supply of skilled labour. On the other hand, Ukraine is an important consumer of light petroleum products in the Soviet Union, namely: bensine, tractor fuel, kerosene, as well as of lubricating oils, so that the bulk of the new production could be easily absorbed by the local market.

In this way all the transportation problems, which are elsewhere the principle obstacle standing in the way of the rapid development of the Soviet oil undustry, would not arise at all in Ukraine.

The Soviet geologists started geophysical and geological research work in Central Ukraine only in 1935-1936 in order to explore the oil possibilities of this vast region.

Geologically, all of the Central Ukraine to the East of the Dniepr river, i.e., the Southern part of the province of Chernigov, the province of Poltava, the province of Sumy, the province of Dniepropetrovsk, forms a large belt of Lower Tertiary deposits, whereas in the South-East (Eastern part of the Dniepropetrovsk province and the provinces of Stalino and Voroshilovgrad) the Lower Tertiary belt is adjoined by a Carboniferous basin,- the well known Donets coal basin,- which is the largest centre of coal production in the U.S.S.R.

The deeper stratigraphy and the tectonics of the Lower Tertiary belt are almost unknown, first because they never attracted much attention, and secondly because, in view of the topography of this region, such a study was almost impossible by means of ordinary geology.

Geophysical exploration of the Ukrainian Salt-Domes.

First geophysical research work in Central Ukraine was organized in connection with the study of the Western extension of the Ural-Emba salt-dome region. It is generally known that, in the Emba river basin oil accumulations are being encountered in the flanks of Permian salt-domes, usually in Cretaceous formations. Previously it was expected that these salt-domes do not extend farther West than the Ural river, but recently a considerable number of salt-domes were discovefed by means of geophysical methods in the region situated between the Ural and Volga rivers, and even on the right (Western) bank of Volga. It may be assumed that this region of Permian salt-domes could extend farther West - reaching into Central Ukraine.

In the light of the foregoing, the discovery of some gypsum outcrops in the vicinity of the town of Romny (province of Sumy) acquired a special interest. Later on, while drilling for water, rock-salt was found at a depth of only 60 meters in the same area. Soon after this (1935) gravimetrical study was organized in various localities of the Central Ukraine. This geophysical research work led to the discovery of several strongly marked negative anomalies, particularly in the districts of Romny, Lubny, Krasnograd and Borispol [redacted] However, in th[redacted]

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Donetz basin, in the region of Carboniferous formations, only positive anomalies were discovered. In the Ural-Emba region negative anomalies usually indicate the presence of buried masses of salt, and, therefore, the Soviet geologists interpret the negative anomalies in Central Ukraine as also being connected with salt-domes. If this hypothesis proves to be correct, drilling on a large scale could be started in this part of the Soviet Union.

Up to the present time drilling was carried out in several localities, namely: Romny district (Province of Sumy); Lubny district (province of Poltava); Dmitrievka (Chernigov province); etc.

1. Romny area.

Geophysical exploration work which was started in this area in 1935, resulted in the discovery of a large salt-dome (Gora Zolotukha), located at a distance of about 15 kilometers of the town of Romny. First test well was spudded in in this area in 1935, and it was located to the crestal part of the domal uplift. It did not give, however, any definite results and was abandoned for technical reasons. Four more wells were drilled here in 1936, all of which were located on the edges of the salt contour, with the purpose to determine the stratigraphy and tectonic structure of this area. Oil indications were encountered, in November 1936, in the well No.1-AN, when it entered a horizon of clayey breccia, which was the cap rock lying immediately above the salt. Test drilling was continued at Romny in 1937, when test well No.2, located near the well No3-R, yielded from a depth of 457 meters a small quantity of oil (1,946 kilogrammes); and continued to give during the following days about 1.2 ton of crude per day. This crude has a specific gravity of 0.954 at 20°C.

Geological research work and test drilling operations were continued in this area and a considerable number of structures had been discovered between 1938 and 1948 by means of geophysical methods. Altogether 32 structures were found in the vicinity of the town of Romny, and 19 more structures - in the areas adjoining the Donets basin. More than one hundred shallow test wells had been drilled in the Romny districts up to 1948; most part of these wells reached but small depths, but a small number of them reached formations over 2,000 meters deep.

Two deep test wells - Nos; 1-R and 2-R- did not encounter any oil shows, in spite of the fact that they have reached depths of 1,307 and 1,408 meters respectively in the Carboniferous deposits. After these negative results, new test wells were spudded in nearer to the first shallow wells, which had yielded small quantities of oil earlier.

Several wells which had been completed at Romny during 1939 and 1940, gave small yields of oil. Insignificant crude production was thus obtained in the Romny area in 1939. Deep test drilling operations were continued to a number of salt-domes situated in this district (Kremennaya, Yusemskaya, etc.) The average depth of test wells , which had been drilled in this general area in 1940 reached between 1,400 and 1,500 meters. Small quantities of crude were, generally, obtained from these wells. Thus, test well No.12 gave, for instance, within first five days an initial yield of about 30 tons of oil. In December 1940 first oil flow was obtained in the Romny area when the well No.14 gave an initial crude production of about 100 tons. Five exploitation wells were put on regular production at Romny in 1941. Well No.9 encountered an oilbearing layer at a depth of 1,153 meters. Small industrial exploitation was started here in 1940, when a group of Baku and Grozny technicians and skilled workmen arrived to Romny in order to organize the production in the new field.

Wells Nos. 15 and 18, which were completed in this field in 1940, also gave small yields of oil. These last two wells are located in the immediate vicinity of Gora Zolotukha (Zolotukha mountain).

Interrupted by the war in 1941, the development of the Romny oil-producing area was resumed since 1946; a systematic study of geological material obtained by the exploration work of several structures, which had been discovered before the war in the Romny district, was started.

Oil occurences, generally, coincide with the disjunctive faults in places where these crevices are being crossed by wells. Thus, for example, oil indications were met in the test well No.3-R at a depth of 990 meters, whereas a disjoncture was found at a depth of 970 meters; in the well No.13-R

two oil showings, at depths of 710 and 980 meters were discovered, and two disjonctures were found in the same well at 700 and 950 meters depth respectively? Three oil indications were met - at 600,660 and 700 meters depths, respectively- in the well No.6-R, and a disjoncture was encountered at a depth of 585 meters, which unconformity passed almost parallely and very near to this well. But in the wells Nos. 1-R and 2-R neither oil shows, nor tectonics faults were ever met.

Further exploration work is bein; continued in the Romny area, where small industrial exploitation was resumed since the end of the war and the completion of the reconstruction of the destroyed installations. Although the Romny crude is being produced from Carboniferous deposits, it is believed that it seems to be of a secondary origing and that oil occurrences originate from collectors formed by lenvices resulting from tectonic unconformities and, therefore, possibly, this crude may be of a Devonian origin.

2. Sumy area.

In the Sumy district, adjoining that of Romny, oil seepages were discovered in March 1941 in the vicinity of the village of Talalayevo. Two shallow test wells were spudded in at Talalayevo, but drilling operations had to be suspended soon in this locality due to the beginning of the war. Geophysical research work was resumed here in 1946, and contour drilling was also undertaken in order to determine the limits of the Talalayevo structure, situated in the Yaroshevo fold . Test drilling operations were continued in this area, but, no definite results were as yet obtained at Talalayevo. Test drilling was also started to the Glinsky domal structure, located in the same area, and which has been discovered by means of geophysical methods in 1946.

3. Lubny area.

In the Lubny district of the province of Poltava, adjacent to that of Sumy, the presence of a salt-dome has been discovered in the vicinity of the village of Issachky. This discovery seemed to be of a particular interest, because this area is one of the very few places in Ukraine, where surface oil seepages have been encountered. Indeed, in the

neighbourhood of this village some limestone outcrops were discovered, which on examination proved to be covered with a bituminous substance. After the drilling of a few geological holes, deep test drilling was started in the Lubny area, in the vicinity of the maximum point of gravity, which has been established by means of variometric survey. However, these deep test drilling operations, which were carried out at Issachky in 1940 and 1941, did not give any definite results before the war. Exploration work was resumed in this area since 1947.

At Baiserovo, a locality situated in the Lubny district, a domal structure was discovered by means of geophysics, and deep test drilling was organized since 1946, but, besides some small bituminous showings, no positive results were, so far, obtained.

4. Chernigov district.

Investigations for petroleum are also being carried out in Chernigov district, where shallow test drilling was undertaken in the vicinity of the village of Gaivoron. In a number ofareas of this region outcrops of combustible shales have been observed in ravines and along river banks. Apparently, these shales are of Mesozoic age, although a more accurate determination has not yet been made. Analyses of these shales are being made and the entire region is to undergo a thorough geological examination.

The existence of a large geological structure has been discovered in 1939 near the village of Dmitrievka, where deep test drilling was started in 1940. In September 1939 a gas gusher was obtained from the shallow test well No.6, which was drilled in the immediate vicinity of Dmitrievka. Ten deep test wells had been under drilling in this area in 1940 and 1941; some bituminous showings were encountered in a few of these wells, but no definite results were obtained at Dmitrievka before the war. Research work was resumed in the Chernigov region since 1947.

5. Melitopol area.

Numerous natural seepages of combustible gas exist in the vicinity of the town of Melitopol in the Southern Ukraine (province of Kherson), located on the main railway line connecting Ukraine with Crimean peninsula. This is a region , where.....

where Upper Tertiary deposits are strongly developed, but in all probability the gas comes from lower lying Mesozoic formations. Some of these gas seepages are being utilized for heating and illuminating purposes in the town of Melitopol, but this exploitation is still carried on on a limited scale.

Geophysical and geological exploration work was undertaken in this area, but no interesting discoveries were as yet made at Melitopol. Investigations for petroleum are being continued in this locality.

6. Other Exploration Areas of Central Ukraine.

Geophysical and geological research work and test drilling operations were resumed since 1946-1947 in a number of localities all situated within the so-called Western half of the Dniepr Donetz geosyncline. Contour drilling of deep "limit wells" was undertaken for the first time in this region. One of these wells, which was completed in the vicinity of the town of Putivl, situated in the Northern part of the province of Sumy, has met at a depth of 942 meters crystallic rocks, without having crossed any Devonian formations. Another of these wells has been completed in the Starobelsk area, lying in the Eastern part of the province of Kharkov. Some oil shows were encountered in this well at a depth of 447 meters and some gas indications at depth of 379 and 388 meters. Salt water was obtained in a well, which has been drilled near the railway station Millerovo (Voroshilovgrad province) at depths of 260 and 550 meters, whereas gas showings were found at depths of 270 and 555 meters in the same well.

Thus, salt water, gas and oil occurrences can be considered as a regional phenomenon. All the above-mentioned salt water-gas-oil indications apparently correspond to pre-Carboniferous, probably Devonian, formations.

The existence of coal deposits in the Donetz basin, at Romny and at Raiserovo (Lubny district), and, consequently, over the entire territory of the Dniepr-Donetz geosyncline, as well as that of either direct or indirect oil occurrences, authorizes to formulate the problem of "The Dniepr-Donetz oil and coal basin".

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[redacted] as to the oil occu- 50X1-HUM
rrence, three types of areas are being encountered in this vast region, namely: 1. Definitely oilbearing; 2. Probably oilbearing; and 3. Possibly oilbearing. To the first group belong the areas where direct oil occurences were discoverd; into the second category are comprised the areas, which are located within the limits of the determined domal structures; and, finally, into the category of possible oil areas should be included all the remaining areas lying within the contour line of the productive Middle Carboniferous thickness, in the North, and within the Northern edge of the Donets basin in the South, and further to the West following the contour line of Lower Carboniferous formations.

The Northern limit of the possible oilbearing area is determined by the deep contour wells, which have been drilled: to the North of the town of Starobelsk (province of Kharkov) and in the vicinity of the town of Putivl (province of Sumy), where no Devonian deposits were encountered, whereas the Southern limit of this territory is less definite.

[redacted] necessity of 50X1-HUM
a complex study of Carboniferous and Devonian strata, [redacted] 50X1-HUM
potentially coal and oil-bearing. [redacted] also reccomend a de- 50X1-HUM
tailed test of these deposits by means of deep wells and deep mines. Naturally, the investigations of this importance would require a considerable period of time, and it is too early, for the time being, to anticipate as to their possible results. The very fact, however, of such search for petroleum to be undertaken on a large regional scale should be pointed out as another proof of an intensified exploration work which is being carried out now by the Soviets in the Central Ukraine.

7. Donets Basin.

Whereas in Central Ukraine oil possibilities are connected with Permian salt-domes or with structures of younger Mesozoic (Cretaceous) and Tertiary (Miocene) formations, in the Donets basin, which as mentioned above is a Carboniferous basin, oil occurences were hitherto encountered either a. in Middle and Lower Carboniferous deposits, which contain several. . .

horisons of porous dolomitic limestones suitable for the accumulation of oil, or in Cambrian formations, which seem to contain several rather thick sand horisons. At the present time, geophysical investigations are proceeding in various parts of the Donetz basin in an attempt to find favourable structures for the further exploration work for petroleum, particularly in the Voroshilovgrad area, where during the drilling of a water well some oil and gas shows were observed.

V. CRUDE OIL RESERVES OF UKRAINE.

[redacted] the potential crude oil reserves of the oilbearing areas situated within the limits of Western Ukraine are still of a considerable importance, and it is generally believed that with the progress of deep test drilling the exploitation of these possible reserves may eventually change the whole producing situation of this region. The actual crude reserves situation is estimated to be as follows:-

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CRUDE OIL RESERVES OF THE UKRAINIAN OIL AREAS.
(In Metric Tons).

Area.	Proven.	Semi-Proven.	Probable.	Possible.	Total.
Central Ukraine.					
Romny, etc.	50,000 -	100,000-	400,000-	2,000,000-	2,550,000
Western Ukraine.					
Borislav and Stanislavov areas	650,000 -	1,500,000-	12,000,000-	110,000,000-	124,150,000
Grand Total Ukraine:-	700,000-	1,600,000-	12,400,000-	112,000,000-	126,700,000

It should be pointed out, however, that the high figure of the possible reserves of Western Ukraine seems to be rather too optimistic, in view of the fact that the exhaustion of the old producing fields of Eastern Carpathians continues for the last thirty years and, for the time being, no new prolific oil areas were discovered in this region. The figure of 110 million tons of possible reserves can be considered as far from being accurate, but ought to be taken as an estimate of purely potential reserves of Western Ukraine. The hypothesis of the existence in this area of large crude reserves, made by the Soviet geologists, with the progress of deep test drilling, would be, either justified, or completely abandoned by them.

VI. REFINING.

A. Western Ukraine.

The refining installations of the Western Ukraine are all situated at Drogobych, where the Soviets have established the offices of the Ukrneftepererabotka (Ukrainian Oil Refining) Altogether, 25 small refining and cracking units were found by the Soviets at Drogobych in 1939, when they have occupied the Western Ukraine (formerly belonging to Poland). Only 9 of these units, all grouped now into the above-mentioned refining organization, are of some importance; these include the following refineries: a. ex-"Polmin"; ex-"Galicia"; ex-"Naphta"; and ex-"Dross"; the largest of these units has an intake capacity of 500 tons.*) The total intake capacity of Western Ukrainian refining installations exceeds 1,000,000 tons per annum, but they are now operating at less than one half of their general capacity, what is due to the gradual exhaustion of oil fields in this region.

The average annual refinery runs of the Galician refineries (including the crude production of Western Galicia, which remained under the jurisdiction of the Polish Government) were of an order of 500,000 tons before the war. The yields of various petroleum products were as follows in 1939:

Products.		Metric Tons.
Petrol	-	100,000.
Kerosene	-	141,000.
Gas Oil	-	92,000.
Lubricating Oils	-	47,000.
Paraffin	-	22,000.
Other Products	-	57,000

Since 1940 the Soviets began the re-construction of the small Drogobych refineries, a considerable number of which were very old and possessed an obsolete equipment. After the end of the war, the modernization of these refining installations was continued. Several units of old type were dismantled; new units of Soviet design were substituted for them. Small refineris were regrouped around the largest plants existing in this area.

Measures were also taken towards the increase of storage capacity in the fields, construction of local field pipe-lines, the improvement of the transportation facilities, etc..

*). Per day/

B. Central Ukraine.

As regards the Central Ukraine, no refining installations were constructed there by the Soviets for the obvious reason that, so far, no industrial crude oil production of any importance is taking place in this part of the country.

Following cracking plants have been erected, however, in the ports of the Southern Ukraine by the Soviets. These units operate on the Baku or Grosny fuel oil which is being transported by tankers from Batum and Tuapse to Odessa, Kherson and Berdiansk

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UKRAINIAN CRACKING PLANTS.

Location.	Type of Unit.	Daily Cracking Capacity (In barrels of 42 U.S. Gallons)	Date of Construction
Odessa	1 cracking plant (Soviet design)	5,250-	1938/46 *).
Kherson	1 cracking plant (Soviet design)	5,250-	1938/46.*).
Berdiansk	1 cracking plant (Soviet design)	5,250-	1938/46.*).
Total cracking daily capacity: 15,750 bbls.			

*). Reconstructed after the war.

C. Pipe-Lines.

1. Grozny-Lissichansk Pipe-Line for Transportation of Tractor Motor Fuel and Kerosene.

The construction of this pipe-line has been completed by the Soviets in 1939 for the purpose of pumping of the Grosny tractor motor fuel and kerosene to the Ukrainian and Rostov districts for domestic consumption. At the first stage of its construction only the middle section of this pipe-line was laid, namely from Armavir to Trudovaia via Rostov, and therefore the tractor fuel was being transported from Grosny to Armavir by railway. Here the kerosene was stored and then pumped into the pipe-line to Trudovaia, whence it was again transported by rail. Some of this tractor motor fuel is transported only so far as Rostov and Bataisk, where it is delivered to the local M.T.S. (machinery-tractor agricultural stations), and other consumers.

Below are given a few particulars regarding this pipe-line:

Annual capacity: - 1,540,000 tons.
Total length: - 796 kilometers.
(Grozny-Lissichansk)
Pipe-line diameter: - 12 inches.
Date of completion: - 1939.
Pumping stations: - There are three main pumping stations at Grozny, Armavir and Rostov and several minor pumping stations. The Armavir station is equipped with 5 plunging pumps connected with Diesel engines of 400 H.P. each. The Rostov station has only 2 groups with the same pumps and Diesel engines.

With the beginning of the operation of this pipe-line the Soviets have achieved a considerable improvement of the transport conditions on the North-Caucasian and Ukrainian railway system, which are already overloaded with freight traffic, such as Coal of the Donets basin, row materials and manufactured goods coming from a great number of industrial plants existing in this part of the country.

Over 1,600,000 tons of tractor fuel and kerosene are supplied now to the agricultural areas of Central Ukraine and Rostov region by means of this pipe-line, what makes 160,000 tanker-cars available for other destinations every year.

According to the original scheme, the Grozny-Lissichansk pipe-line should have been extended to the city of Kharkov (Northern Ukraine), but this plan was not, so far, carried out by the Soviets, what is, probably, due to the decline of the Grozny crude production between 1936 and 1946. With the reconstruction of the oil fields in the Grozny area, however, followed by a steady increase of their yields, a further extension of this pipe-line could be undertaken in a near future.

VII. GENERAL SUMMARY AND CONCLUSIONS.

The small oil fields of the Western Ukraine (Borislav and Stanislavov districts), which are being gradually exhausted, after a long exploitation - in some cases of over 50 years -, present but a limited interest. For the time being there are no indications that, this oil region could be eventually developed into an important oil-producing base for

the entire Ukraine.

In spite of considerable efforts made by the Soviets in order to discover new oil fields in this part of the country, they failed to do so, and investigations for petroleum in Western Ukraine did not give any important results. A moderate increase of crude oil production may be expected in Western Ukraine, due to the modernization of exploitation methods and drilling, and to the practice of secondary production methods, such as gas-lift, air-lift, etc..

As regards the industrial exploitation of the natural gas resources in Carpathians, it is being developed satisfactorily, and the construction of the gas pipe-line Dashava-Kiev led to a considerable economy of fuel. In addition to the Kiev industrial plants, those of Lvov have also been equipped to use natural gas from Dashava, whereas the Drogobych refineries operate on Opary natural gas. A further extension of natural gas utilisation for industrial purposes and by the municipal services is under way in a number of oth other Ukrainian towns, such as Zhitomir, Stanislav, Tarnopol, etc..

Since the end of the second world war exploration work was resumed in Central Ukraine, where geological and geophysical investigations are being carried out in various areas, namely: Romny, Lubny, Sumy, Starobelsk, Putivl, Melitopol, etc.. Up to the present, however, small oil production is being obtained only in the Romny area, and no definite results were as yet achieved in any other district of Central Ukraine. In a general way, a very slow progress of geological research work in this region should be pointed out, what is mainly due to an insufficient study of the regional geology and the complexity of its tectonic structure.

Exploration work is being continued by the Soviets in Central Ukraine and in the Donets basin in the light of a theory, formulated by the Soviet geologists, according to which the Dniepr-Donets geosyncline should be considered as a "Dniepr-Donets oil-coal basin". This hypothesis is based on the fact that, besides the Donets basin, coal deposits are also found in the Romny and Reizerovo (Lubny district) areas, whereas oil shows are being encountered in various localities of this territory.

Naturally, the research work at such a large scale would necessitate a more or less long period of time, and, therefore, it is too early to make any reasonable forecasts about its possible results.

Ukraine is a great consumer of various petroleum products (tractor motor fuel, kerosene, petrol, gas oil, lubricating oils, etc.) Crude produced in the small fields of Western Ukraine is being treated in the Drogobych refineries, which are working now less than at one half of their intake capacity. For the major part of her domestic oil consumption, however, Ukraine is dependent on Caucasian oil, which is transported by tankers from Batum and Tuapse to Odessa, Kherson, and Kerdianak, where the local cracking plants are operating on Baku and Grozny residual fuel oil, or by means of pipe-line Grozny Armavir-Rostov-Lissichansk.

With the continuous development of the Ukrainian industry the problem of oil transportation is one of its difficulties, as the railway network of the country is already overloaded with the traffic of coal, row materials and manufactured goods. To remedy this situation, efforts are being made now in view of an intensification of transportation by waterways. New canals are under construction, the river beds are being deepened in some sections of their course; river tankers are under construction and new storage capacities are being built in various industrial centres of Ukraine.

Summing up the preceding brief study of the oil industry in Ukraine, the following facts should be emphasised: 1. Crude production in the Carpathian oil fields is unlikely to undergo a substantial modification in the immediate future; most probably it would be maintained at its actual level of 350,000 to 400,000 tons per annum.

Certainly, the discovery of a new oil-producing area within the limits of the Central Ukraine, where geophysical and geological investigations for petroleum are being continued on rather a large scale, would have changed the whole oil supply situation. However, it is doubtful that, such a new discovery could exercise its influence during the few coming years, as under the Soviet conditions the bringing into production of new oil-fields usually takes considerable periods of time.

An intensified development of the Natural gas industry industry in Ukraine (gasbearing areas of Dashava, Opary, Kalush and Kossov in Carpathians) should be especially emphasized, as it contributes to at least a local solution of the fuel problem in the parts of the country lying far away from the Donetz coal basin, such as Kiev and other industrial centres of the right bank of the Dniepr river. The exploration for new gas-bearing areas may lead to an increase of the known natural gas resources of Western Ukraine.

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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

REPORT

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DATE DISTR. 21 April 1951

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1. As a result of recent political moves undertaken by the Yugoslav regime in the field of foreign policy, it is apparent that a rapprochement of any kind between Moscow and Belgrade is totally impossible. Since this is so, the time is now ripe to seek major political and economic concessions of a democratic cast from the Belgrade Government. The only serious obstacle to further reforms is the strong opposition to Tito by Cominform supporters. However, it will be necessary to determine what type of concessions could be obtained at this time.

2. The following conditions could be made with the offer of a loan of $200,000,000:

Rearmament of the Yugoslav Army

Reorganization of the Army

Abolition of political controls within the Army

Abolition of direct and indirect compulsion to join workers' collectives.

Establishment of peasant trade cooperatives according to the West European model.

Recognition of small private trade enterprises

Recognition of small private business enterprises dealing with small consumer items.

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Accordance of full and real religious freedom to churches, but not the right of political influence.

Unrestricted rights for Yugoslav citizens to leave and return to Yugoslavia.

Each one of the above concessions, once achieved, should be sanctioned by law.

The Yugoslav constitution is very liberal, but also flexible, and the Communists find no difficulty in rendering interpretations to justify their political ends. It would be of great importance if a detailed annotation could be added as an integral part of the Constitution, containing the precise interpretation of each individual constitutional promulgation. Such an annotation or comment to the Constitution should be written by a political commission made up of non-Communist members with democratic leanings.

3. Membership of Yugoslavia in the European Union and the Atlantic Pact.

The Minister of Foreign Affairs will have to be persuaded that Yugoslavia's present political attitude (cf. the speech of Kardelj on the occasion of the budgetary debate during the latter part of 1950) is very fine in theory, but that it does not correspond to the serious international situation of the present day. He will have to be persuaded that Yugoslavia must side with the West on all issues, an attitude which will fully and definitely guarantee her independence and sovereignty. An open armed attack against Yugoslavia is most unlikely without the existence of a powerful and secure Cominform group in Yugoslavia upon which Moscow could depend. Tito's frequent warnings against the danger of attack by the neighboring satellite countries are merely a political maneuver by Belgrade for acquisition of material aid and political support.

4. There are two important factors to be borne in mind when formulating an estimate of the Yugoslav foreign political situation. The first factor is that Belgrade has long secretly hoped to make peace with Moscow, providing an agreement could be reached which would maintain her political prestige, regardless of Moscow's economic aspirations toward Belgrade.

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5. If no radical changes in Yugoslav internal policy are introduced by Belgrade, it would not then be necessary to approve a large loan to Yugoslavia. Any loan, providing conditions for it are favorable

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A loan would alleviate the situation of the Yugoslav peasant, and liberate him from the heavy burdens which he can hardly bear at present. It would also fortify Yugoslavia's military potential

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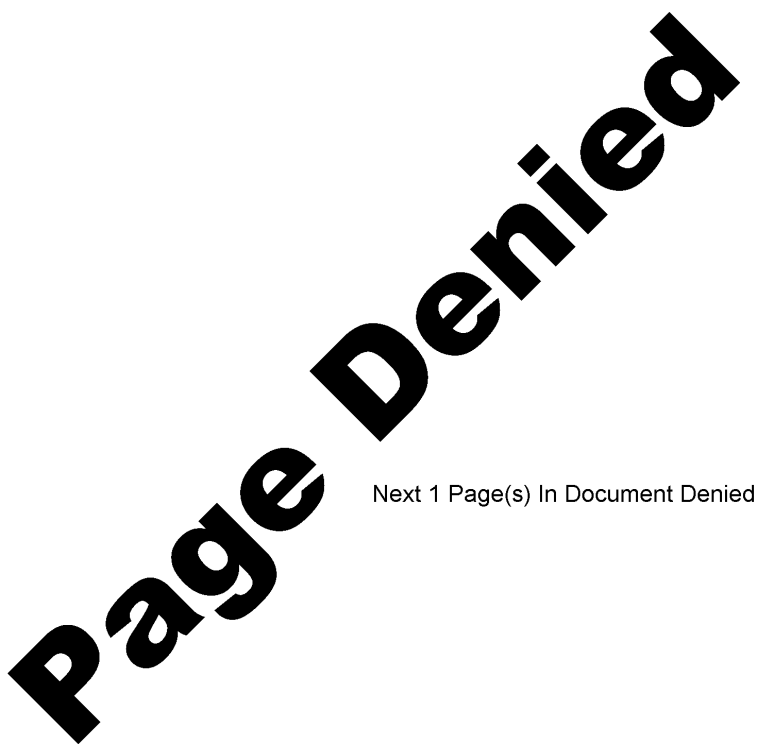

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