INTELLIGENCE FORM NO. 51-61 MAY 1949

CLASSIFICATION SECRET/CONTROL-US OFFICIALS ONLY

50X1-HUM

CENTRAL INTELLIGENCE AGENCY

REPORT

INFORMATION REPORT

CD NO.

COUNTRY USSR

DATE DISTR. 17 Sept. 1951

50X1-HUM

SUBJECT The Oil Fields of Sakhalin Island

NO. OF PAGES 1

PLACE ACQUIRED

NO. OF ENCLS. 1 (LISTED BELOW)

DATE ACQUIRED

SUPPLEMENT TO REPORT NO.

50X1-HUM

THIS IS UNEVALUATED INFORMATION

50X1-HUM

50X1-HUM

CLASSIFICATION SECRET/CONTROL-US OFFICIALS ONLY

STATE		NAVY		NSRB		DISTRIBUTION						

THE OIL FIELDS OF SAKHALIN.

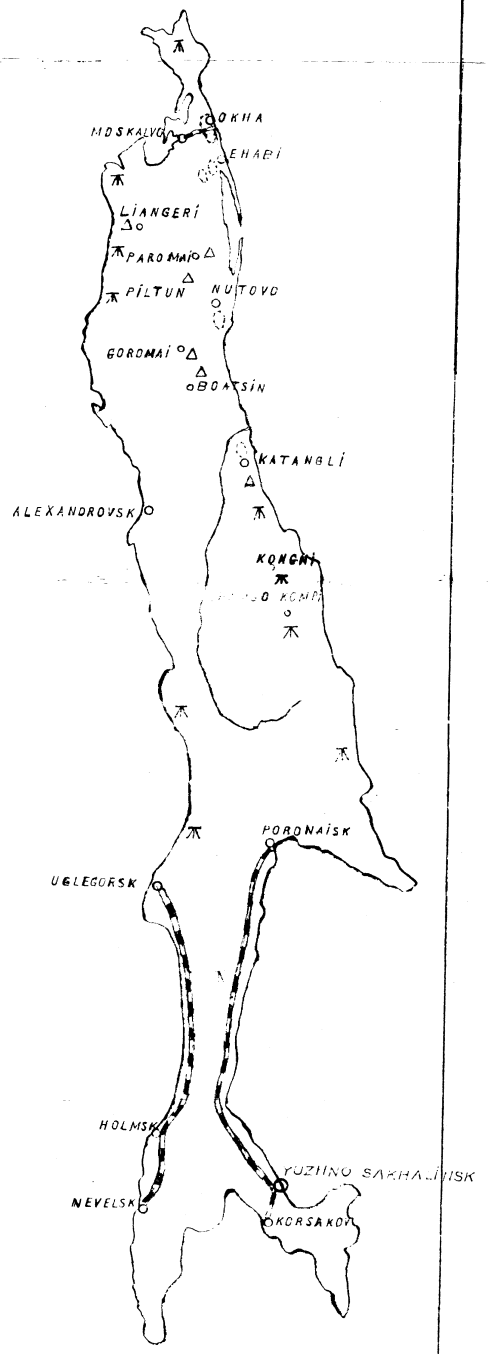
SCALE.

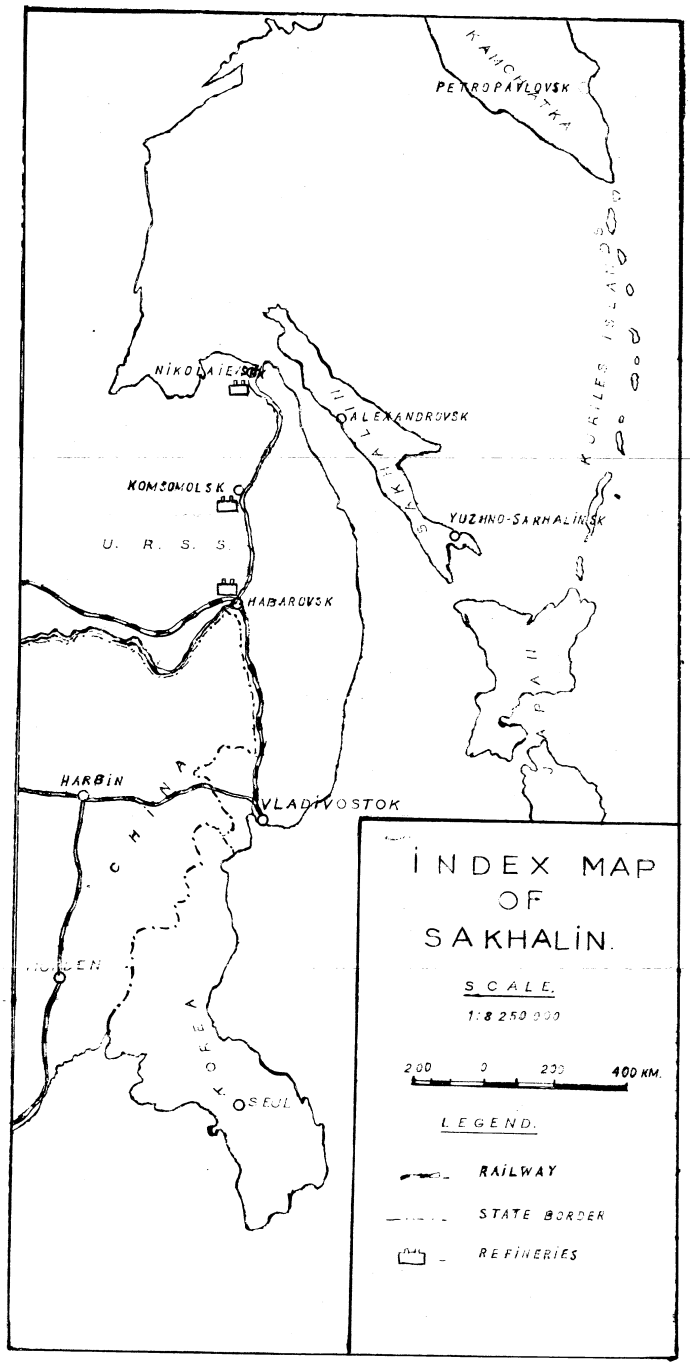
1 : 2,000,000.

0 20 40 60 80 100KM.

LEGEND.

- RAILWAY
- OIL FIELD
- EXPLORATION AREA
- GEOPHYSICAL SURVEY





50X1-HUM

Next 1 Page(s) In Document Denied

THE OIL FIELDS OF THE SAKHALIN ISLAND.

(THE DALNEFT).

INDEX OF CONTENTS.

* * *

50X1-HUM

SECRET CONTROL U. S. OFFICIALS ONLY

THE OIL FIELDS OF THE SAKHALIN ISLAND.

I. INTRODUCTION.

The Sakhalin Island is lying in the Sea of Okhotsk between 54° and 46° of Northern Lattitude and is separated from the Eastern coast of Siberia by a channel from 15 to 120 kilometers wide. The Island itself is about 960 kilometers long and extends in longitudinal direction (See the Index map of Sakhalin attached to the present report). Mountain ridges strike along the Island, the Northern part of which is a wild country with a cold climate, whereas the climatic conditions of its Southern part are milder, what makes the valleys of Southern Sakhalin suitable for agriculture.

The communications between Sakhalin and the Siberian mainland are maintained by ship, from Vladivostok to Alexandrovsk and other ports, or from Nikolaievsk on Amur to Moscalvo (240 kilometers) by schooner , and from Moscalvo by a local railway line (30 kilometers) to the Okha oil field.

In the Southern part of Sakhalin two railway lines run along the Western coast (between Nevelsk in the South and Uglegorsk in the North) and on the Eastern coast (between Korsakov in the South and Poronaisk in the North - See Map of The Oil Fields of Sakhalin hereto attached).

Coal, oil and gold are the principal mineral ressources exploited in Sakhalin. In addition timber, paper and fish preserves are produced in the Island.

Russians started the colonization of Sakhalin in the beginning of the XIXth century. After the Russo-Japanese war of 1904-1905 the Southern half of the Island, up to the 50th parallel, was annexed by Japan. The Soviets have recovered it in 1945 in accordance with the terms of the Yalta agreement.

Since 1925 the Soviets began the development of the Northern part of Sakhalin, the population of which gradually increased to almost 100,000 inhabitants in 1939, due to the arrival of new settlers from the Siberian continent. Oil production and coal mining was organized, while the exploitation of timber industry and fisheries was intensified to a considerable extent.

After the second world war the Soviets began to colonize the Southern part of Sakhalin, which with a great number of new immigrants became the main centre of fisheries and fish preserves factories in the Soviet Far East. The town of Yuzhno-Sakhalinsk, situated in the extreme South of the Island, is the

administrative centre of the Sakhalin province of the U.S.S.R.

Industrial exploitation of the oil ressources of Northern Sakhalin started in 1928, when first wells had been put on regular production in the Okha area (See the Map of Sakhalin hereto attached). Subsequently four other oil fields were discovered by the Soviets in the Northern part of the Island and had been gradually brought into production. These area: Ehabi field which has been brought in in 1936; Katangli field, put on regular production since 1940; Eastern Ehabi field, exploited since 1947, and Nutovo field, which has been brought into production in 1945.

All these oil producing fields are controlled by the Soviet Dalneft (Far Oil) organization, with the head office at Habarovsk on the Siberian mainland. The Dalneft also exploits the refineries and cracking plants at Habarovsk, Nikolaievsk on Amur and Komsomolsk (See the Index map of Sakhalin attached to this report).

According to the scheme of "complex regional development," the Soviets make efforts to create in the Far East quite an autonomous self-supporting oil producing and refining organization; hence the intensification of the crude production's development in Sakhalin in order that this production may satisfy all the requirements of the Soviet Far East home market. At present the Far Eastern refining centres possess the intake capacities (for detail see the paragraph Refining of the present report) sufficient to treat the total amount of crude produced in the Sakhalin oil fields, whereas between 1935 and 1939 large quantities of this crude remained unrefined, and were, either exported, stored in earthen pits in the fields, or even used as fuel, as the Habarovsk refinery - sole operating during that period - had an intake capacity inadequate to deal with all the crude oil produced in Sakhalin.

The normal development of this remote oil region is, naturally, rendered especially difficult due to an insufficient study of its geology, the general wilderness of the country, where roads are very scarce, the lack of modern technical equipment, various materials, accomodation for technicians and workmen, etc.

Despite considerable delays in progress of geological research work and of drilling operations, as well as a number of other shortcomings, inavoidable under the Soviet conditions, the Sakhalin oil fields continued to increase their crude production since 1940, and particularly with the bringing into production

of the new oil fields of Eastern Ehabi, Katangli and Nutovo . Nevertheless, the Dalneft union did not fulfill the plan quotas in 1949, and its general operation was less satisfactory than that of the most part of the other Soviet Eastern oil producing regions.

A brief analysis of the producing situation's development in the Sakhalin Island since the beginning of the exploitation of its oil fields can be found in chapter II."Production and Exploration" of the present study. The progress of investigations for petroleum in a number of exploration areas of Sakhalin is discribed in the chapter III."Exploration Areas".

General Geology.

Recent deposits are represented in the Sakhalin Island by fluvial alluvial strata, which are well developed in valleys and in river and mountain spring beds. Alluvial formations are, generally, of a great variety in this region; in the vicinity of mountain ridges they are represented by plates and flat stones and Tertiary sandstones. More ancient alluvial deposits form sand terraces of river basins. These sands are characterized by irregular diagonal succession of layers interrupted by various pebble beds, and considerable quantity of organic sediments are mixed with sand and pebble layers. Pit deposits, striking over large areas in the Western coastal plain part of the Island, form another type of recent strata. Marine terraces and sand beaches extend along the coastal line of Sakhalin.

Quarternary Post-Pliocene deposits are strongly developed in the central part of the Island, where they cover a wide area of plains, and they also occupy large surfaces in the coastal zones, thus forming six ancient marine terraces. Post-Pliocene formations are composed of shallow water coastal deposits, mostly of various sand beds, such as large grained sands, pebbles, and a small proportion of clays of different colouring.

Tertiary deposits outcrop to the surface in the lowest parts of the country, such as washed off terraces. These strata form the top parts of the Eastern and Western ridges of the Island. Tertiary formations can be subdivided into a number of Series: a soft shale series strikes at the bottom of the Tertiary thickness of Sakhalin. The stratigraphic section of Tertiary deposits is given in the following table: -

STRATIGRAPHIC SECTION OF EASTERN SAKHALIN.

Group, System, Series, Stage.	Corresponding in Europe to.	Thicknees (In Meters).	Lithology.	Oil Occurence.
RECENT.	P a r t l y a b s e n t.			
QUARTERNARY.				
Post-Pliocene. Liadvo stage. Nutovo stage.	Astian stage.	1,000 1,000-1,200	Various grained quartz sands, interrupted by limey sandstones & clays.	Secondary oil showings (of Tertiary origine).
TERTIARY.				
Pliocene.				
Upper Series.				
Ehabi Stage	Piachenso stage	600-800	Large grained sands with rich fauna	Some oil indications (heavy oil).
Okobikay stage	Meotis stage Sarmatian stage	600,1,000	Soft sandy grey and dark grey clays with sand and sandstone interruption bads	Up to 16 oil-bearing horizons. Main oil producing series of the Northern Sakhalin.
Lower Series.				
Daghi stage.	Lower Sarmatian & Torlonian stages	1,000 -1,300	Various sands, clayey soft sandstones, marine sandstones, clays.	Coals up to 2 meters thick
Miocene.				
Lower Series.				
Attao stage	Helvetian & Aquitanian stages	300-400	Predominent large grained sands & sandstones	Nil.
Oligocene.				
"Soft Shales Series"	Monterey	About 400	Clayeey shales with limey interruption beds	Oil shows.

Note: - At Okha, the horizons I,IV,V,VII, VIII, X, XI, XII, XIII, XIV and XV of the Okobikay stage (Upper Pliocene Series) are oilbearing. The layers III,VII and XIII yield the main crude production in the Northern Sakhalin (oil fields of Okah, Ehabi, Katangli, Eastern Ehabi, and Nutovo).

Tectonics.

The central part of the Sakhalin Island,is formed of a large buried structure, which strikes from the North to the South, sloping to an average level of 1,000 to 1,500 meters in comparison with the Eastern folds. Transversal interruption faults are

encountered in the Island, and they are responsible for the section of the Northern Sakhalin into three parts: The Northern uplifted one (Schmidt peninsula); the middle - the sunken one; and the Southern - again uplifted.

Recent formations strikes in horizontal direction, whereas the Quarternary Post-Pliocene strata strike transgressively under sloping angles of up to 5°. The similarity of lithological composition of Tertiary deposits and the poverty of their fauna, as well as an insufficient outcropping of strata handicap the study of their exact tectonics.

Tectonic lines of Sakhalin are, generally, following the North- South direction; this can also be said about disjonctive dislocations. The crestal parts of the Western and the Eastern ridges represent the areas of the major tectonic uplifts. A number folds, which extend along the Eastern and the Western coasts of Sakhalin, strike in this general direction. Geological investigation of ten of these folds was undertaken in the Eastern coastal zone, and - of eight other on the Western coast

Oil Occurence.

Surface oil seepages are encountered along the entire Eastern coast line of Sakhalin; they correspond, for the most part, to the Okobikay stage of the Opper Plioeene Series, and seldom - to the Ehabi stage (Upper Pliocene), and Nutovo stage (Post-Pliocene). These oil seepages are found under the form of asphaltic matter or tar-oil accumulations in the so-called "asphaltic lakes".

The oil seepages of the Western coast of Sakhalin are less frequent, in the Liageri area, for instance, than in the Eastem part of the Island.

Investigations for Petroleum in Sakhalin.

First geological prospecting of the Sakhalin Island was started by Russians late un XIXth century. Two test wells were drilled in the Okha area in 1892; one of these wells reached a depth of 92 meters, but gave no positive results. In 1898, oil indications were discovered in a well, which was drilled at Nutovo to a depth of 76 meters. Further exploration work had been carried by a British company at Boatsin. Up to 1917 nine test wells had been completed in the Island to a maximum depth of 285 meters.

Geological surveying of Sakhalin was started in 1907 by the Geological Committee; but was far from being completed at the outbreak of the Russian revolution of 1917. In 1918 the Northern part of the Island was occupied by Japanese, who started test drilling in a number of localities on the Eastern coast of Sakhalin. The industrial importance of the Okha field (See Map of the Sakhalin oil fields hereto attached) has been established in 1923. The Japanese have evacuated the Northern half of the Island in 1925. The Soviet oil technicians have brought into production first fourteen wells at Okha in 1928, and since this period the industrial exploitation of the Sakhalin petroleum ressources began.

II. PRODUCTION AND EXPLORATION.

The total cumulative production of the Northern Sakhalin oil region since the beginning of operations to the end of 1949 reached about 8,787,000 tons.

The development of the producing situation in the Sakhalin oil fields is shown in the following table:-

CRUDE OIL PRODUCTION OF SAKHALIN.

Year.	Metric Tons.	% of production in comparison with total Soviet crude oil production.
1928	17,600	0.13%
1929	74,700	0.43%
1930	95,100	0.46%
1931	133,700	0.60%
1932	182,900	0.85%
1933	196,400	0.91%
1934	241,800	0.99%
1935	239,300	0.94%
1936	308,000	1.08%
1937	327,300	1.14%
1938	343,000	1.15%
1939	412,500	1.33%
1940	472,000	1.45%
1941-44	1,750,000 */.	-
1945	560,000 */	2.70%
1946	617,000 */.	2.69%
1947	735,000*/	2.70%
1948	807,000 */.	2.61%
1949	944,000 */.	2.67 %

*/. Our best estimates.

A relatively slow development of the crude production in the oil fields of Sakhalin was due to the small average yeilds of the exploitation wells in this region, on one hand, and also to the particular difficulties enccuntered by the Soviet technicians in this wild and remote country, where drilling operations are being much hampered by climatic conditions and various short comings of technical character.

At present five oil fields are exploited by the Dalneft in the Northern Sakhalin, namely: 1. Okha; 2. Ehabi; 3. Katangli; 4. Eastern Ehabi; and 5. Nutovo. The progress of research for oil in these fields is described below.

1. Okha field.

,This oil field is located on the Eastern coast of the extreme Northern part of Sakhalin (See Map of the Sakhalin oil fields attached to this report).

Stratigraphy.

The exploited area of the Okha field is lying in the uplifted part of the anticlinal fold, which has been discovered in this locality by means of geological study. In the Western flank of the Okha anticlinal uplift the Nutovo (Post Pliocene) and the Ehabi (Upper Pliocene) Series are encountered, whereas its crestal part is formed of Okha Series, corresponding to the Okobikay stage of the Upper Pliocene deposits. The general thickness of explôited strata reaches over 770 meters, and it can be subdivided into four horizons, composed of several oilbearing layers each.

Horizon I. (Cassidulina), which is about 200 meters thick, is mainly composed of grey and blueish clays with frequent interruption beds of sands, and four sand layers interrupted by hard limey sandstones. The third sand layer is characterized by the presence of large grained sands. Large grains of quartz dark rocks and carbon rests are found in sands.

Horizon II. This horizon generally contains five sand layers; one of which, Layer IV sometimes reaches a thickness of 70 meters. These sands are usually small or middle grained. The total thickness of this horizon reaches 250 meters, icluding almost 100 meters of clayey strata/ Layers 5,6;7 are constant as to their thickness, but their composition changes, so that small, middle and large grained sands are found here.

Horizon III (Uvegerina).

The lower section of the Okha Series begins with this horizon characterized by a predomination of strong dark clays; sands encountered in these clays are, generally, small grained and form insignificant beds. Three layers were determined within this horizon: -layers : XI,XII, and XIII, all of which are characterized by the modification of quartz grains, considerable content of clayey parts, and a general inconstanty of their nature. The general thickness of the horizon III exceeds 230 meters.

Horizon IV (Cyclamina).

The layer XIV is the only layer of this horizon which is composed of large grained sands, all the others being formed of clays The deposits of this horizon, judging by the character of their clays, can be classified as lagunae formations. The exact nature of the microfauna of the lower section of the productive thickness (layers XV and XVI) was not yet determined.

Tectonics.

The Okha structure forms a brachy-anticline striking in almost the meredianal direction. The Western flank of this fold id gently sloping, whereas the Eastern one is dipping at a more stiff angle. A number of diagonal faults interrupt the structure from the South-West to the North-East. The surfaces of throws dip at angles up to 60°. The Western flank of the fold is sloping at an angle of 13°, and the Eastern is plunging at an angle of up to 80°.

Oil Occurence.

Oil indications are encountered at Okha in the Lower section of the Ehabi stage (Upper Pliocene Series), where two oilbearing layers were discovered. However, the main oil producing horizons correspond to Okobikai stage of Upper Pliocene. The lithological composition of oilbearing strata change according to their horizontal extension or their depth. Throws and other faults exercise their influence over the nature of industrial accumulations of oil.

The following layers are being exploited at Okha: layers III, IV, V, VII, VIII, X, XI, XII, XIII, XIV and XV, but the principal commercial yields are being obtained from layers III, VII and XIII Altogether, sixteen oilbearing layers were discovered in the Okobikai stage of the Upper Pliocene Series in this area, at depths

varying from 600 to 1,000 meters.

The average initial daily yields of the wells which had been drilled to the layers III varied from 2 to 20 tons of oil per well; of those drilled to horizon VII reached up to 20 tons per well, while flowing production was obtained from a few wells, which were completed to layer XIII;- thus, for instance, an initial daily oil flow of 500 tons was yielded by the well No.4/22, which was drilled to layer XIIIbis in 1934. The general thickness of oilbearing horizons - including those belonging to the Ehabi stage of Upper Pliocene Series - is estimated to reach about 1,300 meters.

The layer VII is considered as the most prolific at Okha. Good initial average yields are also obtained from layers XIII bis and XIV. Gas indications are encountered in layers XI, XII and XIII.

Exploration.

In spite of the fact that the existence of oil occurences in the Eastern part of Sakhalin was known since a long time, the exploration of the Okha area started only in 1920, when the Japanese spudded in first test wells in this locality. The preliminary geological investigations were carried out almost entirely by the Japanese, who have obtained at Okha first commercial quantities of oil in 1923 (1,252 tons), and thus have established the industrial importance of this oil area.

The Soviets utilized these discoveries in order to organize their own crude production in the Island, after the withdrawal of the Japanese in 1925. First group of Soviets technicians arrived ~~to~~ in Okha in 1928, when fourteen exploitation wells were put on regular production and a total crude production of 17,600 tons was obtained.

Further exploitation of the Okha oil field was, naturally, hampered by the remoteness and inaccesibility of this area, but despite all the prevailing difficulties, the Soviets managed to develop the production during the following few years. Thus, 133,700 tons were produced and 57 wells were under exploitation at Okha in 1931, whereas in 1934 the total crude production of the Okha field reached 241,800 tons with about 150 exploited wells.

Until 1936 Okha was the only oil field of the Eastern part of Northern Sakhalin where the industrial exploitation was organized by the Soviets, but in 1936 interesting results were obtained .....

in the Ehabi area (see next paragraph). In October 1936 well No 30/9 was brought in with an initial flowing production of about 200 tons per day. Subsequently, early in 1937 another well algo gave flowing production from a depth of 602 meters. Contour test drilling was continued at Okha in 1937 and 1938, and a number of wells which had been completed there during this period permitted to extend the exploited area of this field.

Production of the Okha oil field continued to increase in 1939 and 1940, when it reached about 360,000 tons per annum. The average daily production, however, continued to decrease following the exhaustion of the initial oil flows, and it did not exceed from 4.8 to 5.3 tons per producing well before the war. In result of a number of successful completion the exploited area of this field was extended in the Southern direction in 1940, and it reached about 4 1/2 kilometers in length and over 1 1/2 kilometers in width.

The progress of exploitation drilling was much delayed at Okha due to frequent accidents and to the special technical difficulties caused by the complicated tectonics of the Okha geological structure.

To remedy a rapid exhaustion of flowing wells, secondary methods of exploitation are being applied at Okha since 1947, where a certain intensification of yields was obtained during the last three years by means of gas injection into the crestal parts of the oilbearing layers.

2. Ehabi oil fields.

The Ehabi area is situated at a distance of about 15 kilometers in the Southern direction of the Okha field, and to the West of the Ehabi bay (See Map of the Oil fields of Sakhalin attached to the present report).

Two anticlinal folds were discovered in this area by means of geophysical methods. Geological exploration work was started at Ehabi by the Japanese, who organized test drilling operation in this locality since 1923, but no definite results were obtained at Ehabi under the Japanese occupation.

A. Western Ehabi.

The Western Ehabi anticline forms an assymetric fold with a sloping large dome composed of a section of Ehabi Series (Upper Pliocene). The axis of the uplift dips in its Southern part at an angle of 10°; the crestal part of the structure is

up to two kilometers wide. Test well No.1 has met in this fold three sand layers, from 5 to 7 meters thick each, with oil indications. At a depth of 800 meters a fourth oilbearing horizon- about 10 meetrs thick - was discovered. Well No.1 has crossed at a depth of 600 meters layer XIV of the Okobikai stage (Upper Pliocene Series), which yielded an initial oil flow of about 250 tons per day under a pressure of 5 atmospheres. A number of gasbearing layers were discovered above layer XIV. Thus, the industrial importance of the Western Ehabi anticline has been determined in 1936. Test well No.2 reached at a depth of 608 meters horizon XVI of the Okobikai stage (Upper Pliocene), also crossed several gasbearing horizons, and found oil indications in sand interruption beds corresponding to those which were discovered by the well No.1.

The Ehabi oil field has been brought into production in 1936/37 and continued to be developed satisfactorily since that time. The wells completed in this area in 1940 gave on the average initial yields of some 50 tons per day and per well. However, in this field also the initial oil flows, generally, discontinued very soon, and the average daily production dropped to an order of 5 to 10 tons. Contour drilling was continued at Ehabi with the purpose to establish the extent of the oilbearing area. Large quantities of crude were stored during the period of 1937-1940 in earthen pits, due to the lack of storage capacities and the difficiency of this new field's installations, such as local pipe-lines, reservoirs, etc. The situation has improved since 1940, however, with the completion of new refineries at Nikolaievsk on Amur and Komsomolsk able to treat the entire crude produced at Ehabi and in other fields of Sakhalin.

Crude production continued to increase in the Western Ehabi, but its development was somewhat hampered for various political and strategical reasons during the period 1940 - 1945. In spite of a generally satisfactory producing situation at Ehabi, a considerable number of wells were temporary suspended in this field, what also delayed the normal development of this new oil producing area.

B. Eastern Ehabi.

The Eastern anticline of Ehabi is stiffly uplifted and is interrupted by a longitudinal throw along which Okobikai

and Ehabi Series are brought into contact with sands belonging to Nutovo stage (Post-Pliocene). Surface oil seepages were frequently discovered in the central part of this fold, and - to a lesser degree - in its Northern part. In the Southern part of the anticline, which is separated from the rest of it by a fault following the axis of the structure, the flanks dip at angles varying from 30 to 40°, so that the fold becomes more symetrical,- oil occurence are insignificant.

Test drilling, which had been carried out in the Central and Northern parts of the Eastern Ehabi structure, did not give any positive results. Some oil indications were found, however, between 1934 and 1936. Well No.1 reached a depth of 823 meters and crossed Okobikai sand-clayey strata about 450 meters thick. Oil was discovered at a depth of 660-678 meters, and the average daily yields of up to 20 tons per well were initially obtained in this area.

Further exploration work was continued at Eastern Ehabi between 1937 and 1940, but drilling operations were progressing with an extreme slowness, what could be explained by an insufficient study of the local tectonics. However, the industrial importance of this oil area was established only in 1946, and the Eastern Ehabi field has been put on regular production in 1947.

With the end of the second world war, the development of the Ehabi producing area was resumed and several new oil-bearing horizons belonging to the Okobikai and Ehabi stages of the Upper Pliocene Series were discovered in these fields.

A number of new successful completions achived at Ehabi in 1947 and 1948 led to a further extension of the exploited area of the Western field, while the industrial importance of the Eastern Ehabi area was definitely confirmed. Contour drilling was continued in this last field during 1948 and 1949.

3. Katangli field.

Katangli area is lying at a distance of about 220 kilometers in the Southern direction of the Okha field. Three anticlinal uplifts striking in the South-Eastern direction were discovered in this area: the most Eastern fold, which is divided into two separate uflifts, the Northern, located

in the lower course of the Noglik river and the Southern, situated in the basin of the Katangli river. The Katangli fold is symetrical; in its crestal part Okobikai Series outcrop to the surface. The fold is dipping at angles varying from 15° to 30°; the South-Eastern part is sloping at an angle of 1- 2°, whereas the angle at which the North-Eastern part of the fold is plunging reaches 10 to 12°. Oil occurences are connected with the lower section of the Okobikai stage (Upper Pliocene Series) and the upper horizons of the Daghi stage (Lower Pliocene Series).

Test drilling operations were started at Katangli in 1932, and first oil indications were obtained in the South-Eastern part of the Katangli structure in 1934. The existence of two oilbearing layers has been determined, namely "K_1" and "K_2", both belonging to the upper horizons of the Daghi stage. The average depth of the oilbearing strata is about 200 meters, and the average initial daily yields vary in this area from 5 to 10 tons per well.

Sixteen wells were completed at Katangli between 1935 and 1938, and small crude production had been obtained in this area since 1936, but the new field could not be put on regular production for years, due to a number of technical reasons, such as the lack of an adequate technical equipment, accomodation for technicians and workmen, very slow progress of drilling, poor conditions of roads etc.,- difficulties usual under the Soviet operation of new fields, especially in remote wild regions. The Katangli oil field has been definitely brought in in 1940.

Test drilling had also been carried out in the Nabil area, and oil indications were obtained in well No.1 at a depth of 51 meters. The oilbearing sands correspond here to Horizon "K" of the Daghi stage (Lower Pliocene Series). Drilling operations were discontinued following some accidents. Exploration work was resumed in this locality since 1947, but, so far, no definite results were achieved.

4. Nutovo field.

The Nutovo field is located in about 85 kilometers to the South of Ehabi (See the Map of Sakhalin). Surface oil seepages were frequently encountered at Nutovo. An anticlinal structure was discovered here by means of geophysical methods; this

fold is dipping at angles varying from 55° to 65°, and in its Eastern flank the anticline is plunging at an angle of 90°. The crestal part of the anticline is formed of the Okobikai stage of the Upper Pliocene Series. Asphaltic lakes are found in the Nutovo river valley. A few test wells had been drilled in this locality during the period of 1935-1937, but no positive results were obtained then, and further drilling operations were discontinued. Test drilling was resumed at Nutovo in 1946 and industrial quantities of oil were discovered in the Okobikay horizons in 1946 and 1947, when this new oil field has been brought into production.

III. THE EXPLORATION AREAS OF SAKHALIN.

Geophysical and geological research work was carried out for a number of years in various districts of Sakhalin. Several structures favourable for oil accumulation were discovered by the Soviet geologists in the Eastern part of Northern Sakhalin. Among these can be mentioned the following areas: 1.Paramai; 2. Kadulanyi; 3. Piltun; 4. Gorowai; 5.Boatsin; 6.Konghi; and 7.Chamgu-Nompi. We shall briefly examine the progress of investigations for oil in the above-mentioned localities, proceeding from North to South as follows:

1. Paramai- Kadylanyi.

This exploration area is lying in about 65 kilometers to the South of the Ehabi oil field. Geological section of this area is composed of Recent, Post-Pliocene and Tertiary deposits Tertiary formations can be subdivided into four powerful thicknesses: 1. Upper-Nutovo Series (Post-Pliocene); 2. Nutovo-Series, which are up to 2,000 meters thick; 3. Ehabi stage of Upper Pliocene (about 800 meters thick); and 4. Okobikai stage - 250 meters thick (Upper Pliocene).

A well determined large anticlinal fold was discovered in this area; the Western flank of this anticline is interrupted by faults, whereas the Eastern flank is well developed. The Southern part of its axis is displaced in the Western direction and forms a number of wide throws; some unconformities are also found in the Western part of the axis. Okobikay deposits outcrop in the crestal part of the structure; these strata are followed by the Ehabi and Nutovo Series, which strike along the axis.

In the Eastern flank of the anticline, the Ehabi strata

dip at angles varying from 45 to 50°, whereas the Nutovo Series plunge at 35 to 50°. The Western flank is dipping at angles reaching 60 to 90°. Due to a sharp displacement of strata Okobikai and Nutovo formations were brought into the contact.

Oil occurences correspond at Paromai tot he lower section of sandy clays, which belong partly to the Ehabi stage and partly to the Okobikai stage of the Upper Pliocene deposits. Surface oil seepages are found in the crestal part of the fold along the lines of unconformities.

Geological exploration work was started at Paromai in 1932. A few test wells were also drilled in this locality; test well No.1 encountered some oil indications in sands at a depth of 130 meters. In 1935 test drilling was discontinued at Paromay. No definite results were obtained in this exploration area before the war. Investigations for petroleum were resumed here since 1947.

2. Piltun.

At Piltun, located at a distance of 22 kilometers to the South of Palomai, surface oil seepages were known since a long time. Geophysical study of this area was carried out in 1938 -1939, but no interesting discoveries were as yet made in this locality. Further exploration work was suspended at Piltun in 1940, and it was not resumed since the end of the war.

3. Goromai.

This exploration area is situated in about 100 kilometers to the South of Ehabi. An anticlinal uplift, striking from North to South, was discovered at Goromai by means of geophysical methods. The crestal part of the structure is formed of dark grey clays, interrupted by beds of middle-grained sands about 12 meters thick, which belong to the Okobikai stage of the Upper Pliocene Series. The Ehabi Series reach here a general thickness of 500 meters, and they dip at angles up to 35°.

Geological research work was followed by test drilling in 1933, when the well No.1 has reached a depth of 1,190 meters; this well encountered several sand layers with some oil indications. Well No.5 yielded small quantities of oil from the layer II of the Okobikai stage. Test drilling operations were discontinued in this area during the period 1936-1946, to be resumed in 1947. However, no definite results of industrial importance were, so far, obtained at Goromai.

4. Boatsin.

At Boatsin, lying in about 18 kilometers to the South of Goromai, surface oil seepages are frequently found. Prior to the Russian revolution a British petroleum company was carrying out geological prospecting in this area, and a few shallow test wells were drilled. In 1920-1925 the Japanese had spudded in several test wells at Boatsin, but no positive discoveries were made in this locality, and test drilling operations were not resumed here until 1947, when the Soviets undertook a methodic geological survey of the Eastern coast of Sakhalin, followed by the organization of test drilling in a number of interesting areas, including Boatsin.

5. Konghi.

In this area, situated at a distance of 65 kilometers to the South of the Katangli oil field, geological and geophysical investigations for oil were carried out for several years, but no interesting discoveries were as yet made at Konghi.

6. Chamgu-Nompi.

The locality of Chamgu-Nompi is located in some 90 kilometers in the Southern direction of Katangli. Geophysical research was organized in this area between 1938 and 1939, but no definite results were obtained at Chamgu-Nompi before the war. Geological surveying was carried out here since 1947.

In addition, investigations for petroleum were undertaken by the Soviets on the Western coast of the Sakhalin Island; among the exploration areas of this group, Liangeri is the most important.

7. Liangeri.

Liangeri exploration area is situated in the North-Western part of the Northern Sakhalin almost opposite to the estuary of the Amur river, at a distance of about 90 kilometers in the South Western direction of the Okha field.

A strip of plain about 8 kilometers wide runs from North to South along the coastal line, followed by a chain of hills some 100 to 130 meters high. Geologically this area is formed of Recent, Post-Pliocene and Tertiary deposits.

Two large anticlinal folds were discovered at Liangeri; these anticlines are composed of Tertiary formations, which strik in longitudinal direction; their Western flank dips at angles

varying from 10 to 15°, whereas the Eastern flank plunges at 20°. In the crestal part of the structure a coal-bearing Series, dipping at an angle of 60°, outcrops to the surface.

Surface oil seepages were discovered in the Western flank of the Eastern anticline along the Irkri river - a tributary of the Liangeri river and in the vicinity of the Sladkoye Lake.

Geological and geophysical research work was started at Liangeri in 1933, and a few shallow test wells were drilled in this locality between 1935 and 1939. Some oil indications were encountered by the test well No1 in a sand bed at a depth of 391 meters, but no definite results were obtained at Liangeri before the war and further drilling operations were suspended in this area.

Exploration work and drilling were resumed, however, in this area since 1946/47, and several deep test wells were completed in 1948 and 1949, but, so far, no discoveries of any industrial importance were made at Liangeri.

8. Geological and Geophysical investigations for oil in the Southern part of Sakhalin.

Besides the above-mentioned geological research work for petroleum in various exploration areas of the Northern Sakhalin, the Soviets are carrying out geological and geophysical investigations in a number of localities situated within the limits of the Southern half of the Island, which was occupied by the Soviets in 1945.

The Far Eastern Expedition of the Geological Scientific Research Institute of the Soviet Union started geophysical and geological surveying operations in the Southern part of Sakhalin since 1947. In result of the prospecting work so far achieved, the main lines of stratigraphy and tectonics of South Sakhalin have been determined. Oil occurences and gas seepages were encountered by the expedition in a number of exploration areas located on the Western coast of the Island. Geological and Geophysical research work is being continued in Southern Sakhalin with the purpose to discover the most promising areas for the organization of test drilling.

9. Summary of the Exploration Work in the Sakhalin Island.

Following the intensification of the geological research work in the Northern part of Sakhalin since 1947, considerable

geological material was collected; this material enables to establish the particular conditions of industial oil accumulation in the Island, and thus to make practical conclusions as to the genesis of same.

Under the local conditions, however, the progress of exploration work is much delayed, especially in remote wild areas of the Island, where the communications are rendered difficult by the almost inexistence of roads. The extreme urgency of road building and construction of accomodations for technicians and workmen, as well as the laying of pipe-lines of local interest is, therefore, emphasized by the Soviet petroleum experts.

In order to hasten the development of the research for oil in new exploration areas, drilling of a large number of deep test wells is advised by the Soviet technicians. The completion of these wells - it is believed - would contribute to a rapid solution of the problem of oil occurence in the productive thickness (Upper Pliocene Series) of the Sakhalin Island.

B. Drilling.

Exploitation and deep test drilling operations were carried out with a greater intensity since 1946 in various oil fields and exploration areas of the Northern Sakhalin. The total amount of drilling reached 95,000 meters during 1948, as against 42,100 meters in 1940, whereas the drilling situation developed in Sakhalin between 1930 and 1940 as follows: -

DRILLING IN THE SAKHALIN ISLAND.
(In Meters).

Year.	Exploitation Drilling.	Test Drilling.	Total.
1930	3,500	1,800	5,300
1931	6,000	2,100	8,100
1932	8,500	9,100	17,600
1933	14,200	8,900	23,100
1934	17,500	6,700	24,200
1935	20,100	6,900	27,000
1936	21,900	17,500	39,400
1937	27,400	6,300	33,700
1938	24,500	6,000	30,500
1939	28,300	10,400	38,700
1940	29,400	12,700	42,100

The average depth of exploited wells varied during the same period between 70 and 670 meters, whereas the average depth of test wells increased from 133 in 1930 to 621 in 1940. With the generalized practice of deep test drilling since 1947, the average depth of test wells raeched about 850 meters in 1948. As regards the average speed of drilling, it reached about 275 meters per rig and per month in 1949, as against 185 meters in 1939, for the test drilling, and - 397 meters, in comparison with only 230 meters, for the exploitation drilling respectively

According to our best estimates the number of producing wells was of about 530 in the exploited oil fields of the Northern Sakhalin, but the average daily stabilized yields were of an order of only 4.8 to 5.2 tons per well. Furthermore, a considerable number of wells were temporarily suspended for repairs and the average number of actually working wells did not exceed some 85 % of the total number of producing wells.

The drilling situation started to improve somewhat since 1948, when modern drilling equipment of Soviet construction was brought to Sakhalin, and the introduction of new rigs and turbine drills into the oil fields and exploration areas of the Dalneft contributed to the progress of the drilling's speed and the efficiency of drilling operations in general.

Nevertheless, the Soviet technicians continue to meet in Sakhalin with considerable difficulties during drilling operations in wild remote areas, where the repair-shops are inadequate and the communications with the industrial centres rendered very difficult by the hardships of climate and poor road network.

C. Crude Oil Reserves of the Sakhalin Island.

According to the estimates of the Soviet geologists the crude oil reserves of the Sakhalin fields and exploration areas as of January 1st 1947 can be represented as follows:

Proven	-	6,000,000 tons
Semi-Proven	-	8,500,000 "
Probable	-	15,000,000 "
Possible	-	62,000,000 "

Following the bringing into production of the Eastern Ehabi field and of Nutovo field the total amount of proven and semi-proven reserves would have increased, after the tranfer of corresponding quantities of semi-proven to the proven category, and of the probable reserves to the semi-proven category.

IV. SPECIFICATIONS OF THE SAKHALIN CRUDES.

The specifications of the most typical crude oils of the Sakhalin Island are given in the following tables:-

1. Okha Crude (Layer III).

Specific gravity at 15°C	-	0.933
" " at 20°C	-	0.929
Engler viscosity at 50°C	-	3.11
Flash point (Brenken)	-	84°C
Cold test	below	-20°C
Paraffin content (Golde)	-	0.03%
Sulphur content	-	0.31%
Resins content (Conradson)	-	34.0%
Coke content Conradson	-	3.6%
Acid content in % SO_3	-	0.064%

---

2. Okha Crude (Layers VII & VIII).

Specific gravity at 15°C	-	0.919
" " at 20°C	-	0.916
Engler viscosity at 50°C	-	2.37
Flash point	-	68°C
Cold test	below	- 20°C
Paraffin content (Golde)	-	0.69%
Paraffin melting point	-	57°C
Sulphur content	-	0.46%
Asphaltic matter content	-	1.37%
Resins content	-	35%
Coke content Conradson	-	4.26%
Acid content in % SO_3	-	0.019%

---

3. Okha Crude (Layers XI & XII).

Specific gravity at 15°C	-	0.871
" " at 20°C	-	0.867
Engler viscosity at 50°C	-	1.27
Flash point	-	22°C
Coagulating point	below	-20°C
Paraffin content (Golde)		1.13%
Paraffin melting point	-	55°C
Sulphur content	-	0.28%
Resins content	-	20%
Coke content Conradson	-	2.7%
Acid content in % SO_3	-	0.051%

4. Okha Crude (Layer XIIIbis).

Specific gravity at 20°C	-	0.897
Engler viscosity at 50°C	-	1.77
Flash point (Brenken)	-	40°C
Coagulating point	below	-20°C
Paraffin content (Golde)	-	1.57%
Paraffin melting point	-	54°C
Sulphur content	-	0.59%
Resins content	-	19 %
Coke content Conradson	-	2.64%
Asphaltic matter content	-	0.46%
Acid content in % SO_3	-	0.0015%

5. Okha Crude (Layer XIV) ( ).

Specific gravity at 20°C	-	0.908
Engler viscosity at 50°C	-	2.06
Flash point (Brenken)	-	33°C.
Ignition point	-	82°C.
Coagulating point	below	-20°C
Paraffin content (Golde)	-	1.04%
Paraffin melting point	-	53%
Sulphur content	-	0.60%
Resins content	-	40%
Coke content Conradson	-	3.93%
Asphaltic matter content	-	1.103%
Acid content in % SO_3	-	0.0014%

6. Okha Crude (Layers XIII & XV).

Specific gravity at 15°C	-	0.907
" " at 20°C	-	0.903
Engler viscosity at 50°C	-	2.05
Flash point	-	30.5°C
Coagulating point	-	-20°C
Paraffin content (Golde)	-	0.96%
Paraffin melting point	-	52°C
Resins content	-	39%
Coke content Conradson	-	3.05%
Acid content in % SO_3	-	0.022 %

7. Ehabi crude.

Specific gravity at 15°C	-	0.907
" " at 20°C	-	0.903
Engler viscosity at 50°C	-	1.3
Flash point (Abel-Pensky)	-	310C
Coagulating point	below	- 18°C.
Resins content		- 22%

Note: The Ehabi crude oil is resinuous, slightly sulphuric, paraffinless with a high content of gasoline and ligroine fractions; high octane number gasolines and high specific gravity distillates are being obtained from this crude.

8. Katangli crude.

Specific gravity at 15°C	-	0.945
" " at 20°C	-	0.941
Engler viscosity at 50°C	-	6.69
Flash point (Martens-Pensky)	-	126°C
Coagulating point	below	20°C
Resins content	-	34.5%
Sulphur content (Eshke)	-	0.42%.

9. Nutovo Crude.

Specific gravity at 15°C	-	0.864
" " at 20°C	-	0.860
Engler viscosity at 50°C	-	1.13
Flash point (Abel-Pensky)	-	50°C
Coagulating point	-	6°C
Paraffin content (Golde)	-	1.71 %
Paraffin melting point	-	56°C
Sulphur content	-	0.38%
Resins content	-	4 %
Coke content Conradson	-	0.53%
Asphaltic matter content	-	0.30%
Acid content in % SO_3	-	0.092%

10. Liangeri Crude.

Specific gravity at 15°C	-	0.901
" " at 20°C	-	0.897
Engler viscosity at 50°C	-	1.35
Coagulating point below		- 20°C
Resins content	-	11%
Paraffin content	-	0.17%

SECRET CONTROL U. S. OFFICIALS ONLY

V. REFINING.

Since 1935 the Sakhalin crude oil is being refined at Habarovsk on the Siberian mainland (See Index map of Sakhalin hereto attached), where a first distillation plant has been constructed by the Soviets with an original daily intake capacity of 4,200 barrels. However, with the gradual increase of crude production in the Sakhalin Island, this refinery was unable to treat the total amount of crude available, and large quantities of same had to be either exported, or accumulated in earthen pits in Sakhalin oil fields, or even burned as fuel.

To remedy this unsatisfactory situation the Soviets have taken the following measures: 1. The daily intake capacity of the Habarovsk refinery was increased, after its reconstruction in 1938, up to 7,000 bbls; and 2. two new first distillation plants were constructed in 1940/41 at Nikolaievsk-on-Amur and at Komsomolsk with a daily intake capcity of 7,000 barrels each. Thus, since 1940 the total quantities of crude which are being produced in the Northern Sakhalin oil field can be treated in the above three refineries. The Nikolaievsk refinery, situated in the estuary of the Amur river is linked with the Okha oil field by a pipe line reaching the Western coast of the Island and long about 90 kilometers. Local field pipe-lines unite Ehabi and other oil fields of the Eastern coast of Sakhalin to the main Sakhalin pipe-line.

In addition to the first distillation plants, cracking plants were erected by the Soviets, at Habarovsk (in 1935); at Nikolaievsk on Amur and at Komsomolsk (in 1940/41).

The actual refining and cracking capacities of the Dalneft (Far East Oil) is as follows:-

Location.	Type of Plant	Daily intake Capacity.	Date of construction.
Daily Capacities are shown in barrels of 42U.S. Gallons.			
Habarovsk-1	Topping plant (Soviet design)	7,000	1935/1938*).
Nikolaievsk-	1 Pipe-still (Badger type-Soviet construction)	7,000	1940/1941
Komsomolsk-	1 Pipe-still (Badger type-Soviet construction)	7,000	1940/1941
Total first distillation plants:		21,000 bbls.	

*).Reconstructed in 1938.

Cracking Plants.

Daily capacities are shown in barrels of 42 U.S. Gallons.

Location.	Type of Plant.	Daily cracking Capacity.	Date of Cosntruction.
Habarovsk -	1 Cracking unit (Soviet Construction Winkler-Koch design)	3,500	1935.
Nikolaievsk	1 Cracking unit (Soviet Construction Winkler-Koch design)	3,500	1940/41
Komsomolsk	1 Cracking unit (Soviet Construction Winkler-Koch design)	3,500	1940/41

Total Far East cracking capacity: 10,500 bbls.

VI. GENERAL SUMMARY AND CONCLUSIONS.

Summing up the producing situation in the Sakhalin Island it should be stated that the production of the various oil fields of the Dalneft (Okha, Ehabi, Katangli, Eastern Ehabi, Nutovo) developed on the whole satisfactorily in 1949, despite the fact that the plan quota was not achieved during last year. This situation seemed to have improved, however, during the first half of 1950, when the quarterly production schedules were fulfilled by the Sakhalin oil fields. The further development of crude production in Sakhalin is much delayed due to the small average stabilized per well yields, a relatively slow progress of exploitation drilling and general technical difficulties of local character.

As regards new discoveries, the bringing into production by the Dalneft since the end of the war of two new fields, namely: Eastern Ehabi and Nutovo (1947) can be mentioned as a positive fact in the operation of this organization. The Soviets, in spite of considerable difficulties of geographical, geological (complicated tectonics of oilbearing structures) and technical nature(the lack of modern technical equipment, the inadequacy of communications in this remote and wild country, etc.), continue, if with a great slowness, to increase the crude production in the Northern part of the Island.

The intensification of crude production in the Sakhalin oil fields is due in some cases to the utilization of secondary exploitation methods, such as gas lift, for instance, which are being practiced now at Okha and Ehabi.

Furthermore, a systematic geological and geophysical surveying is being carried out in the most interesting exploration areas of the Island, including its Southern part.

Considerable efforts are being made by the Soviets in order to improve the communications in the Island: new roads are under construction; ports are being modernized; local pipe-lines are being laid. The afflux of new immigrants in large numbers since the end of the war is bound to facillitate the solution of the labour problem, as well as that of formation of new technicians for the oil industry of the Island.

Nevertheless, the progress of the Sakhalin's development is much hampered by the very wilderness of the country, the hardships of its climate and its remoteness from large industrial centres of the U.S.S.R..

The problem of technical equipment of oil fields and the of supplying of exploration anddrilling parties with every kind of necessary modern machinery and apparatus is also far from a definite solution. The lack of acomodation for technicians and labour is responsible to a great extent for continuous delays in bringing up the number of personnel to the level of local requirements.

The further development of crude oil production in the Sakhalin Island should be considered as one of the main elements of the building up by the Soviets of a regional petroleum base in the Far East. Up to the present, investigations for oil in Siberia did not give any definite results of industrial importance, although surface oil seepages are being encountered in various parts of Siberian mainland, and exploration work was resumed in a number of areas since the end of the war.

Therefore, Sakhalin oil fields, together with three refining centres on the Siberian continent, namely: at Khabarovsk, Nicolaievsk-on-Amur and Komsomolsk, (See the Index Map of Sakhalin attached to the present report) form, so far the only producing and refining organization created by the Dalneft in the Soviet Far East, which has to supply with

SECRET CONTROL U. S. OFFICIALS ONLY

various petroleum products the requirements of the Soviet Far Eastern economy.

With the gradual colonization and industrialization of these territories, however, the home market's demand for these products steadily increases, and a further growth of domestic oil consumption has to be expected in the Soviet Far East for the immediate future.

Under these circumstances, the creation of a large oil supplying base in this region seems to be a problem of a great urgency for the Soviets. Consequently, new efforts towards the intensification of the exploitation of the Sakhalin petroleum ressources will be made by the Soviets in order to safeguard the normal industrialization of their Far Eastern Territories.

Finally, the development of crude production in the Far East is connected with another important problem, that of supply of China (and Korea) with petroleum products. The oil exports can be carried out by the Soviets only on a very limited scale, in view of the continuous increase of the domestic demand for petroleum products. It can be expected, therefore, that the crude oil production would be intensified in Manchuria and Kan-Su province with the help of the Soviet technicians and that the investigations for petroleum would be actively continued in the Sin-Kiang province by the joint effort of the Soviets and the Chinese.

* * *

50X1-HUM

Declassified in Part - Sanitized Copy Approved for Release 2012/02/23 : CIA-RDP83-00415R006800060003-7