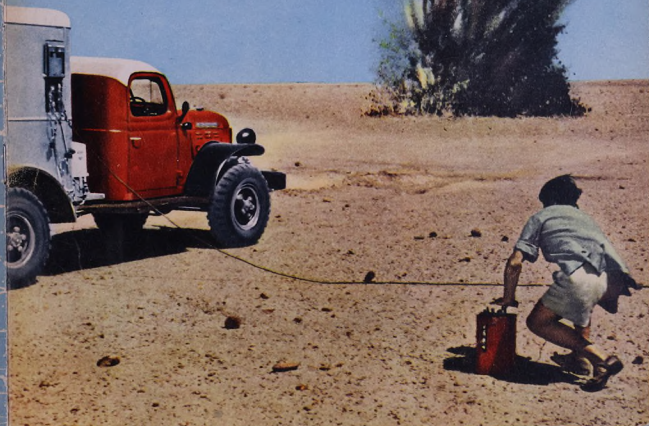


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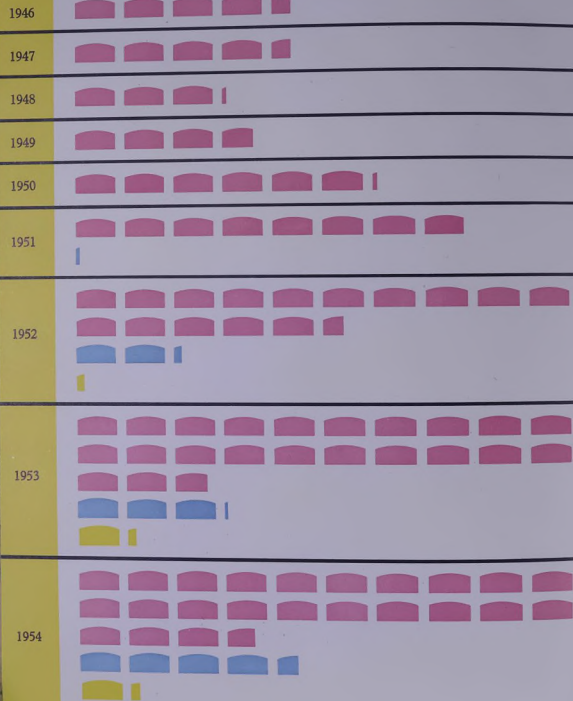
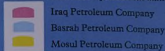
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in 1954



Iraq crude oil production

Each tank represents one million tons



Foreword

In 1954 the economic progress of Iraq continued at a pace which was retarded but never halted by the disastrous floods of March and April. Happily, the construction work already accomplished on the Wadi Tharthar flood relief scheme was not destroyed by the floods and, although interrupted, the Development Board reports that the project is now again proceeding satisfactorily and is due for completion by March 1956. The priority given by the Development Board to this project should ensure that the recurrent annual threat of flood to the city of Baghdad will be permanently removed.

During the year new levels of production were achieved by each of the three Companies, with the result that their total production rose to 29.6 million tons.

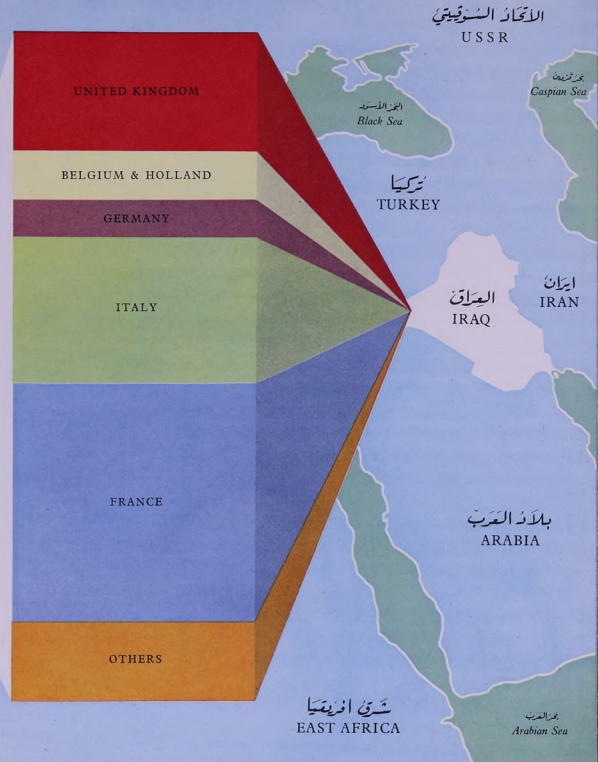
The high level of production from Kirkuk, the high rate of pressure decline at Zubair, and the still more serious production difficulties at Ain Zalah and Butmah, make it urgently necessary to discover new reserves to supplement these producing fields, and in 1954 the exploratory efforts of the three Companies were intensified. In the I P C concession these efforts have been crowned with success at Jumbur and Bai Hassan, and in the Basrah concession by the discovery of the Rumaila field. Unfortunately, in the Mosul concession, where over 100 test wells have been drilled, no structure comparable with the producing fields of central and southern Iraq has yet been found. But the search, using all the resources of geology and geophysics, and an intensive programme of drilling, is being vigorously pursued.

It is again my pleasure to record a year of progress, which has been made possible by the co-operation of Government and local officials, and by the enthusiastic efforts of all our personnel. Nowhere was their devoted loyalty more strikingly exemplified than at Fao in November, when six of the 4,750,000 gallon storage tanks were set on fire by lightning. Then, both national and expatriate employees co-operated with such zeal and courage that all the fires were extinguished within three hours, and what might have been a major disaster was averted. Such is the spirit of the Companies' personnel, united in their determination to ensure for Iraq a happier and more prosperous future.

MANAGING DIRECTOR



Destinations and uses of Iraq Oil in 1954



Iraq Petroleum Company

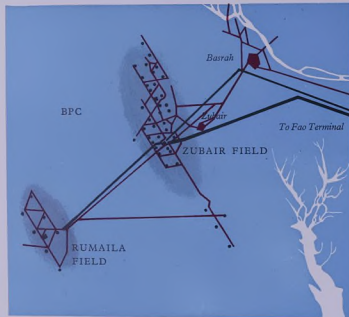
Production from the Kirkuk field in 1954 was 23,719,672 tons, bringing the cumulative total for this field to 130 million tons. Only 11 other oilfields in the world have produced over 100 million tons, and the production of over 20 million tons a year from Kirkuk by natural flow cannot be expected to continue indefinitely. In 1954 exploration of neighbouring structures was intensified in the hope of finding other productive structures to support Kirkuk. The whole of the 18,000 feet drilled in the IPC concession in 1954 was, therefore, exploratory drilling.

Among new facilities completed in Kirkuk field during the year may be mentioned the classroom block of the Industrial Training Centre at Arrapha, and a Supply Centre at Baba, including a retail shop, warehouse storage, and cold store. An advanced stage was reached by the end of the year on the Training Workshops, next to the Training Centre, and on a new club at Baba, including air conditioning plant, swimming pool, and sports grounds; and work was begun upon the installation of air conditioning plant at the Industrial Training Centre, upon electrical installations for that centre and for the Baba Club, and upon a new water softening plant for the power station at K1.



Left: Night scene at Kirkuk process plant, through which nearly twenty-four million tons of crude passed during the year
Right: Manifold and Hortonspheres at Avanaah Pump Station





*Above: Horizontal gas separators are a special feature of Southern Iraq oilfields in Zubair and Rumaila
Page 11: Screw piles for a new jetty, the superstructure of a jetty at Fao Terminal, and 24-inch pipe ready for laying*

- Oilfields
- Pipelines
- Roads



Basrah Petroleum Company



Production for 1954 was 4,584,358 tons: and the footage drilled was 90,830.

During 1954 the Company's steady expansion of installations continued, in preparation for a throughput of crude oil at the rate of 8,000,000 tons annually by the end of 1955. In this development the Company made the fullest possible use of public utilities and of local firms in the Basrah district; it also provided assistance to Southern Iraq, notably in connection with flood relief measures, during the first half of the year.

The most significant activity was the development of the Rumaila field, 20 miles west of Zubair. To form a link between Rumaila and Zubair, 20 miles of 12-inch pipe were laid. The 24-inch pipeline, laid during 1953 from Zubair to Fao, was commissioned on 1st January 1954.

Two new degassing stations were built, one near the Hammar Lake, the other in Rumaila field. Shu'aiba No.2 Degassing Station operated on a temporary basis during the year, but will shortly be dismantled.

A new main pump station was installed to serve Zubair and Rumaila. It consists of three main electrically driven pump units, provided with power from a new power station at Zubair. This power station, commissioned in April, is fuelled by gas, with oil as a standby system.

At Fao Terminal four new storage tanks were added to the eight previously in use, and 10 more tanks were under con-

struction. A third jetty was completed in September, and by the end of the year a fourth was almost ready.

Early in November lightning ignited six of the storage tanks at Fao, but such were the efforts of the Company's personnel and the help given by the local authorities that the fire was extinguished within three hours. Thus there was no interruption in the export of oil from Southern Iraq. Later in the same month one of the six tanks was again ignited by lightning, but the fire was extinguished within half an hour.

At Fao the Company, which has a multi-channel vhf communications network, with automatic dialling and teleprinter facilities, between Makinah, Zubair, and Fao, erected a 124-foot mast to provide radio communication for the Iraq Government between Iraq and Kuwait.

Nor were these developments unmatched in the measures taken to provide personnel amenities. For staff employees 30 houses in Basrah, built by local landlords on three new estates, were nearing completion by the end of the year; three more houses were built at Fao; and at Barjisiyah 21 houses had been built or were nearing completion. For monthly and daily rate employees, 96 houses at Zubair were completed in 1954, and 32 more were under construction there. At Fao 48 houses were under construction; and at Faisalayah, adjoining the municipal housing estate, 84 houses were built. The total number of houses for these employees was, at the end of the year, 236, with 80 others under construction.

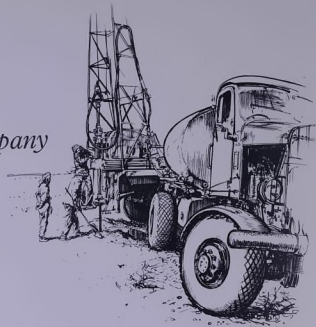
Three swimming pools were built for the use of personnel at Fao, Zubair, and Barjisiyah. In Basrah the building of a recreation centre was started by a local landlord in September: it will be rented by the Company. At Fao a new club and a 20-man mess were nearing completion; and there are plans for further amenities in all areas.

On the general question of housing, much is held to turn upon the degree of success of the Home Ownership Scheme, for which Government approval was obtained at the end of 1953. During 1954 three houses of impressive design and pleasing interior were built and occupied under this scheme, and over 20 more were being planned - a start was made on some - by the end of the year.

Thus on all fronts, the Company, still in the developing stage, was preparing itself for an even more significant role in the life of the country.



Mosul Petroleum Company



Production for 1954 was 1,281,827 tons: and the footage drilled was 17,939.

To support the limited resources of Ain Zalah three more wells were completed at Butmah, two of which were producers, but the high rate of pressure decline in these wells, and in the Ain Zalah first pay producers, was a constant source of anxiety. Another disturbing factor was the appearance of water with the oil in Ain Zalah second pay producers. In view of these problems preparations were made for the installation of gas lift in Butmah producers, using Ain Zalah gas. By the end of the year a gas line had been laid from Ain Zalah to Butmah, and foundations prepared for the compressors which are to be installed at Ain Zalah.

Parallel with these steps to sustain production the search for new oil bearing structures was intensified and is described in the section of this report dealing with the exploratory operations of the Companies.

At Badoosh, on the Tigris, a water pump station was built, and a 4-inch water pipeline was laid from it to the Atshan structure. Similarly for the Makhul structure a pump station, water line, and road were constructed.

A well drilled at Qaiyarah will supply the 100,000 tons of heavy oil a year required for the Government bitumen plant.

- Oilfields 
- Pipelines 
- Roads 
- Railways 



*The oldest and the most up to date
Below: Arbil, standing on the
ruins of its own past, is the
oldest continuously inhabited town
in the world
Right: A modern degassing station
at Ain Zalah*

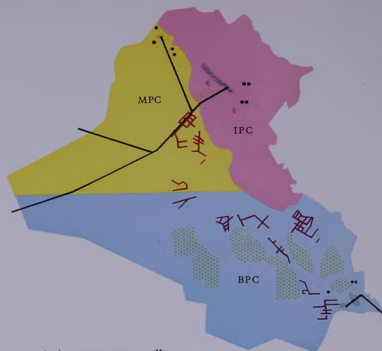




Basra, Iraq. Photographs: universal images. By: copyright.com

Markets for Iraq oil are in western Europe

Exploration



- Gravity surveys during year ended July 1954
- Seismic
- Oilfields
- Post-war test well areas
- Pipeline

Just as a country with a declining population must eventually succumb to more virile or richer rivals, unless new and more efficient methods of production are found, so an oil industry, while developing and producing known resources, must ever seek fresh supplies to supplement the oil that is being taken from the ground. The oil industry is complex, but no activity is more important than the patient investigation which enables scientists to select sites for new test wells.

The search for new sources of oil in Iraq, and for information on oil resources, was intensified in 1954, and the results of that quest followed a pattern, familiar enough in the history of the oil industry, of partial success and partial failure - with the successes happily outweighing the failures.

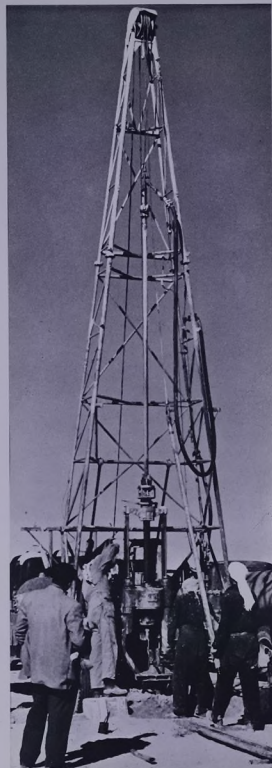
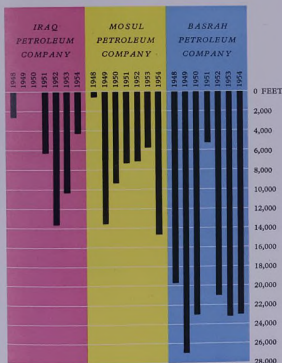
No year could compare with the 'wonder year' of 1927, when the 'gusher' at Baba Gurgur provided the proof which had been patiently awaited that oil existed in considerable commercial quantity in Iraq; but 1954 will be remembered for a major discovery of excellent oil at Jambur.

Let us look at the actual configuration of Iraq. It consists of mountains, foothills, and plains, calling for the application of varying geological and geophysical techniques.

In the area of the Iraq Petroleum Company, for instance, there are mountains and foothills in which surface evidence is sufficient for the geologist to assess the probability of the

Right: Portable rig used for drilling shot holes for seismic soundings

Exploration footage drilled in 1948-54



presence of oil; but in the plains in the south-western sector of the territory, geophysics, consisting primarily of gravity and seismic methods, has to be employed.

The area of the Mosul Petroleum Company is similarly divided into mountains, foothills, and plains; and the nature of exploration in that territory followed the pattern of the IPC concession east of the Tigris. A large part of the concession had already been covered by a gravity survey, and only seismic methods were employed in the year under review.

In the Basrah Petroleum Company's area, however, the entire territory – with the exception of a strip of country behind Amara, towards the Persian frontier, and of the most westerly part of the concession, which are mainly for geological examination – has to be explored by geophysical parties. These parties in their gravity and seismic operations during 1954 sometimes added to the former a magnetic survey, using a magnetometer.

The whole effort in the three territories represented arduous pioneering work in desert tracts or in hilly locations far removed from cities or creature comforts.



Right: The water pump station for the Alan test well

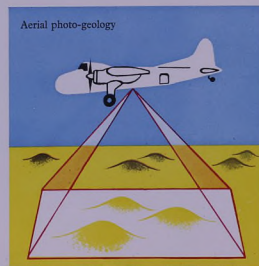
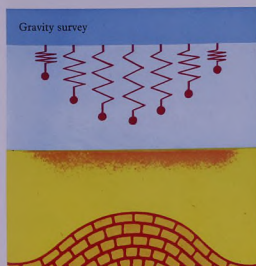
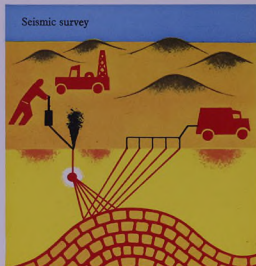
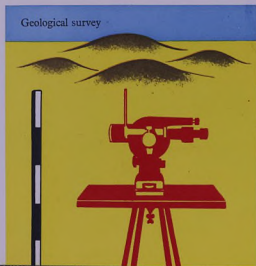
Left: The Qara Chauq Dagh, forty miles north-west of Kirkuk, where the limestone which is oil bearing at Kirkuk lies exposed at the surface



In 1953 and 1954 these efforts were crowned with success. In the IPC's territory, the 1953 discovery of Bai Hassan field, 20 miles from Kirkuk, was followed in 1954 by the discovery of oil at Jambur. If these two fields realise expectations - three wells have already been drilled and a fourth well is being drilled at Bai Hassan, and three wells have been drilled and another is being drilled at Jambur - they will materially assist the Kirkuk field in sustaining the high levels of production which have been operating since the construction of the 30-inch line to Banias.

Of these two new fields in the IPC area, that of Bai Hassan, before the discovery of oil there in 1953, had previously been found to contain gas. Well No.1 was never completed; Well No.2 had only gas, and was abandoned in 1947; Well No.3 found oil; Well No.4 was completed in 1954; and Well No.5 is now being drilled. Oiled roads linking Bai Hassan with the road from Kirkuk to the Zab have been constructed, and others will be made to other sites, where wells will be drilled not only to determine the exact extent of the reservoir but also to provide information on the drainage. The Bai Hassan field can depend upon Kirkuk for all the support facilities needed to maintain an oilfield.

Methods of Searching for Oil

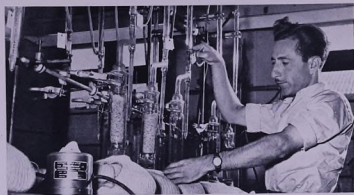


Gravimetric survey in Basrah Marshes





*Left: Natural seepages, such as this at Kor Mor, do not always indicate the presence of commercial accumulations of oil
Above: Water extraction apparatus used in core analysis
Below: At Fatha the Tigris is crossed by ferry and overhead cable transporter*



It is otherwise in the hilly terrain of the Jambur field where a well drilled in 1927-29 was abandoned for mechanical reasons before the main oil bearing limestone was reached. Circuitous roads have been made – and more will be necessary to the sites of other wells through this difficult Jabal Tauq territory. This is a field, in fact, which, while it will depend on Kirkuk for administration, maintenance, and general services, will nevertheless have permanent living accommodation. A beginning has already been made; and in time water, electricity, drainage and other services will be installed.

Well No.1 at Jambur was abandoned in 1929 after encountering some gas pressure, when drilling technique was much less advanced than it is now. Well No.2, on the northern side of the structure, found oil and was completed during 1954 at a depth of 5,800 feet. Well No.3, begun on 15th September on the southern side of the structure, was due for

completion by the end of the year at a depth of 7,000 feet, and a similar depth was contemplated for Well No.4, due for completion in early February 1955.






The Jambur field appears to be about 30 miles long by about two miles wide – half the area, approximately, of the Kirkuk field – but more wells will be needed to determine its precise extent.

In 1954 the disappointing results obtained at Kor Mor in 1953 were repeated. The well drilled there to a depth of 5,330 feet failed to yield anything but gas; and during 1954 the original well, first drilled in 1930 to a depth of 6,500 feet, was opened up for investigation, but after several tests it failed to confirm the presence of a commercial accumulation of oil.

Yet all in all, the IPC may be said to have had a successful year, in which new fields have been found to sustain the high level of production now being borne by the Kirkuk field.

A quite different story has unfortunately to be told of operations in the Mosul Petroleum Company's concession, in which over 100 wells were drilled before oil in producible quality

Right: Typical topography in the Kurdish mountains

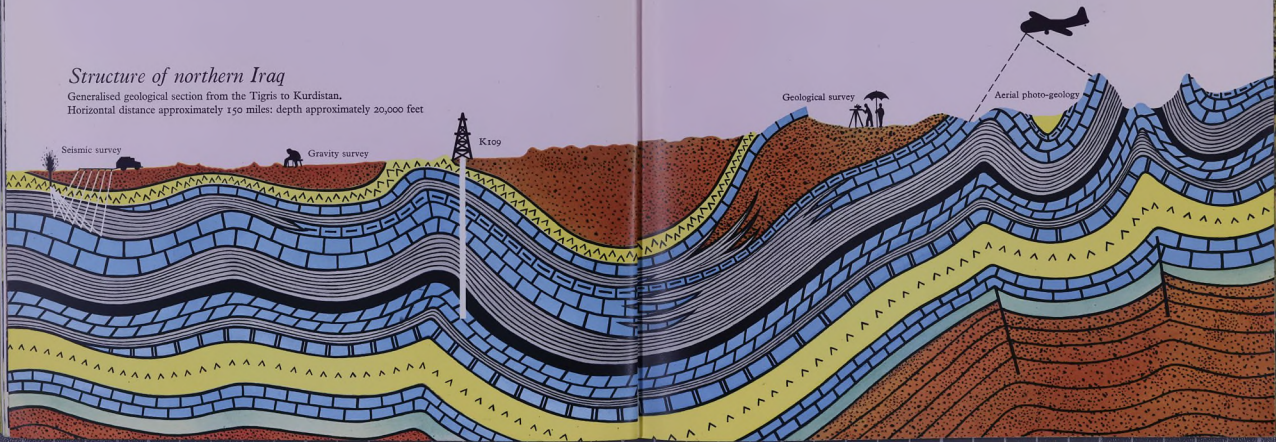
-  Sand, gravel and quartzite
-  Limestone
-  Anhydrite and salt
-  Marl and shale
-  (unlabeled)



Structure of northern Iraq

Generalised geological section from the Tigris to Kurdistan.

Horizontal distance approximately 150 miles; depth approximately 20,000 feet



and quantity was found. Since operations were resumed after the war a small production has been achieved from the Ain Zalah and Butmah structures, but it may be difficult to sustain the output of 1.25 million tons which was obtained in 1953 and in 1954.

In this territory there are both short term and long term problems. The short term problem has been to discover oil of marketable quality to supplement the limited capacity of Ain Zalah. A well at Gusair was re-opened in 1953, and was deepened in 1954 from 4,003 feet in the Upper Cretaceous to 6,987 feet in the Middle Cretaceous, but no success attended the effort; only a quantity of heavy oil which would not flow was found. In Butmah three further wells were drilled during the year, and a small production was obtained from two.

The long term problem is being tackled in a series of deep tests in search of further reserves. The choice of sites for deep tests was based on information gained from previous drilling and stratigraphical research.

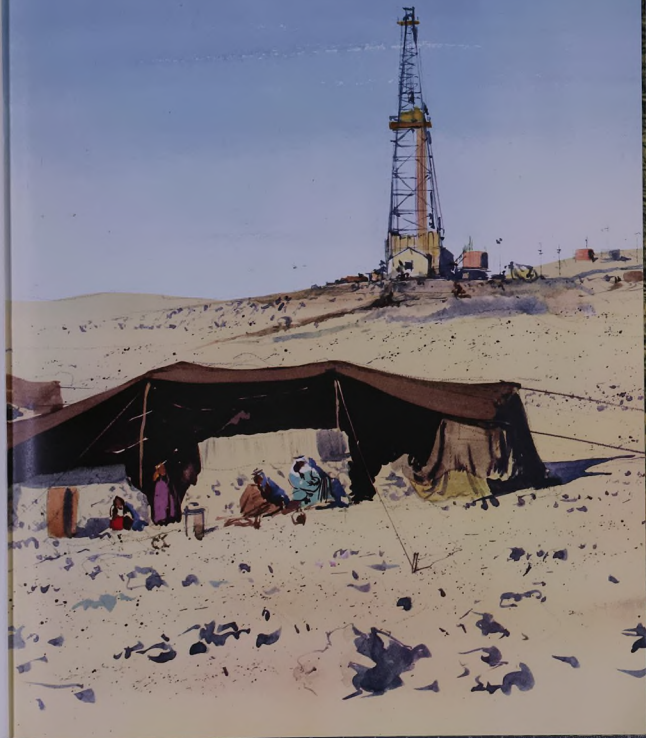
Work on Butmah No.2 continued during 1954, but after reaching the Triassic the well was shut down at 11,367 feet, where a production test of the Triassic Zone will be made.

Drilling on the Atshan structure began in April, but at a depth of over 7,000 feet at the end of the year no light oil accumulations had been found. This well will be deepened until the Permian is reached – expected at about 9,700 feet – unless commercial oil is discovered in the Triassic, through which drilling was proceeding at the end of the year.

For Atshan and other selected sites access roads had to be built, and water supplies, either from wells or pipelines from the river, had to be provided. For instance, a road was built to the Sasan location, near Tel Afar, and drilling of a water well for this structure began in October. Exploratory drilling on this structure, scheduled to begin in 1955, is intended primarily as a test of the Upper Cretaceous and Middle Cretaceous, the latter being expected at about 4,000 feet.

Again, for the Alan Well No.1, on which operations were resumed towards the end of the year, water supplies were provided by means of a pump station on the Tigris, which 'boosts' the water up the sides of Jabal Alan. This well was originally drilled before the second world war to the Middle Jurassic: the intention now is to deepen it to the Triassic, expected around 6,900 feet.

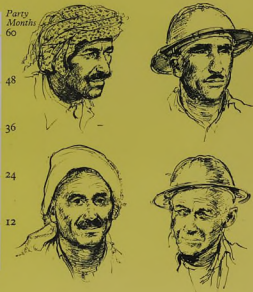
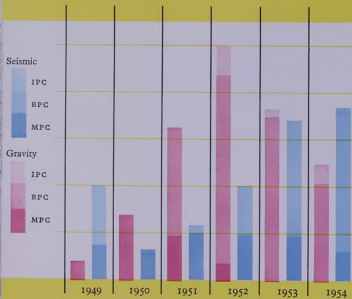
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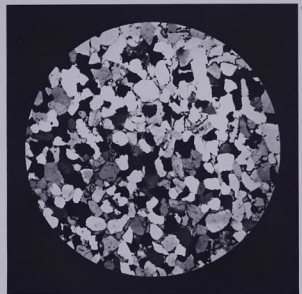
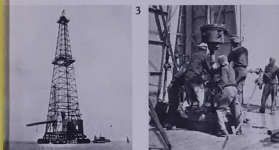
*Drilling on the
Atshan structure began in April*

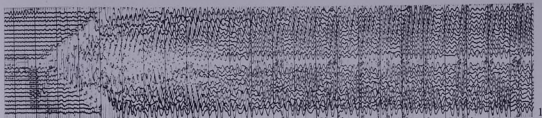


In the post-war years intensive geophysical surveys have been carried out. The diagram shows the numbers of party-months devoted to seismic and gravity surveys from 1949 to 1954



Finding and Developing an Oilfield





1



2

Finding and Developing an Oilfield



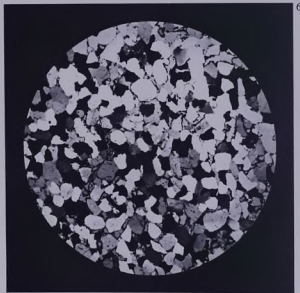
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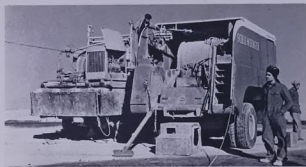


11



12

Geophysical and geological surveys are carried out (1), maps are made (2), rigs are erected or moved into position (3) and wells are drilled (4). At every stage rock samples are examined (5 and 6) and, on completion of drilling, electric logging (7) helps to define the underground structure. The first oil to flow from a producing well is contaminated by mud fluid used during drilling and is burned off (8). When clean oil begins to flow samples are taken for examination in the laboratory (9), well head fittings (10) are installed and connected by flow lines to a degassing station (11) where surplus gas must be removed before the oil can be transported by pipeline (12) to storage tanks at ocean terminals (13). There jetties (14) are built from which tankers (15) carry the oil to the markets of the world.



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Continued from page 28

Very considerable interest was aroused in the resolve to drill on Jabal Makhul, on which a site was selected on the crest maximum of the south dome. (A well drilled before the war on the north dome had reached 5,543 feet in the Upper Jurassic without success.) For Makhul No.2 a pump station was built on the Tigris, at Fathah, and a spectacularly difficult road, six miles long, and branching off from the main pipeline road, was made up this mountain, which is a prolongation of the Jabal Hamrin range. By the end of the year all the necessary equipment had been carried on low loaders to the well site, and drilling was expected to begin in January 1955. Here, as elsewhere in the MPC concessionary area, drilling may go to a depth comparable with that at which oil has been found in the Basrah area (over 10,000 feet), but of course to deeper geological horizons.

Down in the plains, in the southern section of the territory, a geophysical party was at work until July. Resuming work later in the year it surveyed the Tel Uwainat feature near Ain Zalah, previously only partially surveyed by aerial photography. Heavy expenditure has been entailed in carefully planned comprehensive seismic surveys, and a considerable part of the southern area has now been covered.

More obviously than ever before the MPC is looking ahead. Much effort was devoted to the alleviation of the immediate production problems at Ain Zalah and Butmah: much also to intensifying exploration of structures as far afield as Atshan, Alan, Sasan, and Jabal Makhul.

From the uncertainties enveloping Mosul we pass with confidence to Basrah. By the end of 1955 the BPC will attain an export rate of 8,000,000 tons annually, for which the fields of Zubair and Rumaila will be responsible.

Throughout 1954 a vigorous exploration programme was maintained by the BPC. A geological survey party operated west of the Euphrates, making a detailed investigation of the region between Rumaila and Busaiya; a reconnaissance was also made in the north-west corner of the concessionary territory. These surveys and reconnaissances covered an area of 2,100 square miles, examining geological structures that might be suitable for drilling, and obtaining stratigraphical information.

In the western and southern deserts a limited amount of aerial photography was carried out; and in the first half of the

Continued on page 36



year a triangulation party operated in conjunction with geophysical parties.

The Company was happy to place at the disposal of the Government the knowledge of its specialists in matters relating to water resources in the desert.

Two gravity and three seismic parties covered large blocks of territory, ranging far into the desert. Late in the year structural drilling began at Luqait on a geological feature. This operation was carried out with a 43-foot high portable rig.

One feature of the intensive seismic work was the aptitude shown by national personnel. All shot hole drilling was done by Iraqis, of whom there were four in each of the three parties, under the supervision of foreign technicians, while the recording men and computers were provided by a contracting firm.

For the purpose of immediate production, reliance is being placed upon Zubair, where by the end of 1954 the thirty-eighth well had been completed, and upon Rumaila, where by the end of the year five wells had been completed, with three others still drilling. The average depth of wells in these two fields is about two miles, and the total footage drilled has already exceeded 100 miles.

Many of these pages have been devoted to drilling, but drilling is only the final phase of exploration, which embraces also all branches of geophysical and geological investigation, whereby the structure of the earth's crust is elucidated. The gratifying results of 1954 are, therefore, the result of the patient and painstaking research extending over the past 30 years. The geologists and geophysicists of today, in their search to sustain Iraq's position as one of the great oil producing countries of the world, not only build on the foundations laid by their predecessors in Iraq, but also use the new tools and techniques which are being constantly developed by oil geologists throughout the world.



Left: Drilling for water with a portable drilling rig near Tel Afar

Cover illustrations: front, artificial explosion during seismic survey; back, enlarged section of a seismogram; inside covers, aerial photograph of the Jambur structure - typical Kurdish foothill topography

