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Marienberg-1, Sepik Basin

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Abstract

Marienberg-1 was drilled in 1925–8 near Marienberg, Sepik River, Papua New Guinea, by the Ormildah Oil Development Company Ltd. For over fifty years it was the only deep (2705 ft; 825 m) oil well in the basin. In the late 1960s it was an enigma to a new generation of explorers, with very little known of the reasons or results. The discovery of extensive files in various Australian libraries and archives has allowed this retelling of Ormildah's Marienberg venture.

Consulting Geologist, Dr H.I. Jensen, recommended the well site on an east/northeast-trending anticline he mapped in the hills west of Marienberg. Spudded in August 1925, Marienberg-1 encountered mainly shale and mudstone, with minor siltstone and sandstone, and conglomerates near the base. Weak oil and gas shows occurred through the section which was dated as Late Miocene. Progressively deeper-water facies were interpreted to 360 m where "globerigina ooze" identified a bathyal environment. Conglomerates below 790 m were seen as evidence of a regressive cycle, with the objective estuarine facies close below. Unfortunately, the casing jammed in the conglomerates, and broke, and the well was abandoned on 30 March 1928.

The Anglo-Persian Oil Company's 1929 report to the Commonwealth Government dismissed the area as unprospective, and criticised Jensen's mapping as superficial. This precluded public or Government funding for a second well, and the licence was relinquished in 1930.

The well samples were re-examined by CONAUS in 1969. The upper 621 m was redefined as Pliocene age, and the basal conglomerates were interpreted as debris-flows in a deep-water basin.

Introduction

Marienberg-1 was the first deep oil exploration well in northern Papua New Guinea (Figure 1). Located near Marienberg on the Sepik River, and drilled to 825 m in 1925–8 by the Ormildah Oil Development Company Ltd (Ormildah), it remained for nearly 50 years the only oil well in the Ramu-Sepik Basin.

Over those years it became part of the landscape and legend of the river. Water flowing from the well set a lush dark line across the kunai, pinpointing the site for miles above. Gas bubbled continuously in the small pool around the broken casing (Figure 2), and burnt with a bluish flame.

With time, the legend grew and the facts faded. Some maps referred to Ormildah-1; others showed two wells, Ormildah-1 and Marienberg-1. When Continental Oil Company of Australia (CONAUS) began exploration in the P41 Madang Block in the 1960s, the well had long since become an enigma. Except for a short Government report (Papp, 1930), there seemed to be no record of the reasons or the results. All efforts to locate information were unsuccessful.

The writer took up the search in 1969 during the Madang Seismic Survey (Purcell, 1970a). Marienberg-1 was located on one of the lines (Appendix 2) and was potentially of major importance to the interpretation and evaluation of the area. Besides, it was too good a mystery to leave alone!

The search proved very successful. Geological reports and correspondence were obtained from the National Archives, the Bureau of Mineral Resources, the Sydney Stock Exchange, and the University of Queensland. The voluminous private papers of the late Dr H.I. Jensen, the consulting geologist for the Marienberg venture, were found in the John Oxley Library, Brisbane, and included many notes, reports and photographs from New Guinea. The samples from the well were found in a Bureau of Mineral Resources warehouse, Canberra.

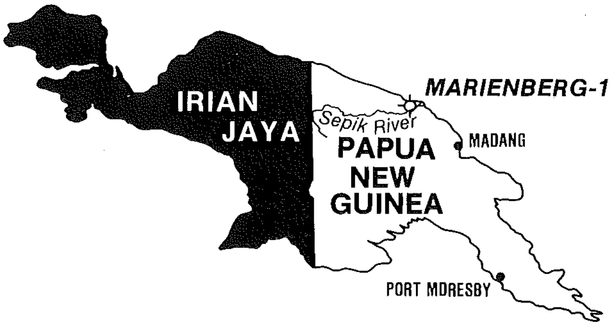

Figure 1. Location map.

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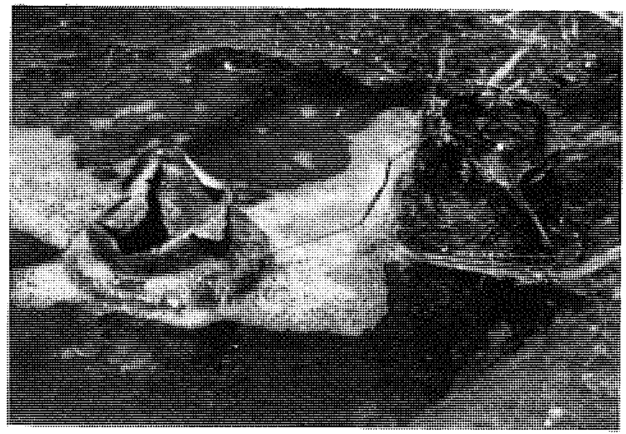

Figure 2. Marienberg-1 well-site, 1969.

The story of the Ormildah company and Marienberg-1 was presented in a detailed CONAUS report (Purcell, 1970b). This was filed with the Bureau of Mineral Resources and the University of Papua New Guinea, but the material has not previously been published.

This paper aims to provide a comprehensive and more readily accessible reference document for Marienberg-1. Dr Jensen's original geology report, and his resume of the well results are reproduced in Appendix 1. Results of CONAUS' geophysical work in the Marienberg area, and analyses of Marienberg-1 samples are presented in Appendix 2.

The Ormildah Company

Interest in the petroleum potential of northern New Guinea began early this century when oil seeps were discovered along the north coast (Stanley, 1923). Reports of seeps and German drilling plans in the Sepik River valley became common during the war years. Official investigations and reports were classified 'secret' for national security purposes, and all prospecting was officially discouraged until the future administration of the colony was decided (Macandie, 1917). When the Austalian Government continued the embargo on exploration in the newly Mandated Territory, speculation began anew. An oil rig enroute to 'the Sepik oilfields' from Germany was supposedly captured on the high seas when war broke out (Petroleum World, 1919). The banks of the Sepik River were said to be lined with oil for more than 80 km. Seeps along the river were reported flowing at 'thousands of gallons a minute' (The Age, 1919).

In 1923 the Federal Government 'finally lifted its monopolistic finger off the oil possibilities of the Mandated Territory of New Guinea' (Wildcat Monthly, 1924). One of the companies born in the rush to explore those 'Sepik oil fields' was the Ormildah Oil Development Company.

Three Sydney men, Messrs Orwin, Miller and Davis, had seen a report about structures mapped in the Sepik Valley by a Dr Schlenzig, and related drilling plans involving both private consortia and the Reichstag. Davis was a Sydney-based merchant; Orwin and Miller reportedly worked for the New South Wales Lands Department and Mines Department respectively. They formed the Ormildah syndicate (the name is an acrostic from the first letters of their surnames) and successfully applied for a Prospecting Licence in the upper Sepik Valley (Figure 3). The Ormildah Oil Development Company Limited was successfully floated on the Sydney Stock Exchange in November 1924, with 20,000 one pound shares. Of the original syndicate, only Davis was on the board; details of the others' association with the company are not known.

Plans for immediate drilling were announced (Wildcat Monthly, 1924). This eagerness was partly the prevailing boom-time mentality, but it drew considerable impetus from the reported German involvement: the 'Hun' may have been the enemy of late, but he was respected as efficient and thorough; if the Germans were ready to drill, so was Ormildah!

On the advice of Professor Edgeworth David of the University of Sydney, Ormildah retained Dr Harold Ingermann Jensen as Consulting Geologist. Born in Denmark but educated in Australia, Jensen had graduated from the University of Sydney in 1903, and lectured there while earning a D.Sc. in 1908. Subsequently, he had worked as Government Geologist for the Northern Territory and Queensland, and was highly regarded.

It did not take Jensen long to find himself at odds with Ormildah's opinions and enthusiasm. Firstly, the German geological work, well documented and summarized in Stanley's (1923) report 'did not afford much evidence of possible oil country in the upper Sepik valley'. Secondly, Jensen could find no record of the geologist Schlenzig and concluded that he was a fictional composite of several German explorers, notably Von Scleinitz who explored the north coast in 1886, and Dr. Schultze who reported on the geology of the Sepik River valley during the 1910 German-Dutch Boundary Expedition.

The directors of Ormildah were not deterred by these details. For a start, their faith in Schlenzig's existence was unshaken. They were also faced with that all too familiar imperative: a drilling rig on contract! They had already hired a rig and chartered a boat; the rig and six-months provisions were aboard. It was no time to be fussing about geology and German names!

In fact, Jensen was quite happy to go, and very enthusiatic about the prospects. Whatever his doubts about Ormildah's Upper Sepik licence, he was convinced of the potential of the New Guinea region, and supremely confident he would find prospective areas to explore.

The Ormildah Expedition

The Ormildah Expedition left Sydney in January 1925 under the command of Colonel Munro, and sailed to Rabaul, then administrative centre for the Territory. There, they obtained a copy of Schultze's map of the Sepik River, showing basement rocks to the south, east and west of the Ormildah Licence, and describing the northern part as impenetrable swamp and jungle. At the same time, however, they would have learnt that Schlenzig had been the Mining Warden in Rabaul before the war and had, indeed, reported to Germany on the Tertiary oil seeps and potential.

En route to the Upper Sepik Licence area, the expedition stopped at Marienberg, a Roman Catholic mission and Police Station, c60 km from the river mouth. It was a propitious visit. The Mission's leader, Fr Kirshbaum, was an authority on the Sepik River region, and a very competent amateur geologist. He explained that Schlenzig had never visited the Sepik; his reports were all about the well-known Matapau area on the north coast. Specimens in his extensive rock collection confirmed many of the reported basement outcrops upriver.

In contrast, Kirshbaum told Jensen of the vast area of sedimentary rocks to the west of Marienberg, as far as the Hansemann Ranges. A short walk inland re-

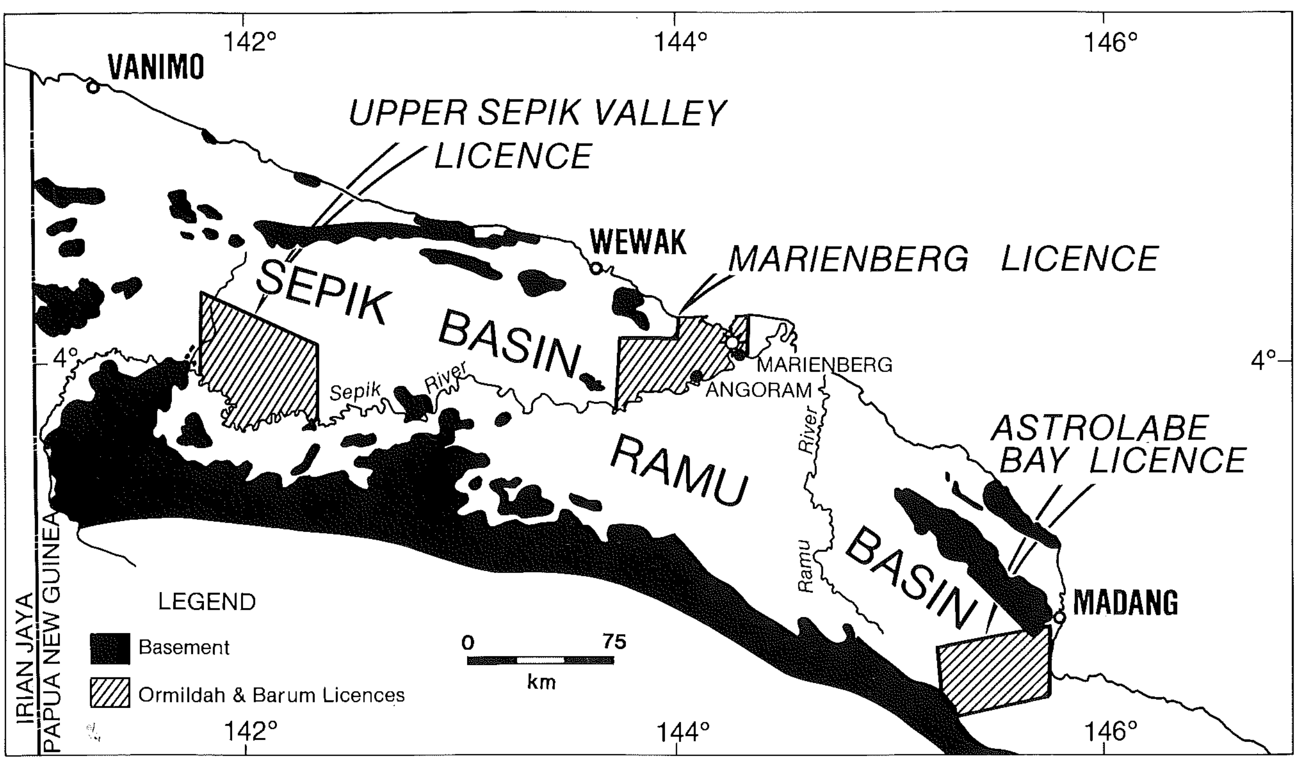

Figure 3. Location map, Marienberg, Upper Sepik and Astrolabe Bay licences.

vealed 'Upper Tertiary coral reef elevated into gently rolling downs' (Jensen, 1925a). Jensen was immediately convinced he had 'discovered' a new sedimentary province, and quite certain it was prospective — even before Fr Kirshbaum told him of the oil slicks on the Murik Lakes to the north and the gas seep near Maisan village (Figure 7). 'The configuration of the country points to a continuation in this area of the Tertiary oil strata of the north coast', he noted (Jensen, 1925a).

Jensen was equally convinced that the Ramu Fault was the controlling structure. Stanley (1923) had proposed this major fault along the mountain front and extending northwest across the Sepik Valley, separating the downfaulted sedimentary province to the north from the igneous/ metamorphic province to the south. Jensen (1925a) surmised that the fault swung northward up the Keram valley to the coast, separating basement rocks of the Torricelli Mountains from the Marienberg sedimentary basin.

The corollary was that the area up-river, being on the up-side of the Ramu Fault, was a basement province, as the Germans and Stanley (1923) had reported - and as Fr Kirshbaum's rock collection testified. En route to the Ormildah licence area, with Fr Kirshbaum as enthusiastic guide and student, Jensen found nothing to conflict with this.

From Angoram to Timbunke there were no outcrops along the river but thereafter metamorphic and igneous rocks were common. No outcrops occurred along the river within the licence area itself but basement rocks were found on the eastern and western boundaries, and in hills to the south. A bore hole to 110 feet (Figures 4, 5) encountered brown silt with 'large mica flakes indicating derivation from mica schist'. Efforts to penetrate the cane grass swamps to the northeast were unsuccessful (Figure 6).

'The Ormildah area is quite hopeless for oil. . .' Jensen reported to Ormildah. 'The country is composed of alluvial silt overlying metamorphic rock.' A small sedimentary basin might be present in the northern licence area but 'it would be almost impossible to transport machinery to it'(Jensen, 1925a). The only option was 'immediate abandonment of the area before any more money was wasted on so hopeless an enterprise.'

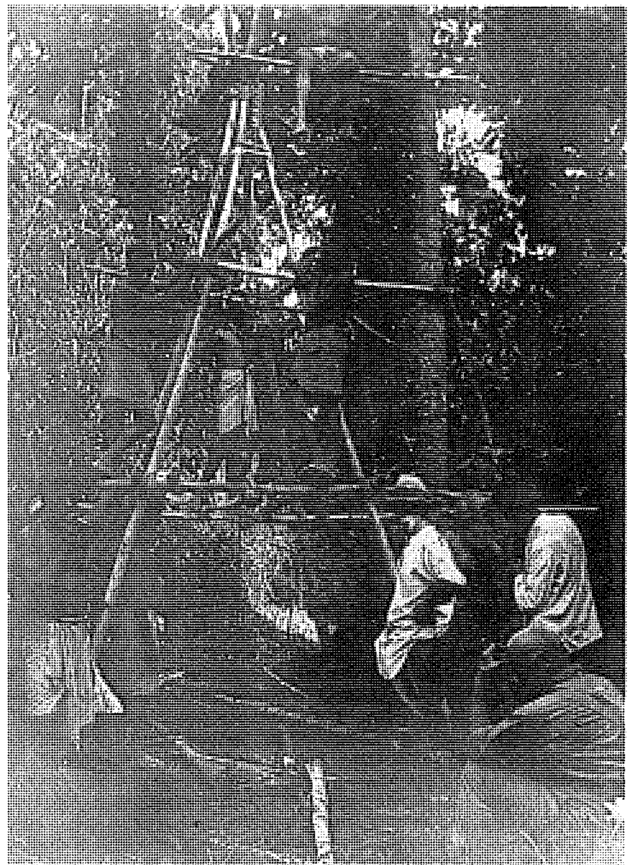

Figure 5. Drilling shallow bore, Pioneer Lager, Upper Sepik Valley. Photograph courtesy of John Oxley Library, Queensland.

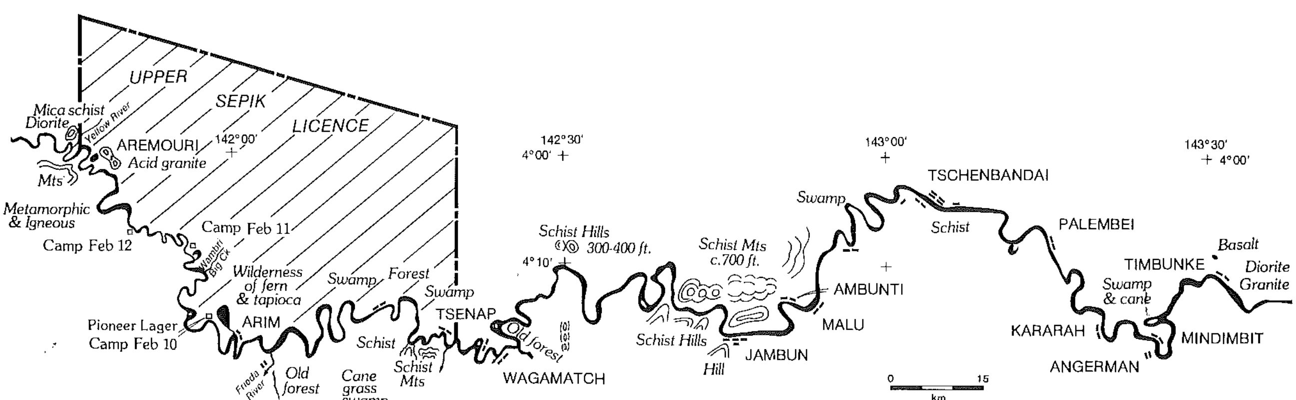

Figure 4. Ormildah expedition's sketch map of upper Sepik Valley. (Reproduced from original in John Oxley Library, Queensland.)

Figure 6. Jensen and party in cane swamp, Upper Sepik Valley. Photograph courtesy of the John Oxley Library, Queensland.

Instead, Jensen recommended that the Company apply for a licence over the Marienberg area or, failing that, the Astrolabe Bay area near Madang or the Gazelle Peninsula, New Britian (Figure 3). Marienberg was the priority. Though it was an 'opinion based on only a few hours inspection', Jensen (1925a) was confident that 'structures can be mapped there and drilling will not be mere wildcatting'.

The expedition returned to Marienberg where Jensen and his assistants spent two days examining the outcrops near Banan village and the gas seep at Maisan. At Banan, Jensen found 'Pliocene or recent coralline limestone' encrusting 'a drab grey compact limestone' containing foraminifera and other fossils which suggested a Miocene age. A domal structure seemed evident. 'The area appears very favourable', Jensen (1925b) advised the Colonel.

With this assurance, Colonel Munro sailed to Rabaul where he successfully negotiated title to the licence over the Marienberg area, as well as a separate licence in the Astrolabe Bay area. Another company apparently held the Marienberg licence, but no details of the company or the transfer of title are known.

Back in Marienberg, Jensen had begun his detailed geological investigations. A few days more work in the Marienberg hills convinced him of an anticlinal structure in that area. An abrupt juxtaposition of Pleistocene and Tertiary limestones at Angoram was interpreted as marking the trace of the Ramu Fault. What remained unclear was the depth of section. Was the Marienberg occurrence a thin veneer, or did it belong to a broader basin in which thick sediments could be expected? An overland traverse to Kaup on the coast, returning by canoe across the Murik Lakes, showed 'that the whole area east of the line joining Angoram to Kaup is Tertiary ranging from Mio-Pliocene (the oil formations of New Guinea) to Pleistocene'. Jensen (1925c) envisaged the area as part of an extensive 'Sepik-Ramu Tertiary Bay' bounded on the west by the Ramu Fault.

The detailed field mapping continued until late March, defining 'a pronounced anticline striking ENE-WSW between the township of Chook, NNE of Marienberg, and Gavieng'. Jensen's geology map is shown on Figure 7; the final report, with Jensen's detailed descriptions and reasoning, is reproduced verbatim in Appendix 1. Two separate closures were mapped along the structure, 'the Banan dome and the Gavieng dome'. The structures were 'well closed... only gently folded... not broken by any faults (with) impermeable as well as porous beds' (Jensen, 1925c).

In the end, he had concluded that the gas at Maisan was not seeping from oil horizons at a depth, and was probably produced in shallow peaty beds. The oil films on the Murik Lakes was similarly insignificant viz-a-viz oil potential.

This work, Jensen informed the Ormildah Directors, 'entailed over 100 miles of walking. . .by native tracks, across running creeks, quagmires and swamps, across rough ridgy country, steep and always wet and slippery, across deep alligator infested creeks over swaying logs and so forth. It also involved about 60 miles of travelling by native canoes of frail type (Figure 8) on the Murik Lake and in the Sepik River' (Jensen, 1925c).

On March 28, 1925, Jensen recommended that Ormildah drill an exploratory well at Banan. He still had some concerns about the thickness of section, and he selected the Banan dome because it was farthest from the 'old continental rocks (with) a chance of passing through a much thicker series of Mio-Pliocene rocks with successive oil horizons.'(Jensen, 1925c).

Jensen then proceeded to Madang and spent two months mapping (Figure 8) in the Astrolabe Bay area in a licence held by Ormildah affiliate, Barum River Oil Company. He recognized a continuity of the basin from the Marienberg area and considered that the Ameli Limestone of the Gogol River area near Madang was the equivalent of the Banan Limestone at Marienberg. Outcrops revealed a section thickness of c2000 m below the Ameli Limestone, and Jensen suggested that a similar thickness of sediment could be expected in the Banan anticline (Jensen, 1925d).

Marienberg-1

Marienberg-1 was spudded at Banan on August 25, 1925 using a cable tool rig (Figure 9). The well was expected to 'yield oil between 700 (213 m) and 1,500 feet (457 m), with better pools at greater depths up to 4000 feet (1220 m)' (Jensen, 1925e).

A resume of the well results written for the Ormildah Company by Dr Jensen is included as Appendix

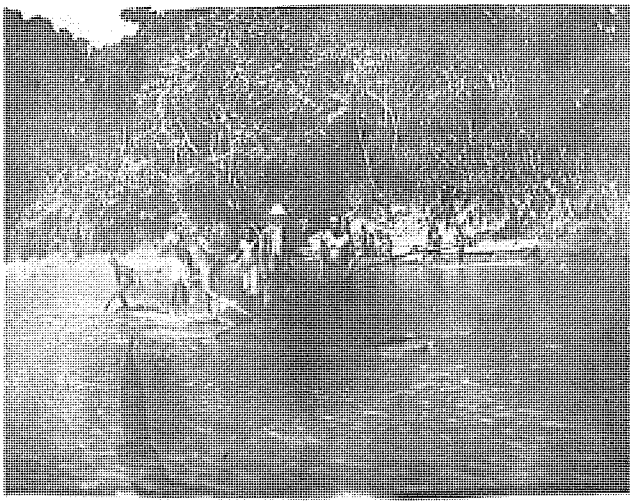

Figure 8. (a) Jensen on native raft. (b) Jensen with native party. Photographs courtesy of John Oxley Library, Queensland.

2; the diagrammatic well-log from that document is reproduced as Figure 10.

The Banan Limestone was thinner than expected, and was underlain by dark grey-brown mudstones, as expected by analogy to the Astrolabe Bay area. The section was 'highly favourable for oil' Jensen (1925e) reported. 'As soon as sandstone or conglomerate bands are met with, the appearance of showings of oil may be hopefully looked for'.

At 107 m shoreline 'shell sands' were encountered and a small show of gas was recorded (Jensen, 1926a). The 10 inch casing was set at 122 m but no further shows were encountered. Glauconitic shales persisted to 183 m where drilling ceased on November 13, 1925 because of a shortage of 8 inch casing. Water shortages and labour problems had restricted drilling during the period to a few hours per day.

This early period was to prove typical of the well.

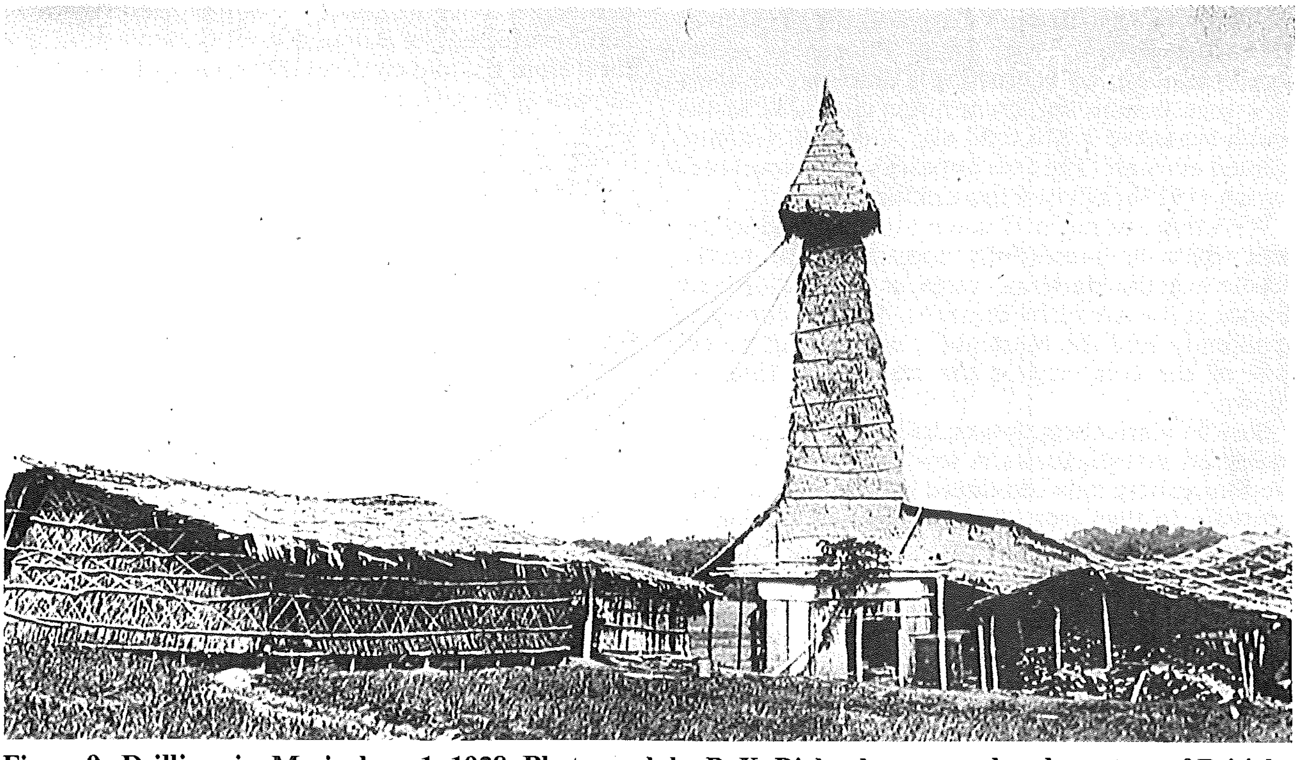

Figure 9. Drilling rig, Marienberg-1, 1928. Photograph by R. K. Richardson; reproduced courtesy of British Petroleum, London.

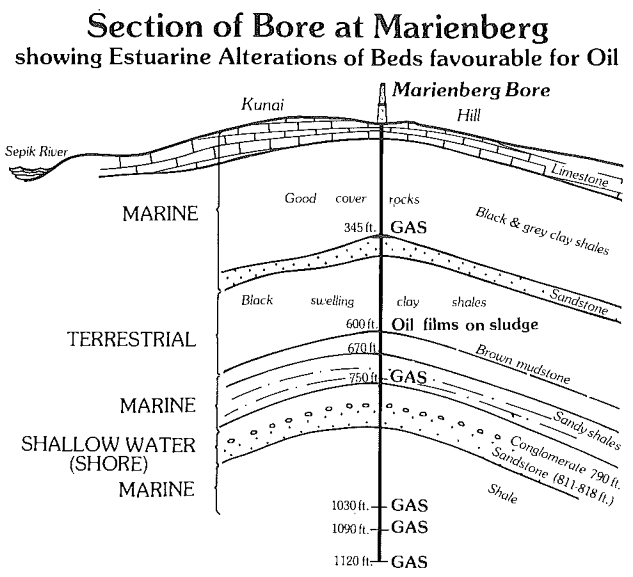

Figure 11. Marienberg-1 section, 0–341 m, by H. I. Jensen. (Redrawn from original in John Oxley Library, Queensland).

The whole history of Marienberg-1 is a never-ending wait for reservoir facies - amid never-ending indications that the facies change was imminent, and just enough hydrocarbon shows to make belief possible. Jensen believed that oil deposits were associated with regressive depositional cycles: that oil formed in 'peaty and coaly beds', and accumulated in overlying littoral sands. Any evidence of a change from marine to shoreline facies was eagerly sought.

When drilling resumed in February 1926, the driller reported black swelling clay and an oil stain in the slush drain. 'Big possibility of striking oil 1000 ft (305 m)', he wrote in the well log-book. Jensen (1926b) agreed: the swelling clays were 'pounded up soft shale rich in vegetable matter of fresh water origin. . .The prospects of oil at 1000 ft (305 m) are excellent. . . good showings are likely from 700 ft (213 m) down in sandy strata. . .'

At 229 m the shales did become very sandy, and a strong gas blow occurred at 231 m. Hopes soared in the Ormildah office. Reports came by cable every few days, always running a few days behind, and the delay only adding to the excitement and anticipation. Even as they read of the gas shows, the well could be flowing oil!

It never was, of course. Once again the zone proved thin, and excitement abated.

The 8 inch casing was set at 250 m, and drilling continued, still very slowly, at about 30 metres/month, in grey-green shales and occasional thin sandstones and conglomerates. These strata were thought to be of very shallow marine origin because of the broken shell remains, and shoreline facies were expected daily. Further gas shows occurred at 314, 332 and 342 m — just prior to the Annual Shareholders' Meeting in Sydney in June 1926.

By this time, Ormildah was in serious financial trouble. A request for a subsidy from the Commonwealth Government had been turned down earlier in the year, and without additional funding, drilling could not continue. Jensen gave the shareholders a diagrammatic sketch of the Marienberg structure (Figure 11) and urged them not to be discouraged. 'It was not to be expected that in such a gentle anticline as that of Marienberg there would be much migration in the upper 1000 ft. . . That so much gas had been encountered, (and so little water). . . indicated that the bore was going down on a good anticlinal structure' (Jensen, 1926c). The shareholders voted additional funds, and drilling continued for two months.

The section to 424 m consisted 'almost wholly of a foraminiferal deposit. . .generally termed globerigina ooze' (Jensen,1926d). Given that they were hoping for shoreline facies, the change to a bathyal environment might have allowed some disappointment; not to Jensen. In the first instance, similar beds were common in the Tertiary oilfields of the Near and Far East, and many geologists thought them the source of the oil. While that didn't impress Jensen, he knew it would impress the shareholders. For himself, the real importance was otherwise.

'The occurrence of the deepwater (foraminiferal) beds must be studied in conjuction with the Ramu Fault. . . A fault of such large dimensions never, according to geological experience, happens as a sudden cataclysm. It takes place in gentle stages. The down faulted area would first have its valleys silted up with boulder beds and marsh muds. Then it would be completely submerged and would become covered with littoral deposits: then we would get blue and green muds of shallow marine origin laid down; then as subsidence continues the deep water deposits like the globerigina ooze.'

'We will therefore probably pass from our deep water deposits into more mudstones and sandstones of shallower marine origin, in which more gas blows with or without petroleum indications will be struck. Below that we will enter littoral sandstone and conglomerates in which the channels of payable oil will be excellent. Below shales, sandstone and pebbly bands and coaly or peaty seams which in my opinion will constitute the main source of oils' (Jensen, 1926d).

The log books for this period are not clear. It appears that drilling ceased at 424 m in early August 1926 and did not resume until late in the year. The new crew cleaned out the hole and drilled to 473 m by early 1927 when operations were suspended. Jensen (1927a) blamed the delays on 'changes of drillers and difficulty experienced in getting steady and reliable men to stay at their posts in the wilds'.

The section below 424 m was shale and mudstone, with occassional shelly bands. 'Black lignite like fragments' were observed in cuttings at 433 m, and a weak gas flow at 434 m. Jensen interpreted these shales and shelly bands as evidence of shallower water conditions, as his model predicted. Publicly he remained as optimistic as ever: 'I fully anticipate favourable results within the next 500 to 600 feet. . .' Privately, his concern was growing that the estuarine facies might be too deeply buried.

For the first time he warned shareholders that the Banan site was not 'the most favourable. Better sites could have been got about a dozen miles west, but the accessibility from the Sepik. . .' was prohibitive. It is hard not to see some rationalization in this. The western sites had been downgraded because of the probability of shallower basement there. Now, as Marienberg-1 drilled on and on in deep-water facies, a thinner section looked increasingly attractive!

Drilling resumed in June 1927. During cleanup operations, cavings and mud from the interval 453–473 m yielded a faint flourescence, and fragments of lignite and ashphaltum. At 517 m gas was encountered in a sandy shale full of shell fragments. Drilling progress was now relatively rapid, and much excitement attended the cables from the rig site.

August 1st: Depth 1718 ft (524 m). Strata grey shale and shells. Gas coming up from bore and we are of opinion oil.
August 4th: Gas smelt strongly of kerosene.
August 13th: On August 8th, depth was 1880ft (573 m). . . strata as before, gas still coming up between 6 inch and 8 inch casing, causing tightening of casing.

'The caving and tightening of casing is probably due to proximity to a strong gas blow', Jensen (1927a) noted. 'On more sandy strata being encountered, which should occur within a few hundred feet, strong gas and more plentiful and stronger oil showing can reasonably be expected.'

'There is little doubt that we passed through an oil horizon.', Jensen (1928b) wrote after seeing the samples from this zone. 'Between 1800–1820 ft (529–535 m) the drillings and washed pump material contained fragments of asphaltum, which burned with a tarry odour and dissolved, giving a strong brown colouration to chloroform.' (Jensen, 1928c).

By Christmas 1927 - when drilling stopped for the holidays - the well had reached 724 m, in 'calcareous shales, sandstones and mudstones with abundant foraminiferal remains' (Jensen, 1928a). Salt water had begun to flow into the hole at c720 m at a rate of c150,000 litres/day. Ever the optimist, Jensen viewed the higher sand content between 701 and 724 m, and the presence of broken shells and foraminifera as indicative of higher energy conditions. 'The change may be near', he advised the Directors. 'Care should be taken to shut off the water, if possible, and to install apparatus for controlling the gas and oil that may be met with. . .'

The 6 inch casing was set at 732 m when operations resumed in the New Year, and drilling continued with 5 inch tools. The early results offered real encouragement. The grey shales, presumed to be shallow marine facies, had persisted to 791 m but, at that point, a 'gritty conglomerate with quartz, metamorphic and volcanic pebbles' marked a distinct change in environment. Over the next 30 m 'similar bands of conglomerates occurred, intercalated between sandstones and shales, all of which contain coarse gastropod and lamellibranch remains. . .'

'We are back again in shore deposits', Jensen (1928c) concluded. 'An unknown thickness of estuarine deposits' - and all their hopes - were expected below. Water was continuing to flow into the hole, causing caving and running sands, and drilling operations were increasingly difficult.

At 825 m on March 10, 1927 the casing jammed during efforts to drill through a conglomerate bed. On March 13, during an attempt to raise it, the casing broke near 547 m depth. All efforts to recover it with a casing spear failed, and the well was abandoned. The last day in the log book was March 30, 1927, 2 years, 8 months and 5 days after the well spudded.

Marienberg-2 Recommendation

Jensen immediately recommended that a second well, Marienberg-2, should be drilled on the Gavieng Dome to the west.

'The bore has fully established the petroliferous nature of the strata, the sufficiency of the thickness of the sedimentary beds to yield payable oil supplies, and the close geological relationship in age and nature of strata of this region with other Miocene oilfields of the east. . .The good structure traversing the area from east to west is corroborated by the frequent gas blows met with and the paucity of water supplies encountered in the bore.' (Jensen, 1929a).

'By shifting our next bore west towards the (Ramu) fault, we may reduce the thickness of marine series to be encountered, besides getting higher up the anticline. . .'

Ormildah's new Managing Director, Frank Innes, agreed with the recommendation but lacked funds to implement it. A new share issue was essential. At the same time he knew it was impossible to attract the substantial capital needed until the so-called Anglo-Persian report on the Territory's oil prospects was released - and then only if the report was favourable regarding the Marienberg area. Innes had no reason to suspect otherwise - his faith in Jensen was unshakeable - and he began to plan accordingly.

Innes acquired leases in the Roma area, then booming on Australian bourses, restructured the company as Roma Ormildah Oil Development Company Ltd, and announced a new share issue to fund drilling at Roma and Marienberg. Early in 1929, Ormildah's New Guinea Manager reported that Dr.

Papp, the Anglo-Persian geologist, had told him 'that (Ormildah) had a good area and he would report favourably on it'. Ormildah had their prospectus ready, and their hopes on hold.

The Anglo-Persian Report

The Anglo-Persian Oil Company (later British Petroleum) had been commissioned by the Federal Government in 1927 to evaluate the petroleum possibilities of the (then) Mandated Territory, concentrating on areas under licence to private companies. The Ormildah Licence area was studied by Dr. Simon Papp late in 1928, a few months after the well was completed.

Contrary to Ormildah's confident expectations, his final report on the area (Papp, 1930) was very negative. The covering report by Dr Richardson (1930), head of the Anglo-Persian party, was equally dismissive.

'There are no favourable structures for oil accumulation. . .this area is only gently folded and the present structure is due to block faulting' (Figure 12). 'The Ormildah company's well is located on the flank of a monocline of which beds are dipping 10–20 degrees towards the south east.' (Papp, 1930).

'No direct oil indications were seen on the surface'. There were no 'proper free oil traces' in the well, and 'the pressure and quantity of gas must have been small since they had no eruptions even when the well was dry'.

'Taking into consideration all present available geological evidence', he concluded, 'there is not much hope of finding oil in exploitable quantities'.

Papp was critical of Jensen's mapping, and said so in no uncertain terms. 'The impression received is that only a very superficial examination was undertaken by Dr Jensen. His geological map of the Ormildah Company's property is entirely incorrect'.

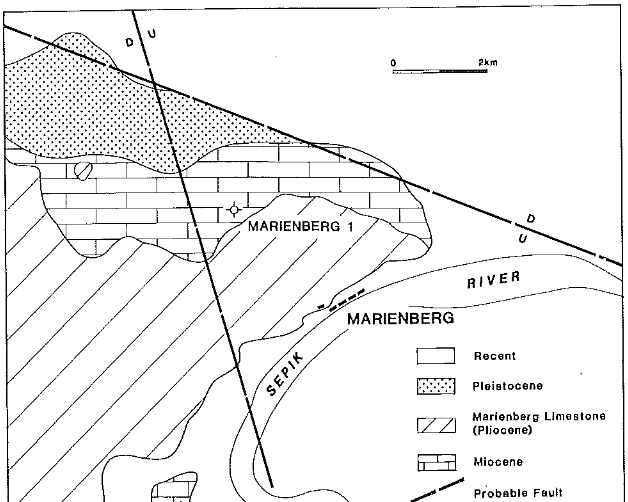

Figure 12. Dr S. Papp's Geology map, Marienberg Area. (Redrawn from Papp (1930).)

This report was a devastating blow to the company, the more so because of Papp's reported good opinion of the area. 'It is, to say the least, extraordinary' Innes (1929) wrote to Jensen, 'that the official report should turn out to be just the opposite. . . It would almost appear some influence has been brought to bear on Papp to alter his report.'

Quite how the confusion arose is not known. Papp's comments seem too clear and too blunt to be anything but his honest views. Perhaps Ormildah's Manager misunderstood a politely vague remark, or heard what he wanted to hear. In the end, it was just one more story told as 'proof' of the Anglo-Persian's conspiracy - sometimes with Commonwealth collusion, sometimes without - to hide the truth of New Guinea's oil potential!

'Nobody in the Territory ever thought the Anglo-Persian company wanted oil.', G.A.V. Stanley (1930) remarked derisively. 'They are about fifty-fifty with the Commonwealth in refining Anglo-Persian crude oil from Persia, they would want to be a benevolent institution to try to get oil at Papua and nobody who knows them credits them with being that'.

For years the Anglo-Persian Company's special entitlements and Government subsidies in Papua and the Mandated Territory had been resented. Now their report to the Federal Government, dismissing area after area as unprospective, read like an obituary on New Guinea's petroleum prospects - and on the fortunes of many companies and individuals.

Jensen's Reply

Jensen was infuriated.

'The conclusions of Dr. Richardson and Dr. Papp are entirely at variance with their own data which shows either a lamentable lack of practical knowledge of field work and of nature, or a determination to get a damnatory report out by hook or by crook.' There was 'nothing to dispute in the vast amount of padding in Dr. Papp's report as regards geography and accessibility, climate and vegetation etc. It is his stratigraphy and interpretation of geology, which are more or less at sea.' (Jensen, 1929c).

The main point of criticism was Papp's interpretation of the surface geology and topography in terms of faulting. Jensen (1929c) considered this ridiculous: 'Papp's map would not have passed in second year work under Professor David'.

Nor did he admit any value to their emphasis on the absence of oil indications. 'If wide Tertiary areas in New Guinea like Marienberg are to be condemned because there are no seepages, the best plan of campaign for the Commonwealth to adopt in the search for oil is not to send out Anglo-Perian geologists, but to send a bottle of crude oil to every District Officer and to let a gang of natives taste and smell it, and send them abush to scour every part of the country for crude oil seepages.' (Jensen, 1929b).

'I am not prepared to attach any weight to any of the conclusions of the A.P. parties.', he concluded. 'They have delighted in casting slurs on previous work which shows either want of experience and conceit, or intention to do so, especially in regard to myself, to prevent the search for oil in Australia.' (Jensen, 1929c).

Epilogue

Whether or not Jensen won this verbal battle did not matter, he - and Ormildah - had lost the war. The new share issue, scheduled to capitalise on a favourable Anglo-Persian report had only limited success. The company was unable to fulfil its 1930 obligations on the Marienberg Licence, and it was cancelled. At the same time, however, Ormildah acquired a 50% interest in Aitape Oilfields' licence on the north coast, an area favourably described in the Anglo-Persian report. This caused some friction between Ormildah and Jensen who felt the action reflected on him. Despite assurances from Ormildah management (Innes, 1930) the rift widened into a disagreement over ownership of leases at Roma.

The company dropped the Roma leases and name in 1931, and acquired 100% of the Aitape block. From 1932–38, the area was explored by Oil Search in conjunction with its own Special Licence 1 over the region. In 1938, in a confusion over dates, Ormildah missed payment of the $20 annual fee, and the licence was cancelled. Ormildah protested and pleaded all the way to the Prime Minister (Innes, 1938) but to no avail; there was no legal basis for reinstating a permit (Hogan, 1938). Bereft of permits or capital, the company was declared defunct and struck from the registrar in 1939.

Jensen continued to work as a consultant until 1937 when he became Senior Geologist for the Geological and Geophysical Survey of Northern Australia, retiring in 1945. He was a methodical man who wrote extensively on scientific, political and economic matters, and kept life-long, orderly files on many subjects. On his death in 1945, these papers were donated to the Oxley Memorial Library in the Public Library of Queensland. Among them was a researcher's fantasy of files on the Marienberg venture, even down to original hand-written geology reports and working sketches.

His nemesis, Simon Papp, became Chief Geologist for Anglo-Persian, before returning in 1932 to his native Hungary where he worked for Maort, a Standard Oil subsidiary. He retired as Vice President/Manager in 1947, and became Professor of Oil Technology at the National Mining Academy. In 1948 he was arrested and sentenced to death for alleged crimes against the Communist Government. Worldwide protests from scientific organizations saw the sentence commuted to life imprisonment. He was released in 1955 and died in 1970 in Budapest.

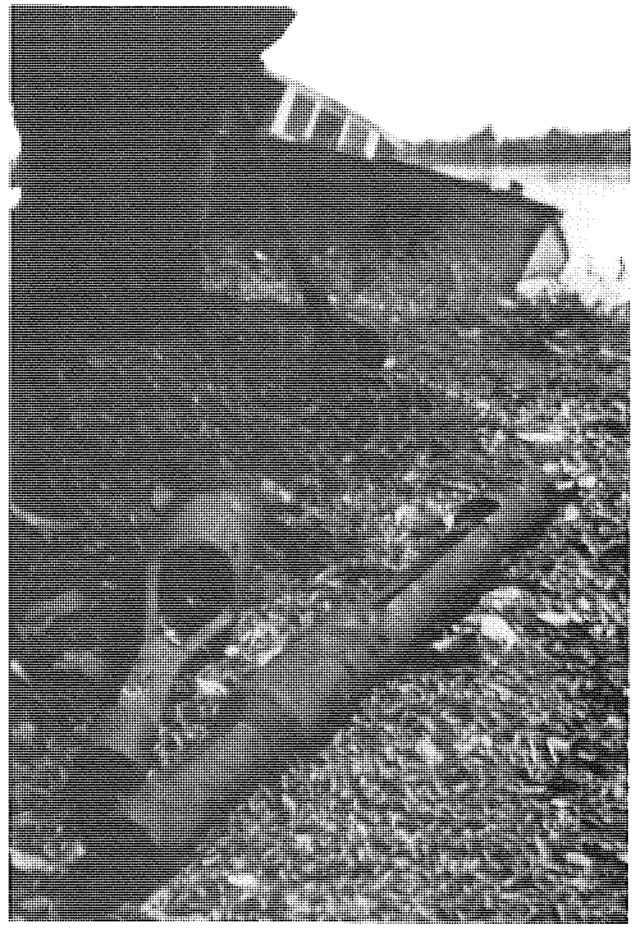

Figure 13. Cable tools and equipment found at Marienberg, 1969.

The drilling rig and plant was given to the Mission. The rig was dismantled and taken into Marienberg where, in myriad pieces, it became part of the mission fabric. Heavier pieces such as the cable tools were piled beside one of the sheds and forgotten. They were still there in late 1969, covered by several decades of river silt and leaves, along with the relics of the war (Figure 13).

The boiler was moved into the jungle nearby, to a site called Nazareth, where it powered a sawmill until the Japanese invasion in 1942. After the war, the sawmill was re-established beside the river at Marienberg, but the boiler was left behind. Nazareth became hap belong masin, a strange, eerie place, with the old boiler overgrown by the jungle, and a nesting place for wild bees (Figure 14).

At the well site itself, warm salty water flowed up and formed a shallow pool around the broken casing, and gas has frothed and bubbled on the surface ever since. Passers-by still set the gas alight, and wonder

Figure 14. The boiler in the jungle at hap bilong masin, 1969.

about the mystery and magic of it all. Long ago, no doubt, some Sepik poet found a song to sing of madmen.

A eulogy?

Jensen's (1926c) words are the best:

'The Marienberg bore had yielded very satisfactory results — although we would have all have been more pleased to have had a gusher'.

Acknowledgements

A great many people helped solve the Marienberg-1 mystery. Robyn Purcell, as ever, played Watson well. Notable also were A. Denmead, formerly of the University of Queensland; Miss A. Ford, formerly Secretary to the Ormildah companies; and Miss M. Walker, at the Oxley Memorial Library. My thanks to Conoco, especially John Stanley, for support on the project, and to the John Oxley Library, Brisbane, and British Petroleum, London, for permission to publish photographs.

I owe a special thanks to P. and M. Babao. My daughter lived with them at Marienberg as a child. By delightful co-incidence, she typed this manuscript in Perth two decades later.

Appendix 1

Original Geology Reports on Marienberg-1

(These two reports were written by Dr H.I.Jensen for Ormildah Oil Development Company Ltd (Jensen, 1925c; 1929a) and reproduced with minor changes in the 1929 prospectus for the Roma Ormildah Associated Oil Fields Ltd. They are reproduced verbatim here to provide ready access to the main source documents on the well.)

Geology of the Marienberg Area by Dr H.I. Jensen, D.Sc.

1. Location The area now described is an area lying north of the Lower Sepik River, extending from that river to the sea. The portion suited for geological investigation (i.e. not swamp) commences about four miles N.E. of Marienberg, and extends west to a line joining Angorum to a point two miles west of Kaup. This line runs approximately N.N.W. This is the area which I recommend to the Company as my preferential choice.

2. Topography The area differs materially from the country seen higher up the river. The Middle and Upper areas consist of vast swamps interspersed between ridges and rough ranges of metamorphic and igneous rocks. In the Marienberg area, Dr Behrmann's map does not show any ridges. However, Stanley's Report (Parl. Paper No. 18 of 1923) shows ridges from 300 to 600 feet high (an extension of the Hansemann Range) in the area. The report by Stanley is correct in that respect, though the range is not continuous, nor does the average height of the hills exceed 300 feet in many places except west of the line joining Angorum to Kaup. The hills are composed of limestone, calcareous sandstone and shale. The calcareous sandstone areas are usually open Kunai (var. of blady grass) country. The rough limestone country (forming the higher hills) is covered with jungle, largely softwood, while the shale and sandstone country is also jungle, largely hardwood.

3. Geology The geological map, Page 18–19, (Editor's note: Refer to Figure 7, this paper) shows the topography of the area, the extent of the sac-sac (sago) swamp and lake country found on my journeys and the correct position of the villages, as found by triangulation to the islands off the coast.

Since the geological map shows the entire geology it is sufficient to briefly summarise the main facts, full notes on which I have prepared in my diary. The geological details would only encumber a report like this and be confusing to the readers.

The interior of German New Guinea (Mandated Territory) is composed essentially of very old metamorphic rocks. There appear to be patches of sedimentary Tertiary rocks as thin cappings in various places high up in the mountains, as instanced by Stanley, Behrmann and others, but such patches, mere fragmentary residuals, are of little use from the oil prospecting standpoint.

The Tertiary areas fringe the coast, as Stanley's map shows. The Marienberg area he left uncoloured which might be according to the legend of the map, intended to imply either metamorphic or undetermined rocks. As no geologist appears to have examined it before and as geologists working towards the mouth of the Sepik from Aitape found igneous rocks and metamorphic formations between Wewak and Kaup at the Mom headlands, Stanley seems to have assumed that the metamorphic rocks of the Prinz Alexander Gebirge extended through the hills to Marienberg.

I have, however, now definitely proved, by the traverse made, that the line joining Angorum to Kaup, is Tertiary ranging from Mio-Pliocene (the oil formations of New Guinea) to Pleistocene. The evidence obtained is very strongly in favour of the existence of an extension of the Ramu fault. Along the edge of the metamorphic boundary, west of Kish and Kaup, there was found a belt of coarse boulder beds underlying calcareous sandstone and obviously directly overlying the metamorphic formations. As subsidence proceeded east of the fault, bed after bed was laid down in the subsiding area, which might be described as the Sepik-Ramu Tertiary Bay. Some of the last Tertiary sediments were deposited even up the Sepik valley west of the fault line, as far as Maiam, but such deposits were only thin freshwater deposits, below which at a shallow depth one will get only the old rocks similar to those of Timbunke.

About one mile west of Angorum compact limestone and calcareous sandstone of the Waskuring type (a compact bedded and sandy-looking stone consisting mostly of carbonate of lime) occurs, while at Angorum itself very recent coral limestone is found in outcrops containing inter alia shells of pecten and ostrea. It is not certain whether the compact rock is merely the basal cemented portion of the Late Tertiary or an outcrop of an older Middle Tertiary rock, but I consider the latter likely, and such a wide discrepancy of age in a distance of a mile points to the Ramu fault passing about one mile west of Angorum. The dip of this compact limestone could not be seen owing to the flood waters submerging the formation. Only loose specimens of the rock could be got on the banks of the creek.

The country east of the Ramu fault and lying between the igneous and metamorphic formations at Mom and the similarly old country south of the Ramu estuary formed a bay in Middle Tertiary times which lasted nearly to the end of the Pleistocene. The old Sepik and Ramu Rivers emptied into this bay. Presumably old rocks underly this area and subsidence went on as a result of sedimentation aided by the Ramu fault. First conglomerates were laid down, then sandstone and mudstones probably with interbedded lignites. These lower rocks of the Tertiary series do not, however, show in this area in outcrops owing to the Ramu Kaup fault. The waters deepening through subsidence, limestone was laid down. Probably these are many beds of limestone separated by shale soapstone and other sediments, but only two limestones are actually evidenced in outcrops, viz. the Mio-Pliocene limestone with Orbitolites, nummulites, miliolina, nubecularia, pulvinulina and etc amongst the forams, innumerable gastropods and lamellibranchs and some corals, and the recent limestones, which are composed mostly of coral, though globigerina ooze underlies it.

The Mio-Pliocene limestone is overlain by calcareous sandstone (Waskuring Type), that again by non-calcareous greenish shale or bluish shale with a soapy feel. The shale is overlain by a pisolitic sandstone full of ironstone concretions, that again by a sandy mudstone in which bands of encrusting coral were occasionally seen (eg about 2m S. of Waimum). On the ocean beach at Morik this sandstone is broken off in fragments below the low tide line by the breakers, and appears a black sandstone. Above this, on the north coast, we have peaty sandstones, peat beds, and some clay beds underlying the present-day sago and mangrove swamps.

The Mio-Pliocene limestone, we may term here, the Banan limestone. This outcrops in the Kunai hills north of Marienberg. It forms the axis of the high ground from Chook to Gavieng. The final elevation of the ridge has taken place in sub-recent times, for there are fragments of Pleistocene coral reef around Marienberg, Banan and Mansip, encrusting the Mio-Pliocene limestone exactly similar to that overlying the Pleistocene sandy shales at Waimum and Angorum. This, of course, indicates a Pleistocene elevation forming an island between Gavieng and Chook followed by a subsidence, preceding final elevation. The last uplift was rapid and the course of the Sepik is parallel to the axis and follows a synclinal trough. Angorum is practically in the centre of the syncline.

On the axis of elevation, I have selected a bore site as marked. The elevation of the axis commenced earlier and was more pronounced behind Marienberg than at Mansip, though at a point one mile west of Gavieng, there appears to be a still more pronounced uplift, the erosion of which has exposed a coarse gritty sandstone underlying the Mio-Pliocene limestone and on soil indications, overlying shale.

I do not consider the western part of the basin nearly as well suited for oil prospecting as the eastern, since proximity to the old continental rocks will make the basin shallow in this part, whereas, in the Marienberg portion there is a chance of passing through a much thicker series of Mio-Pliocene rocks in successive horizons.

As the geological map shows, the Marienberg Gavieng anticline has on it two areas of special elevation forming domes upon it, viz. that of Banan and that of Gavieng. The col. on the range separating these two domes is north of Mansip and shows greenish-grey soapstone shale with plant (sac-sac) fossils superimposed on limestone. This is about 2 miles N. of Mansip. A little further south, in a creek, we descend into the underlying limestone. Furthe rsouth again we get the shale and a little pisolitic sandstone and about four or five miles south of Mansip, we have superimposed on these, coal limestone (Pleistocene) at Waimum. Proceeding further south, we again get on the sandstone and pisolitic sandstone country, with a few coral cappings, and turning SW, toward Angorum the same type of country persists. About four miles north of Angorum, in a creek heading near Gavieng, the same bedded sandy mudstone were met with (Pleistocene).

4. Oil Geology No oil seeps have so far been seen in the area, but the general geology is favourable. As already mentioned, we have a pronounced anticline striking ENE, WSW between the village of Chook, NNE of Marienberg and Gavieng. On this there are two domes, the Banan dome and the Gavient dome. The former done overlies the deeper and more likely portion of the basin.

5. The Gas Seep at Maisan This was visited and examined. Mr Stower put down a test bore to 25 feet (mud to 16 feet, below that peaty sands with shell fragments). The bore increased the gas blow threefold to between 3,000 and 5,000 c. ft per diem. The gas burned with a yellowish flame, smoky at the tip. When burnt it emits an alcoholic smell.

I do not think that this gas comes from oil horizons at a depth, but it is not superficial from the surface peats, since boring increased the flow. It probably is produced in peaty beds at a depth of between 25 and 100 feet in the Pleistocene and sub-recent clays. The fermentation is probably produce of oil, but not in large quantities, not under conditions capable of producing workable pools at the present day. The gas is probably methane, with a little ethane and alcohol.

As the Morik-Kaup coast is definitely subsiding, at the present day, the beds now undergoing fermentation may in a future geological period become well sealed, suitably folded and contain stores of oil. The traces of oil now forming are probably leaking out and helping to form the oily scum noticeable at the meeting of salt and fresh water along the fringe of the Morik Lake. This is probably, in part, vegetable oil still, and does not occur in a film thick enough for collecting.

6. Conclusions The conclusions arrived at from my examinations are:-

(1) That the Marienberg area west of the Ramu-Kaup fault is Tertiary and of the same geological age as the country of the north coast (Aitape-Matapau) carrying oil seeps.

(2) That there is in the Chook-Gavieng anticline a very favourable structure for oil.

(3) That at two points, Banan and Gavieng, the structure is dome-like.

(4) That the area, though only gently folded (dips ranging from 2 to 10 degrees), is not broken by any faults; there are impermeable as well as porous beds, and the structures are well closed in so as not to allow leakage of oil from the supposed oil beds underlying the outcropping Mio-Pliocene limestone.

(5) That this area will be more suited for oil drilling than any other part of the Territory that I have seen, being less disturbed and of larger extent.

Resume of Drilling Operations at No.1 Bore, Marienberg, by Dr H.I. Jensen

The uppermost strata passed through consisted of black soil and some limestone, but soon shales were entered. These and blue clay from the pounding of organic mudstone with occaional streaks of sandstone, dominated to the depth of 600 feet. The driller in charge noted occasional changes in colour from light to dark, blue to grey in the clays brought up and my examination of samples sent to Sydney for my inspection satisfied me that to 600 feet the strata were lacustrine or river deposits and not marine. The material was of exactly the same nature as the organic mudstones and shales with plant remains and lignitic banks which were found to underlie the Ameli limestone of the Astrolabe Area, and which are found south of Mansip, where the overlying limestone has been removed by denudation.

Between 600 feet and 750 feet calcareous and sandy shales with fossil shell remains were met with, which had been laid down under marine estaurine conditions. At the depth of 600 feet the head driller, Mr R Fair noticed films of oil to be floating on the balings. It is regretable that no samples were collected. At the depth of 400 feet, the 10 inch casing was sealed and cut off all surface water, water after that having to be put into the hole to enable the drilling to go on.

At 750 feet, the shales had become very sandy and at 756 feet gas was encountered, which burned with a strong yellowish flame. A bed of conglomerate was met with at 790 feet, and sandstone between 811 feet and 818 feet, the rest being sandy shales and mudstones to 900 feet. These strata were all of marine shallow water origin as shown by the broken shell remains. From 1,000 feet down to 1,030 feet, shale and mudstone continued to carry shallow water shell fossils, about 1,030 feet, another gas suply was struck and another at 1090 feet. A very strong gas supply was struck at 1120 feet in blue mudstones of marine deposition, but laid down in comparatively shallow water. The deposits from 1100 feet down indicated deposition in progressively deeper water, and from 1200 feet to 1390 feet foraminiferal sandstones, mudstones and sandy shales occur which are so largely made up of pelagic forminifera that one might call the horizon one of foraminiferal ooze. My examination of the samples from these depths satisfied me that the strata were mainly laid down in water at least 1000 feet deep, the organic remains being too perfectly preserved for shallow water deposition, and the species as well, pointing to deep water marine life. These conclusions were supported by a very complete scientific examination of all these remains, by the Commonwealth Palaeontologist Dr. Frederick Chapman, whose report is in the Company's possession.

Dr Chapman's report also fully bore out my own conclusion, that there was little hope of obtaining oil in this horizon, and also my previously expressed view that the strata were Upper Miocene.

The occurrence of similar foraminiferal ooze in the oil series of Java and Sumatra (also Miocene) had heartened the Company's new driller, Mr Crawford, into believing that oil was near. However, I pointed out that in my opinion we were unlikely to meet with payable oil sands until we again passed into estuarine strata, which obviously, from the principles of sedimentation, must underlie the marine deep sea deposits.

At 1390 feet grey shale with very hard bands was met with. At 1400 feet the driller commented "Grey shale with very gassy smell." Gas was encountered at 1423 feet, which burnt well with a pale blue flame (methane). Shales and mudstones all containing some foraminifera constituted the rocks passed through to 1465 feet and none of these gave any reaction for oil with chloroform, but the cavings and muds marked 1489, 1505, 1512 and 1530 feet all gave a faint reaction, and the pump washed material from 1526 to 1530 feet yielded fragments of lignite (probably of seaweed origin) and fragments of asphaltum, the latter dissolving readily in chloroform yielding a reddish brown solution. The fragments of asphaltum burned with a strong odour of kerosene. The strata were obviously petroliferous from 1465 to 1530 feet.

The rocks from 1530 feet to 1800 feet consisted essentially of shales and mudstones with foraminiferal and shell remains; that indicated progressively more shallow water conditions. The more porous mudstones were often saline, the harder shales seldom so, this condition being indicated by the rusting of the tins in which the mudstones were sent. At 1695 feet gas was again encountered in a sandy shale full of shell remains. The gas emanation became very strong about 1718 feet. The Company's manager reported that it smelt strongly of kerosene and burnt with a yellow flame. It appears to have been a wet gas. Lower down at 1800 and thence to 1820 feet, the drillings and washed pump material contained fragments of asphaltum, which burned with a tarry odour and dissolved, giving a strong brown colouration to chloroform. The drillings also gave the chloroform reaction.

We see then that two asphaltic horizons were passed through viz (a) 1465 to 1530 feet, and (b) 1800 to 1820 feet, each of which had a strong gas horizon 70 to 80 feet about it.

The drillers informed me that through all this period, the bore was making no water, or at most very little salt water, and that it would have been easy to pump it dry. Probably by pumping out the hole in either of these horizons, oil would have been obtained, but the drillers state that as both of these horizons were in caving material, they would not have been able to keep their casing free if they had baled the bore hole.

The 8-inch casing had been carried to and sealed at 902 feet, and if the 6-inch casing got stuck, we would have had to continue drilling with 5-inch tools, and would have had little chance of reaching our objective, the estaurine strata below. It is obvious now, that the 10-inch casing should have been taken to 550 feet and sealed there to test the oil horizon at 600 feet; the 8-inch casing should have been taken to 1450 feet and seated there to test the oil horizon at 1465 feet and it would have been still better if larger sizes of casing had been used, so that 8-inch casing could have been taken to the oil horizon between 1718 and 1820 feet.

These two petroliferous horizons, as it is, remain untested. No distinct evidence of further petroliferous horizons occurred from 1880 to 2300 feet, up to which depth mudstones and shales continued showing characteristics of progressively more shallow water conditions.

From 2300 to 2400 feet, the rocks passed through were sandy shales of calcareous sandstones with broken littoral shells, foraminifera and spicules all indicating shallow water except one remarkable band of Globerigerina ooze about 2380 feet, containing pelagic forms mainly presumably floated in with the tides had intercalated between littoral deposits.

From 2400 to 2595 feet grey shales of marine shallow water origin continued and at 2595 feet gritty conglomerate with quartz, metamorphic and volcanic pebbles and similar bands of conglomerates occurred intercalated between sandstones and shales, all of which contain Gastroped lamellibranch remains as far as the bottom of the hole. Thus we are back again in shore deposits below which an unknown thickness of estuarine deposits may occur.

Unfortunately, at 2703 feet, owing to a break of casing, further boring had to be stopped, and it is essential to sink a new hole.

The driller states that no water worth mentioning was met with before a depth of approximately 2360 feet below which water of a saline nature amounting to 30,000 gallons per day caused caving, and flowing sands which necessitated the operations that led to a break of casing.

It is considered that by sinking the next bore higher up the anticline on the Mansip or Gavieng suspected domes, the oil manifestations already encountered will be better and less water will be met with in the bottom littoral strata while a certain amount of drilling will be saved by starting in a lower horizon.

The Bore has fully established the petroliferous nature of the strata, the sufficiency of the thickness of the sedimentary beds to yield payable oil supplies and the close geological relationship in age and nature of strata of this region, with other Miocene oilfields of the East. It is regrettable that the oil horizons were not more fully tested.

The good structure traversing the area from east to west is corroborated by the frequent gas blows met with and the paucity of the water supplies encountered in the bore. However, as the anticline is tilted and more elevate to the west, than at No.1 Bore, it is practically certain that better conditions for oil will be got at Mansip or Gavieng.

Appendix 2

Continental Oil Company Investigations

Exploration in the Marienberg Area

Continental Oil Company of Australia (CONAUS) commenced exploration in the Sepik-Ramu Basin in Permit 41 in 1965. Field mapping in the Marienberg area confirmed the southeast dips reported by Papp. The Madang Aeromagnetic Survey (Continental, 1968) established a depth to magnetic basement of 1–2 km in the Marienberg area, and suggested the presence of a northwest trending basement ridge north of the well location. The Madang (1969) Seismic Survey (Purcell, 1970a) included a seismic line (Line 9) through the Marienberg-1 well site, and a continuous profile in the nearby Sepik River.

Line 9 (Figure 15) shows a relatively continuous reflector (Horizon C) dipping from NW to SE. At SP 1127, only a few metres from the well, this reflection is at 0.77 seconds TWT. This corresponds to a subsurface depth of approximately 790 m and can be correlated precisely with the top of the conglomeratic sequence. The structure on Horizon C is shown on Figure 16.

The seismic character on Line 9, and correlation with the magnetic basement depth suggests that the conglomerate beds immediately overlie basement. However, a very good jump correlation to the Sepik River profile, both as regards character and structure, suggests otherwise. An expanded spread in the river near Marienberg identified two reflectors below Horizon C, and suggests that basement is not shallower than 1.4 seconds TWT. This indicates a section thickness of c900 m between the conglomerate and basement. This agrees remakably well with Jensen's (1925d) original prediction of 1800–2400 m of section at the well site. Papp (1929) suggested that basement was about 800 m below TD, based on a correlation of the bottom-hole conglomerates to the conglomerates in outcrop near Kuap (Figure 7).

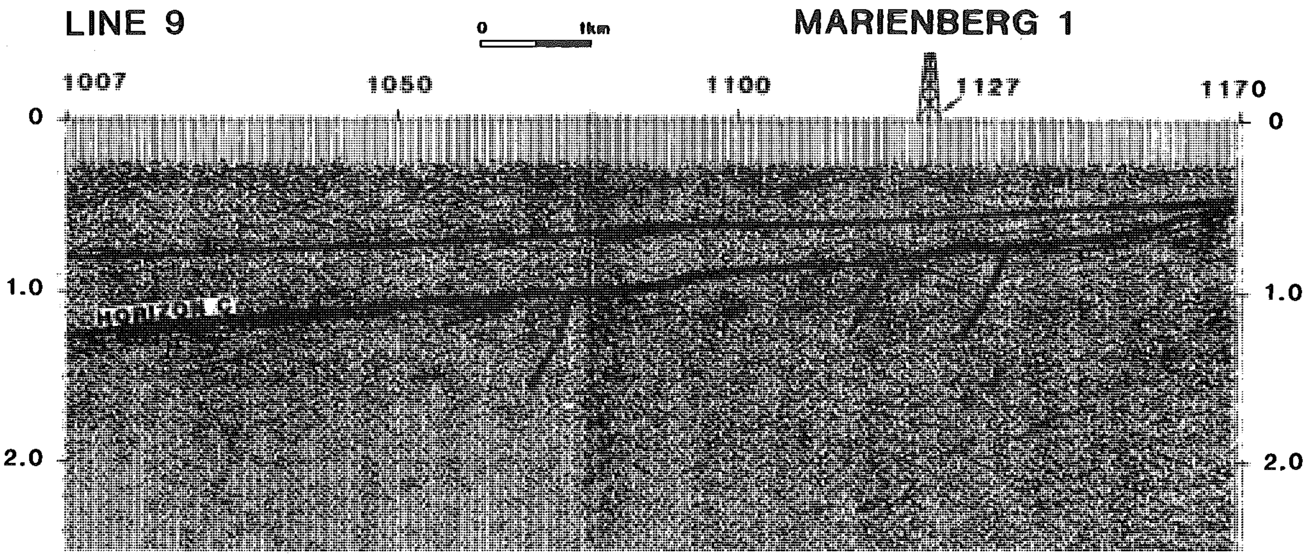

Figure 15. Line 9, Madang Seismic Survey (from Purcell, 1970a).

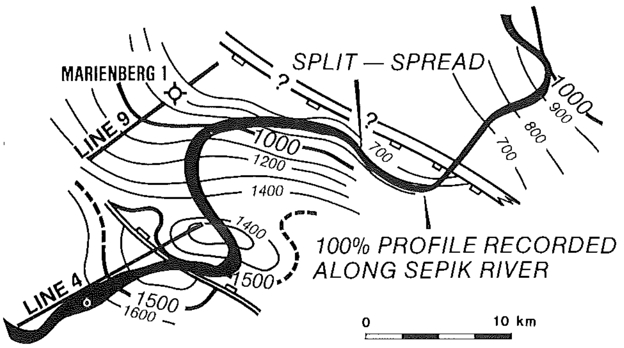

Figure 16. Structure Map, Horizon C, Marienberg area (from Purcell, 1970a).

Analysis of Marienberg-1 Samples

The samples from Marienberg-1 were located in a Bureau of Mineral Resources warehouse in Canberra - thanks to the patient and persistent efforts of Messrs Taylor-Rogers and Nicholas. In all, there were 63 tins and 41 pill-boxes containing washed residues, as well as 46 microfossil assemblage slides.

The samples cover the interval 365–790 m, generally at a 2–5 m spacing but with several gaps of c60 m. Samples from the upper 365 m and the basal 35 m could not be located.

J. Harrison (1970) examined the samples for CONAUS, and prepared a lithology log (Figure 17): 'Since the samples were disintegrated, washed and sieved the nature of the cementing material, sorting and roundness of the grains could not be determined with any degree of certainty. For this reason the lithology described in the log need not necessarily be a true representation of the rock types encountered in the hole.' The iron staining at around 500 m was attributed to oxidation of pyrite nodules in the sediments; the deep water environment reported at this depth (Keston, 1970) precluded interpretation of an erosional surface.

S. Keston (1970) examined the samples and slides, and determined the following biostratigraphic and paleo-environmental data.

AGE	SAMPLES
Pliocene	365 - 551 m
Lower Pliocene	614 - 621 m
Upper Miocene	641 - 790 m

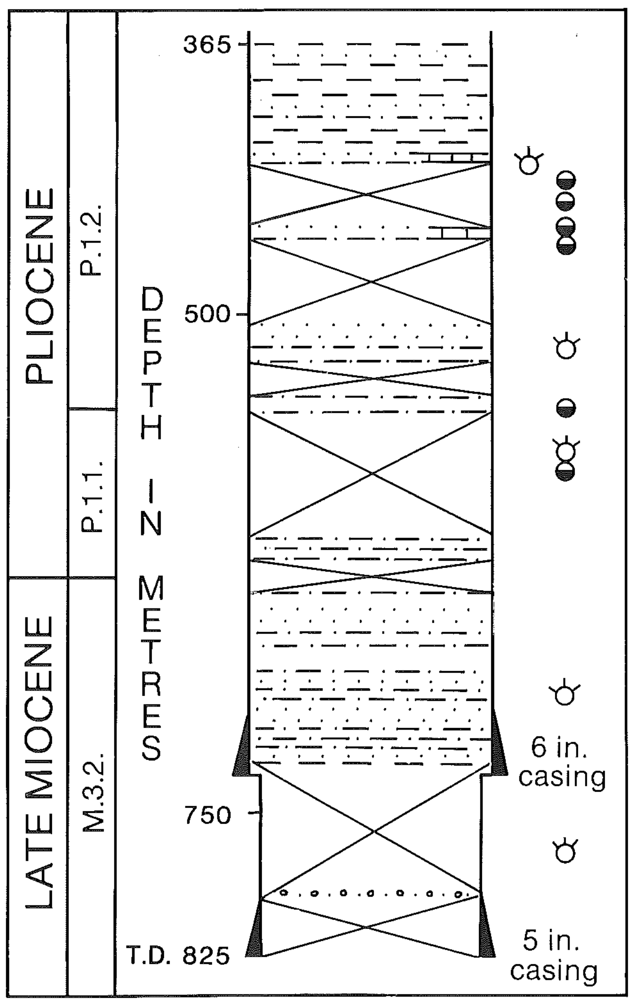

Figure 17. Conaus' Lithology Log, Marienberg-1. (Simplified from Harrison, 1970).

'The biofacies indicators point to a deep-water mode of deposition (outer neritic to bathyal range) for nearly the entire section. Samples between say 1800 ft (548 m) and 2200 ft (670 m) are even deeper (mid-bathyal). It was a type of restricted, deep-water basin, appears to have been silled, in which mudstones and possibly an occasional turbidite must have accumulated. These mudstones could be potential source rocks.'The fauna in samples at 695–701 m 'appears to be outer neritic in character, or even mixed neritic into upper bathyal environment, which may indicate slumping'. The deepest sample at 790 m had an impoverished but similar fauna, with no evidence of transitional facies and, correspondingly 'does not appear to be a basal transgressive sand' i.e. the conglomerate are probably debris-flows.

References

Age, The, 1919, Riches of Rabaul, Vast Oil Fields Discovered: 30 April 1919 Edition.

Harrison, J., 1970, Lithological Log of Marienberg-1: in Purcell, P.G., Marienberg No.1 - A History of the Ormildah Well: Continental Oil Company of Autralia report (unpublished)

Hogan, G., 1938, Letter to from Crown Law Office to Secretary for Lands & Mines: Department of External Affairs Correspondence File, 'Ormildah Associated Oilfields Limited', Commonwealth Archives Office CRS A518, Item AB 834/1, Canberra, ACT.

Innes, F.A., 1929, Letter (26/7/29) to H.I. Jensen: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Innes, F.A., 1930, Letter (15/8/30) to H.I. Jensen: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Innes, F.A., 1938, Letter to Prime Minister Hughes Department: Department of External Affairs Correspondence File, 'Ormildah Associated Oilfields Limited', Commonwealth Archives Office CRS A518, Item AB 834/1, Canberra, ACT.

Jensen, H.I., 1925a, Report on Geology and Oil Prospects of Ormildah Company's Lease, Upper Sepik River: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1925b, Further note on Marienberg Area: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1925c, Report on Marienberg Area: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1925d, Report on Astrolabe Area: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1925e, Letter (4/12/25) to Directors, Ormildah: Bureau of Mineral Resources Archives File, Notes to the Ormildah Oil Development Company on their leases in Mandated Territory of New Guines by the Consulting Geologist, H.I. Jensen, Canberra, ACT.

Jensen, H.I., 1926a, Letter (18/1/26) to Secretary, Ormildah: Bureau of Mineral Resources Archives File, Notes to the Ormildah Oil Development Company on their leases in Mandated Territory of New Guines by the Consulting Geologist, H.I. Jensen, Canberra, ACT.

Jensen, H.I., 1926b, Letter (11/3/26) to Directors, Ormildah: Bureau of Mineral Resources Archives File, Notes to the Ormildah Oil Development Company on their leases in Mandated Territory of New Guines by the Consulting Geologist, H.I. Jensen, Canberra, ACT.

Jensen, H.I., 1926c, Address (14/6/26) to Shareholders, Ormildah: Bureau of Mineral Resources Archives File, Notes to the Ormildah Oil Development Company on their leases in Mandated Territory of New Guines by the Consulting Geologist, H.I. Jensen, Canberra, ACT.

Jensen, H.I., 1926d, Letter (31/8/26) to Directors, Ormildah: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1926e, Circular to Shareholders,Ormildah: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1927, Letter (17/8/27) to Directors, Ormildah: Bureau of Mineral Resources Archives File, Notes to the Ormildah Oil Development Company on their leases in Mandated Territory of New Guines by the Consulting Geologist, H.I. Jensen, Canberra, ACT.

Jensen, H.I., 1928a, Report on Ormildah Drillings (1700–2375 ft): John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1928b, Resume of Drilling Results: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1929a, Resume of Drilling Operations at No1 Bore at Marienberg Prospect, in Roma Ormildah Associatied Oil Fields Ltd. Prospectus: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1929b, Preliminary Comments on Papp's Map: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Jensen, H.I., 1929c, Letter (6/10/29) to Captain Innes: John Oxley Library, Brisbane, Jensen Papers, c1905–65, OM69–29.

Keston, S., 1970, Palaeontological Report on Ormildah Well, Northern New Guinea: in Purcell, P.G., Marienberg No.1 - A History of the Ormildah Well: Continental Oil Company of Autralia report (unpublished).

Macandie, G.L., 1917, Letter (21/8/17) from Naval Secretary to Secretary, Department of Defence: Territories Branch, Prime Minister's Department, Correspondence File, Multiple Number Series: 'New Guinea - Oil Reports made during Military Occupation, 1915–1921', Commonwealth Archives Office: CRS A518, item Z834/1.

Roma Ormildah Associated Oil Fields Ltd., 1929: Company Prospectus.

Papp, S., 1930, Geology of the North-Eastern Part of Sepik District, Mandated Territory of New Guinea: in Anglo-Persian Oil Company - The Oil Exploration Work in Papua and New Guinea Conducted by the Anglo-Persian Oil Company on behalf of the Government of the Commonwealth of Australia, 1920–1929: London, Government Printer, 2, 65–79.

Petroleum World, 1919, Volume II, 169, 468.

Purcell, P.G., 1970a, Final Report, Madang Seismic Survey: Petroleum Search Subsidy Report (unpublished).

Purcell, P.G., 1970b, Marienberg No.1 - A History of the Ormildah Well: Continental Oil Company of Australia Report (unpublished).

Richardson, R.K., 1930, The Ormildah Oil Development Company's Concession - Covering Report on work of the Anglo-Persian Party: in Anglo-Persian Oil Company - The Oil Exploration Work in Papua and New Guinea Conducted by the Anglo-Persian Oil Company on behalf of the Government of the Commonwealth of Australia, 1920–1929: London, Government Printer, 2.

Wildcat Monthly, 1924, Ormildah Oil Development Company Ltd: January 11 Edition, 418, The Bulletin Newspaper Company, Sydney.

Wildcat Monthly, 1930, The Oil Search in New Guinea: August 2 Edition, 346–7, The Bulletin Newspaper Company, Sydney.

Stanley, E.R., 1923, Report on the Salient Geological Features and Natural Resources of the New Guinea Territory: Government Printer, Melbourne.

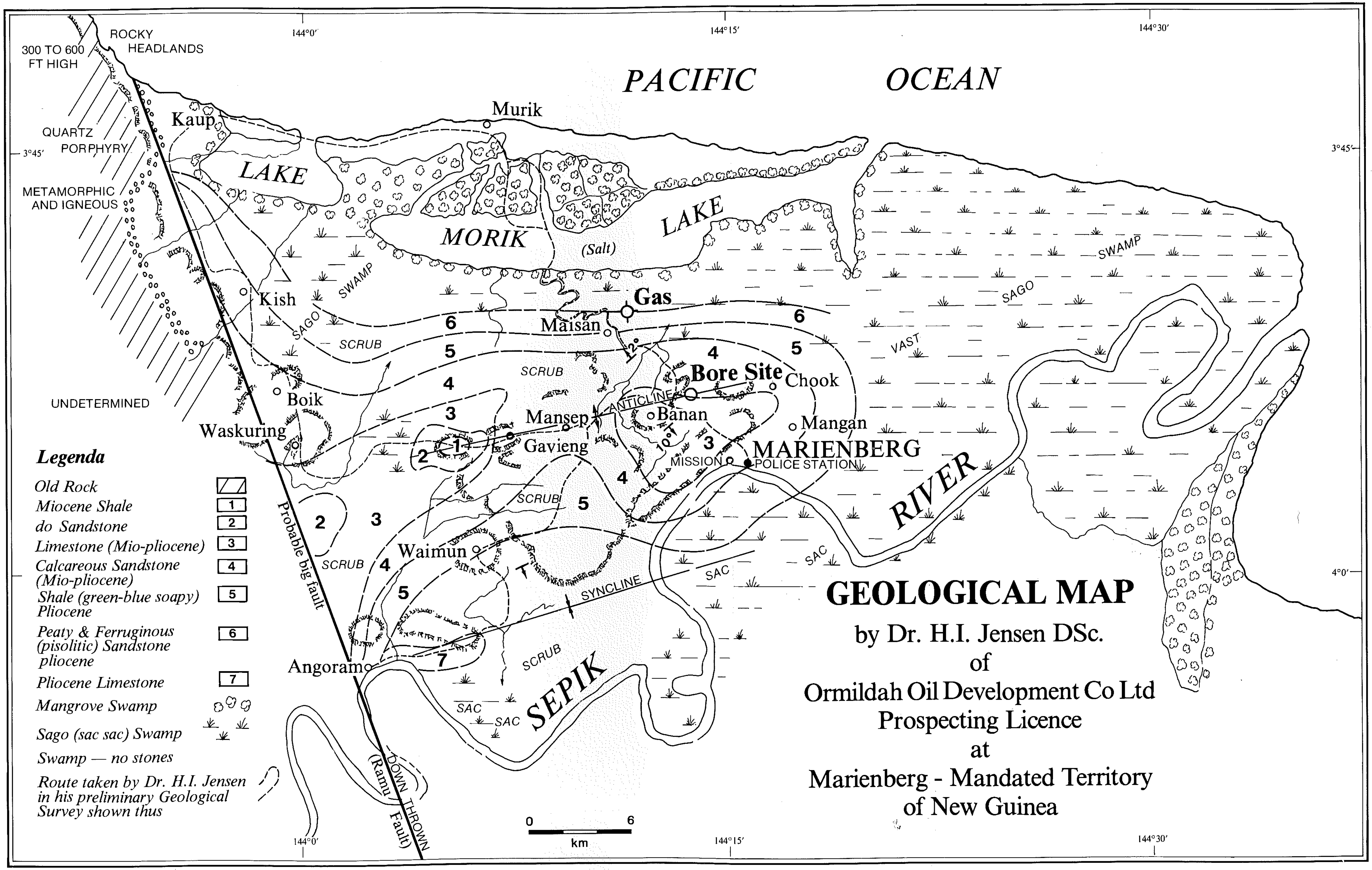

Figure 7. Dr H. I. Jensen's Geology Map of the Marienberg Area. (Redrawn from Roma Ormildah, 1929).

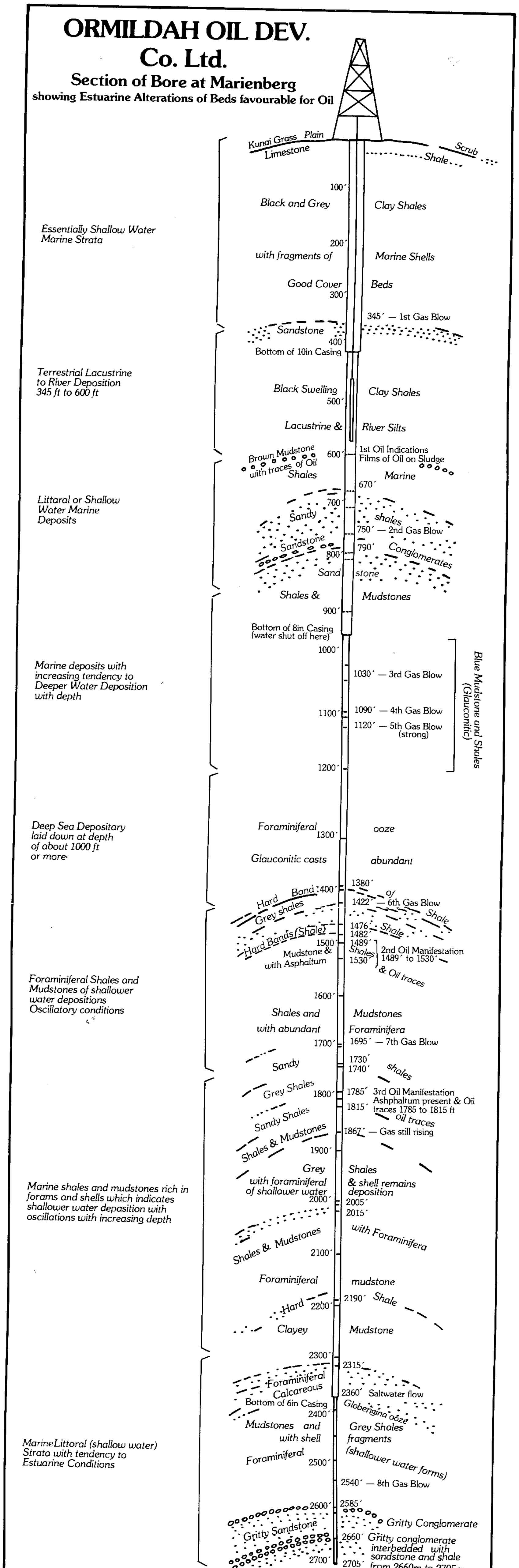

Figure 10. Lithology Log, Marienberg No. 1, by H. I. Jensen. (Redrawn from Roma Ormildah, 1929).