Habitat of Palaeozoic Gas in N.W. Europe

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Habitat of Palaeozoic Gas in N.W. Europe

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Contents

Preface

This two-day Conference on 'Habitat of Palaeozoic Gas in N.W. Europe' was organised by The Geological Society-Petroleum Group and the Petroleum Exploration Society of Great Britain (PESGB) and held at The Royal Society, London, on 11th-12th February 1985.

The Geographical Society and PESGB contributed towards the expenses of the Conference and this is gratefully acknowledged. We also thank staff of the Geological Society for administration and organisation before and during the meeting and to Mr and Mrs Ewens for making the evening social function at the Geological Society so successful and enjoyable.

The effectiveness of the four sessions of the Conference owed much to their Chairmen: Mr Richard Hardman (Amerada Hess: then Chairman of PESGB); Mr Ted Hart (Department of Energy); Dr Ken Glennie (Shell Expro U.K.) and Dr Jim Brooks (Britoil: Chairman of the Petroleum Group), whom we thank.

The Conference were honoured with an opening short paper by Sir Denis Rooke (Chairman: British Gas Council) whose expert comments on the history, state-of-the-art, and future needs for gas and gas exploration set the Conference off to an impressive start with clear directions and aims for the oil and gas industry. The papers presented at the meeting ranged far and wide over a whole range of topics and discussion on Palaeozoic gas and one, of a number, of the highlights of the Conference was the excellent and concise manner in which the closing remarks and overview of the papers and topics were summarised by Dr Michael Ridd (Croft Exploration). Delegates from different disciplines, companies and of varied interests in gas, all appreciated the opening and closing remarks by Sir Denis and Mike Ridd.

But now to the 'technical meat' in the Conference sandwich presented in this volume: We leave the readers to explore the various papers and trust that you will gain some of the flavour of a very enjoyable two days at the Conference.

We are most grateful to the referees who undertook the task of refereeing all the papers. The papers of this volume have benefited from comments of various anonymous reviewers.

Finally we thank the authors (and their companies) for their presentations at the Conference and also for their excellent responses to preparing their manuscripts on time.

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Introduction

Opening Address by Sir Denis Rooke (Chairman: British Gas) to the Conference 'Habitat of Palaeozoic Gas in North West Europe', 11th February 1985.

(Revised: February 1986)

Mr Chairman,
Ladies and Gentlemen,

'The Habitat of Palaeozoic Gas in North West Europe' is a formidable title, and a subject that — quite frankly — I would have been wary of taking on if my talk had not just been limited to a short Opening Address. However members of my staff will be contributing more technically and deeply to the Conference.

The Habitats of Palaeozoic gas are of immense interest to the gas industry, as they have been the source of much of the raw material of this industry, which every year throughout N.W. Europe becomes a more important cornerstone of our economic life.

I shall, however, in this opening Address talk predominantly of the U.K.

Looking back, at the time that the U.K. Gas Industry was brought together by the Act of Nationalisation of 1949, the dominant raw material was Coal with only a small usage of oil in the manufacture of Carburetted water gas. In the next 10 years much was done to integrate the Industry and discard small and uneconomic means of production but little change in the methods of manufacture occurred. However in the following decade there was a massive shift away from carbonisation to the production of gas under pressure from oil, much of it by catalytic processes, some of a very sophisticated character. But 1959 also saw the dawning of the natural gas era in Britain through the development, by the British Gas Industry with U.S. interests, of the techniques of large-scale liquefaction of natural gas and its carriage in bulk across the oceans of the world at its atmospheric boiling point, i.e. in a state of deep refrigeration. With the new image of gas as a modern fuel and better economics, the early sixties were a time of unprecedented growth in demand. From being virtually static, sales quickly grew to reach an annual growth rate of 10 to 12%. The stage was set for North Sea Gas.

The first major discovery was made by BP in October 1965: this was the West Sole Field some 40 miles off the mouth of the Humber, and by mid-1967 that gas was flowing ashore through a terminal constructed at Easington. That remarkably short lead time was achieved as a result of considerable enthusiasm, and exceptional team work between geologists, the engineers who developed the fields, and those onshore who built the pipelines and converted appliances to utilise natural gas direct. This was a complicated job because the combustion characteristics of the manufactured gas of those days and natural gas are very different. Incidentally the calorific value of natural gas was roughly double that of the old town gas, thus doubling overnight the capacity of storage: a most useful boost. But the rapid absorption of offshore natural gas was only possible because of the vibrancy of the gas market due to its stimulus by the newer manufactured gas. And we now know what a fortunate conjunction of events that turned out to be, because the rate of growth doubled again and by the time of the first OPEC shock, the gas industry's dependence on oil had virtually disappeared.

Some dedicated geologists have long had a conviction that natural gas was waiting to be found in and around the United Kingdom. Indeed the geological evidence for large-scale gas in Palaeozoic rocks, was there quite early on. In 1937 for example gas was found in

Permian limestone in Eskdale in Yorkshire, and in 1953 the then Gas Council was sufficiently convinced of the possibility of finding gas, that an arrangement was made with a forerunner of British Petroleum, systematically to explore on land.

Gas was found at Cousland, near Edinburgh, in 1954, but attention was drawn away from onshore exploration with the discovery of the giant Groningen gas field, in the Netherlands in 1959. This discovery of course aroused intense expectations about the possibility of finding gas offshore, and there was no shortage of contenders to explore for it in the Southern North Sea.

From the beginning, the North Sea was an area of international interest, as the nations surrounding it struggled to achieve mutually agreeable national sector boundaries, under the precepts of the United Nations Conference on the Law of the Sea. And considerable international co-operation resulted.

The Gas Council, now British Gas Corporation, was involved at the outset with the first wave of gas exploration in the 1960s, as part of a group with Amoco, Amerada and Texas Eastern. That group helped discover and develop the Leman and Indefatigable Fields in the Rotliegendes sandstones of the Permian, the second and third gasfields in the North Sea. We have continued an active exploration programme since through the two wholly owned subsidiary companies in U.K. waters, Gas Council (Exploration) Ltd. and Hydrocarbons (Great Britain) Ltd. And for operations offshore Eire we have a third wholly owned subsidiary, Hydrocarbons Ireland Ltd. But of course like all true explorers we set out to look for economically 'producible' hydrocarbons, not limiting ourselves purely to gas for obvious technical reasons. However, since the Eighth Round, and the enforced sale of the Corporation's offshore oil interests, limitation has been placed on British Gas to apply for licences only on blocks which are considered by officials of Department of Energy as likely to produce gas.

Even so, we are still very actively involved in exploration, and currently hold 29 licences, covering 55 blocks on the United Kingdom Continental Shelf, and 22 licences onshore. Gas Council (Exploration) Limited operate nine of these offshore licences, and six licences onshore and Hydrocarbons (Great Britain) Ltd., five offshore licences.

This represents, I am sure you will agree, a very substantial commitment to Britain's future gas supplies from the United Kingdom sector of the North Sea. British Gas is a substantial gas *producer* as well — we produced through equity participation 8% of all the gas produced in 1983 putting us fourth in the league of U.K. gas producers.

We see no let up in exploration activity, generally in the near future and we are hoping for an improved allocation of Blocks likely to be gas bearing in the Ninth Round. We continue to explore the Irish Sea basin, which has Carboniferous and Permo-Triassic sediments similar to the Souther North Sea basin. Our Morecambe field discovered in 1974, containing gas of upper Carboniferous origin within Triassic sands has been developed for peak demand production, and will ensure supplies well into the 1990s. Incidentally, first gas came ashore from the field on 8th January last year.

In recent years there has been a resurgence of interest in gas and since 1982 there has been a second wave of gas exploration activity on the United Kingdom Continental Shelf. Many wells have been sunk in 'frontier' areas like West of Shetlands, the Forth Approaches, the Celtic Sea, Cardigan Bay and the English Channel; and the mature areas of the Southern North Sea and the Irish Sea Basins, are being looked at again. (The imminent introduction of Licensing Rounds Onshore, reflects a revival of interest in onshore exploration; and a large number of wells have been drilled to Palaeozoic strata in the Midlands and Yorkshire which have shown an encouraging amount of gas.)

I have concentrated on the U.K. scene because that is all I know about and it is, of course, my main interest in business. But I am well aware that the Conference takes in north-west Europe and we in Britain must surely maintain an interest in that as a source of our gas in years to come.

When I first gave this paper it was felt that the potentially available gas reserves on the United Kingdom Continental Shelf were insufficient to satisfy the projected U.K. demand in the 1990s and therefore that gas should be imported from the Norwegian Sleipner Field. The position has somewhat improved and recent evaluations based on the latest negotiations and other indications from producers suggest that we should be able to cover our requirements for gas from the United Kingdom Continental Shelf for longer than earlier supposed. However, there are still uncertainties, and even assuming the 'best possible' case for United Kingdom production, through the development of all the small gas and condensate fields, we *know* that we cannot afford to ignore the possibility of importing gas in the future. But all this must serve to underline the importance of the major work which you, as North Sea geologists and reservoir engineers, are engaged on. We *do* need to know more about new potential sources, and how to extract gas from deeply buried poorer quality reservoir rocks and also to enhance the ultimate recovery from all types of field. There is no doubt that this work will become increasingly important as the more readily accessible gas is exhausted. There is no shortage or problems requiring solution nor of markets to absorb your discoveries given a reasonable span of years.

And so Mr Chairman, may I wish you all a successful Conference. Your deliberations, are of much interest and the 'Habitats' of Palaeozoic gas will continue to be of great importance to gas users everywhere in the years to come, not least in Great Britain.

London, February 1986