

Section 3

Petroleum

Section 3.1

Petroleum Exploration in Northern Ireland 1964-2000

The geology of Northern Ireland divides naturally into four main regions – the Dalradian rocks of the Sperrins and surrounding areas, the Lower Palaeozoic rocks of Down and Armagh, the Devonian and Carboniferous sedimentary rocks of Fermanagh, Tyrone and parts of Armagh, and the Antrim Plateau with its cover of basalts and underlying Mesozoic and Palaeozoic sedimentary rocks. In terms of hydrocarbon* prospectivity the first two areas can be discounted – these older rocks have been subjected to too high temperatures and pressures for them to retain either reservoir or source rock potential. Hydrocarbon



exploration has concentrated on the two areas with potential for discoveries – the Carboniferous basins in Fermanagh and Tyrone, and the concealed sedimentary basins in the northeast of Northern Ireland.

The first phase of hydrocarbon exploration started in the southwest in 1965. Gas shows in two wells drilled in County Cavan, in the Republic of Ireland, encouraged the consortium responsible to search for hydrocarbons in the adjoining areas of Northern Ireland. The Marathon-led group obtained the first licence issued under the Petroleum (Production) Act (Northern Ireland) 1964 and this covered large areas of Counties Fermanagh and Tyrone.

Exploration since then has gone in cycles of activity until the present and the following is a brief account of the progress in the intervening years.

Carboniferous Basins, Fermanagh and Tyrone

The first gas shows

The first exploration licence, awarded to Marathon, covered most of the Carboniferous outcrop of Counties Fermanagh and Tyrone. This outcrop, and the underlying strata, forms part of the Irish Northwest Carboniferous basin that straddles the border and occupies much of Counties Fermanagh, Tyrone, Cavan, south Donegal, Leitrim, Monaghan and Sligo. Drilling has shown that there is a thick succession of up to 2500 metres of Lower Carboniferous rocks in this basin. These are mainly marine sediments and include organic-rich shales and deltaic sandstones that form potential hydrocarbon source and reservoir rocks respectively.

Following the minor gas discoveries at Dowra-1 and Macnean-1 in County Cavan, three wells were drilled in County Fermanagh in 1965-66. Gas shows were

* Under the Petroleum (Production) Act (Northern Ireland) 1964 petroleum is defined as including both oil and gas. For simplicity the term hydrocarbon is used in this section to include both oil and gas.

recorded in Big Dog-1 and Owengarr-1 but Glenoo-1, on Slieve Beagh, was dry. Interest in the area lapsed when testing of the wells produced, at best, non-commercial gas flow rates.

The main factor limiting the production of gas is the poor quality of the reservoir sandstones. The sandstones have low porosities and permeabilities which means that relatively low concentrations of hydrocarbons are trapped in often isolated pore spaces from which they are difficult to extract.

Return to Dowra

A number of explorationists felt that the reservoirs had not been fully evaluated in this first group of wells. Similar 'tight gas sandstone' reservoirs were being exploited commercially in various areas of the United States. In 1980 a group led by Marinex obtained a licence in the Republic of Ireland which included the previous Dowra-1 and Macnean-1 discoveries. Marinex re-entered Dowra-1 and tried to improve the permeability and gas production by acidising and fracturing the reservoir interval. Flow-rates increased almost tenfold from approximately 30,000 cubic feet of gas per day (CFGD) to 250,000 CFGD. Thus encouraged, the group acquired a licence for large areas of Counties Fermanagh, Tyrone and west Armagh in 1981.

This second phase of exploration involved a more integrated approach combining geology, geochemistry and geophysics. Detailed geological mapping of the Fermanagh Highlands was undertaken, as were studies of the richness and maturity of potential hydrocarbon source rocks. A seismic reflection survey was run over the contiguous licenced areas in Northern Ireland and the Republic of Ireland. This resulted in the identification of a number of prospective structures, and four wells were drilled during 1984 and 1985, two in the Republic of Ireland followed by two in County Fermanagh. The first three wells, Macnean-2,



Drumkeeran-1 and Slisgarrow-1 all had gas shows but did not flow gas to the surface when they were tested. The final well, Kilcoo Cross-1, had a target within the Old Red Sandstone beneath the Carboniferous. The Old Red Sandstone reservoir did not match up to prognosis although gas shows were encountered within the shallow Carboniferous sandstones. The consortium did not renew their interest in the licence when it expired in 1987.

Recent exploration

Despite sporadic expressions of interest, the area lay fallow until 1996 when seven licences covering a swathe of land from the Fermanagh Highlands to the western shores of Lough Neagh were awarded to a consortium of companies operating out of Denver, Colorado. The operators believe that recent advances in techniques for extracting hydrocarbons from tight reservoirs will increase the viability of the known accumulations. Future commercial hydrocarbon

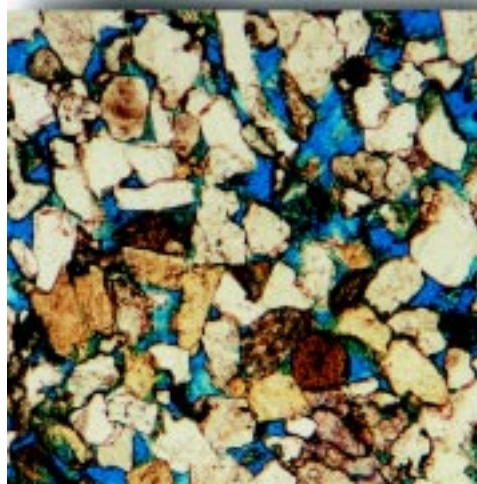
production also probably depends on the identification of areas of better quality reservoir rocks, perhaps enhanced by fracture porosity. Perversely, though, the tightness of the reservoir may mean that the presence of hydrocarbons is not so dependent on structural traps and that there is a widespread distribution of 'basin-centred gas'.



The Northwest Carboniferous basin can be summarised as an area with known gas and, to a lesser extent, oil generation and entrapment but poor reservoir quality. Because of the tight nature of the reservoir, production wells will only drain a relatively small volume of hydrocarbons (compared, for example, to the reservoirs of many North Sea fields). In this case, the viability of any discoveries may depend on the presence of nearby markets or a suitable energy infrastructure in the region. In this context another development which may have relevance to the exploitation of the gas reserves in this area is the establishment of co-generation plants. These plants are especially suited to the production of gas from relatively small accumulations that may be present in the basin. The gas is used to generate power which is fed into the electricity grid and to generate heat which is used for local commercial and domestic purposes.

Concealed sedimentary basins, northeast Ireland

In the northeast, largely concealed by the Tertiary basalts, there are a number of fault-controlled sedimentary basins that have been another focus for hydrocarbon exploration. The existence of these deep sedimentary basins was predicted by geologists in the middle of the last century and was proved by a series of deep boreholes commissioned by the Northern Ireland Government in 1960-61 and 1978-79. The boreholes established the existence of good quality sandstone reservoirs with effective overlying mudstone and salt seals within the thick Permo-Triassic fill but although mature Carboniferous source rocks are postulated to be present in at least some of the basins their occurrence has so far not been established. A similar exploration play has been productive in the nearby East Irish Sea Basin which includes the giant Morecambe Bay gas field and a number of more recent oil and gas discoveries.



Newmill-1

Marathon acquired the first licence in this area in 1968, covering part of southeast Antrim onshore and the adjacent offshore. One well, Newmill No 1, was drilled under a farm-in agreement with Shell in 1971 on the

southwestern shore of Larne Lough. This well was located on a surface anticline and proved a thick Permo-Triassic sequence including potential reservoirs in the Triassic Sherwood Sandstone Group and Lower Permian Sandstones, but gave no significant hydrocarbon indications. The licence expired in 1975 and exploration in the northeast ceased for a number of years.

Government funded seismic surveys

In 1981 the Department, acting on advice from GSNI, instigated a programme of research which was particularly influential in stimulating subsequent hydrocarbon exploration activity in the northeast. The thick basalt cover had previously proved a deterrent to onshore exploration so an experimental seismic survey was shot in southeast Antrim and west of Lough Neagh in December 1981, partly over basalt outcrop.

The results proved that, with sufficient source energy and modern processing techniques, useful reflections could be obtained from the sedimentary rocks lying beneath the basalts (Figure 4). Studies of source rock potential commissioned by GSNI at this time also proved the existence of gas-prone source rocks within the Carboniferous rocks of Northern Ireland. The Department also commissioned a follow-up Vibroseis survey over the basalts west of Lough Neagh in 1983. Reflector quality in the pre-basalt section was good enough to allow a time structure map to the Permian Magnesian Limestone to be made from this reconnaissance grid. In 1984 a gravity survey was run over Lough Neagh, using a lake-bottom gravimeter, and the results indicated the presence of a number of sedimentary sub-basins beneath the lough.

Energy Sources (NI) Ltd. were awarded a licence around Ballycastle and Rathlin Island in 1980 and in 1982 a group led by Anvil Exploration Ltd. obtained a licence over an adjacent area in north Antrim and County Londonderry. Offshore seismic surveys were

shot across both licences to try and define the deep structure of coastal geological features. Several exploration leads but no definite prospective structures were identified from these surveys.

Anvil Exploration shot a Vibroseis survey over the northern part of its licence area in 1982 but quality was variable and the company undertook a detailed gravity survey in 1983 to try to develop some structural leads. These leads were used to plan a Vibroseis survey in 1984 the acquisition and processing of which leaned heavily on the experience gained from the earlier Departmental seismic surveys. Anvil subsequently identified one drillable structure but, following a re-appraisal of the data by both GSNI and the operator, decided that it was too shallow to be prospective.

The Anvil licence expired without drilling and the Energy Sources licence was revoked when the licensee failed to complete the scheduled work programme.

In 1985, the Department offered three areas for licensing, one in the Rathlin Trough and the other two in East Antrim. As a result, Fynegold Petroleum plc was granted a licence to explore an area of County Antrim, to the north of Larne. In 1987 the Department commissioned Robertson Research International Ltd. to carry out a review of the hydrocarbon potential of northern Ireland as the prelude to a Departmental initiative to heighten interest in petroleum exploration in the area. GSNI contributed to this review particularly by instigating an interpretation of the Bouguer gravity anomaly data by BGS Regional Geophysics Research Group. This study was important in helping to constrain the extent and depth to base of the concealed sedimentary basins. Two further licences were issued as a result of this initiative, to Northwest Exploration plc to the north and south of Lough Neagh, and to Mustang Oil Ltd. in east Antrim, north of Belfast Lough. Lough Neagh Exploration and partners held a licence north of Lough Neagh over some of the

acreage originally licensed to Northwest Exploration plc.

Recent exploration

Fynegold drilled an exploration well at Ballytober 6km northwest of Larne in November-December 1990.

Lough Neagh Exploration and its American partners Nuevo Energy drilled two wells north of Lough Neagh near Toome in 1993 and 1994. The exploration results of all these remain confidential.

The concealed sedimentary basins in the northeast remain relatively little explored and retain significant exploration potential. The Permo-Triassic sandstones commonly have good to excellent reservoir properties and the mudstones and salt sections should form

effective seals. Tilted fault blocks within the basins are also likely to form structures capable of trapping hydrocarbons. The main risk in exploration is in how widespread the Carboniferous source rocks are below the Mesozoic strata as they were not penetrated beneath the deepest Permo-Triassic sections at Larne No 2 and Ballymacilroy. Lack of knowledge about these potential source rocks also prevents accurate modelling of the relative timing of hydrocarbon generation, trap formation and the migration of hydrocarbons from source rocks to reservoir rocks.

Three licences were issued in the Larne Basin and Rathlin Trough in 1995 and the licensees have made considerable efforts to overcome the problems of shooting seismic over the basalts. Recent seismic

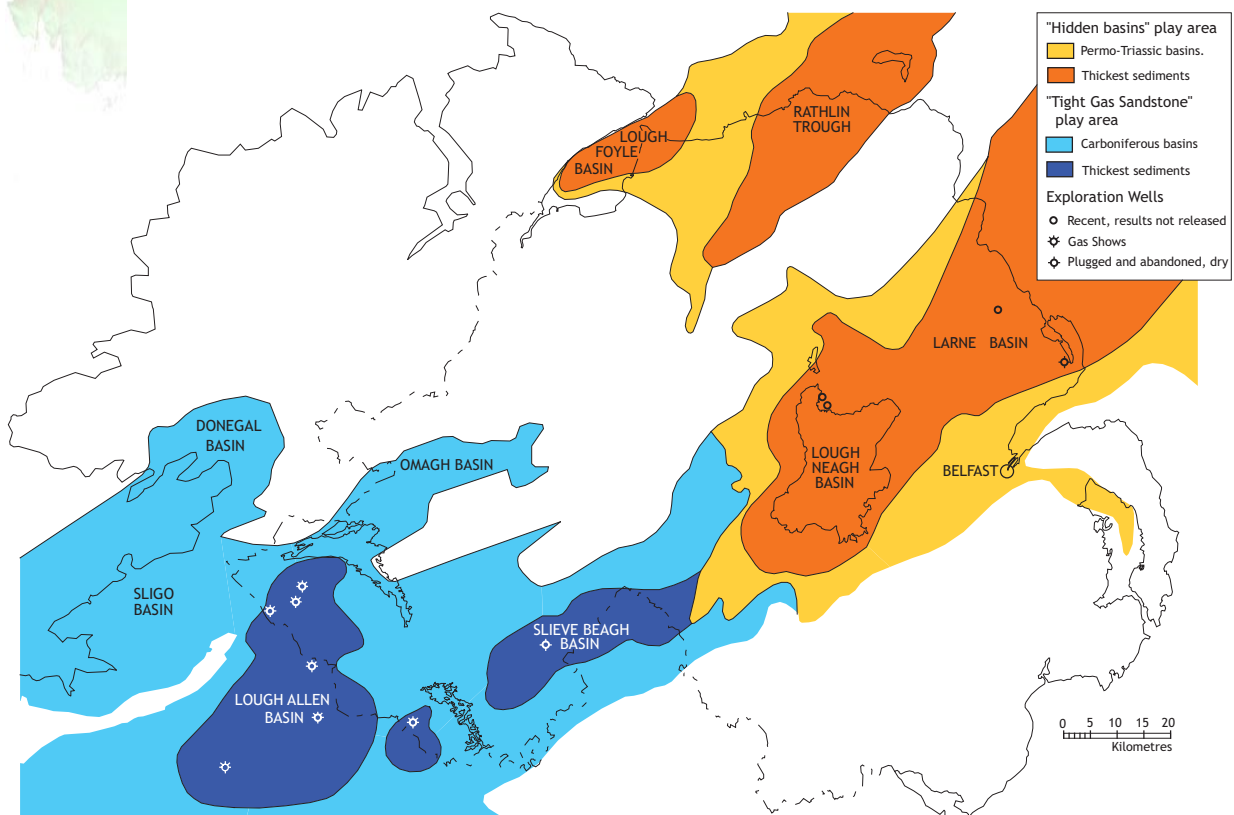
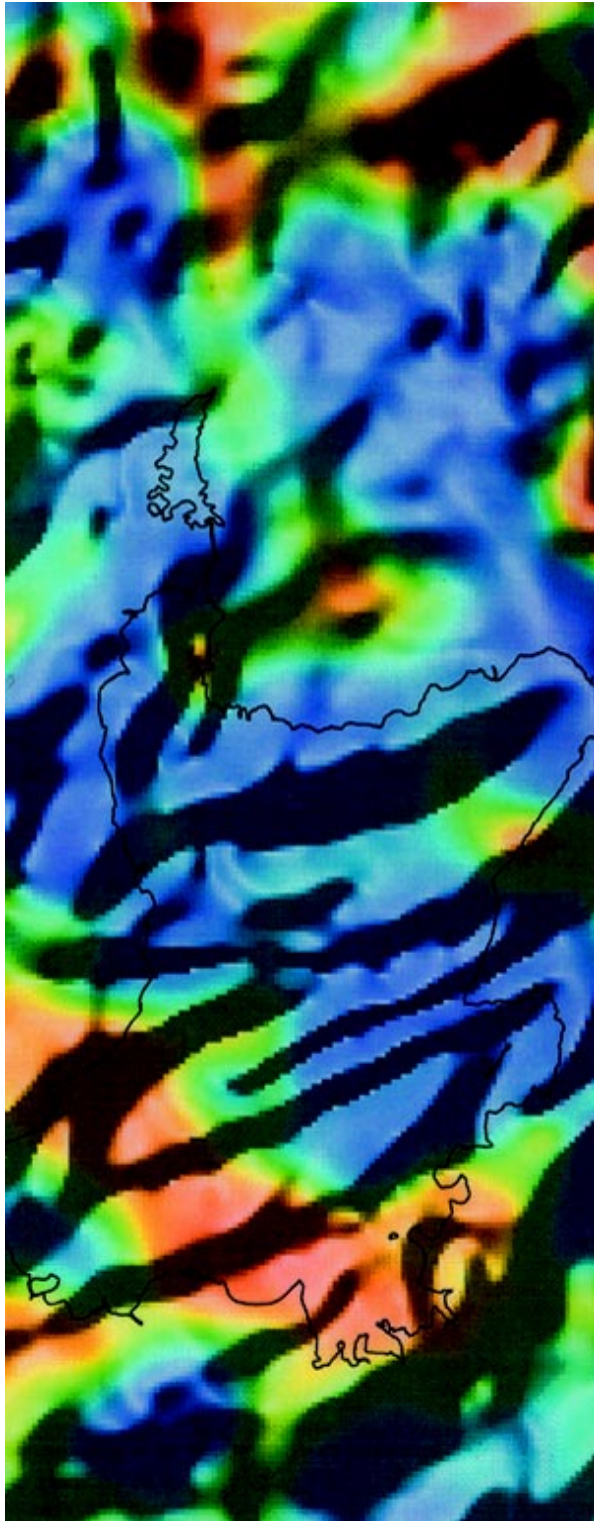


Figure 4 - Oil and Gas exploration plays in Northern Ireland



Combined image of aeromagnetic (colours) and gravity (shaded relief) anomalies, Lough Neagh

surveys have used both Vibroseis and dynamite sources in an attempt to optimise data quality, although with disappointing results. The poor quality of the seismic data over the Rathlin Trough was a major factor in the relinquishment of PL12/95 by Talisman who inherited the acreage when they took over Rigel Energy. Recently, Antrim Resources has employed slimhole drilling techniques to drill a well on PL11/95 at Carncastle, northwest of Larne.

In the absence of high quality seismic data the potential field data remains an important source of information about the geological structure. BGS and GSNI have again combined to produce an interpretation of these data based on an extensive suite of gravity and aeromagnetic images. Fully integrated seismic, gravity and magnetic interpretations hold out the best prospect of establishing valid geological models on which the exploration strategy may be based. However, it is likely that several more exploration wells drilled into the Carboniferous are needed before a proper assessment of the prospectivity of the concealed basins can be made.

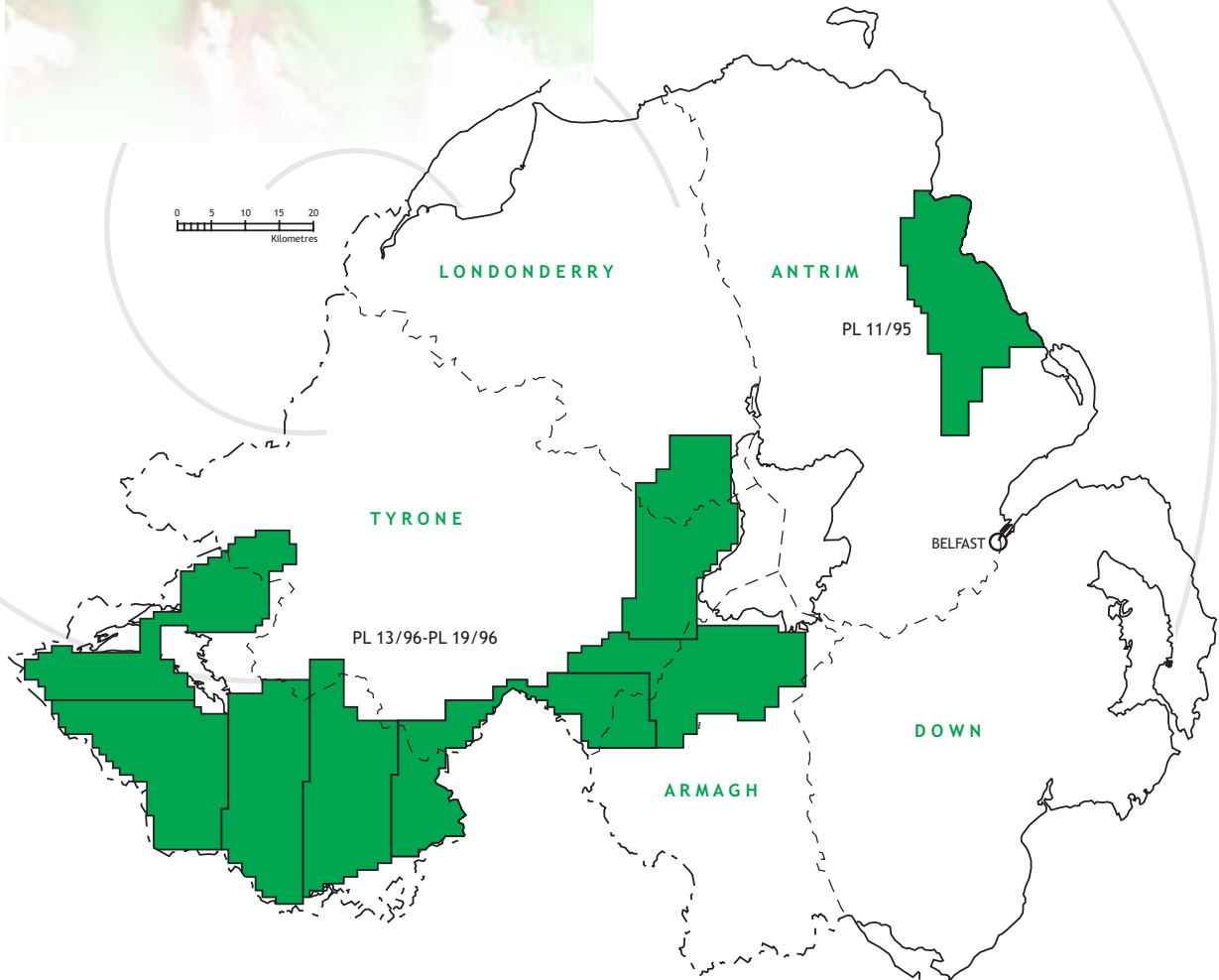
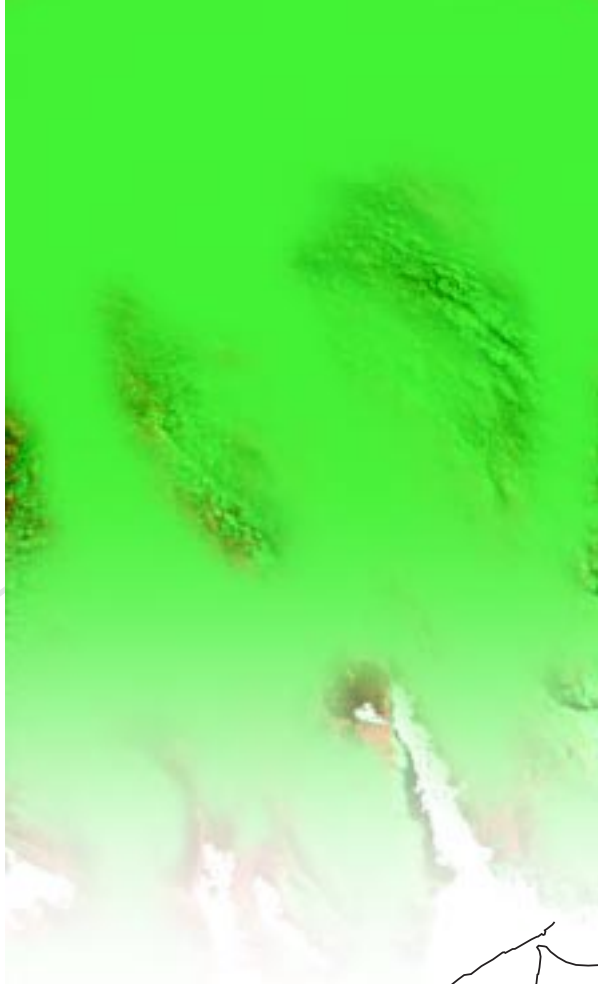


Figure 5 - Petroleum Licensing Position on 31 March 2000

Section 3.2

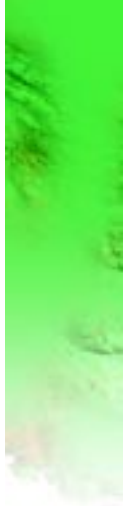
Petroleum Licensing 1 April 1997-31 March 2000

No licences were issued during the years ended 31 March 1998, 1999 and 2000.

Petroleum Licensing Position on 31 March 2000

The petroleum licensing position at 31 March 2000 is set out below. The locations of the licences are shown on the map on the previous page (Figure 5).

Licensee	Location	Licence ref	Size(Sq Km)	Date commenced
Antrim Resources(NI)Ltd	Larne/Carlough	PL11/95	349	1.5.95
Priority Oil & Gas LLC and S Morrice & Associates Ltd	Lower Lough Erne	PL13/96	350	1.7.96
Priority Oil & Gas LLC and S Morrice & Associates Ltd	Belmore	PL14/96	350	1.7.96
Priority Oil & Gas LLC and S Morrice & Associates Ltd	Enniskillen	PL15/96	350	1.7.96
Priority Oil & Gas LLC and S Morrice & Associates Ltd	Lisnaskea	PL16/96	350	1.7.96
Priority Oil & Gas LLC and S Morrice & Associates Ltd	Glennoo	PL17/96	350	1.7.96
Priority Oil & Gas LLC and S Morrice & Associates Ltd	Portadown	PL18/96	350	1.7.96
Priority Oil & Gas LLC and S Morrice & Associates Ltd	Dungannon	PL19/96	350	1.7.96



Section 3.3

Petroleum Licences - Guidance for Applicants

The Petroleum (Production) Act (Northern Ireland) 1964 (“the 1964 Act”) vested petroleum in the Department of Enterprise, Trade and Investment and enables it to grant licences to commercial companies to search for, bore for and get petroleum. The Department’s licensing system is based on the 1964 Act and on the subsequent subordinate legislation which is listed at the end of this section. The main points are, however, summarised below.

Preliminary discussions with the Department’s Energy Division and Geological Survey of Northern Ireland

It is useful for a company thinking of applying for a licence to have preliminary discussions with the Energy Division of the Department. Officials in the Energy Division can advise on administrative aspects of licensing while the Geological Survey of Northern Ireland can advise on the prospectivity of any particular area and the data available for inspection or purchase. (Further information about GSNI is provided in Section 4.)

Licences

Petroleum licences are granted for an initial period of five years but can be renewed for a further term of five years. If it is demonstrated, to the satisfaction of the Department, that commercial quantities of oil or gas are to be found in the licensed area a final 30 year term may be granted (subject to at least half of the original licence area being surrendered).

Licences can be issued for areas up to 350 sq km; licensees are required to carry out agreed work programmes and to report on these to the Department. This information can be kept confidential, if a

company so requires, for up to ten years but after that it becomes publicly available.

Licences give licensees the exclusive right to explore over the whole licensed area. The regulations concerning entry on to land are set out in section 47 of the Mineral Development Act (Northern Ireland) 1969 which also applies to petroleum licences. Licensees are required to seek the agreement of landowners before entering their property. Compensation is payable by licensees for any damage that may be caused during exploration.

Applications for Licences

The method of application is set out in Schedule 1 to the 1987 Regulations.

An application must be accompanied by two original 1:50,000 Ordnance Survey of Northern Ireland outline maps. The application area should be clearly delineated and the boundary should normally follow grid lines. The relevant fee (currently £1,000) and audited accounts for the three years prior to the making of the application (together with, if applicable, similar audited accounts from any parent company) should also be included.

The Department expects an applicant to provide a rationale for the proposed programme showing an understanding of the geological information already available and to submit a phased and costed work programme.



Processing Applications

Applications take a minimum of six months to process.

Before issuing a licence the Department must be satisfied that the applicant has the technical and financial resources to carry out the proposed work programme.

Although not required to do so under the provisions of the 1964 Act, the Department, following the procedure laid down in the Mineral Development Act (NI) 1969, consults other Departments and public bodies about its intention to grant a licence and places notices in the Belfast Gazette and at least one local newspaper circulating in the area to provide an opportunity for the public, particularly the owners of the surface land within the application area, to make their views known. All representations are considered by the Department and, if appropriate, passed to the company together with the draft licence and a 'letter of offer'. This 'letter of offer' may contain a large number of conditions as some consultees anticipate possible development at a later stage. At the exploration stage, however, it is normally sufficient for the company to keep the contacts, who are listed, informed of its plans and progress. When the terms of the draft licence have been agreed and the conditions in the 'letter of offer' are accepted, the engrossments of the licence are prepared and then executed by the company and the Department.

Planning Permission

Planning permission is not required for the early stages of exploration though the Planning Service of the Department of the Environment (DoE) should be kept informed about a company's exploration programme. However, planning permission is normally required at the drilling stage. DoE has a statutory duty to consult District Councils on all developments including drilling within their areas.

Royalties and Compensation to the Former Owners of Petroleum Rights

Under the 1964 Act and the 1965 Regulations on royalties a 7.5% royalty is payable on all petroleum 'won and saved'. This is passed to the former owners of the petroleum rights by way of compensation.

Relevant Legislation

Petroleum (Production) Act (Northern Ireland) 1964.

Petroleum (Production) Royalties Regulations (Northern Ireland) 1965 – SR 1965 No 48.

Petroleum Production Regulations (Northern Ireland) 1987-SR 1987 No 196.

Section 4

Geological Survey of Northern Ireland

The Geological Survey of Northern Ireland (GSNI) exists to provide an information and advisory service for Government, industry, education and the public. Its aim is to promote sustainable economic development of natural resources.

GSNI was established in 1947 when the need for a detailed scientific assessment of the mineral potential of the country was recognised. The scientific staff are drawn from the British Geological Survey (BGS) under an agency agreement which also enables GSNI to draw on expertise in other parts of BGS. It is further strengthened by collaboration with the Geological Survey of Ireland and other organisations which carry out earth science research related to Northern Ireland.

GSNI has powers under the Minerals (Miscellaneous Provisions) Act (Northern Ireland) 1959 of access to land to carry out its work and the Act also requires that the Survey be informed of, and allowed to inspect, every borehole more than 15m in depth.

Repository of Geological Information

- To fulfil its mission GSNI manages a comprehensive collection of earth science data about Northern Ireland. Primary data sets include:
- 1:10,560 and 1:10,000 scale manuscript geological field sheets in a standard format.
- 1:50,000 scale published geological maps
- A database of approximately 30,000 drill holes and collection of representative cores.
- A library of published geological information relating to Northern Ireland.
- A complete collection of survey data and reports relating to exploration and activities carried out by licencees under the Petroleum (Production) Act (Northern Ireland) 1964.



- A complete collection of survey data and reports relating to exploration and activities carried out under the Mineral Development Act (Northern Ireland) 1969.
- GIS linked databases, including mineral occurrences, abandoned mines, quarries and exploration records.

Geological Mapping

On the establishment of GSNI in 1947, it was agreed that geological mapping would proceed in parallel with the assessment and promotion of the mineral resources of Northern Ireland.

Geological mapping is carried out at the 1:10,000 scale. The results of GSNI's investigative programmes

by mapping and other geoscientific research methods are presented in maps of various scales, including the colour printed 1:50,000 scale (formerly 1 inch to 1 mile), memoirs and various reports.

Approximately 75% of Northern Ireland has been mapped since 1947 (see Figure 6). The plan is to complete modern geological map cover at 1:50,000 scale by about 2008 for most areas. Maps at 1:10,000 or 1:25,000 will also be available.

Two geological maps at the 1:250,000 scale covering the whole of Northern Ireland are also available, a Solid Edition published in 1997 and a Drift Edition published in 1991. A programme of digitization of geological maps is in progress.

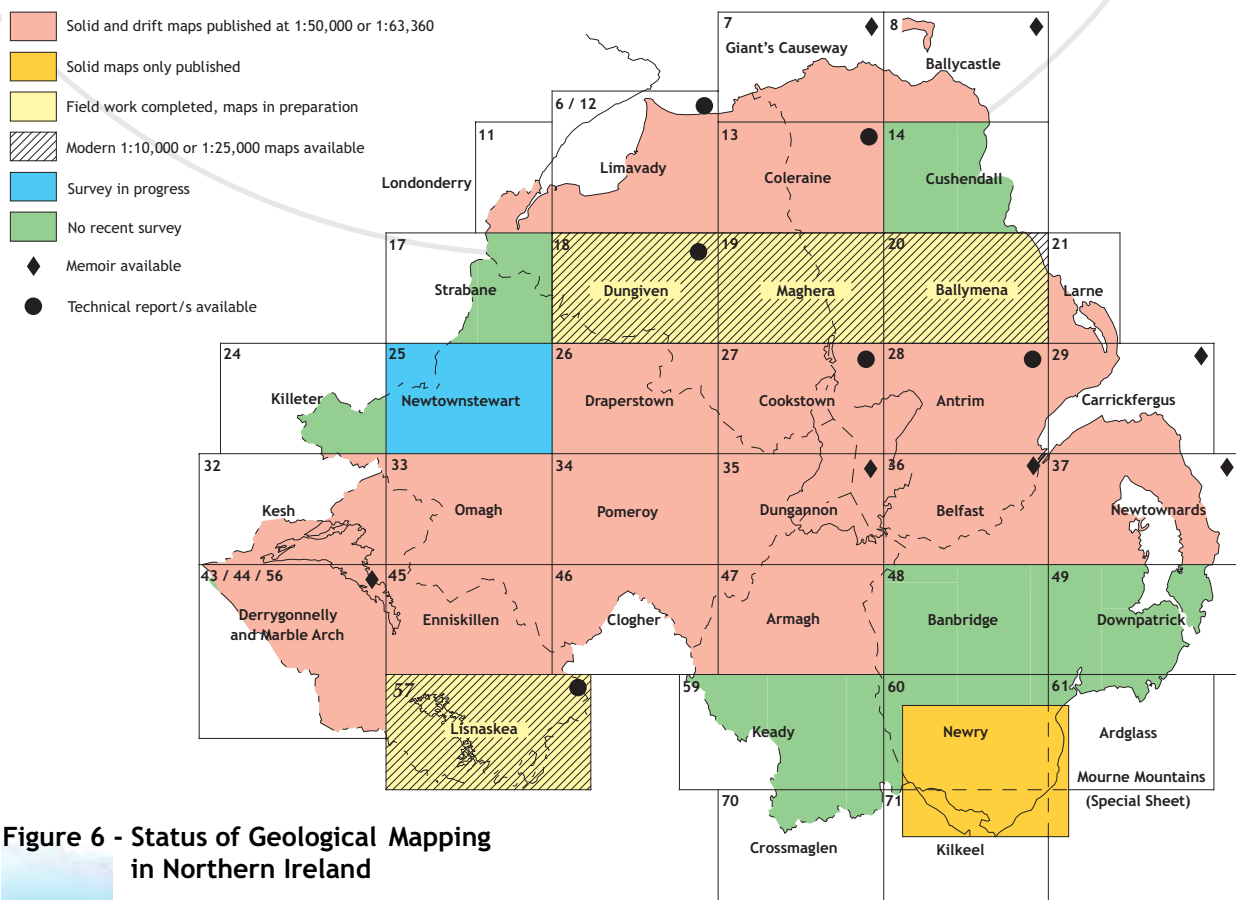


Figure 6 - Status of Geological Mapping in Northern Ireland

Mineral Exploration Promotion

From its inception in 1947 GSNI has been actively involved in promotion of commercial investment in mineral exploration not only through its mapping programme but also by drilling and geochemical and geophysical surveys.

Hard Coal Exploration

In 1950 GSNI drilled 17 exploration holes in east Tyrone and 10 in north Antrim. Coal seams workable under the economic conditions prevailing at the time were discovered in the Ballycastle Coalfield, north Antrim. From 1953 to 1955 attention turned to the potential for deep coal under post-Carboniferous cover. Three deep boreholes were sunk in north Down near Newtownards and south Antrim at Langford Lodge and Templepatrick. Although no economic deposits were encountered, knowledge of the successions in these areas were greatly enhanced, leading to new interpretations of regional geology.

Regional Geophysical Survey

In 1959 and 1960 a gravity survey and an airborne magnetic survey were carried out and published. Again these led to new interpretations of the regional structure of Northern Ireland providing leads for both mineral and hydrocarbon exploration. In 1997 the data sets were re-processed using state-of-the-art image analysis. The filter and combination techniques refined the regional structural interpretation still further.

Regional Geochemical Surveying

From 1974 to 1976 GSNI carried out a geochemical stream sediment survey over the Dalradian rocks of Londonderry and Tyrone. This work highlighted alluvial gold and led to the discovery, by a commercial exploration company, of the Curraghinalt gold deposit. From 1994 to 1997 the whole of western Northern Ireland was covered by a multi-element drainage survey at a density of approximately 1 sample per

2sq.km. and analysed for 38 elements and parameters in the silt fraction and stream water. Panned heavy mineral concentrates were examined for the presence of ore minerals.

Lignite Investigation

In 1976 GSNI began exploration drilling programmes in the Lough Neagh Clay (Oligocene) focusing first on the Crumlin area of Co Antrim. Although only minor occurrences were found, the work led to a major discovery by a commercial exploration company in 1983. Also in 1983 GSNI began exploration drilling programmes in east Tyrone and north Antrim where major new discoveries were made.

Base Metals in Co Tyrone

In 1996 GSNI supervised a geochemical survey of soils and deep overburden samples in the Clogher Valley, Co Tyrone. This work focused on theoretical targets for base metals in the fault-bounded margins of the Carboniferous trough.

Gold Veins in the Dalradian

Subsequent to the discovery of potentially economic gold deposits in Co Tyrone, GSNI supervised in 1996 a major study of vein mineralisation in the Dalradian. A range of techniques including cathodoluminescence, litho-geochemistry, isotopic determinations and structural analysis gave a detailed ore deposit characterisation and hence exploration model of the Dalradian gold deposits. In 1998 and 1999 soil grids and magnetic surveys were carried out in west Tyrone highlighting anomalies there.

Gold in the Lower Paleozoic

Alluvial gold occurrences around the margins of the Newry Granodiorite were studied by microchemical and microscopic techniques.

Cation-Exchange Minerals

From 1998 to 2000 surveys and sampling of altered basalt horizons identified substantial deposits of mixed layer clay horizons within the Tertiary basalts covering most of Co Antrim. These have been shown to be a potential substitute for the high quality imported bentonite clay used in landfill liners.

Hydrocarbon Exploration Promotion

Hydrocarbon exploration in Northern Ireland started in Fermanagh and Cavan in the mid-sixties based on the recognition of a thick Carboniferous sedimentary basin with similarities to the gas basins of the Southern North Sea and adjacent area. With the exception of the Newmill No. 1 well in south Antrim in 1971 there was little exploration activity until 1981. From 1979 onwards GSNI has actively stimulated exploration through a variety of projects and initiatives.

Stratigraphic boreholes

The GSNI series of boreholes sunk in the fifties and sixties for coal exploration helped to outline the distribution and thickness of sedimentary rocks in the sedimentary basins largely concealed beneath the Antrim basalts. The deep boreholes at Killary Glebe (1979), Ballymacilroy (1979) and the 1982 Larne No. 2 geothermal exploration well further demonstrated the presence of thick Permo-Triassic potential hydrocarbon reservoirs and seals.

Seismic surveys

In 1981 GSNI planned and commissioned a Vibroseis seismic reflection survey along the east and south Antrim coast, and west of Lough Neagh. The main aim of this survey was to discover if useful seismic data could be obtained from the strata below the basalts. The results were promising and subsequent work in 1983 by GSNI and by exploration companies confirmed the usefulness of this technique. A more detailed account of this work is included in Section 3.1 'Petroleum

Exploration in Northern Ireland 1964-2000'.

Potential field geophysics

The thick basalts still significantly degrade seismic data quality and coverage remains sparse. Interpretation of potential field data – variations of the earth's gravity and magnetic fields caused by the rock structure - provide another method of modelling the deep geological structure. In 1987 the Department commissioned a report on the interpretation of gravity anomaly data by the Regional Geophysics Group of the British Geological Survey. A series of 2.5 dimensionally modelled profiles across Northern Ireland, and the application of image analysis techniques to processed gravity and magnetic data, allowed new insight into the major structures defining the sedimentary basins and the possible thickness of sedimentary fill. In 1997 BGS re-processed all the available gravity and regional aeromagnetic data over



Northern Ireland and produced an atlas of geophysical images at 1:250,000 scale with an accompanying interpretation report. This latest study has a great deal of structural information (from the regional GSNI datasets) of use to explorationists

Source rock and maturation studies

In 1981 and 1982 GSNI geologists sampled Carboniferous rocks from around Northern Ireland and sent these for analysis to determine the quality and maturity of these potential source rocks. The results confirmed the widespread distribution of marine shale source rocks mature for dry and, in some circumstances, wet gas.

Reservoir studies

Laboratory measurements of the porosity and permeability of core samples from the Magilligan and Portmore boreholes and log analyses from the Killary Glebe, Ballymacilroy and Larne No. 2 boreholes established intervals in the Triassic Sherwood Sandstone and Lower Permian Sandstones as high quality potential reservoirs. In 1995 GSNI initiated a study, by Queen's University of Belfast research geologists, of potential Carboniferous reservoir rocks exposed at Ballycastle.

Basin studies and regional syntheses

In 1987 GSNI collected together all the relevant data in the public domain and supplied this to Robertson Research who compiled a review of the hydrocarbon potential of Northern Ireland.

In 1995 GSNI asked BGS to carry out a study of the palynology of the Permo-Triassic sequences in the deep boreholes. This produced a more precise time framework for these sequences and gave an insight into differential fault block movement in Permo-Triassic times. This data is important for modelling the burial history of potential source rocks and the relative timing of trap formation, and the generation

and migration of hydrocarbons.

Licensing initiatives

GSNI has assisted the Energy Division to mount presentations to the hydrocarbon industry in 1985 and 1987, following the completion of the major projects involving seismic, drilling, geochemistry, geophysics and prospectivity reviews. These led to the award of a number of hydrocarbon licences in 1985, 1987 and 1988. In recent years GSNI and Energy Division staff have marketed the exploration potential of Northern Ireland in the International Pavilion at the Annual Convention of the American Association of Petroleum Geologists in Denver, Colorado and supplied information to a website promoting international exploration opportunities.

Assistance from GSNI

GSNI's experienced geologists using the extensive collections of records are in a unique position to provide geological information about Northern Ireland. Details can be obtained from the GSNI office.

Appendix 1

Useful Addresses

Energy Division

Department of Enterprise, Trade and Investment
Netherleigh
Massey Avenue
BELFAST
BT4 2JP
Tel: 028 9052 9900 – Switchboard
028 9052 9381 – Direct
Fax: 028 9052 9549

Geological Survey of Northern Ireland

20 College Gardens
BELFAST
BT9 6BS
Tel: 028 9066 6595
Fax: 028 9066 2835
E-mail gsni@bgs.ac.uk

Planning Service

Department of Environment
Clarence Court
10-18 Adelaide Street
BELFAST
BT2 8GB
Tel: 028 9054 0540
Fax: 028 9054 0024

Ordnance Survey of Northern Ireland

Department of Culture, Arts and Leisure
Colby House
Stranmillis Court
BELFAST
BT9 5BJ
Tel: 028 9066 1244
Fax: 028 9068 3211

Crown Mineral Agent

Wardell Armstrong
Lancaster Building
High Street
NEWCASTLE-UPON-LYME
Staffordshire
ST5 1PQ
Tel: (01782) 612626
Fax: (01782) 662882

Companies' Registry

IDB House
64 Chichester Street
BELFAST
BT1 4JX
Tel: 028 9023 4488
Fax: 028 9032 6403

Appendix 2

Addresses of Companies holding Minerals Licences on 31 March 2000

Antrim Coal Company Ltd

25 Aghnadarragh Road
Glenavy
CRUMLIN
Co Antrim
BT29 4QQ

Meekatharra (NI) Ltd

C/o Mills & Selig
20 Callendar Street
BELFAST
BT1 5BQ

Antrim Perlite Ltd

14 Victoria Street
BELFAST
BT1 3GF

Omagh Minerals Ltd

Imperial House
7 Donegall Square East
BELFAST
BT1 5HD

Brancote Mining Ltd

Grant Thorton House
Melton Street
LONDON
NW1

James Stevenson Quarries Ltd

Clinty Quarry
215 Doury Road
BALLYMENA
Co Antrim
BT43 6SS

Blue Circle Industries plc

Northern Region Estates Office
HILTON
Derby
DE6 5GE

Ulster Minerals Ltd

43 Market Street
OMAGH
Co Tyrone
BT78 1EE

Appendix 3

Addresses of Companies holding Petroleum Licences on 31 March 2000

Antrim Resources (NI) Ltd

Imperial House
7 Donegall Square East
BELFAST
BT1 5HD

Priority Oil & Gas LLC

633, 17th Street
Suite 1520
DENVER
COLORADO
USA



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