

# North Sea Exploration Opportunity

## Southern Gas Basin Blocks 41/18, 19, 20

**Overview** - Deltaic Systems Limited was awarded blocks 41/18, 19 and 20 in the 21<sup>st</sup> UK Offshore Licensing Round held in May, 2003. The blocks are located in the northwest corner of the Southern Gas Basin and are adjacent to the east coast of England where several gas fields have been discovered and are currently in production. Deltaic's initial review of the blocks has confirmed several structures including one large feature that has previously tested gas from a well drilled on the edge of mapped closure. **The Company is currently continuing its technical evaluation of the blocks and intends to secure an investment partner within the next 12 months.**

The Blocks were awarded under the Promote Scheme which provides Deltaic with an exclusive two year period in which to conduct technical studies over the blocks. The agreed work programme for the blocks includes geological and geophysical studies, seismic reprocessing and the submission of a technical study report to the DTI at the end of year two. **There are no seismic acquisition or well commitments during the initial two year exploration period.**

**Regional Geology** - The Southern Gas Basin is part of a Permo-Triassic basin which extends from England east to Poland. The whole basin is underlain by Carboniferous Westphalian Coal Measures which are a prolific world class gas source. The bulk of the United Kingdom's gas reserves are contained within the Southern Gas Basin with production mainly from the clastic sandstone reservoirs of the Triassic Bunter Sand, the Lower Permian Rotliegendes Sand and the Carboniferous Westphalian sands. Some gas and oil production comes from Upper Permian Zechstein dolomites. Giant gas fields have been discovered in this basin – Leman (6tcf), Indefatigable (5tcf) and Hewett (5tcf). Current drilling and production technology and the presence of a comprehensive pipeline infrastructure means that it is now possible to ensure commerciality of fields with less than 50bcf reserves.

**Block Setting** - The licence lies adjacent to the Yorkshire coast close to the western margin of the Southern Gas Basin (Figure 1) within a broad structural area known as the Sole Pit which at this point is in transition with the onshore Cleveland Basin.

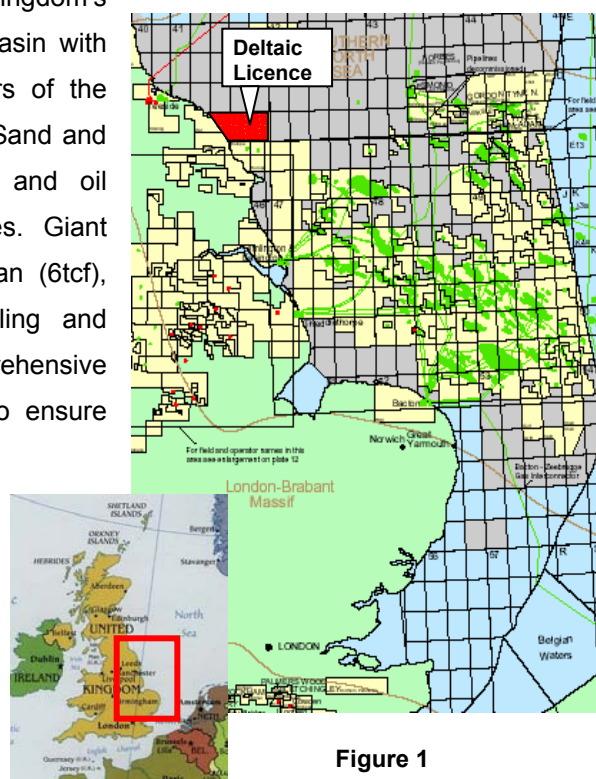


Figure 1

The Sole Pit lies to the east of the Dowsing Fault Zone which continues into the Cleveland Basin. This area has been a depocentre since the Early Permian and has undergone several episodes of subsidence and uplift the most recent of which in the Late Cretaceous to Early Tertiary resulted in the inversion of the Sole

Pit and Cleveland Basin parallel with the depositional axes (E-W in the Cleveland Basin and NW-SE adjacent to the Dowsing Fault zone).

**Exploration History** - Four wells have been drilled in the three blocks. In 1966 well 41/18-1 tested gas from the Carboniferous. Well 41/20-1 (1965/6) drilled in excess of 5000 feet of Carboniferous sediments from Westphalian B to Namurian. Four drill stem tests were conducted in the Zechstein Plattendolomite based on gas shows though there was no flow to surface. 41/20-2 (1969) just penetrated the top of the Carboniferous. Three open hole DST's were conducted. A flow of 1.71mmcf/d gas was achieved from the Hauptdolomite.

**Hydrocarbon Setting** - The licence lies in a proven hydrocarbon province. A number of discoveries have been made within the Sole Pit and Cleveland Basin and gas has been flowed from two wells on the licence (41/20-2 and 41/18-1). Gas has also been discovered immediately to the south in blocks 41/24 and 41/25 with wells 41/24-1 and 41/25-1 flowing gas and condensate from fractured Zechstein dolomites. To the west in the Cleveland Basin the Zechstein dolomites are the most common reservoir, though there are instances of Rotliegendes (Caythorpe) and Carboniferous (Kirby Misperton) discoveries. Woollaston, Whittle and Cleeton are the closest offshore Rotliegendes fields, 25km to the SE, also within the Sole Pit. Gas has also been encountered in the Triassic Bunter Sand in well 41/24a-3.

The 41/24a-1 well discovered in 1981 was further appraised in 1992 by Conoco who drilled a horizontal well into the Plattendolomite and tested an average rate, limited by surface equipment, of 34.3 mmcf/d gas and 1283 bpd condensate over a total flow period of 102 hours.

**Reservoirs** – The primary target on the blocks is sands of the Carboniferous Westphalian A and B (Figure 2). This is a deltaic sequence of distributary fluvial channel sands interbedded with interdistributary bay muds and coals the lower part of which was encountered in well 41/20-1. Channel sand units of between 50 and 100 feet thick are present in this well. These sands have not been cored but are expected to have reasonable reservoir properties with porosity in excess of 10%.

The licence lies on the northern margin of the Rotliegendes basin where Rotliegendes sands are patchily developed and the Rotliegendes is represented predominantly by Silverpit Shales. Thin tightly cemented sands, not exceeding 5 feet, are present in 41/20-1, however, producing offshore Rotliegendes gas fields lie 25 km to the SE and the onshore Caythorpe discovery lies 6 km to the south. The potential for preserved thicknesses greater than that observed to date in wells drilled on present day structural highs will be investigated.

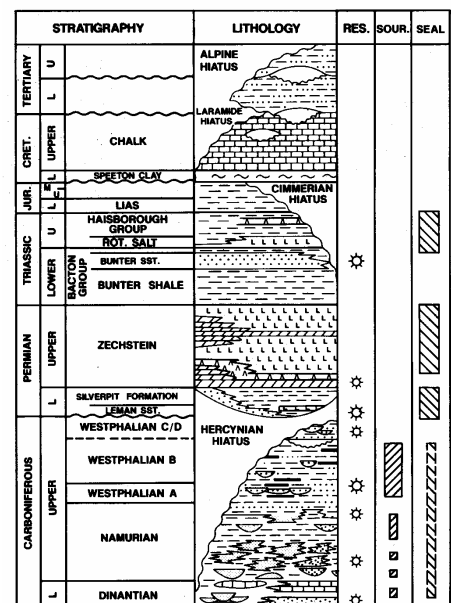


Figure 2

There are two primary reservoir targets in the Zechstein at this location: the Zechsteinkalk/Hauptdolomite and Plattendolomite. Both are dolomites and both have tested gas on and adjacent to the licence. The Plattendolomite reaches 250 feet thick and the Hauptdolomite/Zechsteinkalk 310 feet in block 41/24 and both have abundant microfractures, occasional large scale fractures and vuggy porosity. Matrix porosity reaches 11.7% and permeability averages 5 mD with a maximum of 262mD recorded.

The Bunter Sand is a 500 feet thick sequence of stacked braided fluvial channels with occasional shales. Average porosity is 18%-21% in well 41/24-3. The Lenton Member is a series of discretely interbedded sands and shales throughout the Bunter shale in the southern part of blocks 41/24 and 41/25. It is possible that these sands may extend into blocks 41/18 and 19, though their distribution is likely to be restricted to the proximity of the Dowsing Fault zone. Reservoir quality in well 41/24a-2 is average with average porosity 12%.

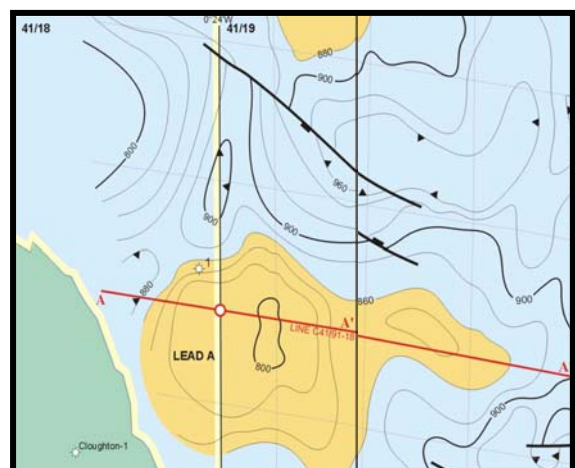
**Source Rocks** - Mature source rocks comprising predominantly coals of Namurian and Westphalian age are preserved in pockets beneath the Base Permian Unconformity, though over large parts of the area these have been stripped off leaving early Namurian and Visean sediments subcropping the Base Permian. The high condensate gas ratio (CGR) exhibited by the 41/24a and 41/25a discoveries indicates that the presence of liquid hydrocarbons can not be ruled out in any valid structure and this may be due to migration from organic rich shales within the Visean and Namurian ("Bowland Shale").

**Prospectivity** - Three leads have been identified on the blocks.

### Lead A

Lead A lies in blocks 41/18 and 41/19 (Figure 3). It is defined by a 4-way dip closure at the Base Permian Unconformity. The primary reservoir is sands of the Carboniferous Westphalian A and B. Top seal is provided by a combination of Rotliegendes Silverpit shale and Zechstein Stassfurt Halite.

Independent dip closure can be mapped down to 840 msec. The presence of well A339/1-2 (41/18-1), which was drilled in 1966, on the northeastern flank of the structure has indicated there may be potential to push the closure down to 860 msec. This well is reported to have tested non-commercial quantities of gas from a sand in the Carboniferous. The onshore Cloughton-1 well at the western end of the structure also tested quantities of gas from the Carboniferous.



**Figure 3**

The Westphalian sands demonstrate an angular unconformity within the Base Permian structural closure similar to that seen in the Carboniferous fields in Quads 43/44 with the Carboniferous showing strong dip to the north and east. To the east of the Base Permian crest there is a dip closure within the Namurian and Westphalian section

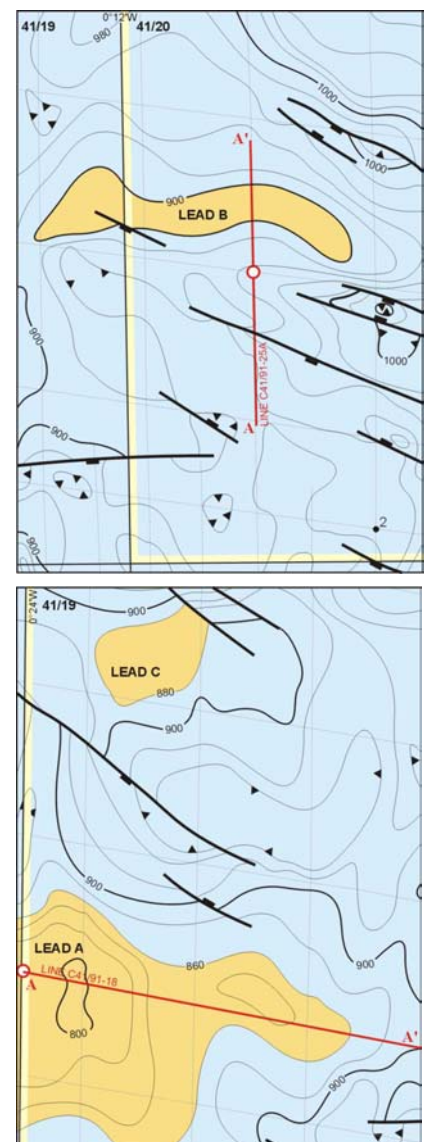
The Base Permian Structural closure at 860 msec covers an area of approximately 46 sq km with a column height of 360 feet. Assuming slightly better parameters than the Namurian of 41/20-1, 10% average porosity, but a low N/G of 30% to reflect sand presence, a  $S_g$  of 0.8 and a GEF 150 a scoping Gas-In-Place volume of **300 bcf** can be calculated.

### Lead B

This is a Base Permian 4-way dip closure trending E-W split between blocks 41/19 and 41/20 with two thirds of the closure on 41/20 (Figure 4). The reservoir is fluvio-deltaic sands of the Carboniferous Westphalian A and B. There is independent dip closure to 900 msec, with upside of 920 msec, giving up to 190 ft of relief. The strong angular unconformity with the Base Permian could lead to enhanced relief providing there are sealing shales present within the Westphalian. The dip closure covers an area of approximately 9 sq km which, using the same reservoir parameters as Lead A could give a Gas-In-Place volume of **11 – 66 bcf**.

### Lead C

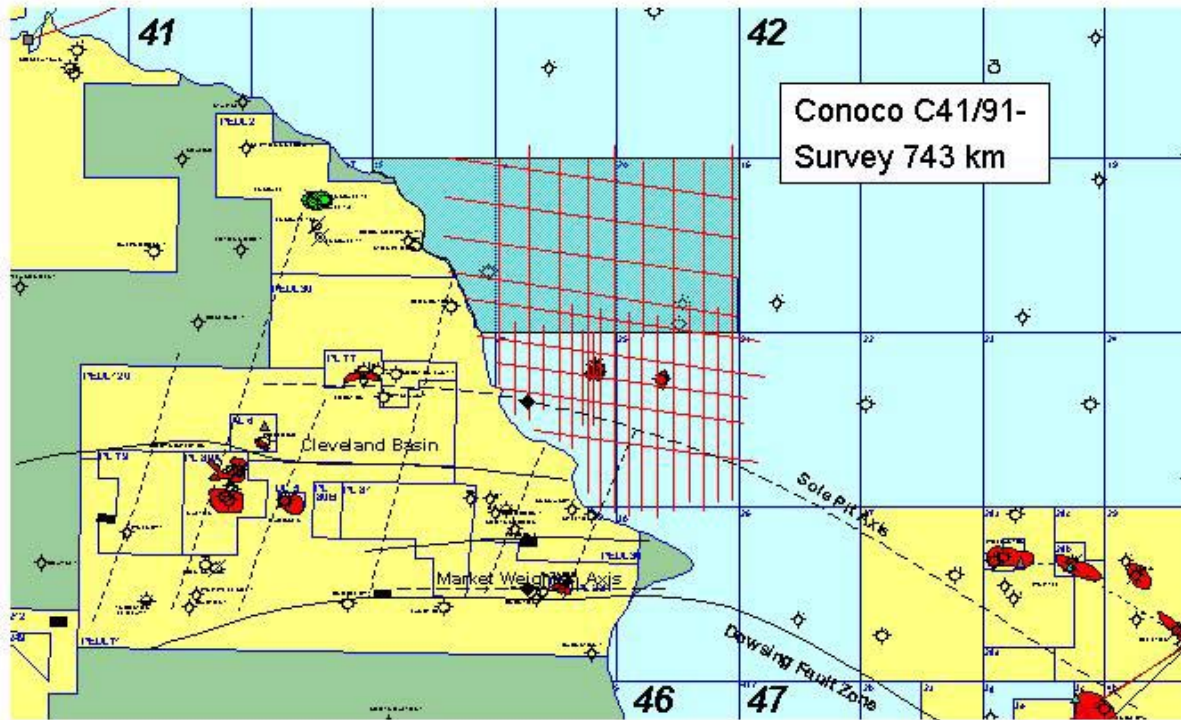
This lead lies wholly within block 41/19 (Figure 5). It is dip-closed in three directions and relies on northerly fault closure against the Rotliegende Silverpit Shales. There is the possibility that the Carboniferous Westphalian A and B sediments could be juxtaposed against the Hauptdolomite across this fault and this could provide a potential leak point to the structure. This correlation may be able to be verified after reprocessing of the seismic data. There is little or no angularity of the Carboniferous with the Base Permian in this lead. The area of closure is approximately 6 sq km. with 60 feet of relief however the area has only been mapped using a sparse, un-reprocessed dataset. With the purchase of additional released seismic data it will be possible to re-map this structure to determine whether a larger structure than that currently perceived exists.



**Figure 5**



**Current Status of Blocks** - Deltaic has purchased 743 km of released 2D seismic data to assist with the evaluation of these blocks. The Conoco C41/91- survey was acquired in 1991 and is the most recent data to have been acquired on the blocks and the single most comprehensive survey available. It was shot on a 3 km. x 4 km. grid over the license area (Figure 6). Additional 2D seismic of various vintages dating back to 1964 is available. Selected surveys are being reviewed for additional purchase which will satisfy part of the initial term working obligation.



**Figure 6**

**Company Background-** Deltaic Systems Limited was incorporated in 1999 as a project management company with particular focus on the energy industry. The management of Deltaic have spent their entire careers in the oil industry and have an in-depth range of knowledge and experience having worked with independent and major oil companies and contractors. Frank Inouye, Deltaic's Managing Director was previously head of Corporate Development at Premier Oil and was instrumental in establishing Premier's Far East asset base. Chris Ellis, Technical Director was head of Seismic Operations at Premier and has over 25 years of experience in managing offshore operations. Andrew Vinall is Deltaic's Exploration Manager and has over 20 years of North Sea experience. Huw Evans is Business Development Director and was previously head of Exploration for Premier Oil Pacific Limited. Deltaic believes they are well positioned in terms of knowledge, expertise and resources to actively participate in the future exploration and development of the UKCS.