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A High Resolution Boomer, Sparker  
and Side Scan Survey

Conducted for

The Murphy Eastern Oil Co.

One in Norwegian Block 2/3  
and one in Danish waters

EG&G Geophysical Ltd.

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## INTRODUCTION

1.1 On 31st July, 1971, a boomer, sparker and side scan sonar survey was conducted by EG&G Geophysical Ltd. for Murphy Eastern Oil Co. in Block 2/3.

The survey consisted of a 1km grid of sonar together with 3 lines of H.R.B. run at  $60^{\circ}$  intervals so as to form a star over the location, centred on

Lat.  $56^{\circ} 48' 15.6''\text{N}$

Long.  $03^{\circ} 58' 09.6''\text{E}$

In addition to this, two sparker lines were run.

A further survey was conducted on 1st August, 1971, in Danish waters centred on

Lat.  $55^{\circ} 40' 00''\text{N}$

Long.  $04^{\circ} 12' 00''\text{E}$

The procedure was similar to the above with the exception that only one line of sparker was run.

Personnel involved in the survey were R. Pilkington, Geologist; D.J. Smith, Engineer, and G. Watton, Engineer.

Navigation was carried out by the Decca Navigator Co. Ltd., using Hi-fix and Sea-Search systems. The chief surveyor was R. Youngman.

## DIARY

2.1	29.7.71.	Sailed Gt. Yarmouth.	0300hrs
	30.7.71.	On passage	
	31.7.71.	Set up Hi-fix 2/4-3X	0520
		Boomer & Sparker	0922-1205
		Sonar & Soundings	1205-1715
		Proceed to Danish Sector	
	1.8.71.	Sonar & Soundings	0735-1000
		Boomer & Sparker	1536-1812
		Sailed for Aberdeen	
	2.8.71.	Docked Aberdeen	1645
	3.8.71.	Gear and personnel off	A.M.

### 3.1 The High Resolution Boomer (HRB)

The High Resolution Boomer transducer consists of an aluminium plate mounted close to an insulated copper coil. This assembly is carried on a small catamaran and towed off the port quarter of the survey vessel. The transmit-receive cycle is initiated and synchronised by the recorder which triggers the discharge of a series of capacitors in the inboard equipment. The resulting electrical pulse passes along the cable to the towed H.R.B. transducer and produces eddy currents in the aluminium plate backed on to the flat spiral coil. The interaction of the magnetic fields of the coil and the plate currents establishes a repulsive force between the plate and the coil. When the plate moves, as a result of this force, it transmits an acoustic pulse through the water.

Much of the success and resolving power of the system lies in the controlled restraints applied to the motion of the plate, and their critical adjustment produces a pressure wave of limited amplitude and duration, giving the good resolution of the geological strata.

The signals returning from the sea-bed and other interfaces are received on the XOC45 ten-element hydrophone, streamed off the starboard quarter, they are filtered, further amplified and displayed on the Model 254 recorder.

The system control settings were logged on the seismic log sheet and on the records themselves.

### 3.2 The Side Scan Sonar System

The Side Scan Sonar System used throughout the survey was comprised of an EG&G Model 268 Mark 1A Dual Channel Towfish and an EG&G 259 wet-paper recorder. The main principle of the sonar is that the transducer in the towfish emits pulses of acoustic energy at an operating frequency of  $105 \pm 10$  KHz. The duration of each pulse is 0.1 milliseconds, this is followed by a quiescent period during which the reflected return signals from the sea floor are received, further amplified and printed electrochemically by the 259 recorder.

The peak output of the acoustic pulse is 118db reference 1 microbar at 1 metre, and is directed into a main beam  $1^\circ$  wide in the horizontal plane, perpendicular to the towing track of the fish; and  $25^\circ$  wide in the vertical plane inclined downwards by  $10^\circ$ . The pulse and the receiving/printing phases are synchronised by the recorder with the sweep helix blade.

The record produced by the Side Scan System is that of the sea floor topography and appears similar to an aerial photograph. The resolving power is dependent on the towing speed, but in general is about 1/200 of the chosen range at the full limit of that range. In the case of this survey, with a range of 250ft, objects or obstructions greater than 2ft would clearly be seen, while on the 500ft range objects of 6ft would be displayed.

## EQUIPMENT OPERATION

4.1           The High Resolution Boomer was used at a power level of 200J throughout most of the survey. Resolution is of the order of 3 feet.

              The sparker was used at a power level of 700J. This gave greater penetration but with a loss in resolution.

### 5.1 H.R.B. & Sparker

The records are scaled horizontally at 10ms intervals which correspond to 24 feet, assuming a sound velocity of 4,800ft/sec.

The vertical lines on the records represent fix marks whose positions may be found on the Decca charts.

System control settings are logged on the sheets appended to this report.

### 5.2 Side Scan Sonar

The scale lines are 50ft apart and the full scale reading is generally 500ft although in some cases the 1000ft range was used, away from the location.

Fix marks are also marked on these records.

Only the starboard channel has been used throughout the survey as shortly after the commencement of the first survey, the port channel developed a fault and as there was a poor weather forecast, it was decided not to risk time repairing same.

6.1 Norwegian Block 2/3

1. The sea bed is flat at approximately 178 feet unreduced. Detailed soundings charts will be forwarded by the Decca Surveys Co.

2. A thin veneer of silt is probably present over the area. Beneath this extending down to 25ft to 36ft fine grained sediments are present showing very well defined, thin, dipping bedding which appears to be forebedding. In places this bedding is horizontal and is likely to represent a crossing along the strike direction of the beds. The sediment here is likely to be silt and fine grained sand, possibly of a lacustrine origin. Some minor infills are present such as at fix 14 on line 2. These have occurred at a later date than the deposition of the above material and may be softer.

The base of this interval is generally well defined but in places it is absent indicating a grading from silt into the underlying material.

3. The underlying sediment is generally transparent on the boomer records and probably consists largely of clay of Pleistocene age.

4. A horizon is present on the sparker at between 62 and 75ft. The material beneath this shows some random bedding and sound scattering and is probably composed of gravels, sands and clays with



some boulders.

5. Some dark patches are present on the sonar records; these probably represent mud patches.

## 6.2 Danish Sector

1. The sea bed slopes very gently towards the North, average depth being about 124ft. A soundings chart will be forwarded by the Decca Surveys Co.

2. Very little detail shows up on the records up to a depth of 80ft, and it is likely that the sediment here is largely clay with a thin veneer of sand at the surface.

Horizons can be seen at approximately 36ft and 80ft sub-bottom; these are relatively clean probably within the clay sequence. They may represent sand or silt layers.

3. The sonar records show the bottom to be free of any major obstructions.

## CONCLUSION

7.1 In conclusion I can see no reason why there should be any difficulties in siting a rig in either of these two areas.

R.J. Pilkington

Geologist







