4.3.2 FLUIDS/DRILL STEM TEST

4.3.2.1 Introduction

One DST was done in the upper part of the Brent.

The perforated interval was: 2386 - 2405 mRKB corresponding the best sand zone in the gas interval.

Perforations were done using TCP with 5 shot per foot.

The main objectives of the test were:

- Obtain reliable fluid samples
- Evaluate reservoir permeability, productivity
- Estimate possible heterogeneities, boundaries

4.3.2.2 Equipment

Two Geoservices Quartz gauges (TERRATEC), two Halliburton Quarts gauges (HMR) and two Flopetrol strain gauges (FHPR-B) were set in gauge carriers. All were reading the tubing pressure and temperature.

4.3.2.3 Quality of the measurements

Some discrepancy in the pressure and temperature readings can be seen between the different gauges. (Figs. 4.13/4.14)

At the end of the main build-up, the pressure ranges form 242.5 to 243.3 bara, and the temperature from 83.1 to 85°C.

Gauge Halliburton 2 was discarded due to obvious problems on temperature readings leading to erroneous pressure corrections.

Flopetrol gauges show pressure unstabilities due to sensitivity to annulus pressure changes. Flopetrol 1 is more than 1/2 bar too low compared with the other gauges and RFT pressures.

Both Geoservices gauges are almost perfectly overlayed.

It was then decided to interpret the build up on three gauges:
Geoservices 2, Halliburton 1 and Flopetrol 2.

4.3.2.4 Test data (Fig. 4.18)

Average data for the different test periods are summarized in the following table:

Pressures are given at the end of each period and bottom hole pressures are taken from gauge Haliburton 1. Gas rate and GOR are average values over flow periods. They were only corrected off-shore.

Date	Time	Choke size	W.H.P (bara)	B.H.P (bara)	Qgas m3/d	GOR vol/vol	Remark
06/03/90	23h14 to 24h00	16/64			NS	NS	Clean-up flow
07/03/90	00h00 to 01h00	16/64	177.9	240.4	100000*	NS	idem
07/03/90	01h00 to 02h09	20/64	182.5	239.2	200000*	NS	idem
07/03/90	02h09 to 03h31		186.1	243.1	0		Shut-in (leak)
07/03/90	03h31 to 03h37	16/64					Clean-up flow
07/03/90	03h37 to 07h15	20/64	181.4	239.7	200000	NS	
07/03/90	07h15 to 15h50	28/64	177.4	238.9	355000	6200**	
07/03/90	15h50 to 21h17	40/64	155.8	235.2	585000	5100**	
07/03/90	from 21h17						Build-up
08/03/90	12h00			243.1	0		End of build-up

N.S. = non stabilized
* = values estimated for test interpretation
** = GOR variation coherent with separator temperature changes

4.3.2.5 PVT data (Fig. 4.15)

No PVT sample was taken during RFT
Five complete sets of PVT samples (gas + oil) were taken during test production period:

Set Nb	Choke size	Gas bottles	Oil bottles	Remark
1	28/64	3	1	
2	28/64	4	1	
3	28/64	6		Isokinetic gas samples, mercury free oil sample
4	28/64	4	1	
5	40/64	2	1	mercury free oil sample

The PVT results are not yet available.

The only available data are the following:

GOR = 5100 to 6200 depending on separator temperature
Bottom hole gradient from RFT: 0.227 g/cm^3
Condensate densities: 0.755 to 0.766 g/cm^3 at 1 bar and 15°C
Gas gravity: 0.678 to 0.692