

Final destination

When the Brent Delta oil platform in the North Sea reached the end of its life, it was brought to ABLE Seaton Port in Hartlepool, England, for decommissioning. During piling works at the quayside in preparation for the load-in of the platform, Solmek was brought in to install monitoring equipment

ABLE UK, a specialist in the field of demolition and marine decommissioning, commissioned geotechnical and environmental engineering company Solmek to drill a series of rotary boreholes at its ABLE Seaton Port (ASP) site.

ASP is located in the centre of the UK on the north-east coast close to the mouth of the River Tees and covers 51ha (126 acres) including a 10ha (25-acre) former dry dock – one of the world’s largest – now acting as a wet dock to facilitate the load-in of the Brent Delta oil platform.

The boreholes were requested along the front and rear of the Quay 6 combi-pile wall in order that various monitoring instruments could be installed. The monitoring instruments were to record groundwater depths and ground movement during piling activities, all of which have been successfully completed.

ASP Quay 6 is now Europe’s strongest quayside and, in May 2017, successfully received the 24,200t Brent Delta platform in a single piece, which constitutes the first phase of what is one of the largest, and most prestigious, oil-rig decommissioning projects to date.

FIELDWORK

As part of the project, the client requested 16 boreholes to varying depths of up to 30m bgl (below ground level). Working closely with the client, Solmek knew that previous boreholes at the facility had encountered interbedded drift deposits of clay and sand, typical of North Sea coast glacial till deposits, overlying Sherwood sandstone bedrock at approximately -25.00m AOD (above ordnance datum/above mean sea level).

Rotary drilling was carried out by the Bainbridge Bros, under



Solmek supervision, using a Symmetrix drill string to advance the boreholes through made ground and drift deposits using air as a flushing medium.

The Symmetrix system is specifically designed to drill through unconsolidated overburden materials such as clay and sand, and to continue into bedrock as it uses simultaneous casing advancement when drilling.

Once rock head was encountered at -25.00m AOD, the borehole was continued to the scheduled depth using PWF core drilling with a mud flush to ensure full core recovery was obtained.

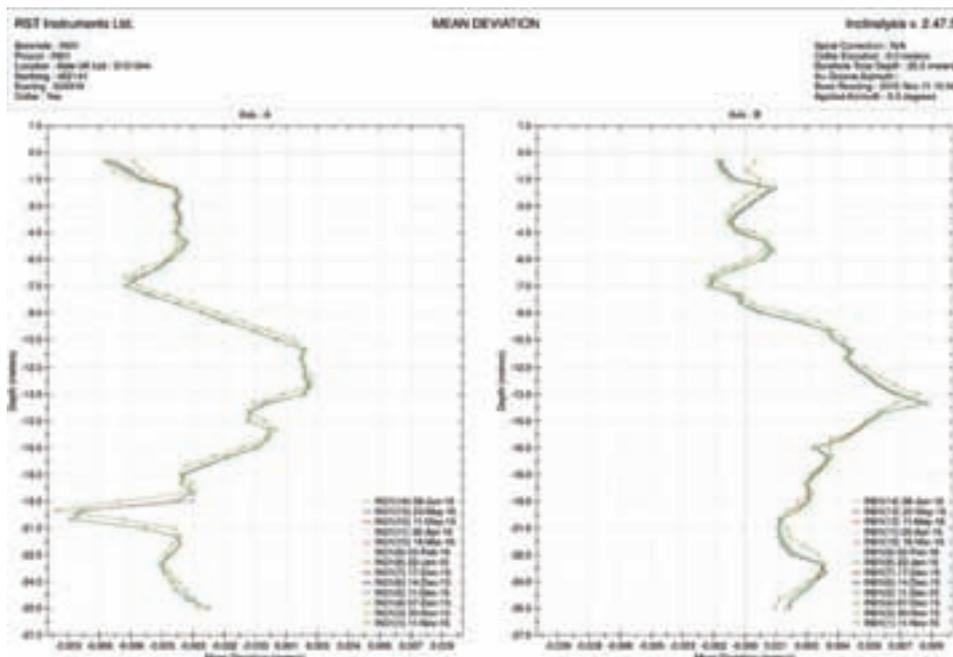
Within the Sherwood sandstone, artesian groundwater was encountered and it produced a head of water to the ground surface. This head of water caused problems with both drilling and installation of the monitoring equipment.

Due to the artesian conditions, excess water was produced from the borehole and this was not acceptable to the client. To remedy the excess water Solmek used a mud mixed with barytes.

The addition of barytes causes the mud to become ‘heavy’, which counteracts the pressure of the artesian head, reducing the head to below ground level and thus stopping the flow of excess water.

This in turn allowed the various instrumentation to be installed correctly to allow subsequent monitoring.

*Above: Quay 6 during load-in of the Brent Delta topside (24,200t)
Below: Example of a typical inclinometer plot*





INSTALLATIONS

The instrumentation installed included standard 63mm HDPE standpipes along with dual ceramic piezometers for ground-water-level monitoring. Additionally, a series of four inclinometers were positioned along the combi-pile wall to ensure movement of the front wall did not occur during ongoing piling activity for Quay 6.

MONITORING

Solmek undertook monitoring of the inclinometers over a period of three months during a busy period of construction activities for the quayside and provided rapid results to the client.

The inclinometers were monitored using the company's in-house MEMS Digital Inclinometer System and operated by its trained technicians. The equipment utilises a biaxial inclinometer probe capable of monitoring movement in two directions, which is connected to a field PC using wireless technology to minimise any human-induced movement into the probe.

An initial baseline set of readings was taken to ascertain the in-situ position of the inclinometer casing. Subsequent monitoring visits carried out by Solmek were undertaken during piling works and the data were processed to produce plots of any movement. The data can be



Rotary rig set-up with mud flush

plotted post monitoring visit in several ways using in-house software. However, Solmek was required to plot the data showing cumulative movement and mean deviation movement. ♥