IOT Holland | Case study | September 2024

EBN - ORANJEOORD-01

INTRODUCTION

IOT Holland has been contracted by Energie Beheer Nederland (EBN) to provide core and core handling services for the SCAN project. The SCAN project aims to assess the potential for geothermal heat extraction in less-explored areas of the Dutch subsurface.
The Oranjeoord-01 (ORO-01) well is the second project under this initiative. It is a vertical well with a total depth (TD) of 836 meters TVDNAP (true vertical depth relative to Amsterdam Ordnance Datum). EBN has identified a total of 6 coring points for this well, spanning a cumulative length of 126 meters. The coring points are located at depths ranging from approximately 350 meters TVD to 794 meters TVD, with hole sizes of 12 ¼ inches and 8 ½ inches.

CHALLENGE

Coring in the North Sea Group Formation

This involves working with ultra-soft and unconsolidated sand(stone) and clay(stone) formations, which present difficulties in maintaining core integrity.

Coring in the Brussels Formation

The presence of interbedded layers, including calcite-cemented banks between soft and unconsolidated sandstones, poses a challenge. There is a potential risk of the core becoming jammed due to these interbedded formations.

Weight on Bit (WOB) Limitation

The maximum allowable WOB is 1 ton. This limitation is necessary to avoid the risk of core collapse in the soft formations of the Brussels Formation, particularly when transitioning from these soft layers into harder stringers.

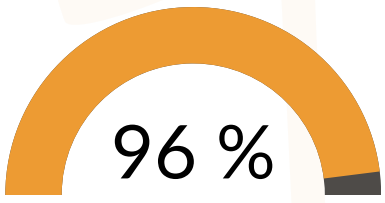
SOLUTION

For the SCAN project, IOT Holland developed a specialized 8 ½” core barrel with a 12 ¼” core head to accommodate coring in sections with a 12 ¼” hole size, allowing for the retrieval of 5 ¼” cores. Additionally, IOT Holland created a system to ensure that both soft, unconsolidated formations and harder formations could be successfully retrieved. This system, known as the IOT Holland Full Closing System, features two clam shells that close upon activation, securely "catching" the core to prevent it from falling out.

The Full Closing System was developed for both 12 ¼” and 8 ½” hole sizes specifically for the Oranjeoord-01 well. To enhance stability during coring operations, an extra stabilized 9-meter core barrel has also been proposed to maintain the bottom hole assembly (BHA) as steady as possible.

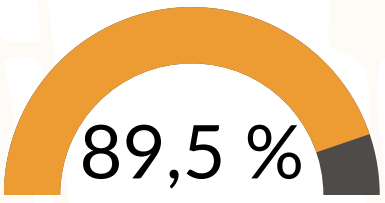
RESULTS

In the 12 ¼” section of the SCAN project, a total of 8 core runs of 9 meters each were conducted. Of these, 7 runs utilized the Full Closing System, cutting a total of 65.5 meters and recovering 62.5 meters, achieving a high-quality core recovery rate of 96%.
In the 8 ½” section, 10 core runs of 9 meters each were performed, all using the Full Closing System. These runs cut a total of 76.7 meters and recovered 68.7 meters, with a core recovery rate of 89.5%. In the event of core jamming, this was recognized in time by the IOT Holland coring engineers.
All coring operations in both the 12 ¼” and 8 ½” sections were conducted using the same type of core head, the IOTS013. This core head features a steel body PDC design with 10 blades and 13mm cutters.



12 ¼” with Full Closing System

Core Recovery



8 ½” with Full Closing System