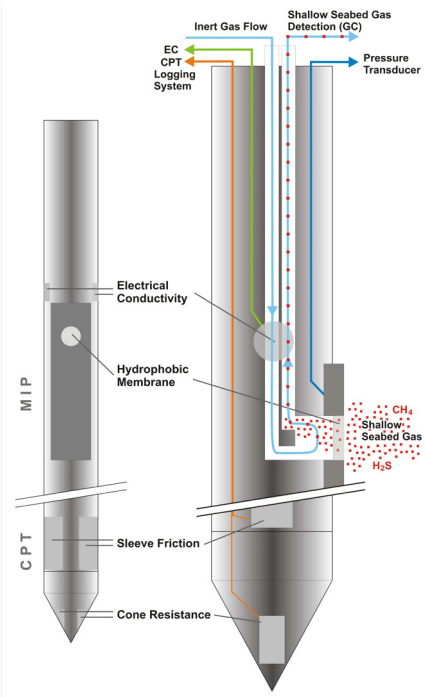
FUGRO
SHALLOW GAS PROBE

During offshore geotechnical site investigation, Fugro identifies the presence of shallow seabed gas posing risk to human health and marine structures.

Shallow gas – usually methane and hydrogen sulphide – is formed by biogenic or thermogenic processes in marine sediments. The gas is most often trapped in confining sediment layers and escapes from the seabed in a diffuse or eruptive manner (gas blowout) during drilling operations or by other disturbance of the gas pressure equilibrium. Risks involved are the toxicity of the escaping gas components, potential explosive gas concentrations over water and reduction of the hydrostatic pressure by rising gas columns which e.g. impacts vessel buoyancy. Furthermore seabed subsidence can occur, causing damage to offshore structures like wind turbines and pipelines.

Initial assessment of shallow gas presence is normally carried out by a geophysical (seismic) site survey prior to drilling operations. Data will be examined for the presence of gas-related anomalies such as acoustic blanking, acoustic turbidity, bright spots and enhanced reflectors. However, it is rarely possible to quantify gas concentrations or gas pressures from seismic data alone; neither is it possible to define thicknesses of gas layers. But more importantly, there are certain ground conditions which prevent the prediction of the presence of shallow gas from seismic data sets alone.



Schematic view of the MIP-CPT Probe.

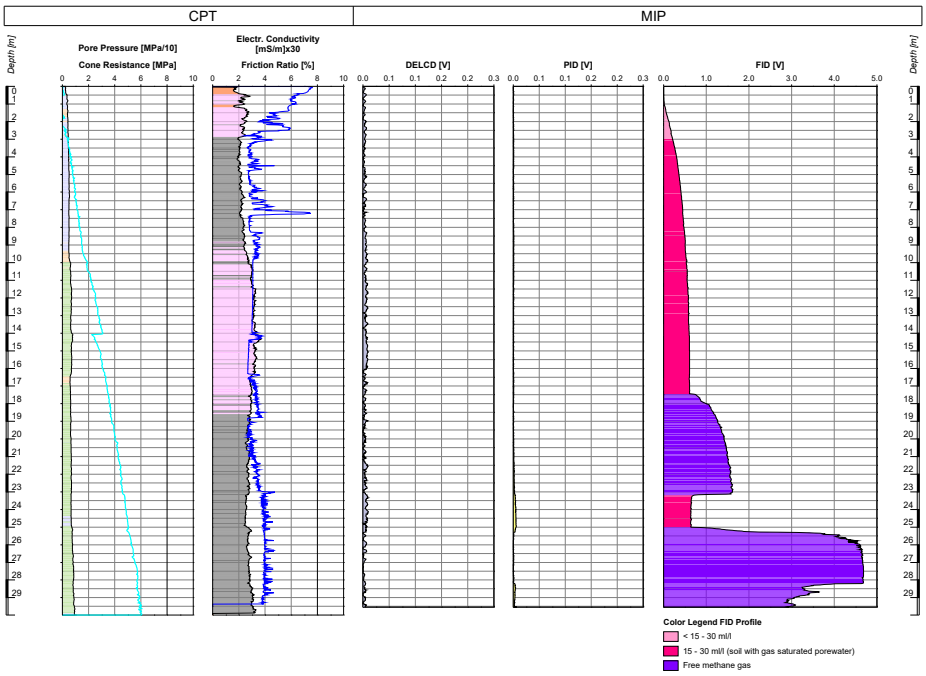
MIP-CPT SHALLOW GAS TESTING

In order to reduce uncertainty and assessing the gas risk Fugro has developed a dedicated shallow gas probe, which allows for accurate detection, quantification and characterization of marine gas below seabed. Fugro has modified its MIP (Membrane Interface Probe) system and has added a gas pressure transducer. Being connected to a CPT cone the MIP serves as a multiparameter probe for measuring gas during the CPT push.

When gas is encountered at depth it diffuses across the semipermeable MIP membrane and travels through capillaries in the cable up to the vessel, where it is continuously measured by three gas detectors: PID (Photo Ionization Detector), FID (Flame Ionization Detector) and DELCD (Dry Electrolytic Conductivity Detector).

If free gas is detected, the in-situ gas pressure can be determined as necessary. Data are presented as combined CPT and gas logs vs. depth.

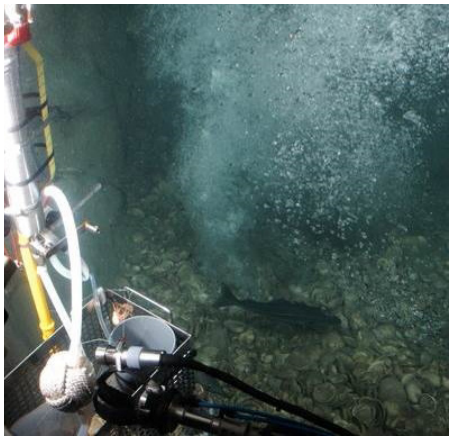
The MIP-CPT shallow gas probe can deployed with standard CPT push technology from either jack-up platforms (top-push) or vessels (seabed frame) up to water depths of 50 m. Results are available immediately and can serve to adapt dynamic work plans on site in order to carefully delineate gas bearing zones in a single mobilization.



MIP-CPT log showing free methane gas trapped below a confining clay layer.

MIP-CPT SHALLOW GAS TESTING KEY BENEFITS

- Combined geotechnical and geohazard risk investigation
- Highly accurate and reliable gas detection
- Continuous in-situ gas profile vs. depth
- Data available in digital (ascii) format
- Supports on-site decision-making
- Verifies geophysical results and removes uncertainties



Shallow gas escaping from the seabed.

MIP controller and gas detector units.

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