HORIZON GEOSCIENCES

Mapping the Marine Environment

WE PRIDE OURSELVES ON OUR FLEXIBILITY AND ABILITY TO REACT QUICKLY TO EVOLVING PROJECT SCOPES WHILST MAINTAINING THE QUALITY OF OUR DELIVERABLES AND THE SAFETY OF OUR PEOPLE, OPERATIONS AND THE ENVIRONMENT

About us

Horizon Geosciences provides quality marine survey, geotechnical and subsea services to clients in multiple sectors around the world.

Working through our network of offices and laboratories, our skilled teams support every stage of offshore and nearshore projects with industry-leading equipment and assets including; offshore vessels, nearshore boats, ROVs, SEPs, Bathymetric and Geophysical spreads and Geotechnical drill rigs.

With key projects successfully completed in a broad range of geographical locations, Horizon has established itself as a leader in its field.

As we continue to expand our services and invest in people, equipment and technology, our goal to provide tailored, cost effective solutions to our clients remains steadfast.

HORIZON GEOSCIENCES SERVE CLIENTS ACROSS SECTORS AND INDUSTRIES INCLUDING; OIL & GAS, RENEWABLES, CIVIL, SUBSEA AND OFFSHORE CONSTRUCTION

Tailored Service Solutions

SURVEY

We offer a broad range of marine and airborne survey services with our capabilities covering all stages of offshore development as well as onshore and shallow intertidal zones. Our fleet of ocean and coastal going vessels are equipped with expert teams and the latest technology and equipment, ensuring accurate project data is provided in good time and within budget.

Whether you are looking to install an offshore asset, inspect existing infrastructure, acquire data for engineering analysis, chart the seafloor or extract samples, we can support you with this and more through the following services:

- **Hydrography**
- **Geophysics**
- **Airborne LiDAR Survey**
- **Precise Positioning**
- **Construction Support**
- **UXO**
- **ROV**
- **Environmental**
- **Metocean**
- **Shallow Seabed Sampling**
- **CP Survey**

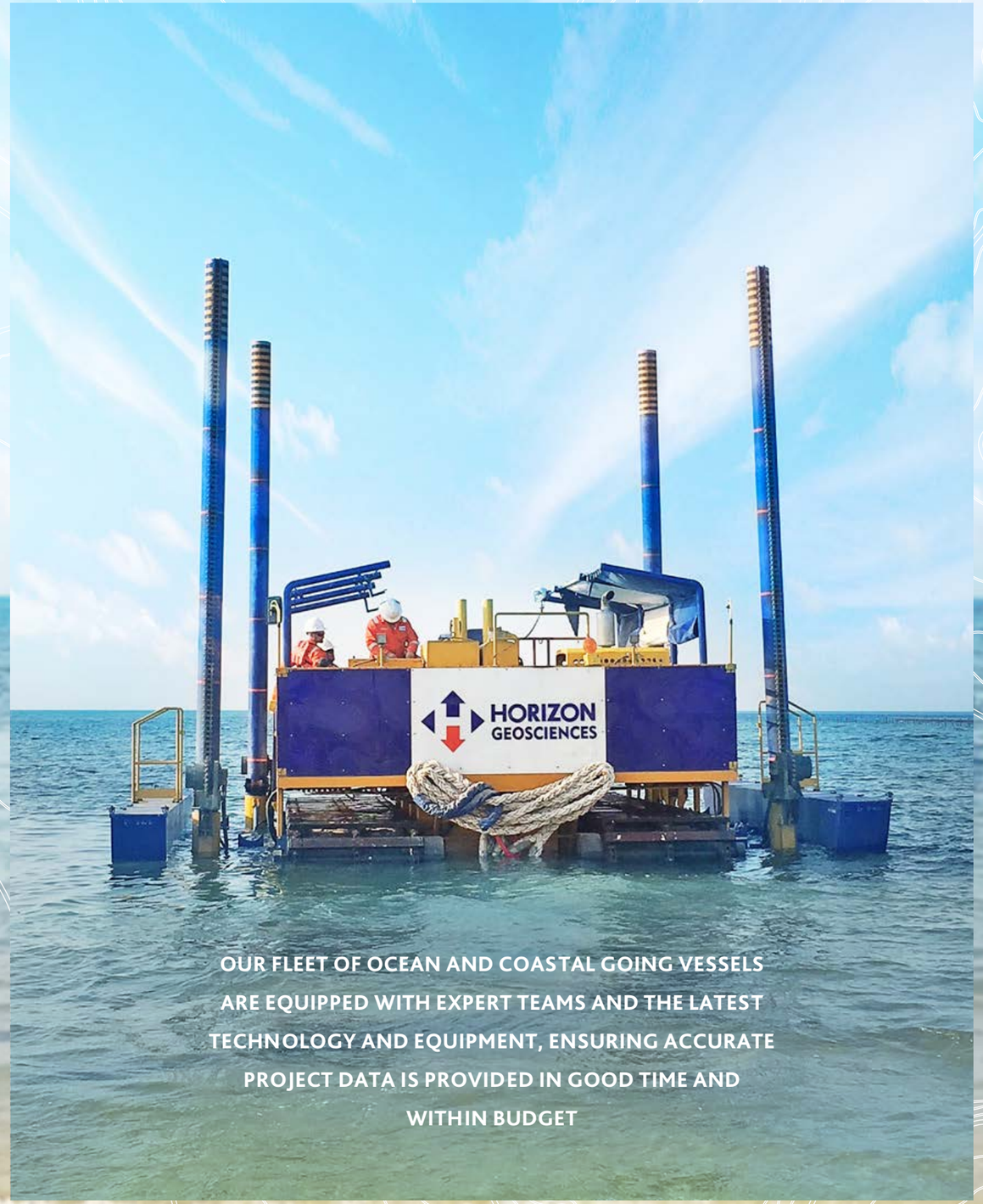
GEOTECHNICAL

Our flexible approach and emphasis on quality, health, safety and the environment, has helped us to establish ourselves as a leading provider of offshore geotechnical engineering services.

We support companies in renewables, oil & gas, civil and subsea industries across continents. Each project is assigned an experienced Project Manager, who will ensure staff and solutions are tailored to your exact project needs and objectives.

- **Offshore Geotechnics**
- **Nearshore Geotechnics**
- **Foundation Engineering**
- **Laboratory Testing**

> **"WE'D LIKE TO PASS ON OUR CONGRATULATIONS AND APPRECIATION TO THE HORIZON GEOSCIENCES TEAM ON BOARD ECLIPSE & MYNX. THE TEAM'S PROFESSIONAL CONDUCT IMPRESSED US GREATLY, IT WOULD BE A PLEASURE TO WORK WITH YOU AGAIN IN THE FUTURE."**
>
> SBM OFFSHORE



SITE INVESTIGATION FIELDWORK ON VINEYARD WIND PROJECT, USA

Client: *Vineyard Wind LLC*
Year: *2018*
Services: *Geophysical and Geotechnical Investigation*

Horizon Geosciences has recently performed a combined geophysical and geotechnical investigation of the Vineyard Wind Offshore Windfarm, Offshore Massachusetts, USA for Vineyard Wind LLC (a joint venture company formed by Copenhagen Infrastructure Partners and Avengrid Renewables). The objective of the survey was to collect hydrographic, geophysical and geotechnical data to provide sufficient information to support studies and preparation for the Construction and Operations Plan and Facilities Design Report for the wind farm.

The works were performed by Horizon's DP2 vessel Horizon Geobay and the Kommandor Iona.

A number of deep geotechnical boreholes were drilled at the specific locations on the site to provide soil data for foundation engineering and installation assessment. Work included sampling and coring in down hole mode together with PCPT testing and P-S logging. A complex and demanding lab testing programme was undertaken to provide interim results throughout the deliverables phase.

Approximately 2,300km of geophysical survey lines were run by the Kommandor Iona acquiring bathymetric, sidescan sonar, sub-bottom data and magnetometer in order to provide data for seabed clearance, inter array cable routing, and lateral variability assessment.

Both vessels worked closely with Vineyard Wind and BOEM to ensure that the stringent environmental procedures and project specifications were achieved.

"THE FUTURE OPPORTUNITIES IN US OFFSHORE WIND ARE DEVELOPING QUICKLY SO BEING INVOLVED IN THIS PRESTIGIOUS PROJECT TO UNDERTAKE ONE OF THE EARLIEST GROUND INVESTIGATIONS WAS A GREAT ACHIEVEMENT FOR HORIZON"

LANCE HANSON, *PROJECTS DIRECTOR*

OFFSHORE WIND FARM, SITE INVESTIGATION, EAST COAST, UK

Client: *Scottish Power Renewables*
Year: *2018*
Services: *Geophysical and Geotechnical Investigations*

Horizon were contracted by Scottish Power Renewables to conduct comprehensive geophysical and geotechnical site investigation on the East Anglia 3 Project Site and export cable corridor in the North Sea.

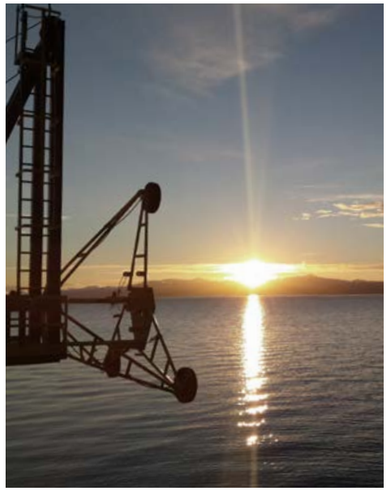
The offshore works were originally planned to be conducted by two survey vessels, however in response to client driven internal milestones, Horizon chartered a third vessel to allow for the programme to be accelerated. The Horizon Geobay was provided to conduct deep geotechnical sampling and in situ CPT borehole; the Kommandor Stuart conducted geophysical survey and shallow geotechnical testing, and Horizon brought in the Atlantic Carrier post contract award complete with Horizon's 200kN Seabed CPT System, and to conduct vibrocore and shallow CPT testing along the cable route.

A total of 20 no. 60-80m boreholes comprise sampling and CPT were conducted from the Horizon Geobay; 40 no. 200kN deep push seabed CPTs together with 20 no. shallow push seabed CPTs and 20 no. vibrocores were conducted from the Atlantic Carrier and over 5,000km of bathymetric survey was completed from the Kommandor Stuart. All works were completed within a two and a half month period and in accordance with the required schedule.

A comprehensive onshore laboratory testing programme was undertaken, with bespoke cyclic testing being specified and conducted in conjunction with Scottish Power Renewables technical consultants and Horizon's laboratory testing partners, overseen by Horizon's team of in-house Senior Geotechnical Engineers.

"WE WORK WITH CLIENTS TO OFFER SOLUTIONS THAT CAN ENSURE TIMELY DATA DELIVERY, SUCH AS CHARTERING ADDITIONAL VESSEL ASSETS, WHERE NECESSARY. THIS ALLOWS FOR SAFE, EFFICIENT AND PRODUCTIVE OPERATIONS TO BE MAXIMISED OFFSHORE, FEEDING INTO THE ONSHORE LABORATORY TESTING AND REPORTING PHASES, WHILST REMAINING QUALITY AND SCHEDULE FOCUSED THROUGHOUT"

JOHN CUDDEN, *SENIOR PROJECT MANAGER*



GEOPHYSICAL & GEOTECHNICAL SITE INVESTIGATION, UK

Client: *Premier Oil UK Limited*
Year: *2017*
Services: *Geophysical UHR Survey, Geotechnical Site Investigation and Foundation Engineering Analysis*

Horizon Geosciences successfully completed a combined geophysical and geotechnical investigation with subsequent foundation engineering analysis on the Tolmount Field Development for Premier Oil UK Limited in the North Sea.

A two vessel solution was proposed to carry out the field work which involved simultaneous vessel operations to ensure the critical data and project deliverables were submitted in accordance with the client requirements.

The objective of the geophysical survey was to perform a 24km route survey in a single pass using a full analogue and UHRS spread. Works were performed from Horizon's UK geophysical vessel the Kommandor Stuart. The geotechnical investigations were undertaken by Horizon's DP2 vessel, Horizon Geobay. Works included sampling and coring in down hole mode together with PCPT testing, Seismic PCPT testing and P-S logging. An onshore classification and advanced lab testing programme was undertaken with subsequent delivery of a comprehensive platform foundation engineering analysis report, produced by Horizon Geosciences UK based in-house engineering team.

"ON BEHALF OF PREMIER OIL, I WOULD LIKE TO THANK THE HORIZON TEAM VERY MUCH FOR THEIR EFFORTS IN PROVIDING A PRODUCT THAT IS NOT ONLY AS GOOD AS, BUT IMPROVES ON SOME OF THE DATA COLLECTED DURING PREVIOUS CAMPAIGNS"

LUCIAN WEST, *SENIOR SUBSEA PROJECT ENGINEER, PREMIER OIL UK LIMITED*

GEOTECHNICAL SITE INVESTIGATION, NORTH SEA, UK

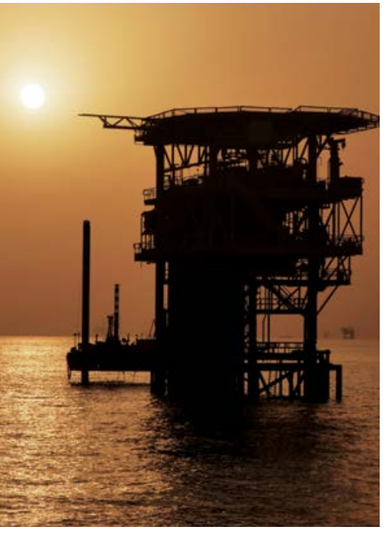
Client: *DONG Energy*
Year: *2017*
Services: *Geotechnical Site Investigation*

Horizon teams were proud to be involved, alongside DONG Energy, on the main geotechnical site investigation on the Hornsea 2 project in the North Sea. Horizon provided vital site characterisation data for ground model development, the provision of high quality samples and data, and determined engineering parameters to assist with foundation design.

The Horizon Geobay was deployed for the works as multiple geotechnical sampling and data collection techniques were required. Sampling and coring was conducted down hole together with CPT testing, complimented by Horizon's separate 200kN Seabed CPT System and Vibrocore system. Both down hole and seabed CPT systems were utilised in both standard and seismic mode, to collate important small strain measurements essential for ensuring accurate foundation design. All systems were carried simultaneously and interchanged at sea, avoiding the need for port calls. A complex onshore laboratory testing regime was proposed, specified and managed by Horizon Geosciences Geotechnical Engineering Department in Bristol ensuring quality, flexibility and control throughout the campaign.

"HORIZON'S TECHNICAL INPUT AND OVERALL MANAGEMENT OF THE ONSHORE LAB TESTING PROGRAM, WHICH INCLUDED A COMPLEX ADVANCED TESTING SCOPE AND RESEARCH TRIALS, HAS ALLOWED DONG ENERGY TO CONTINUE WITH THEIR SITE CHARACTERISATION EFFORTS, AND PROVIDED INPUT TO THEIR FUTURE ENGINEERING OBJECTIVES. ALL OF THIS HAS BEEN ACHIEVED THROUGH CLOSE COLLABORATION BETWEEN HORIZON'S UK BASED ENGINEERING TEAM AND DONG ENERGY'S TECHNICAL DEPARTMENT"

TOBY MASTERS, *SENIOR GEOTECHNICAL ENGINEER*



GEOTECHNICAL PROJECT, MANIFA FIELD, KSA

Client: *McDermott Arabia Company Ltd*
Year: *2014*
Services: *Geotechnical Investigation, Engineering Analysis*

Our requirement was to investigate 11 platform sites and a number of locations for buried cables and pipeline. With water depths at 5-12m, Horizon utilised the self-propelled jack-up platform (Aqua Jack 1) with a TD500 rig mobilised onto it. Boreholes were drilled to 60m (platform) and 10m (pipeline and cable) using Geobor S wireline rotary techniques to maximise recovery of the samples.

In order to expedite testing and results, a fully equipped containerised geotechnical testing laboratory was mobilised on a support vessel so that key tests could be carried out offshore and around the clock.

"HORIZON USE RELEVANT PROPRIETARY SOFTWARE AND APPLY REGIONAL METHODOLOGIES FOR PILE CAPACITY ASSESSMENTS, DRIVABILITY STUDIES AND LIQUEFACTION ASSESSMENTS. ADDITIONALLY, MUDMAT BEARING CAPACITY / SETTLEMENT ANALYSES ARE CARRIED OUT USING 3D FINITE ELEMENT METHODS"

GRANT WOODYARD, *ENGINEERING MANAGER, HORIZON GEOSCIENCES*

ENVIRONMENTAL SURVEY, OFFSHORE, QATAR

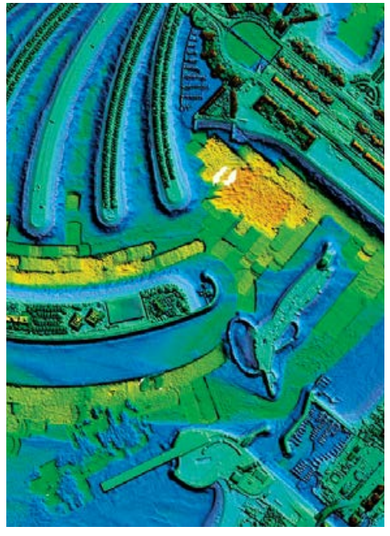
Client: *GDF Suez*
Year: *2014*
Services: *Post-Drilling Environmental Survey*

Horizon Geosciences supported GDF Suez during a post-drilling environmental survey around two well-head locations in Block 4, Qatar. The objective was to present environmental data to the client for Ministry of Environment (MoE) drilling approval.

During the campaign, water and sediment samples were extracted and analysed for pollutant levels and indicators of biological content. Both small and large organisms were monitored using a variety of techniques from zooplankton trawling, benthic sieving for microscope identification and ROV video camera transect analysis.

"ENVIRONMENTAL SURVEYS ARE EXTREMELY IMPORTANT IN THE OFFSHORE INDUSTRY AND OUR DEPARTMENT IS EXPERIENCING INCREASED DEMAND FOR THEM. STUDIES LIKE THIS HIGHLIGHT POTENTIAL DETRIMENTAL IMPACTS TO THE MARINE ENVIRONMENT AND ENABLE CLIENTS TO MAKE INFORMED DECISIONS"

ENVIRONMENT MANAGER, HORIZON GEOSCIENCES



AIRBORNE LIDAR PROJECT, UAE

Client: *Dubai Municipality*
Year: *2013*
Services: *Airborne Laser Bathymetry (ALB) Survey*

Horizon Geosciences undertook an Airborne Laser Bathymetry (ALB) Survey of the shoreline and off lying coastal waters of Dubai in 2013. The Coastal Zone and Waterways Management Section of Dubai Municipality instructed the work.

The survey was conducted using a Hawkeye Bathymetric LiDAR manufactured by Airborne Hydrography (Sweden) in an Aero Commander 690 aircraft. The Aero Commander is a high-winged twin, pressurised turboprop aircraft. It's highly durable and capable of carrying two pilots plus an observer so it's ideal for operating LiDAR systems at low level for coastal surveying.

Bathymetric, Topographic and Imagery data was collected simultaneously along the entire coastal area of Dubai, covering land and sea. For bathymetry purposes, data was captured at 3m resolution with topography collected at 1m resolution and imagery at 0.2m resolution.

This data capture is made possible due to the Hawkeye being an integrated system that operates a green laser, which measures depth, an IR Laser, which measures the topography, and a camera, which takes imagery coincident with the LiDAR survey. The end result is a seamless terrain model and imagery mosaic of the area surveyed.

AS BUILT SURVEY, UAE

Client: *Technip*
Year: *2015*
Services: *ROV*

Horizon Geosciences supported Technip on a Dubai Petroleum project in March 2015 by undertaking an As Built Survey of 13 pipelines and their associated risers across various platforms offshore the UAE.

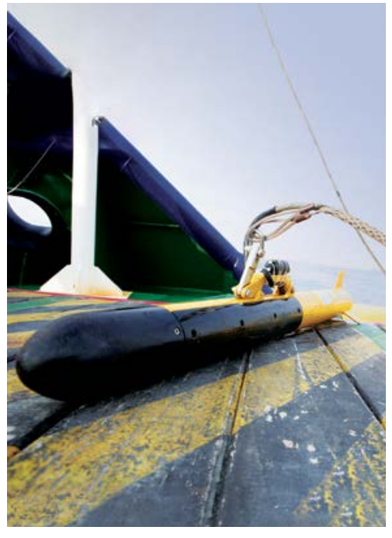
The pipeline inspected was 123 kilometres long with diameters varying from 6 to 30 inches. The Seaeye Cougar XT was selected for this job due to its flexibility and manoeuvrability. This ROV system is an upgraded version of the Seaeye Cougar and is a compact, highly flexible machine. For this project, the Cougar XT was equipped with an As Built survey sensor package including dual head profilers, boom cameras, CP and bathy suite and successfully completed 370 dive hours in the water with minimum maintenance.

The work was completed within a demanding timeframe.

"DURING PLATFORM WORK THE COMPACT SIZE OF THE COUGAR XT AND ITS MANOEUVRABILITY, EVEN IN STRONG CURRENTS, MAKES IT EASY TO PILOT INSIDE AND AROUND STRUCTURES. ITS EXCELLENT PAYLOAD CAPABILITIES ALSO ALLOW THE INTERFACE OF MULTIPLE SURVEY SENSORS OF VARIED CONFIGURATIONS REQUIRED FOR PIPELINE INSPECTIONS"

KAMAL SAWLANI, *ROV GENERAL MANAGER*

Operational Map



MULTI-DISCIPLINARY SITE INVESTIGATION, UK

Client: *Inchcape Offshore Ltd*
Year: *2015*
Services: *Geophysical Survey, Geotechnical Site Investigation*

Horizon Geosciences performed a combined geophysical and geotechnical investigation of the Inch Cape Offshore Windfarm for Inch Cape Offshore Limited.

The objective of the geophysical survey was to provide additional geophysical data to update the ground model and provide unexploded ordinance (UXO) clearance for the geotechnical works. The geotechnical investigation was to support the performance foundation engineering. Approximately 400km of geophysical survey lines were run acquiring bathymetric, sidescan sonar and sub-bottom data as well as magnetometer and gradiometer data.

A total of 11 locations were investigated by drilling boreholes up to 50m beneath seabed level. A program of cone penetration testing (CPT) and sampling was performed in the boreholes to provide in situ characteristics in addition to samples for laboratory testing. Less than 0.2% technical downtime was recorded during this phase of the project enabling maximum progress to be achieved during periods of workable weather.

"ON BEHALF OF THE INCH CAPE TEAM HERE AT REPSOL IN EDINBURGH, I WANT TO EXPRESS OUR THANKS TO EVERYONE ON BOARD THE GEOBAY. WE ARE PLEASED WITH THE TRANSPARENT AND PROACTIVE APPROACH HORIZON HAS TAKEN, PARTICULARLY IN RESPECT TO SAFETY MATTERS"

JOHN REDDISH, *INCHCAPE*

NEARSHORE CP SURVEY, QATAR

Client: *Halul Offshore Services on behalf of Qatar Gas*
Year: *2015*
Services: *CP Pipeline Survey – Trailing Wire Method*

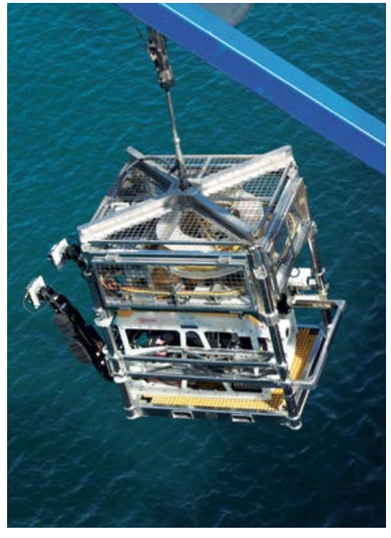
CP is a technique used to control the corrosion of a metal surface which can occur due to a multitude of environmental and time related factors.

Horizon Geosciences performed a cathodic protection pipeline survey, nearshore Qatar, January 2016 for Halul. The trailing wire method was used whereby teams of engineers made hard wire connections at test points along the beach, these ran to the water line where the trailing wire was connected. The HS2 ran 6 X 3KM survey lines individually towing a dummy fish with a AG/AGcl cell attached.

Both the cell and trailing wire were connected to online data acquisition software to record the data, against the provided navigation. The results are then processed and presented to the client in a comprehensive report.

"CORROSION IS AN ELECTROCHEMICAL PROCESS THAT OCCURS IN STAGES AND IF LEFT UNTREATED, SUBSEA ASSETS CAN BECOME HAZARDOUS AND THEIR RESTORATION COSTLY. HORIZON OFFER A RANGE OF CP SURVEY SERVICES ENABLING CLIENTS TO ASSESS AND MAINTAIN THEIR SUBSEA ASSETS"

SEAN LOWE, *PROJECT MANAGER, HORIZON GEOSCIENCES*



Geotechnical & Drilling Stats

Horizon's revolutionary digital CPT System is designed to achieve a continuous profile to depths in excess of 40m into the ground, representing a substantial cost and time saving for clients. The importance of deep push Seabed CPT profiles across the site allows for accurate ground model generational and verification, which supports key decision making on foundation options with a greater degree of accuracy and confidence.

EUROPEAN & ATLANTIC

(From 2013 - 2019)

- **Uptime** *93%*
- **Drilling** *19,941m*
- **P-S Logging** *2,171m*
- **200kN Seabed CPT** *3,405m*
- **Seismic CPT** *318m*

MIDDLE EAST & INDIAN OCEAN

(From 2005 - 2019)

- **Uptime** *96%*
- **Drilling** *42,361.5m*

"ALL OPERATIONS WERE CONDUCTED SAFELY AND IN-LINE WITH HSE REQUIREMENTS BY THE ENTIRE CREW. A DEDICATED ENGINEERING TEAM WORKED ALONGSIDE OFFSHORE FIELDWORK AS WELL AS ONSHORE ENGINEERING AS THE PROJECT CONTINUED INTO THE LAB TESTING PHASE"

VATTENFALL PROJECT MANAGER

BUILDING AN ACCURATE GROUND MODEL IS CRUCIAL TO THE DEVELOPMENT OF OFFSHORE WIND FARMS, THEREFORE A HIGH VOLUME OF QUALITY CPT DATA IS NEEDED, OFTEN WITHIN TIGHT TIMESCALES. THIS IS WHERE HORIZON'S 200KN CPT CAN SURPASS TRADITIONAL DRILLING EXPECTATIONS IN TERMS OF PRODUCTION AND COST

JOHN CUDDEN, *SENIOR PROJECT MANAGER*

Our fleet

We own a fleet of OVID and IMCA-approved multi-purpose vessels suited to a diverse range of projects both nearshore and offshore.

Shallow sampling equipment including vibrocorer, drop corer & piston corer as well as Roson CPT can be mobilised on any of our vessels. Additionally, we have digital 2DHR spreads and a range of multipurpose ROVs available upon request.

Quest Horizon

65m DP2 Geotechnical Site Investigation Vessel. *Operating in the Middle East and Indian Ocean*

Horizon Nomad

60m DP2 Multipurpose Site Investigation and ROV. *Operating in the Middle East and Indian Ocean*

Horizon 27

Self Elevating Platform. Operating in the Middle East and Indian Ocean

Horizon Surveyor

40m Geophysical & ROV Survey Vessel. *Operating in the Middle East and Indian Ocean*

OUR OTHER VESSELS

- **Terra Surf SEP**
- **AV1**
- **Nearshore Survey Boats**

"THANK YOU FOR THE HARD WORK PUT INTO MAKING THIS PROJECT A SUCCESS AND FOR GOING THE EXTRA MILE"

LEIGHTON O&M

HORIZON HAS A FLEET OF NEARSHORE SURVEY BOATS WHICH ARE ALL PERMANENTLY MOBILISED WITH ANALOGUE GEOPHYSICAL AND HYDROGRAPHIC SURVEY SPREADS. THE NEARSHORE SURVEY BOATS ARE PREDOMINANTLY USED TO SUPPORT OUR OFFSHORE SURVEY VESSELS AND ARE TYPICALLY MOBILISED ONTO THE LARGER VESSELS TO PERFORM ANY SURVEY WHERE SHALLOW WATERS OR DIFFICULT ACCESS PRECLUDES THE LARGER VESSELS FROM OPERATING.

OUR FLEET OF NEARSHORE BOATS ALL COMPLY WITH INTERNATIONAL HSE STANDARDS AND SUPPORT OUR GLOBAL OPERATIONS.

Some of our clients

PETRONAS
REPSOL
ADNOC
VATTENFALL
SBM OFFSHORE
Technip
sapura energy
TOTAL
PremierOil
HEXICON
Lamprell
UD
ارامكو السعودية Saudi Aramco
RasGas
SAIPEM
subsea 7
شركة نفط الشمال North Oil Company
MAERSK OIL
enQuest
LS Cable & System
JX
DONG energy
eni
HYUNDAI HEAVY INDUSTRIES CO.,LTD.
McDERMOTT
wintershall
XER XCITE ENERGY RESOURCES
Polarcus

"THROUGHOUT THE PROJECT THIS TEAM SHOWED PROFESSIONALISM AND WORKED HARD, LEADING TO THE SCOPE OF WORK BEING COMPLETED AHEAD OF TIME. EXTENDING MY SINCERE THANKS ON BEHALF OF SAIPEM, WE LOOK FORWARD TO WORKING WITH YOU ON THE NEXT PROJECT SOON"

SAIPEM

I WOULD LIKE TO THANK HORIZON STAFF FOR THEIR PROFESSIONALISM AND CONTRIBUTION ON THIS PROJECT, THEY PARTICIPATED ON BOARD WITH ENTHUSIASM AND WERE A CREDIT TO THEMSELVES AND THEIR COMPANY

MAERSK OIL

Why choose us?

Quality marine science is at the core of everything we do. Our continued investment in specialised technology and equipment enables us to provide integrated, innovative, multi-disciplinary solutions that can be tailored to your specific project needs in a broad range of geographical locations.

Your assigned Project Manager will be a dedicated resource for the life-cycle of the project, managing our teams on the ground and consistently ensuring the project objectives are being delivered on time and within budget.

At Horizon Geosciences, transparency and trust are central to our business operations and clients remain our driving force.

"I WOULD LIKE TO EXPRESS MY GRATITUDE AND THANKS FOR THE GREAT EFFORT. I'M PARTICULARLY IMPRESSED BY THE EXTRA EFFORT THAT HORIZON HAS PUT IN; SOMETHING THAT WE DON'T SEE THAT OFTEN WITH OTHER SERVICE PROVIDERS."

QATAR SHELL

MAPPING THE MARINE ENVIRONMENT

HORIZON GEOBAY

D – 19.5 METRES

horizon-geosciences.com