

*Acquisition of  
Seabed Massive Sulphide Data  
in the Norwegian Sea*



**NORWEGIAN PETROLEUM  
DIRECTORATE**

## Contents

Scope of work: .....	3
1 Description of the assignment .....	3
1.1 Background .....	3
1.2 Technical overview .....	3
1.3 Timing .....	4
1.4 Processing .....	4
1.5 Project time schedule .....	5
1.6 Crew-Change .....	5
1.7 Client's representative .....	5
1.8 Navigation specifications .....	5
1.9 Communication.....	5
1.10 Data delivery and final products .....	5
2 Costs .....	6
2.1 General conditions .....	6
2.2 Mobilization and demobilization .....	6
2.3 Transit rate .....	7
2.4 Operational rate .....	7
2.5 Standby rate .....	7
2.6 Cost associated with crew-change .....	7
2.7 Cost for optional equipment .....	7

**Scope of work:**

The NPD intends to acquire a variety of geophysical data that may be used in the exploration for volcanic massive sulphide deposits of extinct hydrothermal vents in the seabed of the Mohns Spreading Ridge in the Norwegian Sea during summer 2019. The survey shall consist of a set of semi-regional survey lines and some stations for seabed rock sampling using a remote operated vehicle (ROV). The total cost with all included shall not exceed NOK 22 000 000 ex. VAT.

The main part of the survey is to take place along the central rift of the Mohns Ridge within an area of coordinates: 6.15E, 73.33N, 4.02E, 72.86N, 4.49E, 72.68N, 6.69E, 73.14N and possible within an optional area of coordinates 0.91E, 72.43N, -2.77E, 71.89N, -2.40E, 71.60N, 1.39E, 72.13N

All coordinates above are provided in WGS84.

NPD has an option to order additional work within or in connection with this scope of work, for up to NOK 10 000 000,- ex. VAT. Additional work may i.e. consist of more acquisition in the same area or in optional areas. If such option is exercised, invoice for additional work must be submitted in first quarter 2020 (budgetary reasons).

**1 Description of the assignment****1.1 Background**

The marine acquisition campaign described here is part of NPD's program for mapping the deep-sea mineral resources of the Norwegian continental shelf. The data acquisition program will be administered by the NPD, funded through the Ministry of Petroleum and Energy.

**1.2 Technical overview**

Based on experience from NPD's cruise in 2018, we expect a minimum of 750 km survey lines, weather permitted. NPD will honor as much as possible of high-quality data within that budget.

The data shall include spontaneous potential data (SP), multi-beam bathymetry (MBES) including back scatter data and preferably water column data, magnetometry and routine grav/mag, and sub-bottom profiler (SBP) data. In addition, chemical and geophysical sensors, i.e. turbidity, pH and temperature are to be applied. The data acquisition is expected to be carried out using AUV. The NPD is interested in solutions using two AUVs to increase the data acquisition efficiency. Possible ways for combining these data with the acquisition of electromagnetic (EM/CSEM) and/or magneto telluric (MT) data would also be of interest. Both pre- and post-envelope processing shall be part of the deliverables for the SBP data. Each dive of the ROV shall be documented by HD-video imaging.

The data acquisition shall be carried out by at least one AUV. Simultaneous use of two AUVs will be considered positive.

All sensor data acquired must be delivered in at least one format that can be read without using proprietary software (e.g. GeoTiffs and XYZ).

In addition, geological samples are to be collected in areas of special interest. Samples shall be collected by an ROV. The possibility of drilling of cores will be evaluated.

The water depth of the survey area is down to 3500 m, with some shallower areas.

The data are to be acquired along a set of semi-regional survey lines related to the central rift valley and its flanks in a part of the of the Mons Ridge (se Figures 1 and 2). The aim of the survey is to enhance the data base for mineral exploration in general, and to investigate how different data sets may be integrated to best identify possible sulphide mineral deposits.

*Bidder is required to specify all relevant technical information to meet these intentions.*

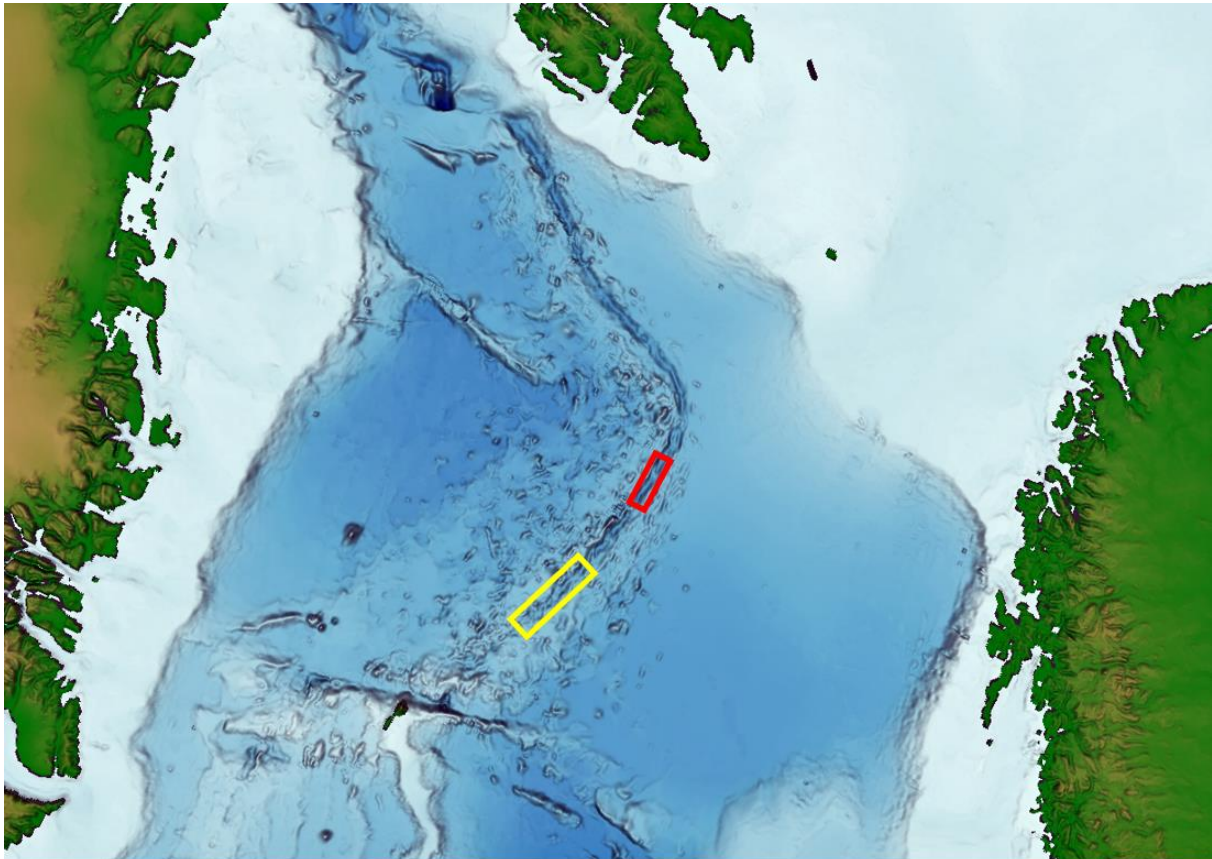


Figure 1. Regional map indicating the general location of the survey (red polygon), and the optional area (yellow polygon).

### 1.3 Timing

The duration of the survey is expected to be approximately one month and to take place between early July and early September 2019.

*Bidder is requested to provide vessel availability meeting this survey period.*

### 1.4 Processing

Processing of all data types shall be in accordance with industry standards. Preferably, SP data should be processed onboard allowing the result to be made available as close to real time as possible in order to guide the ROV to promising dive sites.

## **1.5 Project time schedule**

*The bidder is required to specify a table with a realistic project time schedule based on the scope and technical overview described above.*

## **1.6 Crew change**

If possible, it should be a continuous survey without crew change during the survey. To achieve this, the date when the survey vessel is leaving harbor starting the project operations is expected to be the start-date for a leg (crew-change period).

*The bidder is required to comment on the need for crew-change during the project period.*

## **1.7 Client's representative**

NPD will have representative(s) on board for quality control, operational decisions and daily reporting to NPD.

## **1.8 Navigation specifications**

The survey vessel must have onboard navigation equipment necessary for its movement and ability to stay on location during rock sampling. The technical solutions available onboard will be evaluated.

*Bidder is required to detail all onboard navigation equipment and planned procedures during operations.*

## **1.9 Communication**

There is need for continuous communication to shore. Phone and email communication will have to be available at all times to assure that necessary information is delivered to the NPD and that decisions are taken without unnecessary delay. This information shall include all relevant results and evaluations. A unique high velocity line for this communication is preferred. In this regard the quality of the onboard communication will be evaluated.

*Bidder is required to detail all onboard communication equipment, including capacity for delivery and receipt of information.*

## **1.10 Data delivery and final products**

The contractor shall deliver all raw and final processed data and a set of maps and images. Deliverables with comprehensive reports shall be delivered with the data including an onboard QC and calibration report (delivered on completion of field work), and a Cruise Report and acquisition and processing report (field report). All reports shall be delivered within 1 month after the finalization of the assignment.

The contractor shall deliver all rock samples to a storage facility or any other institution determined by NPD immediately after the finalization of the assignment.

All data and other reporting from optional services have to be delivered to the NPD within the same time schedule. After delivering of all data to and acceptance from the NPD, the contractor shall delete all the data from the contractor's and any third parties' databases.

## 2 Costs

### 2.1 General conditions

The total cost with all included shall not exceed NOK 22 000 000 ex .VAT.

As full compensation to Bidder for satisfactory performance of the Services, NPD shall reimburse Bidder in accordance with the rates and prices hereunder. Such rates and prices are in full and final settlement of all remuneration due to the Bidder for performance of the services, meaning:

- Prices stated by Bidder shall include all costs necessary to carry out the whole acquisition project.
- Costs shall be stated in NOK. Prices shall exclude VAT and shall remain fixed until completion of the work.
- All navigation costs shall be included in the day rates.
- All costs for communication to shore shall be included in the day rates.
- Costs of delivery of the samples and material to the NPD shall be included in the rates quoted for mob/demob, day rates and reporting.
- Costs related to equipment performance and acceptance tests shall be covered by the bidder.
- Food and lodging for the client's representatives shall be included.
- Fuel costs shall be included.

The breakdown of timing regarding production and standby shall, on a daily basis, be agreed between the Party Chief and the NPD. The bidder's breakdown standards on this issue must be part of the tender documentation.

All downtime due to technical breakdown must be covered by the Bidder. *Bidder is required to state prices for all items in section 2.2-2.7.*

### 2.2 Mobilization and demobilization

Mobilization and demobilization will take place in a port conveniently located with respect to suitable facilities and airline connections for the oncoming crew and representatives from the client. In this case, the port is expected to be Tromsø or Bergen. In conjunction with the mobilization, a start-up meeting will be held with representatives from the NPD to provide hands-on information regarding the project to the crew and potentially to do a short vessel inspection.

Bidder shall specify the total cost for mobilization and demobilization related to the port in their bid. Mobilization and demobilization cost shall cover vessel, equipment and personnel costs associated with the mobilization and demobilization of this survey.

The costs shall be stated as lump sums.

For the sake of clarity, the mobilization period will be regarded as finished when the vessel(s) and all equipment, personnel, infrastructure, spare parts and consumables of the Bidder departs from the port of mobilization and starts transiting to the first survey location.

The demobilization is regarded as finalized when the vessel has transited to and arrived at the agreed port after finalization of the survey.

### **2.3 Transit rate**

The Bidder shall quote a transit rate (pr day – 24 hours) related to the transit time from port of mobilization to the area where work is planned to commence, and to the specify expected time for such transit.

The transit rate will relate also to movement of vessel between survey lines, and to the transit from the working area back to port for demobilization.

### **2.4 Operational rate**

Operational rate will apply when the Bidder's equipment and personnel are actually conducting the survey services to be rendered by the Bidder and shall be quoted per day (24 hours).

Operational time is classified as time spent on:

- Preparation for acquisition of data and/or sampling operations
- Acquisition of data operations
- Sampling operations
- Recovery of equipment after ended acquisition and/or sampling operations

The following costs shall be included in operational day rate stated:

- Costs for logistical acquisition/sampling planning.

Use of other optional equipment proposed by contractor may be quoted as "other equipment and services offered by contractor" and quoted as lump sum and daily rental (applies when equipment is in use).

### **2.5 Standby rate**

Standby rate shall be stated as rate per day (24 hours).

Standby time is classified as time spent on:

- Waiting on weather.
- Waiting due to circumstances beyond Bidder's control.

### **2.6 Cost associated with crew-change**

Reference is made to pt. 1.6. In case of need for crew change during the project period, the Bidder shall specify the associated cost. This can be done either by specifying a total sum associated with crew-change during the project, or by a day-rate and associated time expected for the crew-change.

### **2.7 Cost for optional equipment**

Cost for any optional services shall be detailed for the relevant tools or packages of tools. This cost shall include personnel, equipment, operation cost, reporting etc.

The cost for the different tools should be specified for:

- Mobilization/demobilization of the equipment and personnel involved
- Day rates (24 hrs) for the full project duration for personnel and equipment
- Operational rates (24 hrs) for the time of actual operations of the logging tools