Coastal Oil & Gas Limited

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Merthyr Mawr Exploration Borehole

Merthyr Mawr - 004 - Non Technical Summary

November 2014

Drilling of the Merthyr Mawr Borehole

Table of Contents

1. Introduction

Coastal Oil & Gas Ltd. is based at the Bridgend Business Centre, Bridgend, South Wales. It is principally involved in the exploration of UK onshore gas reserves. It has a 50% interest in 49.2 sq. km. of Petroleum Exploration and Development Licence (PEDL 216) which is part of a licence holding in South Wales of 1052.4sq. km. The remaining 50% is held by Adamo Energy (UK) Limited a wholly owned subsidiary of Eden Energy Limited of Perth, Australia. Coastal Oil & Gas Ltd. is approved as an operator for this licence by the Crown.

Coastal Oil & Gas Ltd. were granted Petroleum Exploration and Development Licence (PEDL) 216 by the Department of Energy and Climate Change (DECC). This licence gives the Applicant exclusive rights to search for subsurface petroleum by physical means within the licence area.

The purpose of this document is to provide an overview of the proposed drilling operation and casing program for the proposed drilling of the Merthyr Mawr borehole.

1.1 Summary of regulated Facilities

The development comprises of a Mining Waste Operation as defined in (2)(1) of Schedule 20 of the Environmental Permitting (England and Wales) Regulations 2010 (as amended), under which the management of extractive waste will be regulated. The Mining Waste Operation does not include any integral water discharge regulated facility or integral groundwater regulated facility at the present time.

2. Site Location

The site is located in Merthyr Mawr South West of Bridgend in the Merthyr Mawr community council's areas of Bridgend County Borough Council. The national grid co-ordinates for the site are:-

Eastings 288251 Northings 178367

Figure 1: Location of site

3. Geological Setting

The British Geological Survey map Sheet 262 (Bridgend) maps the area as Jurassic Limestone area is situated to the Vale of Glamorgan and is underlain by the Carboniferous Limestones. The general dip of the strata seams is towards the south.

The borehole will be stopped in the Devonian or Silurian measures, at an approximate depth of 1300 metres. The detail of the geology has been taken from nearby boreholes that have been drilled for various water and limestone exploration.

4. Drilling Operations

The site will be prepared for the arrival of drilling and other site equipment.

The drilling cellar will be installed using a JCB or similar excavator to dig the hole and install the concrete rings.

Around the site a trench will be excavated and a land drain installed to collect surface water in an interceptor tank.

An approximately 12inch diameter hole will commence in the drilling cellar and then be drilled to approximately 50m. This will be of a depth to penetrate through the soils and top of the bedrock (generally limestones). When this hole has been drilled the drilling equipment will be removed from the hole and steel casing will be lowered into the hole. Once all the casing is in place cement is pumped through the casing to fill the void. The cement will be pumped until the cement returns are seen at the surface.

Once the cement is cured the borehole is continued at a diameter of 8.5 inches to a depth of approximately 300m.

A 7inch string casing will be lowered into the borehole and fully cemented. The casing will prevent the migration of groundwater into the borehole and drilling fluids out from the borehole.

The borehole will continue drilling to collect samples (cores) to Total Depth of the borehole.

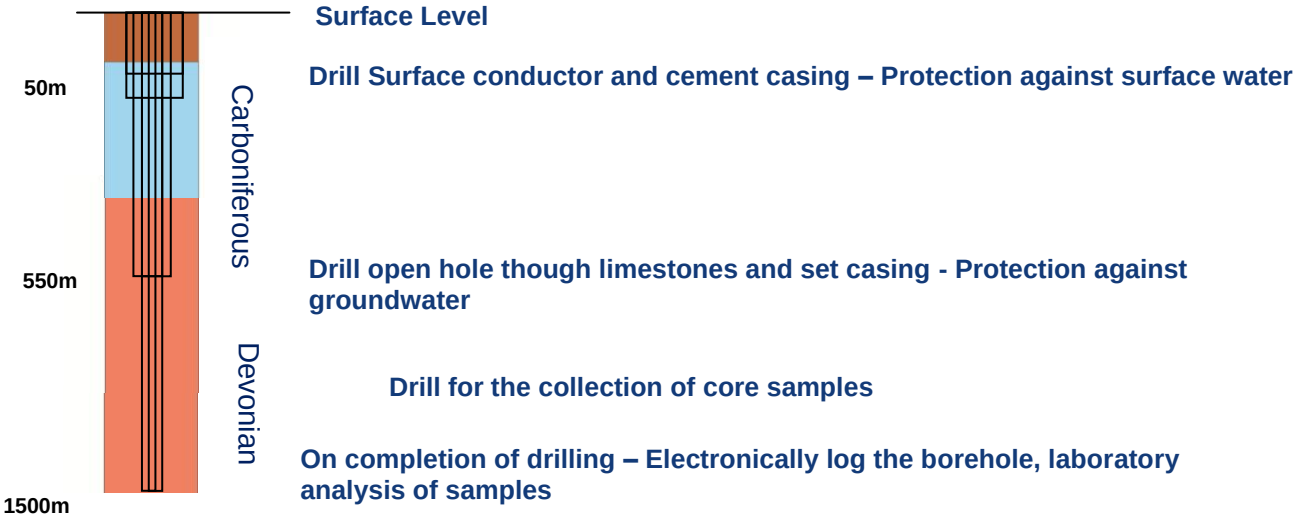

Figure 2: Strip log of the proposed borehole

When the drilling of the borehole has been completed a suite of electric logs will be run in the borehole.

4.1 Timing of Drilling

Summary of Time Scale

	Weeks
Drilling and associated operations	8
Establishment and Site Clearance	4
Laboratory Testing	4
Gas Testing	36

5. Drilling Fluids

There are three main purposes for the drilling fluids:-

- Cool the drilling bit
- Assisting with lifting the cuttings to the surface
- Act as the primary well control

The drilling fluids will comprise of a viscosifer to increase the viscosity of the fluid to increase the ability to lift the cuttings to the surface.

Pure-Bore has recently been granted approval under regulation 31(4)a of the Water Supply (Water Quality) Regulations 2000 and the Water Supply (Water Quality) Regulations 2010 and therefore approved for use in public water supplies and included in the "List of Approved Products for use in Public Water Supply in the United Kingdom" (The approval confirmation is seen on Appendix 2). Pure-Bore was developed by, and is manufactured by the Clear Solutions Group of Companies.

Pure-Bore is PLONOR (pose little or no risk) to the environment, and the CEFAS registration for Pure-Bore was granted in March 2012, with Pure-Bore achieving the best possible environmental rating under this registration scheme (Gold rating).

Prior to mixing Purebore is stored in the store shed as a powder in 25kg sacks.

The Purebore drilling fluids are mixed on the surface in an above ground tank. A venturi system is used to mix the powder and water to insure a consistent mix.

Agitators are placed in the tank to continually mix the drilling fluids. The drilling crew will be responsible for the mixing of the drilling fluids.

During the drilling of the borehole the levels of the drilling fluids are constantly monitored by the drilling crew and tests on the fluids are made during the drilling of a length of drill rod.

The properties tested by the drill crew are:-

- Density of the fluid
- Viscosity of the fluid
- Colour of the fluid
- Sand Content of the fluid

The water / fluids used for drilling are contained in a closed loop system; the volume of fluid required will depend on the depth of the well. The drilling fluid will be held in above ground tanks on the surface so that they can be checked for levels and leaks.

At the end of the drilling operation all excess drilling fluid will be tankered off site to a licensed disposal facility.

As all drilling fluids are maintained in a closed loop system this can easily be monitored for leaks. In the event of a loss of fluid to the system then the source of that loss will be investigated. If there is a leak to a tank / pipe then this will be repaired immediately. The tanks will be placed so that they can be observed by the drilling crew and site staff.

6. Production of Waste

The Mining Waste Operation will be conducted to ensure compliance with the Mining Waste Directive and the implementing regulations, the Environmental Permitting (England and Wales) Regulations 2010, as amended.

Operational management procedures will ensure that:

- The risks that the operations pose to the environment are identified;
- The measures that are required to minimise the risks are identified;
- The operations are managed in accordance with the Waste Management Plan and associated management systems;
- Conformity with the Waste Management Plan and associated management systems is audited at regular intervals; and
- The conditions of the Environmental Permit are complied with

The waste that will be derived from the drilling operations will be:-

- Drilling Cuttings
- Drilling fluids
- Excess Cement

7. Permit Application

Every oil and gas site operation requires local authority planning permission. Under Directive 2006/21/EC of the European Parliament and of the Council on the management of waste from extractive industries, a bespoke environmental permit is required from Natural Resources Wales.

7.1 Application Documents

Together with this Non-Technical Summary the following documentation is also submitted to support the application:-

- Application Forms (Parts A, B2, B5 and F1) and supporting documentation;
- Waste Management Plan;
- Environmental Risk Assessment;
- Site Condition Report;
- Coastal Oil and Gas Limited Environmental Management Plan;

8. Potential Emissions And Controls

The potential emissions from the Mining Waste Operation are non-inert, non-hazardous. The proposed drilling fluids - Purebore is a non-hazardous product.

The Mining Waste Operation site design incorporates features for surface water management, groundwater management and air quality management. The controls and management are described in the following sections.

8.1 Surface Water and Groundwater Management

In order to prevent the discharge of surface water from the site a cut off ditch and a submerged sealed interceptor tank will be constructed on the southern boundary across the lowest point.

A 10,000 gallon bowser will be kept onsite to allow the interceptor to be regularly emptied in the event of rain / surface run off. The bowser that the tank is pumped into will be sent off site to a licensed facility when it has been filled.

The control of groundwater during the drilling of this borehole will be the density of the drilling fluids which would prevent any major water ingress. The hydrostatic pressure created by the column of fluid in the borehole will reduce the ingress of groundwater. The drilling fluid creates a barrier against the wall of the borehole (Filter Cake) to prevent water ingress. The Jurassic and Carboniferous Limestones in the upper section of the borehole this is locally an aquifer. The Limestones will be sealed with steel casing cemented into place; this is a recognised method of sealing an aquifer by the Environment Agency.

The site is not situated in a Source Protection Zone and there are no potable water abstraction points within the application boundary or its immediate vicinity.

8.2 Air Quality Management

Unlike many operations linked to the extractive industries, the management of extractive waste will not operate any boilers or other equipment that consumes primary energy sources and there will be no associated emissions to air that require abatement or control. Accordingly, the potential for climate change from the Mining Waste Facility is low and there is no likelihood of visible plumes.

Fugitive emissions of natural gas are to be prevented by the volume of drilling fluids so there will be no emissions. Monitoring of air quality will be undertaken at the site as part of the normal operating procedures for a hydrocarbon exploratory well.

9. Monitoring

The environmental manager will regularly update the Site Condition Report as a record of the site condition and will be referred to in any site closure plan.

10. Management Arrangements

The Environmental Management System operated by UKOG is detailed in a separate document submitted as part of this application.

To manage conditions of the Mining Waste Permit along with mitigation actions and information from the site condition report.

11. Risk Assessment

In accordance with the Environment Agency's application form guidance, this section of the Non-Technical Summary provides a summary of the key technical standards and control measures which arise from the risk assessments undertaken in support of this Environmental Permit application.

Full details of the environmental risk assessment and risk mitigation measures are provided in the Environmental Risk Assessment documents that have been prepared in support of this Environmental Permit application.

11.1 H1 Environmental Risk Assessment

An Environmental Risk Assessment has been prepared for the drilling operations in support of this Environmental Permit application. The assessment has been undertaken in accordance with:

- The Environment Agency horizontal guidance H1 Environmental Risk Assessment for Permits, Version 2.1, December 2011; and
- EPR6.14 How to comply with your environmental permit. Additional guidance for: mining waste operations, Version 2, February 2011.

This qualitative risk assessment has considered air quality, odour, noise, fugitive emissions, dust, releases to water environment, waste, global warming potential, and potential for accidents and incidents. It relates specifically and only to the Mining Waste Facility and not any other activities that may be performed at the site.

The risk assessment is documented in documents Merthyr Mawr MWP - 002 and Merthyr Mawr MWP - 003. The assessment concluded that, with the implementation of appropriate risk management measures, potential hazards from the Mining Waste Facility are unlikely to be significant.

12. Conclusions

The overall conclusion from the studies undertaken is that the drilling operations to be performed at the site present a very low risk to the environment.