Crawberry Hill Wellsite Non-Technical Summary Exploratory Operations

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TABLE OF CONTENTS

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1 INTRODUCTION

Rathlin Energy (UK) Limited (Rathlin Energy) is a wholly owned subsidiary of Connaught Oil & Gas Ltd, a private company with its head office in Calgary, Canada. Connaught Oil & Gas Ltd is an international petroleum exploration, development and production company with operations in Western Canada and the United Kingdom. The experienced senior management team has an average of 30 years of direct operating experience in Canada and internationally. The United Kingdom operations are conducted through Rathlin Energy (UK) Limited and are directed from the Rathlin office in London.

Rathlin Energy is engaged in the exploration and production of petroleum onshore United Kingdom and holds 100% interest in Petroleum Exploration and Development Licence (PEDL) 183, within which it has drilled two exploration boreholes, Crawberry Hill 1 and West Newton 1.

The Crawberry Hill exploration wellsite was granted planning permission by East Riding of Yorkshire Council in September 2012. A copy of the planning decision notice DC/12/02945/STPLF/STRAT is included within 'Crawberry Hill Wellsite Planning Decision Notice' (RE-05-EPRA-CH-PDN-009) provided in support the of environmental permit application. The site was constructed in 4th quarter 2012 and the drilling of the Crawberry Hill 1 well was completed in 2nd quarter 2013. The well has subsequently been suspended pending analysis of the data gathered during the drilling operation.

The purpose of this document is to outline the waste management arrangements to be implemented at the Crawberry Hill wellsite during exploratory operations, which for clarity includes the testing of the existing CH1 well, the drilling and testing of CH2 well and wellsite restoration operations, permitted under the existing planning consent.

1.1 Site Details

The proposed Crawberry Hill exploratory operations are being undertaken at the following location:

Crawberry Hill Wellsite
Rathlin Energy (UK) Limited
Land Southwest of Crawberry Hill
Bishop Burton
Beverly
East Riding of Yorkshire
HU17 8RU

National Grid Ref: SE 97669 37720

Site Area: 0.99 hectares

Waste Registration Number: OGA961

The site surface boundary is detailed in green on the site plans included within document RE-05-EPRA-CH-SP-004.

2 DEFINITIONS

BAT: Best Available Technique

CH1: Crawberry Hill 1 Well

EA: Environment Agency

EMS: Environmental Management System

EPR 2010: Environmental Permitting (England and Wales) Regulations 2010

Hazardous Waste: As defined by Article 3(2), 7 and Annex III of the Waste Framework Directive

HCI: Hydrochloric Acid

HDPE: High-Density Polyethylene

HSE: Health, Safety and Environment

Inert Waste: A waste that does not undergo any significant physical, chemical or biological transformations. Does not give rise to environmental pollution or harmful to health

LCM: Lost Circulation Material

MMSCF: Million Standard Cubic Feet

Non Hazardous Waste: A waste which is not classified as inert or hazardous waste

Pollutant: Any substance liable to cause pollution

Pollution: A direct or indirect introduction, as a result of human activity, of substances or heat into the air, water land which may;

a) Be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems
b) Result in damage to material property
c) Impair or interfere with amenities or other legitimate uses of the environment

SMS: Safety Management System;

Spent Acid: Calcium chloride, carbon dioxide and water

3 ENVIRONMENTAL LEGISLATION AND APPLICABILITY

Activities associated with the exploration for oil and gas onshore in England fall to be considered within the scope of a number of pieces of environmental legislation. A review of the proposed Crawberry Hill exploratory operations against environmental legislation has identified the following legislation as being applicable to the Crawberry Hill exploratory operations.

3.1 Water Resources Act 1991 (as amended by the Water Act 2003)

Under Section 199 of the Water Resources Act 1991 (as amended by the Water Act 2003), a notice of the intention to construct or extend a boring for the purpose of searching for or extracting minerals must be submitted to the Environment Agency using form WR11. A method statement, including drilling and casing designs, together with storage and use of chemicals and drilling muds, shall accompany the WR11 application form.

The Crawberry Hill 1 well was the subject of a WR11 application, approved by the Environment Agency in December 2012.

The second borehole will be subject to a separate WR11 application, to be submitted to the Environment Agency for approval once final design is confirmed.

3.2 Environmental Permitting (England and Wales) Regulations 2010

A number of activities to be undertaken during the West Newton exploratory operations may require permitting under the Environmental Permitting (England and Wales) Regulations 2010 (EPR 2010).

3.2.1 A Groundwater Activity

Under Schedule 22 of EPR 2010, an activity that could involve the discharge of pollutants into groundwater must be notified to the Environment Agency, together with the nature of these pollutants. The Environment Agency will then determine whether the groundwater activity needs to be permitted.

The Crawberry Hill exploratory operations include a Mini Fall-Off Test within the Upper Visean/Lower Namurian interval and an acid wash and acid squeeze within the Permian interval. The Upper Visean/Lower Namurian formation has extremely low permeability and requires mechanical intervention to enhance its permeability. The quantity and concentration of potassium chloride water introduced to the formation must be considered in the context of the extremely low permeability of the formation and the unlikely presence of a receiving water. Introducing potassium chloride water to the formation will obviate any present of future danger of deterioration in the quality of the receiving groundwater. Whilst the injection of potassium chloride within deep impermeable formations is considered a 'groundwater activity', the activity is considered de minimus and can be excluded under Schedule 22 3 (3) of EPR 2010. The mini fall-off test within the Upper Visean/Lower Namurian interval does not, therefore require a groundwater permit.

Likewise, the introduction of hydrochloric acid at 15% dilution in to the Permian Carbonate interval creates a reaction with the calcite or dolomite through dissolution to produce carbon dioxide (CO_2), water (H_2O) and chloride ions (Cl). The chloride ions exist in the water and pair to form calcium chloride ($CaCl_2$). Calcium chloride is not a hazardous substance and must therefore be considered as a non-hazardous pollutant. The quantity and concentration of acid introduced to the formation must be considered in the context of the naturally occurring concentrations in the receiving water. In this case, given the natural salinity levels of the Permian interval in the North Yorkshire wells and this being considered representative of the same formation at Crawberry Hill, the receiving water is hyper-saline and the addition of the calcium carbonate as a result of introducing acid to the formation will obviate any present of future danger of deterioration in the quality of the receiving groundwater. Whilst the injection of hydrochloric acid within deep saline water bearing formations is a 'groundwater activity', the activity is considered de mimimus and can be excluded under Schedule 22 3 (3) of EPR 2010. The acid wash/squeeze within the Permian Carbonate does not, therefore, require a groundwater permit.

3.2.2 A Mining Waste Activity

The Mining Waste Directive 2006/21/EC requires that extractive wastes are managed in such a way that it minimises harm to human health and the impact on the environment. It applies to the management of waste resulting from the prospecting, extracting, treatment and storage of mineral resources and working quarries, which the Mining Waste Directive refers to as extractive waste. The waste can take the form of a solid, liquid or gas.

Schedule 20 of EPR 2010 defines a mining waste operation as being *the management of extractive waste, whether or not it involves a waste facility.* Under EPR 2010, an environment permit is required to authorise a mining waste operation.

The Crawberry Hill exploratory operations at this stage will involve the management of extractive waste not involving a waste facility.

3.2.3 Industrial Emissions Activity

The Industrial Emissions Directive 2010/75/EU requires a facility within which the incineration of hazardous wastes in plant such as a flare is carried out and where such incineration exceeds 10 tonnes per day, to be classified as an installation.

Regulation 35 of the Environmental Permitting (England and Wales) (Amended) Regulations 2013, which transposes the requirements of the Industrial Emissions Directive, requires an environmental permit to authorise an installation operation.

The Crawberry Hill exploratory operations will involve the incineration of natural gas exceeding 10 tonnes per day and, therefore, a permit to authorise an installation operation is required.

3.2.4 A Radioactive Substances Activity

Schedule 23 of EPR 2010 provides for the control of Naturally Occurring Radioactive Material (NORM). Schedule 23 defines the production of oil and gas as a NORM industrial activity and therefore any accumulation of radioactive waste, which exceeds concentrations set out in Table 1 of Schedule 23 of EPR 2010 (as amended in 2011) and its subsequent disposal requires an environmental permit to authorise a radioactive substances activity.

The Crawberry Hill exploratory operations will involve the circulating to surface of fluids exposed to the formation during drilling and/or well testing, which may or may not contain NORM in concentrations exceeding those set out in Table 1 of Schedule 23 of EPR 2010. Until such time as the concentration of NORM can be established, an environmental permit is required to authorise the management and disposal of NORM.

4 DESCRIPTION OF THE FACILITY

4.1 Site Location

The Crawberry Hill wellsite is located immediately north of Walkington Heads, Beverly within the East Riding of Yorkshire.

4.2 Site Description and Current Status

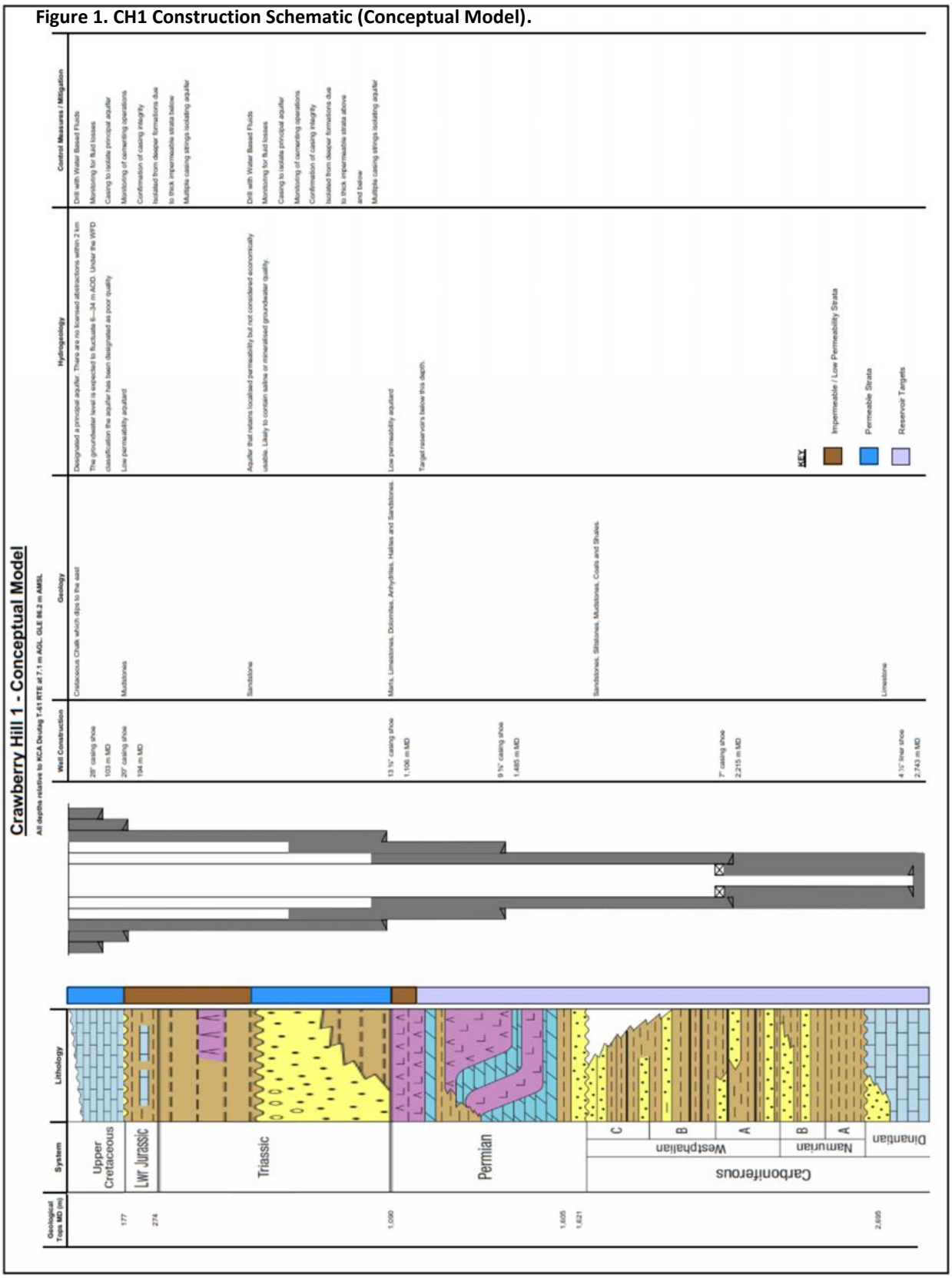
The Crawberry Hill wellsite was constructed in 4th quarter 2012 in preparation for the drilling of a petroleum exploratory borehole. The site was constructed by removing the topsoil and storing it on the eastern and southern boundary of the site. The exposed chalk was then cut to level creating a level plateau. A perimeter ditch was then excavated around the perimeter of the site to aid environmental containment. A 2.75m deep drilling cellar was then constructed using precast concrete rings, each ring individually sealed and cemented to ensure integrity. A 1mm fully welded HDPE membrane was then laid across the site and perimeter containment ditches, protected above and below by a layer of non-needle punch geotextile. Above the impermeable membrane and geotextile was laid geo-grid overlaid by a 300mm layer of MOT Type 1 stone.

Following site construction a small water well drilling rig was mobilised to site and drilled a 36” hole through the boulder clay at surface into the top section of the Chalk at 100m depth. 28” welded casing was then ran into the borehole and cemented back to surface. A 26” hole was drilled to 203m depth and 20” welded casing was then ran into the borehole and cemented back to surface. On completion of this operation the small drilling rig was demobilised from site.

A larger oilfield drilling rig was then mobilised to site to drill the remaining sections of the borehole. Following the drilling of each hole section, threaded steel casing was installed, cemented into position and pressure tested to confirm pressure integrity. A schematic of the well construction, with lithology, is provided as Figure 1.

On completion of the CH1 drilling operation the well was suspended pending a programme of well testing, which is the subject of this application and scheduled to be undertaken once all relevant environmental permits have been issued.

Figure 1. CH1 Construction Schematic (Conceptual Model).



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1.00	Jonathan Foster	Tom Selkirk	D Montagu-Smith	16/01/2014

4.3 Waste Generating Activities

A summary of the proposed CH1 well maintenance and testing operations is detailed below in chronological order, with a more detailed description of each activity provided within each subsection. The summary also includes the drilling of the second well from the wellsite, which is permitted under the existing planning permission. The drilling, well maintenance and testing programme is as follows:

- Well maintenance
- Upper Visean/Lower Namurian (subset within the Dinantian) mini fall-off test
- Lower Namurian pressure monitor and flow test
- Permian carbonate acid wash/squeeze and flow test
- Drilling of second permitted well
- Well abandonment

4.3.1 Well Maintenance

Following drilling operations, during the maintenance cycle of an exploration well, the potential to generate waste is limited and is likely to be associated with cementing operations to ensure integrity and formation isolation.

Borehole logging undertaken during well construction may identify areas where the cement bond between the formation and the casing does not meet the standard set by Rathlin Energy, which exist to meet or exceed industry best practice. In the event such areas are identified, an operation to undertake further logging of the wellbore and perform cement remediation works will be undertaken which may generate small amounts of cement debris. This operation may be repeated until the required cement bond standard is achieved.

4.3.2 Well Testing

Geological logging is undertaken during well construction to determine whether formations encountered during drilling contain petroleum. The borehole logs assist Rathlin Energy in determining specific zones, which justify subsequent testing.

Well testing may involve various different processes, all of which are intended to obtain a greater understanding of the formation properties and ultimately determine whether the formations are capable of producing commercial quantities of petroleum. Well testing process varies, depending on the formation being tested. An overview of the various well testing processes to be undertaken is detailed below:

4.3.2.1 Mini Fall-Off Test within Upper Visean/Lower Namurian

A mini fall-off test is a short duration formation test designed to gather reservoir engineering data (characteristics and properties of the reservoir rock formation). The test is carried out to establish the pressure at which injection of fluid occurs into the formation and analyses how the pressure permeates through the formation over a given period of time (usually 14 days). For clarity, the intention of the mini fall-off test is not to fracture the formation but to establish if and at what

pressure the formation becomes permeable. The information gathered during the mini fall-off test will help determine whether the formation is capable of being hydraulically fractured. Hydraulic fracturing is not being considered as part of the application which this plan supports.

The mini fall-off test is being performed within the Upper Visean/Lower Namurian interval at a depth of 2,677m. The Upper Visean/Lower Namurian interval, which is a subset within the Dinantian, is isolated from near surface aquifers, groundwater and those users and the environment dependent on them by some 2,000m of overlying low permeability formations.

The wellbore will be perforated to provide a flow-path to the formation. The wellbore above the perforated interval will then be sealed using a retrievable packer. Water weighted with non-hazardous Potassium Chloride (KCl) will then be pumped into the wellbore until injection occurs. Fluid is pumped for 5 – 10 minutes, during which $5m^3$ to $10m^3$ of fluid is injected. When pumping is complete, the residual pressure within the tubing is shut in and monitored for 14 days to analyse how the residual pressure permeates through the formation.

On completion of the mini fall-off test, any pressure within the tubing will be released and any remaining KCl water circulated to surface. KCI water injected into the formation during the mini fall-off test is unlikely to return (no flow back) due to the naturally impermeable characteristics of the formation. It will be absorbed by the formation and mixed with the naturally occurring formation water, held within the micro pore spaces. A small quantity of KCI water remaining within the formation will have no discernable effect on the formation or groundwater therein.

The formation has extremely low permeability and requires mechanical intervention to enhance its permeability. The quantity and concentration of potassium chloride water introduced to the formation must be considered in the context of the naturally occurring concentrations in the receiving water. Introducing potassium chloride water to the formation will obviate any present of future danger of deterioration in the quality of the receiving groundwater.

Whilst the injection of potassium chloride within deep impermeable formations is considered a ‘groundwater activity’, the activity is considered de minimus and can be excluded under Schedule 22 3 (3) of EPR 2010. The mini fall-off test within the Upper Visean/Lower Namurian interval does not, therefore require a groundwater permit.

4.3.2.2 Flow Test within Carboniferous Sands

Pressure monitoring and flow test is being performed within the Lower Namurian interval at a depth of 2,582m.

In order to establish communication between the formation and the wellbore, perforating guns will be run into the wellbore and fired, providing a direct connection between the formation and the wellbore. A retrievable packer will then be lowered into the wellbore, immediately above the perforations.

Pressure gauges will be run and set in the wellbore across the formation to monitor formation pressure. In the event that permeability in the formation is suitable, a flow tested may be undertaken, as described in Section 4.3.2.4.

4.3.2.3 Acid Wash/Squeeze and Flow Test within Permian Carbonate

Carbonate formations are heterogeneous with significant variations in porosity and permeability. To improve the flow of petroleum within a carbonate formation, an acid, most commonly hydrochloric acid (HCl) at 15% concentration with water (i.e. 150L of HCl with 850L of water), is applied to the formation through the wellbore. The operation is very much akin to acidisation of boreholes in the water well industry and results in high permeability channels through which water or petroleum can flow.

An acid wash is applied under low pressure in order to clean out any natural fractures which may have been blocked as a result of the initial drilling operation. An acid squeeze is then applied to direct between $6m^3$ to $11m^3$ of HCl acid solution to the formation, at a pressure not exceeding the fracture pressure of the formation. This results in the acid being squeezed through the natural fractures within the formation and increasing the near hole permeability. It is anticipated that all non-hazardous spent acid (calcium chloride, water and carbon dioxide) will be recovered to surface.

The acid wash and squeeze is being performed within the Permian interval at a depth of 1,850m. If more than one interval within the Permian interval is to be tested, the operation will be repeated.

The quantity and concentration of acid introduced to the formation must be considered in the context of the naturally occurring concentrations in the receiving water. In this case, given the natural salinity levels of the Permian interval in the North Yorkshire wells and this being considered representative of the same formation at Crawberry Hill, the receiving water is hyper-saline and the addition of the calcium carbonate as a result of introducing acid to the formation will obviate any present or future danger of deterioration in the quality of the receiving groundwater.

Whilst the injection of hydrochloric acid within deep saline water bearing formations is a 'groundwater activity', the activity is considered de mimimus and can be excluded under Schedule 22 3 (3) of EPR 2010. The acid wash/squeeze within the Permian Carbonate does not, therefore, require a groundwater permit.

4.3.2.4 Flow Test (Carboniferous Sands and Permian Carbonate)

A flow test is a short to medium duration test to analyse the flow characteristics of a formation, which may contain petroleum.

The wellbore will be perforated, providing a direct pathway from the formation to the wellbore, through which petroleum can flow. Petroleum is flowed to surface through the wellbore into temporary fluid separation equipment located on site.

Natural gas is separated from produced fluids (expected to be a mixture of formation water, oil and condensate) and diverted via temporary pipework to an enclosed single point flare located on site for incineration. At the point of incineration the natural gas in considered a waste. The flare is

equipped with a propane fuelled always on pilot, which ensures that ignition takes place as soon as natural gas is present and reignites if there is a break in flow. The enclosed flare is identified as BAT in Environment Agency Technical Guidance Note for Onshore Oil and Gas Exploratory Operations. Should the formation contain petroleum and the formation being capable of flowing such volumes, a suitable flow rate for well testing would be 95.74 tonnes (5mmscf) of gas per day, which for clarity exceeds the threshold values of 10 tonnes per day set out in Regulation 35 of EPR 2010, albeit for a short duration.

Produced fluids are transferred via temporary pipework to cylindrical storage tanks located on site where they are held for subsequent offsite disposal. Oil and condensate will be transported by a licenced haulier to a permitted refinery for sale and are therefore not considered a waste. Produced water, which is considered a waste, will transported by a licenced haulier to an Environment Agency permitted water treatment facility where it is processed, treated and discharged in accordance with the permitted controls of the water treatment facility.

Sufficient storage for produced fluids will be provided in the form of cylindrical tanks, which will be sufficient for a number of days well testing. A minimum of 210m^3 of produced fluids storage will be available on site, supported by 24 hour tanker haulage to remove oil/condensate or produced water to for sale or disposal respectively.

As produced water has the potential to contain low levels of Naturally Occurring Radioactive Material (NORM). Samples of produced water shall be sent to a laboratory holding the appropriate accreditations for radionuclide analysis by gamma spectrum. The maximum volume of aqueous liquid is anticipated during the testing operation is 210m^3. Available storage of aqueous liquid will be 210m^3 and takes into account turnaround times associated with the analytical techniques required.

To aid the initial flow of petroleum, nitrogen may be injected into the wellbore to displace wellbore fluids, reduce its hydrostatic weight. Nitrogen is classified as an inert waste and venting of such considered a closed loop system, insofar as nitrogen is extracted from the atmosphere and is vented back atmosphere. No nitrogen would remain in the formation.

4.3.3 Drilling Operations

The Crawberry Hill wellsite planning permission provides for the drilling of a second well from the wellsite. The well may be required to investigate and test the extents of any potential petroleum reservoir encountered during the drilling and testing of the first well or to investigate and test a formation that may not have been encountered in the first well, the trajectory of the first well having potentially missed a particular formation.

For the purpose of the Waste Management Plan, the design and construction of the second exploratory borehole will be similar to that of the first borehole, insofar as its depths, borehole diameter and produced wastes. The trajectory of the second exploratory borehole will, however, differ slightly from that of the first borehole due to it targeting either the extent of the petroleum reservoir or other formations. The second borehole will be subject to a separate WR11 application, to be submitted to the Environment Agency for approval once final design is confirmed. For clarity,

the waste arising from the drilling of the second exploratory borehole has been included within this waste management plan.

The sub-sections below describe the drilling process.

4.3.3.1 Surface Conductor

A conventional water well drilling rig would be mobilised to the wellsite to drill the surface conductor to 194m TVD GL.

The drilling of the surface conductor will start with the drilling of a 36" hole, to a depth of +/- 103m. Once this section has been drilled, 26" steel casing will be run into the hole and cemented back to surface. A second hole section will be drilled from 103m to +/- 194m TVD GL. once this section has been drilled, 20" casing will be run and cemented to surface. This initial section will be drilled conventionally with fresh water

Once this section of the borehole is completed, the water well drilling rig will be demobilised from the site.

4.3.3.2 Main Drilling Operation

Once the surface conductor has been set, a conventional oilfield drilling rig will be mobilised to the wellsite, rigged up and commissioned. Drilling of the borehole would then be undertaken in the following sequence. The composition of the drilling fluid used is detailed within each hole section.

Hole Section 17 ½"

A 17 ½" hole will be drilled from +/- 194m TVD GL to 1,106m MD GL using a bentonite polymer water based mud system. Once this section has been drilled, 13 ⅜" casing will be run and cemented back to surface. The casing will be pressure tested to 1,800 psi. A Formation Integrity Test will also be completed.

Drilling Fluid Composition:					
$17^{1}/_{2}$" Hole Section – Gel/Polymer				Volume:	6730 bbl
Product:	Unit Size:	Quantity:	Total Quantity:	Quantity (lbs):	Concentration (ppb)
CAUSTIC SODA	13 KG	37	481	1,060	0.44
DRILLING STARCH	25 KG	138	3,450	7,606	3.15
M-I BAR	25 KG	80	2,000	4,409	1.83
BENTONITE OCMA	25 KG	455	11,375	1,003	0.42
POLYPAC UL	25 KG	120	3,000	265	0.11
SAFE-CARB 40	25 KG	225	5,625	496	0.21
SODA ASH	25 KG	7	175	386	0.16

Hole Section 12 ¼"

The 12 ¼" well will continue to be drilled with a salt saturated water based mud drilling fluid. It will be drilled from 1,106m MD GL to 1,485m MD GL. Once this section has been drilled, 9 ⅝" casing will

be run into the hole, cemented up to 700m MD GL and then pressure tested to 2,200 psi to confirm its integrity.

Drilling Fluid Composition:					
$12^{1}/_{4}$" Hole Section – NaCL Salt-Saturated Polymer				Volume:	1664 bbl
Product:	Unit Size:	Quantity:	Total Quantity:	Quantity (lbs):	Concentration (ppb)
CAUSTIC SODA	13 KG	4	52	115	0.03
CITRIC ACID	25 KG	31	775	1709	0.46
DRILLING STARCH	25 KG	192	4800	10582	2.87
DUOVIS	25 KG	80	2000	4409	1.19
DYNARED FINE	25 LBS	80	2000	4409	1.19
EMI-2224	25 LTR	9	225	496	0.13
KWIK SEAL MEDIUM	40 LBS	55	2200	4850	1.31
POTASSIUM CHLORIDE	25 KG	48	1200	2646	0.72
SAFE-CARB 40	25 KG	35	875	1929	0.52
SAFE-CARB 250	25 KG	140	3500	7716	2.09
SAFE-CARB 500	25 KG	100	2500	5512	1.49
PVD SALT	MT	17	17	37479	10.16
PVD SALT	25 KG	52	1300	2866	0.78
CONQOR 404 NS	200 LTR	4	800	1764	0.48
SAFE-CIDE	25 LTR	11	275	606	0.16
LIME	25 KG	30	750	1653	0.45
SODIUM CHLORIDE BRINE	BBL	625	625	1378	0.37
KWIK SEAL COURSE	40 LBS	35	1400	3086	0.84
DYNARED COURSE	25 LBS	84	2100	4630	1.25
POTASSIUM CHLORIDE	MT	7	7	15432	4.18

Hole Section 8 ½"

Prior to drilling the next section, a Formation Integrity Test will be completed to confirm the formation and casing shoe. The 8 ½" borehole will be drilled from 1,485m MD GL to a total depth of 2,750m MD GL. A salt saturated water based mud drilling fluid will be used in this section. Once drilled, 7" casing will be run into the hole to a depth of 2,215m from surface and cemented up to 1,065m MD. It will then be pressure tested to 4,400 psi.

Drilling Fluid Composition:					
$8^{1}/_{2}$" Hole Section – Salt Polymer				Volume:	1814 bbl
Product:	Unit Size:	Quantity:	Total Quantity:	Quantity (lbs):	Concentration (ppb)
CAUSTIC SODA	12.5 KG	24	300	661	0.23
CITRIC ACID	25 KG	14	350	772	0.27
DRILLING STARCH	25 KG	100	2500	5512	1.93
DUOVIS	25 KG	24	600	1323	0.46
EMI-2224	25 LTR	4	100	220	0.08
MI-BAR	25 KG	80	2000	4409	1.54
POLYPAC UL	25 KG	70	1750	3858	1.35
SAFE-CARB 40	25 KG	100	2500	5512	1.93
SAFE-CARB 250	25 KG	100	2500	5512	1.93

SAFE-CARB 500	25 KG	100	2500	5512	1.93
PVD SALT	MT	6	6	13228	4.63
CONQOR 404 NS	200 LTR	2	400	882	0.31
SAFE-CIDE	25 LTR	13	325	717	0.25
LIME	25 KG	9	225	496	0.17
SODIUM CHLORIDE BRINE	BBL	500	500	500	0.17
POTASSIUM CHLORIDE	MT	8	8	17637	6.17
SAFE COR EN	200 LTR	3	600	1323	0.46
SAFE-SCAV NA	25 LTR	1	25	55	0.02

Following logging of the 81/2" hole section below the 7" casing shoe, a 4 ½" liner will be run 50m into the Lower Carboniferous Limestone, with the liner hanger to be set 150m inside the 7" casing. The liner will be tested to 4,400 psi.

A 3 ½" completion and tubing will be run for the upper zone and a 2 ⅞" completion and ubing for the lower zone. The various targets identified will be perforated to allow any hydrocarbons to flow into the annulus. Hydraulic packers will be set in the well to isolate the petroleum reservoirs. The selective completions will be designed to allow production from either the upper target (the Permian interval) only, the Lower Namurian secondary targets only, or both perforated zones combined. The completion and tubing will provide a conduit for the petroleum to flow to surface.

4.3.4 Well Abandonment and Partial Well Abandonment

In the event that the well(s) is not successful in establishing commercially producible petroleum, the well(s) will be abandoned in accordance with Oil & Gas UK *Guidelines for the suspension and abandonment of wells*, which requires all distinct permeable zones penetrated by the well to be isolated from each other and from surface by a minimum of one permanent barrier. If any permeable zone penetrated by the well is hydrocarbon-bearing or over-pressured and water-bearing then the requirement is for two permanent barriers from surface, the second barrier being a back-up to the first.

In addition to the Oil & Gas UK *Guidelines for the suspension and abandonment of wells*, the well abandonment(s) will be undertaken in accordance with the following regulations:

- The Borehole Sites and Operations Regulations 1995, and
- Offshore Installations and Wells (Design & Construction Regulations 1996

The initial design and construction of the well(s) takes into consideration the permeable zones encountered during the drilling operation and whether any of these zones are hydrocarbon-bearing or over-pressured and water-bearing. Construction of the boreholes will therefore provide adequate sealing of these zones when cementing in the various steel casing strings, ensuring compliance with the Oil & Gas UK guidance. On abandonment, cement barriers will be placed, extended above and below the permeable zone(s). The barriers will be verified to ensure that they adequately seal off the well.

Once the well(s) is abandoned, the casing strings will be mechanically cut off at 1.5m below original ground level and a steel plate welded over the top. The pre-cast concrete drilling cellar would then be removed and the site restored to its former use.

5 CLASSIFICATION OF THE OPERATIONS

A review of the proposed Crawberry Hill exploratory operations against applicable environmental legislation has identified the following classifications as being applicable to the wellsite.

5.1 Mining Waste Operation

The Environmental Permitting (England and Wales) Regulations 2010, which transposes the requirements of the Mining Waste Directive 2006/21/EC, requires mining waste operations to be authorised. A mining waste operation is defined in Schedule 20 paragraph 2 (1) of EPR 2010 as *'the management of extractive waste, whether or not involving a mining waste facility*'.

For the purpose of this waste management plan, the Crawberry Hill exploratory operations are classified as a mining waste operation, namely, the management of extractive waste not involving a waste facility.

5.2 Installation

Regulation 35 of the Environmental Permitting (England and Wales) (Amendments) Regulations 2013, which amends EPR 2010, transposes the requirements of the Industrial Emissions Directive 2010/75/EU, defines an 'installation' as an activity specified within Part 2 of Schedule 1 of EPR 2010, disposal or recovery of waste in waste incineration plants or in waste co-incineration plants for hazardous waste with a capacity exceeding 10 tonnes per day.

As the exploratory operations proposed within the Crawberry Hill wellsite anticipate the incineration of hazardous waste (natural gas) with a capacity exceeding 10 tonnes per day, albeit for a short duration, the Crawberry Hill wellsite is classified as an installation under the Environmental Permitting (England and Wales) Regulations 2010.

6 EXTRACTIVE AND NON EXTRACTIVE WASTE MANAGEMENT

The following section describes the various extractive and non-extractives wastes arising from the Crawberry Hill exploratory operation, their classification and anticipated quantities. This section also describes the objectives of Rathlin Energy to appropriately manage waste and how these objectives are achieved through waste minimisation, methods of treatment and disposal.

6.1 Operator Waste Objectives

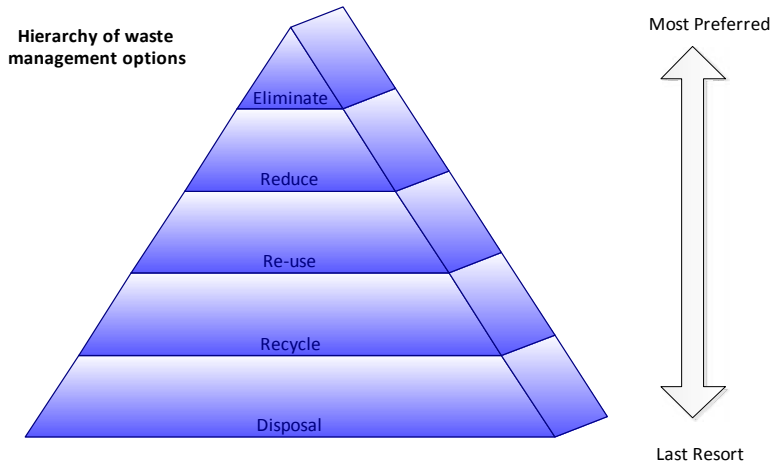
The Rathlin Energy policy on waste Duty of Care, waste segregation, waste handling and waste transfer are set out in the Rathlin Energy Environmental Policy Manual (RE-02-002).

The site waste champion for the Crawberry Hill wellsite is the Rathlin Energy HSE Adviser. He will:

- Promote awareness of the Waste Management Plan;
- Monitor and report on waste generation;
- Monitor and enforce waste segregation;
- Monitor the effectiveness of the Waste Management Plan;
- Form a good working relationship with the waste management contractor; and
- Encourage suggestions for better waste management on site.

6.2 Waste Prevention and Minimisation

The following is an extract from the Rathlin Energy Environmental Policy Manual (RE-02-002), which details the hierarchy of waste management. This hierarchy of waste management has been used when assessing the appropriate waste management arrangements for extractive and non-extractive wastes arising from the Crawberry Hill exploratory operations. Specific waste prevention and minimisation arrangements, together with treatment and disposal methods are provided within Section 6.3.



Eliminate the waste

Every effort will be made to eliminate the waste produced at source. Control measures will include:

- Avoiding packaged material where practicable;
- Ordering correct quantities;
- Avoiding damage by handling and storing correctly.

Reduce the amount of waste produced

This includes planning to reduce over ordering of materials, providing suppliers with sufficient information to supply correctly, avoiding damage or deterioration from poor handling or storage.

Re-use

Only dispose of waste which cannot economically or practically be re-used or recycled. Materials such as drilling fluids can be readily re-used.

Recycle

Waste will be segregated onsite to allow for recycling off site. Additionally, materials that are recycled **shall** be procured for use on site where practicable and where specification permits.

Dispose

Waste that cannot be reused or recycled practicably **shall** be disposed of responsibly and in compliance with Rathlin Energy's duty of care obligations. All waste **shall** be removed from site by a licenced waste carrier to a licenced waste site.

6.3 Waste Description and Management Arrangements

An assessment of the potential waste arising from the Crawberry Hill exploratory operations has been undertaken. The potential waste is described in the subsections below, and more fully in the Waste Management Plan itself.

6.3.1 Extractive Waste

Well Suspension Brine is used to fill the wellbore to prevent the ingress of natural gas. When no longer required it will be circulated out and stored onsite for subsequent reuse within the well operation or considered for use at one of Rathlin Energy's other wellsite operations. When no longer required at the wellsite or one of Rathlin Energy's other wellsite operations, the suspension brine will be removed from site via a licenced haulier to a permitted waste water treatment works facility where it is processed, treated and discharged in accordance with the permitted controls of the water treatment facility.

- Classification Non Hazardous
- LOW Code 01 05 08
- Quantity 25m^3
- On Site Storage 1 x 60m^3 Horizontal Cylindrical Closed Tank
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

Cement is used to secure steel casing used in wellbore construction and for final abandonment of a well. Returns to surface will be transferred to open top builders skips onsite for subsequent removal and disposal to an environmental agency permitted waste facility where it recycled as building rubble for use within the building industry.

- Classification Non Hazardous
- LOW Code 17 01 01
- Quantity 25m^3
- On Site Storage 5 x 6m^3 Plastic lined Open Top Builder's Skip
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

Spent Hydrochloric Acid (Calcium Chloride, Water and Carbon Dioxide). Hydrochloric acid is used to wash and clean out natural fractures within carbonate formations, having potentially being blocked as a result of the initial drilling operations. in addition, hydrochloric acid is squeezed into the natural fractures of the carbonate formation under pressure, increasing the near hole permeability.

The reaction of the hydrochloric acid with the calcite or dolomite produces calcium chloride and is unavoidable, which is classified as non-hazardous. The calcium chloride, a result of the reaction with the carbonate formation (2HCl + CaCO3 CaCl2 + H2O + CO2), will be reversed circulated out of the wellbore into1m3 IBC containers and stored onsite for subsequent removal via a licenced haulier to

an environmental agency permitted waste water treatment works facility where it is processed, treated and discharged in accordance with the permitted controls of the water treatment facility.

- Classification Non Hazardous
- LOW Code 16 10 02
- Quantity $11m^3$ per squeeze
- On Site Storage 11 x $1m^3$ IBC Containers (Bunded)
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

Formation Water may be produced during flow testing operations entrained with the petroleum. Formation water is separated from the petroleum on surface using temporary fluid separation equipment and transferred via temporary pipework to cylindrical storage tanks located onsite for offsite removal. The formation water has the potential to contain low levels of Naturally Occurring Radioactive Material (NORM) samples of formation water will be sent to a laboratory holding the appropriate accreditations for radionuclides analysis by gamma spectrum.

Depending on the outcome of radionuclides analysis formation water will be transported via a licenced haulier to either an environmental agency permitted waste water treatment works facility where it is processed, treated and discharged in accordance with the permitted controls of the water treatment facility, or to a bespoke RSR permitted waste treatment facility for treatment and disposal in accordance with the Best Available Technique (BAT) produced by Studsvik UK Limited.

- Classification Non Hazardous
- LOW Code 16 10 02
- Quantity 16m3 per test
- On Site Storage 4 x 60m3 Horizontal Cylindrical Closed Tank
- Storage Duration 3 Months to Allow for Radionuclide Analysis
- Odour Potential No Odour Anticipated

Natural Gas is likely be produced during flow testing operations of the formation and flowed at different rates to determine the characteristics of the formation, allowing Rathlin Energy to determine whether or not the reservoir is sufficient enough to produce commercial quantities of natural gas.

Natural gas is separated from produced fluids at surface and diverted via temporary pipework to a ground flare located onsite for incineration. The ground flare will be fitted with a pilot and an electrical ignition system. The flare will also be continuously propane fed to allow for a continuous flame.

- Classification Hazardous
- LOW Code Not Applicable

- Quantity 141,584m3 per day (10 days)
- On Site Storage None – Incineration by Ground Flare
- Storage Duration Not Applicable
- Odour Potential No odour anticipated

Nitrogen may be injected into the well to aid the initial lifting of wellbore fluids, thus reducing the hydrostatic pressure and allowing natural gas to flow to surface. As an inert gas, nitrogen that has been extracted from the atmosphere will be vented back into the atmosphere without any treatment being necessary.

- Classification Inert
- LOW Code Not Applicable
- Quantity Not Known at this Time
- On Site Storage None – Vented to Atmosphere
- Storage Duration Not Applicable
- Odour Potential No Odour Anticipated

Chalk Cuttings may be produced during drilling of the secondary exploratory borehole commencing with drilling and installation of a casing string known as a surface conductor. The drilling operation will be carried out using a waterwell drilling rig which will use fresh water to conventionally drill the near surface chalk within which the surface conductor casing will be set and cemented into position. The chalk will be circulated out of the well and return to the surface where it is transferred to an open square tank. The chalk will be transported offsite via a licenced haulier to a permitted composting facility where it is blended into compost after compost has been sanitised.

- Classification Non Hazardous
- LOW Code 01 04 09
- Quantity 184m^3
- On Site Storage 1 x 31m^3 Open Square Tank
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

Fresh Water Drilling Muds and Waste will be produced during drilling of the second exploration well. Drilling muds are used to aid in the drilling process by lubricating the drill bit, circulating to surface the rock cuttings from the drilling process and for well control by maintaining a prescribed hydrostatic pressure within the well to prevent the uncontrolled release of natural gas or formation pressure. Drilling muds are used in a closed loop system, within which the rock cuttings are circulated to surface and removed by vibrating screens (shakers). Finer particles of rock cuttings are then extracted from the drilling mud by a centrifuge and the drilling mud is circulated back down the well.

Drilling muds are used in a closed loop system and become a waste when no longer required for use in the operation. In such an event the drilling mud will be transferred from the active mud system on the drilling rig to a vacuum tanker for removal offsite via licenced haulier to a permitted composting facility where it is blended into compost after compost has been sanitised.

- Classification Non Hazardous
- LOW Code 01 05 04
- Quantity 455m^3
- On Site Storage Minimum 95m^3 Open Top Active Tank System on Rig. 1 x 31m^3 Open Top Tank (Drill Cuttings) and 1 x 20m^3 Open Top Tank (Centrifuge)
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

Chloride Containing Drilling Muds and Waste will be produced during drilling of the second exploration well. Drilling muds are used to aid in the drilling process by lubricating the drill head, circulating to surface the rock cuttings from the drilling process and for well control by maintaining a prescribed hydrostatic pressure within the well to prevent the uncontrolled release of natural gas or formation pressure. Drilling muds are used in a closed loop system, within which the rock cuttings are circulated to surface and removed by vibrating screens (shakers). Finer particles of rock cuttings are then extracted from the drilling mud by a centrifuge and the drilling mud is circulated back down the well.

Drilling muds become a waste when no longer required for use in the operation. In such an event the drilling mud will be transferred from the active mud system on the drilling rig to a vacuum tanker for removal offsite via licenced haulier to a permitted composting facility where it is blended into compost after compost has been sanitised.

- Classification Non Hazardous
- LOW Code 01 05 08
- Quantity 666m^3
- On Site Storage Minimum 95m^3 Open Top Active Tank System on Rig. 1 x 31m^3 Open Top Tank (Drill Cuttings) and 1 x 20m^3 Open Top Tank (Centrifuge)
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

Water Based Rock Cuttings are brought to surface by the drilling mud system. They are removed by removed by vibrating screens (shakers) into an open top tank, which is also a fluid separator tank. Finer particles of rock cuttings are then extracted from the drilling mud by a centrifuge and the drilling mud is circulated back down the well.

Rock cuttings will be transferred from the rock cuttings tank to a sealed road bulker by a hydraulic grab arm fitted to the rock cuttings tank and transported offsite via licenced haulier to a permitted composting facility where it is blended into compost after compost has been sanitised.

- Classification Non Hazardous
- LOW Code 01 04 08
- Quantity 355m^3
- On Site Storage 1 x 31m^3 Open Top Fluid Separator Tank (Drill Cuttings) and 1 x 20m^3 Open Top Tank (Centrifuge)
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

Salt Saturated and KCL Rock Cuttings arise when cuttings are brought to surface by the drilling mud system. They are removed by removed by vibrating screens (shakers) into an open top tank, which is also a fluid separator tank. Finer particles of rock cuttings are then extracted from the drilling mud by a centrifuge and the drilling mud is circulated back down the well.

Rock cuttings will be transferred from the rock cuttings tank to a sealed road bulker by a hydraulic grab arm fitted to the rock cuttings tank and transported offsite via licenced haulier to a permitted composting facility where it is blended into compost after compost has been sanitised.

- Classification Non Hazardous
- LOW Code 01 05 08
- Quantity 223m^3
- On Site Storage 1 x 31m^3 Open Top Fluid Separator Tank (Drill Cuttings) and 1 x 20m^3 Open Top Tank (Centrifuge)
- Storage Duration Maximum 7 Days
- Odour Potential No Odour Anticipated

6.3.2 Non Extractive Waste

During the Crawberry Hill exploratory operations there will be non extractive wastes generated on site:

- Surface run-off water
- Waste water and sewage
- Potential minor fuel oil spills
- Waste engine, gear and lubricating oils
- Waste hydraulic oils
- Oil rags and absorbents
- Waste oil filters
- Paper and cardboard

- Canteen waste
- Wood
- Metal

There will be no treatment or disposal of non extractive waste on site and any storage will be limited to temporary storage, pending collection. No temporary storage of non-extractive waste will exceed 12 months.

7 ENVIRONMENTAL RISK ASSESSMENT

An environmental risk assessment, following the structure set out in Horizontal Guidance Note H1, has been carried out in support of a permit application and is based on a conceptual model derived from a true representation of the subsurface geology encountered during the drilling of CH1 (see Figure 1 above) and the EPR6 14: How to comply with your environmental permit: Additional guidance for: mining waste operations.

In assessing the risk the appropriate H1 annexes have been referenced:

- Annex (a) Amenity and accident risks from installations and waste operations
- Annex (d) Surface Water (basic)
- Annex (f) Air emissions
- Annex (g) Disposal and recovery of waste produced on site
- Annex (h) Global warming potential
- Annex (j) Groundwater
- Annex (k) Justifying and cost-benefit analysis of control measures

A copy of the environmental risk assessment, together with a supporting statement and conventional model is included within the document 'Crawberry Hill Wellsite Environmental Risk Assessment' (RE-05-EPRA-CH-007) provided in support the environmental permit application.

8 MEASURES TO MINIMISE ENVIRONMENTAL IMPACT

Measures to minimise the environmental impact of the operation have been incorporated as part of the initial site selection process, site design and construction through to subsequent exploration operations. The measures to mitigate long term environmental impact are:

- Site located suitable distance from residential properties
- Site located away from any statutory designated areas
- Baseline monitoring of ecology, noise, water
- Hydrogeological risk assessment
- Site design to include impermeable membrane and containment ditches

- Wellbore lifecycle design to protect groundwater
- Hierarchy of waste management
- Operating procedures and inductions
- Waste handling, storage and disposal regime
- Continuous Training and development
- Environmental monitoring
- Restoration and aftercare.

9 CONTROL AND MONITORING OF WASTE

The environmental risk assessment has identified the requirement to control and monitor waste generated from the exploratory operation. The following waste shall be monitored:

9.1 Release to Ground Water

The potential for a release to ground water exists both at surface and within the subsurface.

9.1.1 Surface Release

Incorporated into the design of the wellsite is an impermeable membrane constructed using fully welded 1mm HDPE, protected above and below with non-needle punch geotextile. The impermeable membrane prevents surface fluids (mainly rainwater) penetrating the underlying subsoils. Surface fluids migrate along the surface of the impermeable membrane to a perimeter ditch, where it is contained for subsequent reuse in the operation.

Daily inspections of the drainage ditch are undertaken to ensure the level does not exceed the maximum containment of the ditch. If the level is close to reaching the maximum containment of the ditch, the surface fluids are removed by road tanker for subsequent disposal at an approved waste facility. A daily inspection of all tanks and other waste storage containers shall be undertaken to ensure they remain fit for purpose. The inspections will aid early identification of any potential release to site from equipment which deteriorates over time.

9.1.2 Subsurface Release

Drilling muds and other fluids used in well operations are strictly monitored to ensure an accurate understanding of fluid volumes lost, gained or, in the case of cement, placed in the subsurface. During drilling operations, the volumes of fluids pumped, together with the volumes of fluid within the tanks are continually monitored by a geological logging company (mud loggers). Such monitoring can identify loss of drilling muds to the formation. In the event that losses occur, loss circulation material (LCM) is provided on site to stem the losses.

A scheme of groundwater monitoring was implemented prior to the well being constructed, which provided a baseline for groundwater quality. The scheme was implemented during well construction

and will be implemented during subsequent exploratory operations. The monitoring scheme includes an analysis of:

- Turbidity
- pH
- Total suspended solids
- Alkalinity
- Hardness
- Sulphate
- Chloride
- Nitrate
- Calcium
- Magnesium
- Potassium
- BTEX
- TPH

9.2 Air Emissions

A scheme of air emissions monitoring was implemented prior to the well being constructed, which provided a baseline for air quality. The scheme was implemented during well construction and will be implemented during the subsequent exploratory operations. The monitoring scheme includes:

- H_2S
- BTEX/VOCs
- Methane
- Sulphur Dioxide
- Nitrogen Oxide
- Ozone

No significant emissions to air are expected from the waste stream Emissions to Air.

9.3 Noise

A noise monitoring scheme has been implemented to ensure compliance with planning permission.

9.4 Lighting

Planning permission required the submission of a lighting plan, included as Appendix 7 in the Waste Management Plan. The lighting plan has been implemented to ensure compliance with planning permission and periodic monitoring of the lighting is undertaken to ensure light overspill is reduced to a minimum.

9.5 Traffic

Planning permission required the submission of a traffic management plan and wheel washing facilities to prevent mud being brought out of site onto public highway. The traffic management plan and wheel washing facilities is included as Appendix 8 in the Waste Management Plan. The traffic management plan has been implemented to ensure compliance with planning permission and periodic monitoring of the plan and wheel washing facilities is undertaken.

9.6 Contractor Performance

Rathlin Energy is ultimately responsible for any waste generated on site during the West Newton exploratory operations. Rathlin Energy will not delegate its responsibilities or accountabilities as Operator to a contractor.

Contractors, who are involved in the generating of waste and subsequent reuse, recycle or disposal will first have been selected in accordance with Rathlin Energy's Management of Contractor's Safety and Performance Standard (RE-03-002) and, under that standard, are then subject to periodic monitoring of their performance.

9.7 Security

Security of the wellsite is provided in the form of fencing and lockable gates. Additional fencing is provided around the wellhead when the site is unmanned. A CCTV camera is also active when the site is unmanned and a roaming security detail is provided, carrying out routine visits to the wellsite.

During well operations, 24 hours onsite security is provided. Security control access and egress to the wellsite and play a key role in the control of personnel in the event of an emergency situation, in accordance with the Site Safety Document, a requirement of the Borehole Sites and Operations Regulations 1995.

9.8 Complaints

In the event that a complaint is received from stakeholders, including neighbours, the complaint shall be recorded and investigated in accordance with Rathlin Energy's safety and environmental management system.

Complaints relating to the environment will be reported to the Environment Agency, actions to prevent reoccurrence will be agreed, together with a programme for implementation. Implementation of the actions will be monitored and the Environment Agency informed.

10 ENVIRONMENTAL INCIDENT MANAGEMENT

The potential for an environmental incident to occur during the operation is minimal. The source of such incident is contained within the wellbore and contained within the wellsite.

10.1 Containment within the Wellbore

Well control equipment is deployed on the well in accordance with API RP53 'Recommended Practice for Blowout Prevention Equipment Systems for Drilling Wells'. Well control equipment is considered secondary well control in the event that the primary well control, hydrostatic fluid weight, is compromised. Well control equipment is subject to a schedule of certification and testing, together with a requirement for those operating well control equipment to be certified competent.

10.2 Wellsite Containment

Incorporated into the design of the wellsite is an impermeable membrane constructed using fully welded 1mm HDPE, which prevents any environmental spillages on site penetrating the underlying subsoils and contains the spill within a containment ditch for subsequent reuse, recycle or disposal.

In addition to general spill containment and clean up equipment provided on site, a substantial environmental incident response trailer is provided. The trailer contains equipment necessary to minimise and if possible contain an environmental incident in the unlikely event that the impermeable membrane or containment ditch is compromised. The equipment provides for damming of any nearby water course and subsequent clean up, including temporary bunding of spent clean-up equipment.

In the very unlikely event of an environmental incident occurring beyond the capabilities of the equipment or personnel on site then a specialist contractor, Veolia Environmental Services, based in Hull will be called to assist Rathlin Energy in dealing with the incident.

10.3 Fire Response

Whilst a fire is associated more with the health and safety of the personnel on site, a fire does have the potential to lead to an environmental incident. It is imperative, therefore, that any potential for a fire and subsequent emergency response is identified and included in the operational planning. The Site Safety Document, which is a requirement under Regulation 7 of the Boreholes Sites and Operations Regulations 1995, specifies the arrangements for identification and mitigation in the event of a fire, including consultation with the local Fire & Rescue Service.

Containment of any firefighting fluid is provided by the impermeable membrane incorporated in to the design of the wellsite. In the event that such requirements were to be necessary, continued monitoring of the containment ditch shall be implemented to ensure it does not exceed its containment capacity.

Additional water is available on site and should be used to keep the areas adjacent to the fire cool to avoid any damage being sustained to the impermeable membrane.

10.4 Incident Reporting and Investigation

All incidents, no matter how minor, are reported in accordance with Rathlin Energy's Incident Accident Reporting and Investigation Standard (RE-03-008). The standard provides for the

investigation of all incidents to ensure lessons are captured and actions implemented to avoid reoccurrence.

In addition, the standard provides for the notification to the relevant Regulatory Authority in the event of an incident which extends beyond the containment of the wellsite.

11 ALTERATIONS TO THE PLAN

Any required changes or deviations from this plan are to be referred to the Rathlin Energy HSE & Planning Manager or to the site HSE Adviser in the first instance. No changes to or deviations from this plan are to be implemented until the required changes or deviations have been reviewed and approved by Rathlin Energy and the relevant approvals obtained in writing from the Environment Agency for any changes to the plans and operating techniques approved under the environmental permit to be issued.

12 PLAN FOR CLOSURE

The wellsite is currently being used for petroleum exploration activities to determine whether petroleum is present in the substrata and, if so, in commercial quantities.

In the event that the well(s) is deemed not capable of producing commercial quantities of petroleum a decision will be made to abandon the well in accordance with Oil & Gas UK Guidelines for the *suspension and abandonment of wells* and restore the site. In such an event, a closure plan will be created in accordance with section 3.4 of the Environment Agency's guidance "How to comply with your environmental permit, additional guidance for: mining waste operations" as part of any application to surrender the environmental permit. Wellsite restoration will be the subject of a separate waste management plan.

Other regulations relevant to the closure plan include:

- The Borehole Sites and Operations Regulations 1995, and
- Offshore Installations and Wells (Design & Construction Regulations 1996
- Petroleum Act 1998 (Petroleum Exploration and Development Licence)

In the event that the well is deemed capable of producing commercial quantities of petroleum then applications to vary existing permits and/or acquire new permits to permit the subsequent production of petroleum will be submitted to the Environment Agency.

Until such time as the new permits are obtained, which for clarity will include a new planning permission to produce petroleum, the well will be suspended using a well suspension brine and

mechanical plugs set within the borehole to safely isolate the well from the surface. All equipment associated with the exploratory operations will be removed and wellsite made secure. The wellsite will then be inspected and monitored daily by Rathlin Energy.

13 APPENDICES

The following appendices are included in the Waste Management Plan to provide additional information relevant to the plan.

- Appendix 1 - Rathlin Energy Corporate Information
- Appendix 2 – Rathlin Energy Environmental Policy Manual
- Appendix 3 – Roles and Responsibilities
- Appendix 4 – Chemical Inventory during Exploratory Operations
- Appendix 5 – Air Dispersion Modelling and Report
- Appendix 6 – Management of Radioactive Waste
- Appendix 7 – Lighting Plan
- Appendix 8 – Traffic Management Plan