

Rathlin Energy

Non-Technical Summary

Environmental Permit
Variation

West Newton A
Wellsite

East Riding of Yorkshire

PEDL 183

December 2018



APPROVAL LIST

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1. INTRODUCTION

Rathlin Energy (UK) Limited (Rathlin) is a private company with its head office in Beverley, East Riding of Yorkshire. Rathlin is a petroleum exploration, development and production company with operations in the United Kingdom. Rathlin is the operator of PEDL183.

The purpose of the Non-Technical Summary is to present and outline the contents of the permit application in a non-technical manner.

2. SCOPE

This Non-Technical Summary is applicable to the West Newton A wellsite in accordance environmental permits and planning consent.

It is applicable to Rathlin, its contractors and subcontractors and can be used in support of applications to the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016 (EPR2016), where there is a requirement to provide a Non-Technical Summary.

3. DEFINITIONS

BAT:	Best Available Technique
CO ₂ :	Carbon Dioxide
EPR2016:	Environmental Permitting (England and Wales) Regulations
EWT:	Extended Well Test
HCl:	Hydrochloric Acid
HDPE:	High Density Polyethylene
m:	Metre
mm:	Millimetre
NORM:	Naturally Occurring Radioactive Material
PEDL:	Petroleum Exploration and Development Licence
UK:	United Kingdom
WNA-1:	West Newton A 1 Well
WNA-2:	West Newton A 2 Well

4. PROPOSED ACTIVITIES AND APPLICABLE ENVIRONMENTAL LEGISLATION

The West Newton A wellsite is the subject of a number of activities which, under current environmental legislation, require an environmental permit. The Environment Agency regulate all permitted activities under the Environmental Permitting (England and Wales) Regulations 2016 (EPR2016). Under EPR2016, Operators are required to submit environmental permit applications to the Environment Agency to seek approval to undertake such activities.

The West Newton A wellsite has been the subject of the environmental permitting regulations since 1st October 2013, and as such a number of environmental permits have already been obtained.

4.1 Industrial Emissions Activity

The Industrial Emissions Directive 2010/75/EU lays down rules on integrated prevention of pollution arising from industrial activities, whilst also laying down rules designed to prevent or, where that is not practicable, to reduce emissions into the air, water and land and to prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole.

4.1.1 Oil Storage

Schedule 1, Part 2, of EPR2016 transposes the requirements of the Industrial Emissions Directive, which requires an environmental permit to authorise an installation for gasification, liquefaction and refining activities, as detailed within Section 1.2, Part A(1) including the loading, unloading, handling or storage of, or the physical, chemical or thermal treatment of crude oil.

The West Newton A operations will involve the handling and storage and unloading of oil or condensate and therefore under EPR2016 a bespoke Oil Storage permit will be applied for.

4.1.2 Incineration of Natural Gas

Schedule 1, Part 2 of the EPR2016 transposes the requirements of the Industrial Emissions Directive, which requires an environmental permit to authorise an installation operation for Incineration and co-incineration of waste, as detailed within Section 5.1, Part A(1) which includes the incineration of hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 10 tonnes per day.

The West Newton A operations will involve the incineration of natural gas exceeding 10 tonnes per day and therefore under EPR2016 a permit is required. Rathlin are currently in possession of an environmental permit (EPR/BB3001FT) which allows for the incineration of natural gas above 10 tonnes per day. Rathlin is seeking to vary this activity to reflect the proposed changes to the WNA-2 well testing programme.

4.2 Mining Waste Activity

Schedule 20 of EPR2016 defines a mining waste operation as being the management of extractive waste, whether or not it involves a waste facility. Under EPR2016, an environmental permit is required to authorise a mining waste operation.

The West Newton A operations involve the management of non-hazardous extractive waste, not including a waste facility. Environmental Permit EPR/BB3001FT has been issued by the environment agency which covers the mining waste activities being undertaken at the West Newton A wellsite.

4.3 Water Discharge Activity

Schedule 21 of EPR2016 relates to water discharge activities, including the discharge or entry to inland freshwaters, coastal waters or relevant territorial waters of any trade effluent. Clean surface run-off

water at the wellsite will be collected within containment ditches for subsequent removal via road tanker during operations or where the site is non-operational, discharged to surface water.

Environmental Permit EPR/BB3001FT enables Rathlin to undertake a water discharge activity at the West Newton A wellsite following a variation in 2015. This activity is being retained by Rathlin.

4.4 Groundwater Activity

Under Schedule 22 of EPR2016, 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 West Newton A operations will not involve a groundwater activity. As such, a permit under schedule 22 of EPR2016 will not be applied for.

4.5 Radioactive Substances Activity

Schedule 23 defines the production of oil and gas as a NORM industrial activity and therefore any accumulation of radioactive waste, which exceeds concentration threshold set out in Table 1 of Schedule 23, and its subsequent disposal, requires an environmental permit to authorise a radioactive substances activity.

The West Newton A operations may involve the production of formation water which may or may not contain NORM at levels exceeding those set out in Table 1 of Schedule 23, therefore, until such time as the concentration of NORM can be established a Radioactive Substances Activity Permit is required. A SR2014 No4 Permit (EPR/PB3030DJ) is currently in place.

5. DESCRIPTION OF THE FACILITY

5.1 Development Location

The proposed West Newton exploratory operations are being undertaken at the following location:

West Newton A Wellsite
Rathlin Energy (UK) Limited
Fosham Road
Marton
Hull
HU11 5DA

National Grid Ref: TA 19268 39131

Site Area: 0.975 hectares

A Site Location Plan has been provided within Site Plans Document (RE-EPRA-WN-SP-004).



Figure 5.1: West Newton A Wellsite Location (Source: Google Earth October 2018)

5.2 Site Description and Current Status

The West Newton wellsite is located to the north of West Newton and east of Marton. It is located within the parish of Aldbrough, in the East Riding of Yorkshire.

The surrounding landscape consists of flat open fields that are interspersed with patches of woodland and divided by hedgerows and ditches. An area of semi-improved grassland lies adjacent to the western boundary and extends 10m into the field. There are a number of mature hedgerows that border the field.

The West Newton A wellsite has been the subject of minimal activity following the suspension of the WNA-1 well, with activities being limited to groundwater monitoring and surface water discharges. The WNA-2 drilling operations is expected to commence in 2019.

5.3 Wellsite Construction

The West Newton A wellsite was constructed in the 2nd quarter of 2013, to enable the drilling and testing of up to two exploratory boreholes.

The topsoil was stripped from the site area and placed in a storage bund along the eastern boundary of the wellsite. Subsoil was removed to create a level surface and stored in a separate bund along the southern boundary. A ditch was excavated along the perimeter of the wellsite to provide environmental containment.

Once the surface of the site was level and the perimeter ditch excavated, an impermeable membrane, constructed from 1mm fully welded HDPE, was installed across the entire site area and perimeter ditch. The impermeable membrane is protected above and below from a layer of nonwoven needle punched geotextile, which protects the impermeable membrane from being damaged by subsequent operations. Inspections and testing of the impermeable membrane were performed during installation to confirm its integrity.

Geogrid was then laid across the site area and overlaid by 300mm thick layer of MOT Type 1 stone to provide a suitable working surface.

Three sides of the containment ditch were backfilled using 300mm twin walled perforated plastic pipe and backfilled using clean stone. The purpose of backfilling the perimeter ditches was to provide additional working area.

Within the centre of the site a concrete cellar was constructed, formed from pre-cast concrete rings. The impermeable membrane has been integrated into the cellar walls using foam back metal batons to ensure that the integrity of the site is maintained. The cellar rings were sealed together using a tokstick sealant and a 200mm concrete jacket surround cast. The cellar provides an additional containment and houses the wellhead. An integrity test was carried out following construction to confirm environmental integrity. Integrity tests proved that the cellar had environmental integrity.

Following the construction of the West Newton A wellsite in 2013 additional construction works have been carried out, these include:

- Replacement of perimeter stock fencing with a 1.8m high paladin fencing;
- Installation of two (2) groundwater monitoring boreholes;
- Installation of a Class 1 Oil-Water Separator; and
- Segregating part of the wellsite to create a car parking area at the northern boundary (non-active area).

A second well cellar will also be built for the drilling of the second borehole, known as the West Newton A-2 well (WNA-2). For clarity, Rathlin currently holds the necessary environmental permits to drill the second well.

5.4 WNA-1 Well Construction

Drilling of the West Newton 1 borehole commenced in early 3rd quarter 2013 and was completed by end of 3rd quarter 2013.

Construction of the borehole began with the mobilisation of a small water well rig, which drilled a 32" hole through the boulder clay and into the top section of the chalk to a depth of approximately 69m Below Ground Level. Once the borehole was drilled, steel casing was run and cemented back to surface. This rig was then removed from site.

A larger oilfield drilling rig was then mobilised to site to drill the remaining hole sections to the target depth. The operations involved drilling a number of hole sections, which reduced in size to and through the target formations. As each hole size was drilled, steel casing was run and cemented in place. Once each casing string was run, it was pressure tested to confirm its integrity.

With the casing strings run and cemented in position, it is considered that there is sufficient protection and isolation between the different formations to prevent fluids from other formations contaminating any aquifers.

6. OPERATIONAL ACTIVITIES

A number of activities are already permitted at the West Newton A wellsite. This variation seeks to add additional activities that are covered by the environmental permitting regulatory regime.

6.1 Well Maintenance (Currently Permitted)

Following drilling operations, during the maintenance cycle of an exploration well, the potential to generate waste is limited.

Well Maintenance is currently permitted under the existing environmental permit and will remain a permitted activity.

6.2 Drilling of a Second Permitted Borehole (Currently Permitted)

Rathlin intend to drill an appraisal well (WNA-2) from the West Newton A wellsite. WNA-2 will investigate the extent of the petroleum reservoir encountered during the drilling of the first well (WNA-1).

The drilling of the WNA-2 well is currently permitted under the existing environmental permit and will remain a permitted activity. The same waste streams will be produced as stated within Waste Management Plan Revision 2, however the volume of waste generated will be considerably less due to the well being drilled to circa 2,000m TVD KB, 1,000m less than the currently permitted activity. The Waste Management Plan will form part of an application to vary the existing permit, whilst concurrently the drilling operations for WNA-2 well will be undertaken. Discussions with the Environment Agency have indicated that this approach is satisfactory.

6.3 Well Testing of WNA-2

Geological logging is undertaken during well construction to determine whether formations encountered during drilling contain petroleum. The borehole logs assist Rathlin 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 processes vary, depending on the formation being tested.

Rathlin have identified a number of zones of interest within the Permian which may warrant clean up and testing. A decision will be made during the drilling of WNA-2 as to which zones of interest will be tested.

6.3.1 Perforation of the Casing an Reservoir Formation

In order to establish communication between the formation(s) being tested and the wellbore the casing must be perforated.

The perforating operation, in particular the use of explosive charges, is regulated by the Police Authority and the Health and Safety Executive. Perforating may be undertaken a number of times as deemed necessary by Rathlin.

6.3.2 Well Clean Up

Rathlin may undertake a number of well clean up activities. Well clean up may include one or more well treatment activities, described below within Section 6.3.4.

Following the perforation of the casing and following any well treatments that may be undertaken the formation will be evaluated by means of flow testing. The purpose of an initial flow test or well clean up is to prepare the well for an Extended Well Test (EWT).

Natural gas is flowed to surface (ordinarily unaided), together with any produced fluids (oil, condensate and/or formation water). Once at surface, natural gas and produced fluids will be diverted by temporary pipework to a three phase separator, which will separate out oil/condensate, formation water and natural gas.

Oil and condensate, which for clarity is not a waste, will be stored onsite for subsequent offsite removal by a licenced haulier to a permitted refinery for sale. Formation water, which is considered a waste, will be stored onsite for subsequent offsite removal 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.

6.3.3 Extended Well Test

Once each well clean up is completed the WNA-2 well will be shut in whilst the shrouded flare is substituted for an enclosed flare, with the exception of an EWT for Cadeby oil where the shrouded flare will continue to be used. For clarity, following the completion of an EWT the flares may again be substituted to allow for further well clean up operations within the formation.

A number of EWTs may be undertaken as part of the well testing activities following on from the well clean up phase.

Similarly, as with the clean up phase, natural gas will be flowed to surface together with any produced fluids (oil/condensate and formation water). The natural gas and produced fluids will be separated by the three phase separator where natural gas will be incinerated and considered a waste, with oil/condensate and formation water being separated and stored in separate storage tanks for subsequent offsite removal.

6.3.4 Well and Reservoir Treatments

Well treatments may be undertaken following the drilling of the WNA-2 well. This may include acidisation, as described in Section 6.3.4.1 following perforation, or the use of Carbon Dioxide and/or Nitrogen. The same section may be the subject of repeated well treatments in the event the first treatment is only partially successful in cleaning the near wellbore formation.

6.3.4.1 Acid Wash and Squeeze (Currently Permitted)

Rathlin currently hold the necessary environmental permits to undertake an acid wash and squeeze at the West Newton A wellsite. Following the drilling of the WNA-2 well and when necessary during the lifetime of the well and acid wash and squeeze will be undertaken for the purpose of cleaning the well and the near wellbore.

For clarity, Rathlin will undertake Acid Wash and Acid Squeeze operations in line with the Environment Agency's definition as provided within the '*Use of acid at oil and gas exploration and production sites, January 2018*' publication.

Whilst the injection of hydrochloric acid within deep saline water bearing formations is a 'groundwater activity', the activity is considered de minimis and can be excluded under Schedule 22 3 (3) of EPR2016. The acid wash/squeeze does therefore not require a groundwater permit.

It is anticipated that the acid wash and squeeze process may be undertaken a number of times depending on the discrete zones perforated. Each acid squeeze would involve the application of up to 15m³ of 15% acid solution.

6.3.4.2 Liquid CO₂ Treatment

The purpose of Carbon Dioxide (CO₂) treatment is to assist in the removal of all wellbore fluids and near wellbore debris sustained during the drilling operation.

Each CO₂ injection treatment requires between 2m³ and 5m³ litres of liquid CO₂ per 10m interval being treated, which is pumped in liquid state from surface through the wellbore and into the formation.

All liquid CO₂ introduced to the formation will return to surface in a gaseous state and will be passed through the three phase separator.

6.3.4.3 Nitrogen Treatment (Currently Permitted)

To aid the initial flow of petroleum, nitrogen may be introduced into the wellbore to displace wellbore fluids, reducing 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 wellbore.

6.4 Well Abandonment and Site Restoration

If a decision is made to restore the wellsite, the boreholes will be abandoned in accordance with Oil & Gas UK Guidelines for the abandonment of wells, which requires all distinct permeable zones penetrated by the wellbore to be isolated from each other and from surface by a minimum of one permanent barrier. If any permeable zone penetrated by the wellbore 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 abandonment of wells, the borehole 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, etc.) Regulations 1996.

Prior to any abandonment a full wellbore abandonment programme will be submitted to the HSE and the Rathlin Independent Well Examiner for review and examination. The wellbore abandonment programme does not form part of the Well Testing programme.

7. PRODUCTION OF EXTRACTIVE WASTE

A list of the waste generating activities associated with operations at the West Newton A wellsite is outlined below.

- Well Maintenance (Currently Permitted);
- Drilling of a Second Borehole (WNA-2) (Currently Permitted);
- Well Testing of Second Permitted Well; and
- Well Suspension and Abandonment (Currently Permitted)

The anticipated extractive wastes which may be generated from these activities include:

- Well Suspension Brine;
- Metal Debris
- Spent Acid;
- Carbon Dioxide;
- Nitrogen; and
- Natural Gas;
- Formation Water;

The arrangements for the management of extractive waste during the West Newton A well testing operations are detailed in the Waste Management Plan (RE-EPRA-WNA-WMP-005), submitted in support of this environmental permit application.

8. SUPPORTING DOCUMENTATION

In accordance with the requirements of EPR2016 the following documents have been prepared in support of an application for an Environmental Permit under EPR2016.

8.1 Site Location and Site Layout Plan

Site Plans have been provided to illustrate the location of the wellsite, together with an indicative layout plan throughout each phase of the development illustrating the location of well test equipment and flaring unit(s). Document Reference: RE-EPRA-WNA-SP-004.

8.2 Waste Management Plan

The Waste Management Plan is the principal document of the West Newton A environmental permit application. It is specifically drafted for an application to operate a Mining Waste Operation, whether or not it includes a Mining Waste Facility. Document Reference: RE-EPRA-WNA-WMP-005.

Environmental permits, which are subject to the Mining Waste Directive, cover the management of extracted waste and not the extraction process. The Waste Management Plan has been drafted such that it aligns with the management of extracted waste and not the extraction process.

8.3 Site Condition Report

The Site Condition Report has been prepared as a record of the site condition prior to commencing operations. It will continue to be updated as the operations progress and will be used to identify any changes to the environment as a result of the operation when surrendering the environmental permit. Document Reference: RE-EPRA-WNA-SCR-006.

8.4 Environmental Risk Assessment

The Environmental Risk Assessment is applicable to the West Newton A wellsite during well testing operations. The structure of the Environmental Risk Assessment is consistent with the Environment Agency guidance using the Source-Pathway-Receptor model.

The Environmental Risk Assessment has concluded that the risk to the environment is low based on the control measures implemented by Rathlin, including a contained wellsite incorporating a HDPE impermeable membrane. Document Reference: RE-EPRA-WNA-ERA-007.

8.5 Gas Management Plan

A Gas Management Plan has been produced to outline the gas management arrangements to be implemented at the West Newton A wellsite during well testing operations. The Gas Management Plan also provides for the Assessment of Best Available Technique (BAT) for the management of waste gases and the type of flare to be used for the proposed well testing operations. Document Reference: RE-EPRA-WNA-GMP-010