

***Rathlin  
Energy***



# ODOUR MANAGEMENT PLAN

RE-EPRA-WNA-OMP-009

Revision 7

July 2024

WNA Permit Variation

**APPROVAL LIST**

	<b>Title</b>	<b>Name</b>
Prepared By	HSE Advisor	Tony Fildes
1 <sup>st</sup> Reviewed By	Operations Engineer	Caroline Foster
Approved By	Country Manager	Tom Selkirk

**COPYRIGHT**

© 2021 Rathlin Energy (UK) Limited. All Rights Reserved

The Contents of this document may not be reproduced or copied without the express written permission of Rathlin Energy (UK) Limited.

## TABLE OF CONTENTS

<b>1. Introduction</b> .....	<b>5</b>
<b>2. Scope</b> .....	<b>5</b>
<b>3. Abbreviations and Definitions</b> .....	<b>5</b>
<b>4. Roles and Responsibilities</b> .....	<b>6</b>
<b>5. Odour Management Plan</b> .....	<b>7</b>
5.1 Objective of the Odour Management Plan.....	7
5.2 Distribution of the Approved Odour Management Plan .....	7
5.3 Changes to Operations, Processes or Equipment.....	7
<b>6. Odour Risk Assessment</b> .....	<b>8</b>
6.1 Preliminary Odour Risk Assessment .....	8
6.2 Pre-Task Odour Risk Assessment.....	8
<b>7. Potential Activities Resulting in Odour</b> .....	<b>9</b>
7.1 Storage of Wellbore Fluids .....	9
7.2 Gas Lift .....	9
7.3 Incineration of Natural Gas.....	10
7.4 Purging and Cleaning Tanks and Pipework.....	10
<b>8. Source Materials</b> .....	<b>11</b>
8.1 Use of Alternative Products.....	11
8.2 Identification of Odorous Source Materials .....	11
8.3 Use of Odorous Products.....	11
8.4 Storage Arrangements.....	11
8.5 Management of Storage Areas.....	11
8.6 Waste Storage.....	11
<b>9. Additional Control Measures</b> .....	<b>12</b>
9.1 Engineering Controls.....	12
9.2 Equipment Design.....	12
9.3 Maintenance and Servicing Procedures .....	12
9.4 Promotion of Good Housekeeping .....	13
<b>10. Odour Releases</b> .....	<b>14</b>
10.1 Identification of Potential Odour Release Points .....	14
10.2 Controlling Evaporation of Odorous Products.....	14
10.3 Containment of Odorous Emissions .....	14
10.4 Odour Abatement Techniques .....	14
10.5 Dispersion .....	15
<b>11. Impacts</b> .....	<b>16</b>

11.1	Local Receptors.....	16
<b>12.</b>	<b>Odour Monitoring .....</b>	<b>18</b>
12.1	Monitoring Techniques.....	18
12.2	Steady State Odour Monitoring.....	18
12.3	Release Point Monitoring .....	18
12.4	Reporting and Recording of Odour Emissions.....	18
<b>13.</b>	<b>Odour Investigation.....</b>	<b>19</b>
13.1	Odour Identification .....	19
13.2	Point Source Sampling .....	19
13.3	Recording of Odour Investigations .....	19
13.4	Odour Tracking .....	20
<b>14.</b>	<b>Overview of Odour Management.....</b>	<b>21</b>
14.1	Training of Personnel.....	21
14.2	Engaging Neighbours .....	21
14.3	Odour Complaints.....	21
14.3.1	Recording Odour Complaints.....	21
14.3.2	Odour Diaries .....	21
14.4	Audit Requirements.....	21
14.5	Arrangements for Reviewing and Revising the Odour Management Plan.....	21
14.6	Incidents and Emergencies .....	21
<b>Appendix 1 - Odour Risk Assessment .....</b>		<b>23</b>
<b>Appendix 2 – Supporting Documentation .....</b>		<b>25</b>
<b>Appendix 3 – Odour Sampling and Analysis .....</b>		<b>27</b>

## 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 PEDL 183.

Rathlin have prepared an application to the Environment Agency seeking permission to undertake a number of permitted activities in accordance with the Environmental Permitting (England and Wales) Regulations 2016 (EPR2016).

The purpose of the Odour Management Plan is to present and outline the odour management arrangements for the West Newton A (WNA) Wellsite and has been compiled in accordance with the requirements of the Environment Agency guidance for H4 Odour Management: *how to comply with your environmental permit*.

## 2. SCOPE

This Odour Management Plan is applicable to the WNA Wellsite in accordance with 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 an Odour Management Plan.

This Odour Management Plan has been prepared as part of an application to vary the existing environmental permit (EPR/BB3001FT) and supersedes all previous versions of the Odour Management Plan once approved.

## 3. ABBREVIATIONS AND DEFINITIONS

<b>BAT:</b>	Best Available Technique
<b>CEB:</b>	Certified Ultra-low Emissions Burner
<b>COSHH:</b>	Control of Substances Hazardous to health Regulations 2002
<b>EPR2016:</b>	Environmental Permitting (England & Wales) Regulations 2016
<b>HSE:</b>	Health, Safety and Environmental
<b>Km:</b>	Kilometre
<b>LNR:</b>	Local Nature Reserves
<b>MCERTS:</b>	Environment Agency's Monitoring Certification Scheme
<b>MPA:</b>	Marine Protection Area
<b>NNR:</b>	National Nature Reserves
<b>PEDL:</b>	Petroleum Exploration and Development Licence
<b>SAC:</b>	Special Areas of Conservation
<b>SPA:</b>	Special Protection Area
<b>SSSI:</b>	Site of Special Scientific Interest
<b>WNA-1:</b>	West Newton A 1 Well
<b>WNA-2:</b>	West Newton A 2 Well
<b>Odour:</b>	<p>The term 'Odour' in this document refers to odours from those activities listed in Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2016, which for this proposal includes:</p> <ul style="list-style-type: none"> <li>The loading, unloading or handling of, the storage of, or the physical, chemical or thermal treatment of crude oil;</li> <li>The incineration of hazardous waste gas regardless whether above or below 10 tonnes;</li> <li>Odours from activities not covered by Schedule 1 of EPR2016.</li> </ul> <p>Not all odours identified on site will be generated by these activities and therefore will not necessarily be identified in this Odour Management Plan.</p>

**Table 3.1: Abbreviations and Definitions**

#### 4. ROLES AND RESPONSIBILITIES

Role	Key Responsibilities
<b>Director with Accountability for Health, Safety and Environment.</b>	<ul style="list-style-type: none"> <li>• Ensure suitable and sufficient systems, processes and resources are provided to adhere to legislative and other requirements;</li> <li>• Apply HSE Management standards and procedures throughout the project.</li> <li>• Stipulate project requirements and conditions, e.g. budget, time constraints, milestones and feedback; and</li> <li>• Ensure that a proactive and robust system is in place for the management of odour during operations, production operations, associated workover operations and well abandonment operations.</li> </ul>
<b>Country Manager</b>	<ul style="list-style-type: none"> <li>• The communication and implementation of the Odour Management Plan;</li> <li>• The communication of the Management System structure and responsibilities to the Wellsite Supervisor;</li> <li>• Providing assistance and guidance in the update and approval of the Odour Management Plan;</li> <li>• Ensuring that legislative compliance is maintained through the provision of adequate competent resources;</li> <li>• Ensuring that competent personnel are available to implement, monitor and assess OMP requirements;</li> <li>• Ensuring that roles and responsibilities are identified and the assessment of individuals is recorded;</li> <li>• Appointing contractors who can meet internal HSE standards through a robust tendering and/or selection process and the monitoring of contractors to ensure that these standards are being met;</li> <li>• The development and training of staff or assessing the competence of contractors so that they are competent and capable of carrying out their work to the required standards;</li> <li>• Ensuring that emergency response procedures are developed, maintained, communicated and tested for effectiveness; and</li> <li>• Conducting periodic audits of compliance and communicating environmental performance, significant findings and non-conformances.</li> </ul>
<b>Wellsite Supervisor / Site Supervisor</b>	<ul style="list-style-type: none"> <li>• Ensuring that leadership is clearly established and promoting a high degree of HSE awareness through communication of HSE Policies and responsibilities;</li> <li>• Ensuring that defined practices and processes are communicated;</li> <li>• Ensuring that, where required, monitoring and reporting relating to regulatory compliance is carried out;</li> <li>• Ensuring that odorous emissions are reported and investigated in accordance with internal HSE policies;</li> <li>• Ensuring that where required, odorous emissions are sampled to determine source and composition of the emission;</li> <li>• Ensuring that spillages are remediated as soon as reasonably practicable;</li> <li>• Ensuring that all incidents, involving, or having the potential to cause, injury or harm to personnel, damage to infrastructure or the environment are thoroughly investigated;</li> <li>• Ensuring that emergency response plans are tested on a regular basis, recording the results, identifying, implementing and communicating corrective actions; and</li> <li>• Ensuring that complaints are reported to Rathlin and thoroughly investigated.</li> </ul>
<b>All Personnel</b>	<p>All personnel are to follow the requirements of this Odour Management Plan and cooperate fully with senior management.</p> <p>All personnel must take reasonable care to ensure that their actions do not have an adverse impact on the environment. Personnel must not intentionally or recklessly interfere with, or misuse anything that is provided in the interest of health, safety and the environment.</p>

**Table 4.1: Roles and Responsibilities**

## **5. ODOUR MANAGEMENT PLAN**

This Odour Management Plan covers the following operations to be conducted at the WNA Wellsite:

- Drilling and well testing operations;
- Production operations;
- Workover operations; and
- Well abandonment operations.

### **5.1 Objective of the Odour Management Plan**

The Odour Management Plan is designed to consider odour sources, releases and impacts of potential odours and the implementation of appropriate methods to control and minimise any potential odours. This objective will be achieved through:

- Assessment of Risks;
- Identification of odorous materials subject to the plan;
- Arrangements for additional control measures;
- Identification of potential odour release points;
- Arrangements for controlling evaporation of odorous products;
- Arrangements for the containment of odorous emissions;
- Arrangements for the implementation of odour abatement techniques;
- Arrangements for the dispersion of odorous emissions;
- Arrangements for odour monitoring;
- Arrangements for odour investigation;
- Training of personnel;
- Audit Requirements; and
- Arrangements for reviewing and revising the Odour Management Plan.

### **5.2 Distribution of the Approved Odour Management Plan**

Rathlin will communicate the Odour Management Plan to the Wellsite Supervisor. A copy of the Odour Management Plan is to be held within the Wellsite Supervisor's office and be available for review by regulatory bodies.

The Odour Management Plan will be communicated to site personnel during site induction and a record of induction will be recorded. A copy of the Odour Management Plan will be displayed and made available on site to all personnel during operations.

### **5.3 Changes to Operations, Processes or Equipment**

Any required changes or deviations from this Odour Management Plan are to be referred to Rathlin or to the Wellsite Supervisor in the first instance. No changes to, or deviations from, this Odour Management Plan are to be implemented until the required changes or deviations have been reviewed and approved by Rathlin. Alterations to the plan will be submitted to the Environment Agency for approval; however, alterations may be implemented as an immediate control measure to resolve an identified odour problem prior to notification to the Environment Agency.

## **6. ODOUR RISK ASSESSMENT**

### **6.1 Preliminary Odour Risk Assessment**

In order to understand the how the Odour Management Plan shall be applied it is necessary to understand where the potential odour sources are likely to be generated. A preliminary desktop-based risk assessment has been produced to consider all potential odours that may be generated as a result of the current and proposed operations (including production) relating to the WNA Well site. The risk assessment is qualitative and details the activities and events that may lead to environmental impact on one or more receptors.

The Odour Risk Assessment has assessed the potential odour risks from the proposed operations to be undertaken and includes the following information:

- Potential odour release points;
- Potential sources of odour;
- Operations being carried out which may lead to odour emissions;
- Receptors;
- Pathway;
- Probability of exposure;
- Consequence;
- Magnitude of Risk;
- Risk management to control or minimise odour release;
- Residual Risk; and
- Responsible Person for monitoring release points.

A copy of the Preliminary Odour Risk Assessment is included in Appendix 1.

Rathlin shall undertake a review of the Risk Assessment once the site is completed to capture any changes that the desktop-based risk assessment has not picked up.

### **6.2 Pre-Task Odour Risk Assessment**

A pre-task odour risk assessment will be undertaken by Rathlin prior to commencement of changes within the operations.

The pre-task odour risk assessment will be undertaken to identify any alterations or changes to processes, equipment or odour control measures that had originally been assessed in the Odour Risk Assessment. This may include alterations or changes due to equipment availability or equipment replacement etc.

If alterations or changes to the Odour Risk Assessment are identified, a revised Odour Risk Assessment will be produced and communicated by Rathlin.

## 7. POTENTIAL ACTIVITIES RESULTING IN ODOUR

This section describes the activities that will be conducted during the current and proposed operations concerning the WNA Wellsite and are considered to have the potential to cause odour. For clarity, odour associated with the drilling phases have not been present and no complaints relating to odorous emissions during this phase of works have been received, therefore the activities with odour potential are anticipated to be associated with well testing and early production phases. Should odour become apparent, or a complaint received during a drilling campaign then this Odour Management Plan will be revisited.

### 7.1 Storage of Wellbore Fluids

A number of fluids will be produced from the wells throughout operational periods. Any fluids brought to surface, which may contain reservoir fluids, will be subject to a three-phase separation process in which water/brine, hydrocarbon oils and natural gas will be separated from each other.

Water/brine will be flowed to a stock tank located onsite for storage where it may be reused at some point during the operations or marked for disposal.

Oils and/or gas condensate will also be flowed to a stock tank onsite for storage where it will remain pending collection by an Environment Agency licensed waste carrier to an oil refinery.

Due to the nature of the fluids and the fluids having been exposed to the conditions of the wellbore and formation, there is the potential for odour to be present within the fluid when stored at surface within the stock tanks.

### 7.2 Gas Lift

To aid in the initial flow of hydrocarbons it is common for Nitrogen ( $N_2$ ) or sometimes Carbon Dioxide ( $CO_2$ ) gas to be introduced into the wellbore to displace wellbore fluids introduced during drilling or completion operations. The gas will displace any liquids in the tubing or wellbore which reduces the hydrostatic pressure and allows the well to flow.

As the wellbore fluids,  $N_2/CO_2$  and natural gas rise to surface they will be diverted via temporary pipework to a three-phase separator, which will separate oil, formation water and gas ( $N_2/CO_2$  and natural gas) from each other. Oil (Inc. condensate) will be transferred via temporary pipework to storage tanks pending collection, with produced water being transferred via separate temporary pipework to separate storage tanks.

In the first instance, following artificial lifting, gas separated from the produced fluid will heavily consist of  $N_2/CO_2$ , with small volumes of natural gas, and will be diverted through temporary pipework to combustion unit where the following two processes will occur should artificial lifting be used.

1. The volume of  $N_2/CO_2$  to be introduced into the wellbore will depend on the volume of wellbore fluid requiring lifting. Initially the recovered gas mixture will largely be  $N_2/CO_2$  with entrained natural gas. The gas flow from the well will be cold vented to atmosphere via the stack for a short period of time. It is proposed to raise the calorific value of natural gas to minimise/negate any form of cold venting where possible.
2. As the lifting operations continue, the volume of  $N_2$  will decrease whilst the volume of natural gas will increase. Once a suitable mix of natural gas to oxygen has been achieved (once  $N_2/CO_2$  has reduced and cannot blanket ignition) the pilot light will ignite the gaseous waste stream. The pilot light is always on and will ensure that no unnecessary cold venting will take place by igniting the gas as soon as it is physically possible to do so.

$N_2/CO_2$  are odourless gases and therefore do not directly cause odour issues, however as it will prevent the ignition of natural gas due to providing an 'ignition blanket', meaning that natural gas (although in small quantities) may present an issue of odour at the site albeit for a short duration.

Rathlin have selected suitable units for the incineration of natural gas which includes an auto pilot light to ensure that as soon as the mix of natural gas and oxygen is within a combustible range it will ignite. It is foreseeable that odour will occur from the small volumes of natural gas comingled with the vast volume of nitrogen. The odorous component of releases tends to be the higher hydrocarbon compounds (C6 and above) which are those with lower odour thresholds. A gas composition taken from the WNA-1 well testing operations indicates that the concentration of higher hydrocarbons is low, but can still present an odour at site. However, recent gas analysis shows higher levels of mercaptans which are known to be particularly odorous. Therefore, it is anticipated that any cold venting of gas will give rise to odorous emissions.

The venting of nitrogen/CO<sub>2</sub> and small volumes of natural gas through a flare or CEB Unit(s) will provide better dispersion from the top of the burner than at surface level. Although technically possible to vent gas at higher elevations, if it were not being vented through a burner, it would not provide for the gas to ignite as soon as the combustible range was met, and would result in cold venting natural gas unnecessarily.

### **7.3 Incineration of Natural Gas**

In general, the odorous component of releases tends to be the higher hydrocarbon compounds (C6 and above) which are those with lower odour thresholds, as well as mercaptans. The predominant higher hydrocarbon compounds present in releases are expected to be acetylene, ethyl benzene, benzene, styrene, ethynyl benzene and naphthalene.

To ensure that the release of odour is reduced to as low as reasonably practicable, suitable systems have been identified to ensure that any potentially odorous compounds are effectively combusted prior to dispersion.

Previous incidents regarding strong odours apparent throughout well testing operations were due to unburnt gasses being released.

Incidents regarding strong odours apparent during the previous well testing phase in 2014 were as a result of having insufficient technologies at the site to incinerate the gas due to restriction in operator permissions. The PW shrouded ground flare and / or the CEB units in combination bridges the shortfall to ensure that a suitable clean up can take place to establish a steady flow of gas without compromising on combustion efficiency.

It is understood that gas from certain zones within the Permian contains higher levels of mercaptans which still give rise to odour after incineration.

Under production operation status the harnessing of natural gas will be the preferred option meaning the incineration of natural gas (and any risk of associated odour) will be negated significantly.

### **7.4 Purging and Cleaning Tanks and Pipework**

The breaking of containment, specifically the breaking containment of pipework and the opening of stock tanks will ideally only be undertaken at the end of operations, to limit the potential for any odorous compounds to be emitted.

Pipework which has been the subject of transporting wellbore fluids and gasses will be subject to a purging process which will use either water or nitrogen. However, the exact method of purging and cleaning cannot be confirmed until an appropriate contractor has been appointed.

Stock tanks will also be subject to a purging and cleaning process. The purging process will be undertaken once the tank has been emptied, most likely at the end of operations and prior to cleaning. Again, the purging and cleaning process cannot be confirmed until the appropriate contractor has been appointed.

The processes for purging and cleaning pipework and tanks will be agreed with the contractor and prior to operations commencing.

## **8. SOURCE MATERIALS**

### **8.1 Use of Alternative Products**

Products known to emit odour or products that may emit odour when reacting with other products will be substituted where possible, for alternative non-odorous products which are deemed safe and effective. Service providers will be asked to provide non-odorous products where possible prior to mobilisation and commencement of operations. If odorous products cannot be substituted these products will be identified prior to mobilisation and arrangements will be established for the segregation of these products during transportation, storage, handling and disposal.

If odorous products cannot be substituted, quantities and holding time onsite of odorous products are to be kept to a minimum where possible.

### **8.2 Identification of Odorous Source Materials**

An inventory of potentially odorous products including description and quantities will be undertaken by service providers during initial mobilisation and installation. Inventories are to include all potential odorous liquid, solid and gaseous materials that have been mobilised and held onsite. Inventories of potential odorous products are to be recorded and a copy held within the Wellsite Supervisor's office.

The Wellsite Supervisor will collate service provider inventories and produce a consolidated potential odorous product inventory which will be held in the Wellsite Supervisor's office for review by external regulatory bodies.

The Wellsite Supervisor is to ensure that the odorous product inventory is updated on receipt/disposal of odorous products and a current copy is available for review.

### **8.3 Use of Odorous Products**

If there is a requirement for the use of or transferring of odorous products on site, control measures to eliminate or reduce potential odorous emissions detailed within this Odour Management Plan are to be followed. These include, but are not limited to:

- Containers are to be sealed when not in use;
- Spill pads / containers shall be used to ensure spillages are contained and remediated effectively and efficiently;
- Avoid direct sunlight where possible; and
- Reduce evaporation rate by eliminating air flow and surface area.

### **8.4 Storage Arrangements**

Storage areas will be provided onsite for equipment, chemicals, materials and waste receptacles. Storage areas will be clearly marked and site personnel informed of specific storage requirements for individual areas when receiving site induction. Specific storage areas will be provided for waste, hazardous materials (COSHH) and operational materials. Materials are to be segregated where possible and monitored for signs of degradation.

### **8.5 Management of Storage Areas**

The Wellsite Supervisor is responsible for ensuring that storage areas are kept clean, tidy, monitored regularly for signs of odour, leaks or damage to containers or collection of surface water. Containers identified as leaking or damaged, are to be segregated and provisions implemented for the containment, immediate use or offsite disposal by an Environment Agency licensed waste carrier to an Environment Agency licensed waste facility.

### **8.6 Waste Storage**

Waste products will be stored in a designated area onsite prior to disposal. The storage area will contain, where possible, enclosed skips for the containment, storage and collection of waste products. To ensure that potential reactions between waste products and degradation of waste is reduced or eliminated, waste will be segregated and stored in specific storage areas or waste receptacles prior to offsite disposal by an Environment Agency licensed waste carrier to an Environment Agency licensed waste facility.

It is not envisaged that waste will be held onsite for a period of time that will allow for waste degradation and production of odorous emissions. To ensure that onsite waste storage procedures are followed the Wellsite Supervisor is to undertake regular inspections of waste storage areas and receptacles.

## 9. ADDITIONAL CONTROL MEASURES

### 9.1 Engineering Controls

Engineering controls eliminate or reduce exposure to odours through the use or substitution of engineered machinery or equipment. Rathlin will require, where possible, service providers to provide the Best Available Techniques (BAT) during operations. BAT machinery and equipment will assist in eliminating potential odours at source using oil and gas industry engineering control measures which include:

- Incorporating odour abatement engineering controls into onsite processes including:
  - Installation of scrubbers at vent points within the well testing spread. Scrubbers may include those designed to mitigate against hydrogen sulphide, hydrocarbons and/or Volatile Organic Compounds; and
  - Installation of scrubbers at vent points within the waste storage process. Scrubbers may include those designed to mitigate against hydrocarbons and/or Volatile Organic Compounds;
- Designing the process to minimise potential odours i.e.:
  - Well process equipment to be an enclosed process minimal release points (tank breather line(s) and combustion unit); and
  - Use of Environment Agency approved units for the incineration of potentially odorous waste gases.
- Use of non-odorous products where possible.

### 9.2 Equipment Design

Equipment provided by service providers is to meet current oil and gas industry BAT. Equipment identified as not meeting the required oil and gas industry BAT will be notified to the service provider and they will be asked to source alternative and available equipment to ensure compliance with current oil and gas industry BAT.

### 9.3 Maintenance and Servicing Procedures

To ensure that maintenance and servicing of equipment is kept to a minimum, Rathlin will request that general maintenance and servicing of equipment is conducted by service providers prior to mobilisation to site. This will ensure that the risk of potential odorous emissions during maintenance and servicing is reduced to a minimum and the potential for equipment failure is reduced.

For clarity, maintenance and servicing may include, but may not be limited to, the following equipment:

- |                          |                 |                    |
|--------------------------|-----------------|--------------------|
| • Generators (all types) | • Separator     | • Combustion units |
| • Choke manifold         | • Fluid pump    | • Storage Tanks    |
| • Heater                 | • Storage tanks | • Pipework         |

If there is a requirement for maintenance or servicing of equipment on site, control measures to eliminate or reduce potential odorous emissions detailed within this Odour Management Plan are to be followed, these include:

- Containment and removal of odorous waste materials where practicable. Where practicable, waste materials from maintenance and servicing operations shall be contained in air tight waste receptacles to ensure that odorous vapours cannot be released during storage, handling and transportation. Waste materials from maintenance and servicing operations may include waste oils, grease, containers filters and any absorbents.
- Controlling evaporation of odorous materials / odorous chemicals to air e.g.;
  - Maintenance and servicing to be undertaken under cover and out of direct sunlight (where practicable);
  - Where odour emitting liquids are exposed to atmosphere, tarpaulin / sheeting shall be erected overhead to minimise evaporation rates; and
  - Pipes and equipment to be purged prior to breaking containment.
- Containment of odorous emissions; and
- Odour mitigation techniques.

#### **9.4 Promotion of Good Housekeeping**

Rathlin promote good housekeeping at all times ensuring that waste products are identified and the necessary actions for the storage and containment of waste products are implemented as soon as reasonably practicable.

Housekeeping is part of the site induction process and housekeeping audits are to be undertaken on a regular basis by the Wellsite Supervisor and Rathlin Senior Management.

Rathlin uses an incident reporting system whereby Incident Reports are completed by site personnel for reporting negative observations throughout operations and are recorded and actioned as soon as reasonably practicable by the Wellsite Supervisor.

## 10. ODOUR RELEASES

### 10.1 Identification of Potential Odour Release Points

Potential odour release points have been identified within the Odour Risk Assessment and include, but not limited to, the following potential odour release points:

- Well Head;
- Pressure Control Equipment (PCE);
- Well Testing / Production Equipment;
- Combustion Units;
- Storage Tanks / Storage Tank Vent Stacks;
- Spillages;
- Storage Areas / Process Areas;
- Site Sewage Tank;
- Waste Skips and Waste Receptacles; and
- Onsite Power Generation Equipment.

Control measures for releases of potential odours are detailed within the Odour Risk Assessment included as Appendix 1 of this Odour Management Plan.

### 10.2 Controlling Evaporation of Odorous Products

In the event that odorous products cannot be substituted for non-odorous products, control measures will be implemented to reduce the rate of evaporation. The main method for reducing the rate of evaporation is by using enclosed tanks. The benefit of using enclosed tanks includes:

- Preventing odorous substance from coming into contact with direct sunlight thereby reducing evaporation rates and the release of dissolved odorous chemicals;
- Reduce air flow over the surface of odour-releasing materials thus reducing evaporation rate; and
- Reduce surface area of odorous materials thus reducing evaporation rate.

The advantage of using enclosed tanks is that a lot of the environmental factors which may contribute to odour release are 'designed out'.

### 10.3 Containment of Odorous Emissions

Potential odours may be contained within pipework and enclosed tanks of equipment used within operations. Where practicable, pipework and enclosed tanks will remain sealed until cessation of operations thus reducing the likelihood of potential odorous emissions.

In the event that containment is to be broken on pipework or enclosed tanks, where possible, purging of the system is to be undertaken prior to breaking containment. Liquids used for purging are to be transferred to sealed tanks where odour treatment or offsite disposal by an Environment Agency licensed waste carrier to an Environment Agency licensed waste facility for odour treatment can be undertaken.

Tanks and pipework containing potential odorous emissions are to be checked on a regular basis by the service provider and the Wellsite Supervisor for leaks and/or damage to the containment system. All checks are to be recorded and records of checks are to be made available for inspection.

### 10.4 Odour Abatement Techniques

In the event odour is still apparent following the implementation of design and engineering controls i.e. enclosed storage tanks, then Odour abatement techniques will be employed to remove any residual odours.

The only known odour abatement technique is the removal of the odorous product. Therefore, odorous materials will be removed when safe and practical to do so. Other abatement techniques which may be used are;

- Adsorption using activated carbon;
- Absorption (scrubbing); and
- Odour treatment chemicals.

These methods can only be used once the method has been proved safe for the material being treated. Due to the nature of oil and gas operations it is not always possible to predict the odour causing substance prior to operations commencing.

## 10.5 Dispersion

During testing operations, combustion units may be used to safely incinerate natural gas. The units will ensure that all flammable gas mixtures will be incinerated, which in turn will minimise any potential odorous emissions from the wellsite.

Local meteorological monitoring will be undertaken at the site during operations to provide information on weather conditions, including wind direction and wind strength. This will assist in providing local modelling for any air dispersion from the WNA Wellsite and provide an early indication of any odour control measures that may be required.

For clarity, local meteorological monitoring undertaken onsite will consist of analysing local weather reports from the Met Office, monitoring wind direction, wind speed and weather conditions. Information from the local meteorological monitoring will provide the Wellsite Supervisor with an estimated direction and range of any dispersion.

Due to the nature of the operations, specifically the need to flow the well over a prolonged period of time, it will not be possible to restrict the well testing phase to high wind, high dispersion scenarios. The control measures adopted by Rathlin will ensure that any potential odour as a result of flowing the well, either during clean up or flow testing (with/without N<sub>2</sub> and/or CO<sub>2</sub>) will be reduced to as low as reasonably practicable.

The mitigation measures include separating out the gas from liquids by way of a three phase separator and a knock out pot, ensuring that a cleaner burn is achieved within the units. In addition, a scrubber(s) will be in place at the site to remove any potential Hydrogen Sulphide within the natural gas streams.

The height of the units will vary but is anticipated to be in excess of 6m (with exception of the CEB350 (4.0m)) which will contribute to better dispersion overall. All units have been selected on their ability to effectively incinerate with high levels of efficiency which, in the event odorous materials are present within the gas following treatment (i.e. separation and scrubbers), they will adequately be incinerated.

Incidents regarding strong odours apparent during the previous well testing phase in 2014 were as a result of having insufficient technologies at the site due to restriction in operator permissions.

The CEB combined set up proposed for the forthcoming operations bridges the shortfall and ensures that incineration of all natural gas can be undertaken.

The primary use of the incinerator systems is for the safe disposal of natural gas and although odour dispersion will be managed where possible, there will be certain events when odour emission will not be controlled such as, but not limited to;

- A well control event or emergency shut down;
- Well clean up; and
- Unpredictable multi-phase flow or solids production.

## 11. IMPACTS

### 11.1 Local Receptors

Site selection, in particular the separation distance between the site and sensitive receptors, is an important factor when considering oil and gas operations and their potential impact upon the surrounding environment. It is envisaged that the local community will not be familiar with some of the potential odours from the operations conducted at the WNA Wellsite and therefore any odours emitted from the wellsite will be classed as offensive.

Receptors are classed in to the following categories:

- Low – Footpath or road;
- Medium – Industrial or commercial workplaces; and
- High (sensitive) – Housing, pubs, hotels etc.

The WNA Wellsite is located within a rural landscape within the East Riding of Yorkshire. The nearest sensitive receptors with an indicative distance are provided within Table 11.1 and 11.2.

Receptor Classification	Local Receptor	Distance from Site	Direction from Site	Grid Reference
High	Church House	0.53km	Southwest	TA 18916 38673
High	Old School House	0.58km	Southwest	TA 18948 38593
High	Wood End Farm	0.63km	West	TA 18625 38977
High	Black Bush Farm	0.40km	East	TA 19892 39301
High	Caley Cottage	0.46km	East	TA 19947 39168
High	High Fosham Cottage	0.52km	East	TA 19991 39142
High	Marton Farm	0.78km	West	TA 18481 39216
High	White House Farm	0.84km	Southwest	TA 18618 38534
High	Piper Garth	1.05km	West	TA 18214 39235
High	Straits Farm (Withernwick)	0.92km	North	TA 19571 40124
High	Manor House	0.92km	Northeast	TA 19804 40071
High	Wood House	1.15km	South	TA 19077 37949
High	West Newton Village	1.11km	South	TA 19544 37955
High	Heywood Farm	1.16km	West	TA 18095 39261
High	Treasure Cottage	1.30km	West	TA 17952 39248
High	Model Farm	1.32km	Southeast	TA 19912 37803
High	Hill Farm	1.52km	West	TA 17710 39289
High	Mount Pleasant	1.39km	Southeast	TA 20163 37846
High	Homer House	1.42km	Northeast	TA 20285 40378
High	Farm at Low Fosham	1.43km	East	TA 20878 38786
High	Old Farm Cottage	1.49km	Southeast	TA 20352 37829
High	Withernwick Hall	1.81km	North	TA 19635 41070
High	Longdykes Farm	1.91km	Northwest	TA 18325 40764
High	Northfield Cottage	1.99km	North	TA 19463 41185

Table 11.1 List of Nearest Receptors within 2km of the WNA Wellsite

The site 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 nearest conurbations are West Newton, circa 1,130m to the south and Marton, circa 800m to the west.

A desktop study was undertaken to identify any designated sites which may be affected by the proposals. The results of the desktop survey using the Multi-Agency Geographic Information for the Countryside (MAGIC) interactive mapping tool have been provided within Table 5.1.

Designated Site	Search Radius <sup>1</sup>	Name	Location from Site <sup>2</sup>
RAMSAR	10km	-	-
Special Area of Conservation	10km	-	-
Special Protection Areas	10km	Hornsea Mere	6.93km North
Marine Protection Areas	10km	Greater Wash	5.24km Northeast
Sites of Special Scientific Interest	2km	Lambwath Meadows	0.79km Northeast
Schedule Ancient Monuments	2km	Burton Constable Medieval Settlement <sup>3</sup>	1.92 South
National Nature Reserve	2km	-	-
Local Nature Reserve	2km	-	-
Local Wildlife Site	2km	The Moors Burton Constable	0.84km South
		Wycliffe North Plantation	0.92km Southwest
		Mill Avenue Burton Constable	1.27km South
		Sallymere Plantation	1.70km Southwest
		Burton Constable Parkland	1.77km South

Table 11.2: MAGIC Desktop Study Results

<sup>1</sup> Search Radius derived from Environment Agency Guidance: Annex A – Opra Scheme for Installations.

<sup>2</sup> Location from new site boundary.

<sup>3</sup> Burton Constable medieval settlement and field system, north of Burton Constable Hall

## 12. ODOUR MONITORING

Odour monitoring will be carried out by site personnel throughout operations as detailed in Section 12.2 and Section 12.3 of this Odour Management Plan.

To ensure the effectiveness of odour control measures, monitoring shall be undertaken immediately following the assessment and implementation of control measures. Thereafter, periodic monitoring shall be undertaken to ensure the continued effectiveness of such control measures.

### 12.1 Monitoring Techniques

All monitoring techniques will be carried out in accordance with the requirements of the Environment Agency guidance for H4 Odour Management; *How to comply with your environmental permit* and may include the following techniques:

- Sniff Testing
- Complaints Investigation
- Odour Diaries
- Emissions Monitoring
- Grab Sampling of Source Emissions.

### 12.2 Steady State Odour Monitoring

Steady state monitoring will be conducted throughout operations to provide real time monitoring across the entire wellsite. This shall be via means of sniff testing.

All personnel on the wellsite shall receive training on the importance of conducting steady state odour monitoring and reporting any incidents of odour during operations. A record of training shall be maintained and held by Rathlin.

All Odours reported shall be recorded and any strong odours shall be identified as detailed within section 12.4 of this Odour Management Plan.

### 12.3 Release Point Monitoring

Potential release points shall be identified on the Odour Risk Assessment and shall be monitored, by means of sniff testing, for potential odour emissions. Site personnel involved in release point monitoring shall receive 'release point monitoring' training from Rathlin and a record of training will be held by Rathlin. If an odour is detected which is attributable to the operations, the release point shall be identified and odour control measures implemented.

To ensure that the odour control measures are sufficient, specific odour monitoring at the release point identified will be undertaken regularly throughout the operation.

### 12.4 Reporting and Recording of Odour Emissions

All odours noted on site shall be reported to the Site Supervisor and recorded.

Strong odours that are attributable to site operations or any unidentifiable odours shall be recorded using the Rathlin Odour Report Form.

Due to the location of the WNA Wellsite, there is the potential for odours not associated with the oil and gas industry, i.e. from local farming practices or other industrial processes, to be identified within the wellsite or localised area. To ensure that odours not associated with standard operations are recorded and identified, persons are still to report odours not associated with standard operations to the Wellsite Supervisor who will record it appropriately.

If an odour is reported and the source of the odour is unidentified, an investigation of the odour is to be undertaken as detailed in Section 13 of this OMP.

## 13. ODOUR INVESTIGATION

### 13.1 Odour Identification

As soon as reasonably practicable, once an unknown odour from the operations has been reported, an investigation will be conducted by the Wellsite Supervisor to determine the odour release point, odour source and the substance creating the odour.

The Wellsite Supervisor with assistance from suitably qualified personnel is to ascertain the odour release point and the potential substance causing the odour. If the substance cannot be identified, a sample of the odour will be taken either by means of point source sampling or grab sampling and sent for analysis at an accredited laboratory.

### 13.2 Point Source Sampling

Point source sampling will be undertaken when the substance causing the odour cannot be determined. Point source sampling will be undertaken by a competent and suitable qualified person who may be an independent specialist or the operator of the equipment.

Point source samples will be sent for analysis at an accredited laboratory to ascertain the compound causing the odour and will include analysis of the following parameters detailed within Table 13.1.

Parameters	
1,3 Butadiene	m-p Xylene
Benzene	Methylcyclohexane
Carbon Disulphide	Methylcyclopentane
Carbonyl Sulphide	Sulphur Dioxide
Diethyl Sulphide	Toluene
Ethyl Benzene	Volatile Suite including C1 - C8
Hydrogen Sulphide	

Table 13.1 Point Source Sampling Parameters

If a direct sample cannot be attained, grab sampling will be conducted in the immediate vicinity of the odour by a competent person.

All samples will be transported to an accredited laboratory for analysis under controlled conditions.

Results of the point source sampling will be reviewed by Rathlin to determine the source of the odour. Results of the point source sampling will be made available to the Environment Agency for review.

Appendix 3 includes the Odour Sampling and Analysis document which outlines the methodology for odour monitoring. This methodology was agreed with the Environment Agency in 2014 and has continued to be approved in subsequent applications for an environmental permit at other Rathlin sites.

### 13.3 Recording of Odour Investigations

Each odour investigation shall be recorded on the Rathlin Odour Report Form and communicated to the Rathlin Management Team. The Rathlin Odour Report Form record is to include the following information:

- Date, time and location of odour.
- Wind Strength and Direction.
- Temperature.
- Weather Conditions.
- Intensity of the odour.
- Odour Release Point.
- Constant or Intermittent Odour.
- Receptor Sensitivity.
- Source of the Odour (if evident).
- Description of the Odour.
- Activities being carried out.
- Odorous Substance.
- Details of emission points sampled.
- Sampling Method.
- Preservation and Transporting Procedures.
- Laboratory details undertaking analysis.
- Control Measure Implemented.
- Sketch of where the odour was reported.

#### **13.4 Odour Tracking**

All odours due to activities shall be recorded on the Odour Report Form and, where actionable, the Rathlin Action Log. Rathlin shall record all odour complaints on the Action Log to ensure that the complaint is tracked to conclusion and closed out.

The Action Log shall include all reports and investigations of the odour. The Action Log may help identify, if any, potential sources of odour, prevent potential reoccurrences of odour and assist in investigation of odour complaints.

## **14. OVERVIEW OF ODOUR MANAGEMENT**

### **14.1 Training of Personnel**

All personnel involved in odour monitoring and odour management procedures will receive training prior to commencement of their responsibilities. Training will be undertaken by an independent air quality consultant or Wellsite Supervisor and a record of training will be recorded by Rathlin.

### **14.2 Engaging Neighbours**

Rathlin communicates details of their business activities to the local community via community liaison groups. Rathlin is committed to engaging local neighbours and will investigate all odour complaints reported in accordance with the Rathlin Integrated Management System.

### **14.3 Odour Complaints**

In the event that a complaint is received by Rathlin from persons not associated with the exploratory operations, the complaint shall be investigated. Complaints relating to the environment will be reported to the Environment Agency.

#### **14.3.1 Recording Odour Complaints**

Odour complaints shall be recorded on the Rathlin Odour Complaint Form and an entry made in the Rathlin Action Log to monitor the frequency at which complaints are received. The Rathlin Action Log shall include a subjective description of each complaint, allowing Rathlin to calculate the number of complaints received. The Wellsite Supervisor is to record and investigate all odour complaints and communicate their findings and recommendations to Rathlin Senior Management.

#### **14.3.2 Odour Diaries**

In the event of a complaint being registered, Rathlin may ask residents of local sensitive receptors to maintain an odour diary throughout the exploratory operations. All information should be recorded on a Rathlin Odour Diary Form. Rathlin shall keep a copy of all Odour Diaries.

### **14.4 Audit Requirements**

Senior management will conduct periodic audits of compliance with the Odour Management Plan and communicate environmental performance, significant findings and non-conformances.

The Wellsite Supervisor will ensure sufficient priority is placed on undertaking audits and ensure that performance and findings from audits, inspections and non-conformances is communicated to site personnel and contractors.

### **14.5 Arrangements for Reviewing and Revising the Odour Management Plan**

Rathlin will periodically review the Odour Management Plan or when significant changes to operations or site equipment have occurred and amend where necessary in accordance with the Rathlin Document Control and Data Records Standard.

### **14.6 Incidents and Emergencies**

Unplanned incidents and emergencies may cause odour pollution. In the event of an unplanned incident or emergency there is the capacity to shut in the well and equipment to prevent the further release of reservoir and wellbore fluids from the well. Site personnel are to follow emergency procedures and Rathlin emergency response procedures. All emergency actions must be carried out to make the wellsite and personnel safe in the first instance before odour assessments can be conducted.

\*\*\*Page Left Blank Intentionally\*\*\*

**APPENDIX 1 - ODOUR RISK ASSESSMENT**

\*\*\*Page Left Blank Intentionally\*\*\*

## 1. Abbreviations and Definitions

Definitions for the Environmental Risk Assessment	
<b>ID:</b>	Identification number the hazard has been given to allow for easy referencing.
<b>Activity / Event</b>	The specific operating being undertaken relating to the proposed hazard and risk.
<b>Potential Release Point</b>	The point at which the pollutant / emission leaves its dedicated infrastructure and enters the environment.
<b>Source</b>	A source of pollutants from the activity taking place such as flaring. (Source can also be referred to as 'hazard').
<b>Pathway</b>	The pathway the pollutant is taking such as air or unsaturated zones.
<b>Receptor</b>	Although the likelihood of pollution is low it may have an adverse effect on surrounding residents, wildlife and habitats; these are known as the pollutants receptors.
<b>Exposure Probability</b>	The chance of the hazard occurring without taking into account mitigation measures.
<b>Impact Severity</b>	The impact of the hazard should it occur without taking into account mitigation measures.
<b>Risk Magnitude</b>	A hazard that has been assessed and has been given a risk rating level post mitigation measures i.e. not significant, low, medium, high very high etc.
<b>Risk Management</b>	Mitigation measures that will be put in place to control the risks so far as reasonably practicable.
<b>Residual Risk</b>	A hazard that has been assessed and has been given a risk rating level post mitigation measures i.e. not significant, low, medium, high very high etc.
<b>Not Significant</b>	The severity of risk together with the likelihood of the risk is not expected to cause harm to the environment.
<b>Low</b>	The severity of risk together with the likelihood of the risk is not expected to cause harm to the environment.
<b>Medium</b>	The severity of risk together with the likelihood of the risk has a moderate potential for causing harm to the environment.
<b>High</b>	The severity of risk together with the likelihood of the risk has a high potential for causing harm to the environment.
Other Definitions	
<b>AQIA</b>	Air Quality Impact Assessment
<b>MCPSG</b>	Medium Combustion Plant - Specified Generator
<b>SMR</b>	Steam-Methane Reformation

Table 1.1: Definitions

## 2. Methodology

The structure of the Environmental Risk Assessment follows the Environment Agency guidance using a source pathway receptor model and includes:

- Identifying the risk from the site;
- Assessing risks and checking they are acceptable;
- Justifying appropriate measures to control the risk (if needed); and
- Presenting the risk assessment.

The Environmental Risk Assessment has included the following items, which have been reviewed for applicability within the proposed operations.

- Accidents and Incidents;
- Air Emissions;
- Dust;
- Fugitive Emissions;
- Global Warming Potential;
- Light;
- Noise;
- Odour;
- Releases to Water;
- Waste.

## 2.1 Scoring Criteria

In order to establish a risk rating for each Source-Pathway-Receptor (S-P-R) linkage both the Likelihood (Probability of Exposure) and Consequence have been issued a score. The score is used in conjunction with Table 4.3 to provide an overall risk rating of the activity. All scores and risk ratings are provided on the basis that the mitigation measure are in place.

Likelihood	Descriptor
Very Low	Rarely encountered, never reported or highly unlikely.
Low	Infrequent Occurrences.
Medium	Can be expected to occur several times per year.
High	Repeated Occurrences.

Table 2.1: Scoring System Likelihood

Consequence	Descriptor
Very Low	Slight environmental effect that does not exceed a regulatory standard.
Low	Minor environmental effect which may breach a regulatory standard but is localised to the point of release with no significant impact on the environment or human health.
Medium	Moderate, localised effect on people and the environment in the vicinity of the incident.
High	A major environmental incident resulting in significant damage to the environment and harm to human health.

Table 2.2: Scoring System Consequence

The risk matrix presented in Table 4.3 below derives a risk rating for each S-P-R linkage identified within this Environmental Risk Assessment.

Risk Rating		Consequence			
		Very Low	Low	Medium	High
Likelihood	Very Low	Not Significant	Not Significant	Low	Low
	Low	Not Significant	Low	Medium	Medium
	Medium	Low	Medium	Medium	High
	High	Low	Medium	High	High

Table 2.3: Risk Matrix

Environmental risks are assigned a Not Significant, Low, Medium or High risk rating and coded using a colour coded system. A description of each risk rating is presented in Table 4.4 below.

Consequence	Acceptable	Descriptor
Not Significant	Acceptable	Near-certain that an incident will not occur. If it did occur the consequences would not be significant.
Low	Acceptable	Unlikely an incident will occur or give rise to anything more than a minor consequence on the immediate area.
Medium	Tolerable	The activity can only take place provided that any impacts remain localised and risk remediation is readily available.
High	Unacceptable	The risk must be further reduced before the activity can commence.

Table 2.4 Risk Rating Definition

## 3. Scope

This Environmental Risk Assessment is applicable the WNA development and considers all of the currently permitted and future activities. Although the residual risk for each of the currently permitted activities is unlikely to have increased, it is necessary to revise the previous assessment to consider whether the proposed activities will present any significant changes to the residual risk.

Receptors	Search Radius	Name	Distance from Site	Direction from Site	Grid Reference	Area (Ha)
<b>RAMSAR</b>	<b>10 Km</b>	No receptors found				
<b>Special Areas of Conservation (SAC)</b>	<b>10 Km</b>	No receptors found				
<b>Special Protection Areas (SPA)</b>	<b>10 Km</b>	Hornsea Mere	6.93 Km	North	TA 17983 46008	232.25
<b>Special Protection Areas (Marine)</b>	<b>10 Km</b>	Greater Wash	5.24 Km	Northeast	TA 23650 42421	353,577.85
<b>Marine Conservation Zones</b>	<b>10 Km</b>	Holderness Inshore	5.84 Km	Northeast	TA 24212 41663	30,886.85
<b>Special Areas of Conservation (Marine)</b>	<b>10 Km</b>	No receptors found				
<b>World Heritage Sites</b>	<b>10 Km</b>	No receptors found				
<b>Areas of Outstanding Natural Beauty (AONB)</b>	<b>10 Km</b>	No receptors found				
<b>Sites of Special Scientific Interest (SSSI)</b>	<b>2 Km</b>	Lambwath Meadows	0.79 Km	Northeast	TA 20100 39699	29.59
<b>Scheduled Monuments</b>	<b>2 Km</b>	Burton Constable medieval settlement and field system, north of Burton Constable Hall	1.92 Km	South	TA 18852 37191	7.96
<b>Registered Parks and Gardens</b>	<b>2 Km</b>	Burton Constable	0.81 Km	Southwest	TA 18882 28260	397.54
<b>Wood Pastures and Parkland BAP Priority Habitat</b>	<b>2 Km</b>	Parkland in 1995: Late 18 <sup>th</sup> C	1.62 Km	South	TA 19006 37474	N/A
		Parkland in 1995: Late 18 <sup>th</sup> C	1.70 Km	South	TA 19375 37381	N/A
		Parkland in 1995: Late 18 <sup>th</sup> C	1.76 Km	South	TA 19094 37317	N/A
<b>Local Wildlife Sites (LWS)</b>	<b>2 Km</b>	The Moors, Burton Constable	0.84 Km	South	TA 18876 38359	N/A
		Wycliffe, North Plantation	0.92 Km	South	TA 18676 38389	N/A
		Mill Avenue, Burton Constable	1.27 Km	South	TA 19442 37093	N/A
		Sallymere Plantation	1.70 Km	Southwest	TA 17778 38222	N/A
		Burton Constable Parkland	1.77 Km	South	TA 19098 37311	N/A
<b>National Nature Reserves</b>	<b>2 Km</b>	No receptors found				
<b>National Forest</b>	<b>2 Km</b>	No receptors found				
<b>RSPB Reserves</b>	<b>2 Km</b>	No receptors found				
<b>National Parks</b>	<b>2 Km</b>	No receptors found				
<b>Registered Battlefields</b>	<b>2 Km</b>	No receptors found				
<b>Local Nature Reserves</b>	<b>2 Km</b>	No receptors found				
<b>Sensitive Receptors: Households / Businesses</b>	<b>2 Km</b>	Black Bush Farm	0.40 Km	East	TA 19892 39301	N/A
		Caley Cottage	0.46 Km	East	TA 19947 39168	N/A
		High Fosham Cottage	0.52 Km	East	TA 19991 39142	N/A
		Church House	0.53 Km	Southwest	TA 18916 38673	N/A
		Old School House	0.58 Km	Southwest	TA 18948 38593	N/A
		Wood End Farm	0.63 Km	West	TA 18625 38977	N/A
		Marton Farm	0.78 Km	West	TA 18481 39216	N/A
		White House Farm	0.84 Km	Southwest	TA 18618 38534	N/A
		Straits Farm (Withernwick)	0.92 Km	North	TA 19571 40124	N/A
		Manor House	0.92 Km	Northeast	TA 19804 40071	N/A
		Piper Garth	1.05 Km	West	TA 18214 39235	N/A
		West Newton Village	1.11 Km	South	TA 19544 37955	N/A
		Wood House	1.15 Km	South	TA 19077 37949	N/A
		Heywood Farm	1.16 Km	West	TA 18095 39261	N/A
		Treasure Cottage	1.30 Km	West	TA 17952 39248	N/A
		Model Farm	1.32 Km	Southeast	TA 19912 37803	N/A
		Mount Pleasant	1.39 Km	Southeast	TA 20163 37846	N/A
		Homer House	1.42 Km	Northeast	TA 20285 40378	N/A
		Farm at Low Fosham	1.43 Km	East	TA 20878 38786	N/A
		Old Farm Cottage	1.49 Km	Southeast	TA 20352 37829	N/A
		Hill Farm	1.52 Km	West	TA 17710 39289	N/A
Withernwick Hall	1.81 Km	North	TA 19635 41070	N/A		

Receptors	Search Radius	Name	Distance from Site	Direction from Site	Grid Reference	Area (Ha)
		Longdykes Farm	1.91 Km	Northwest	TA 18325 40764	N/A
		Northfield Cottage	1.99 Km	North	TA 19463 41185	N/A
Surface Water Features (Closest to Boundary in All Directions)	2 km	Field Drain	0.01 km	West	TA 19231 39097	N/A
		Field Drain	0.06 km	North	TA 19235 39265	N/A
		Pond at Black Bush Cottage	0.34 km	East	TA 19815 39298	N/A
		Field Drain	0.53 km	South	TA 19372 38533	N/A
		Field Drain	0.90 km	East	TA 20381 39178	N/A
Aquifers (Bedrock)	2 km	Principal	Site located within designation			N/A
Aquifers (Superficial Drift)	2 km	Secondary (Undifferentiated)	Site located within designation			N/A
		Secondary A	0.25 km	Northwest	TF 19087 39418	N/A
Source Protection Zones	2 km	No receptors found				
Drinking Water Protected Areas (Surface Water)	2 km	No receptors found				
Drinking Water Safeguard Zones (Groundwater)	2 km	No receptors found				
Drinking Water Safeguard Zones (Surface Water)	2 km	No receptors found				
Bathing Waters	2 km	No receptors found				

ID	Activity / Event Leading to Emission	Potential Release Point	S-P-R Linkage			Exposure Probability	Impact Severity	Risk Magnitude	Risk Management	Residual Risk
			Source	Pathway	Receptor					
<b>ASSESSMENT OF ODOUR EMISSIONS - MAJOR</b>										
01	Combustion of Natural Gas	Combustion Unit Stack	Gas and Particulate Matter Emissions	Carried on Prevailing Winds	See Receptor Table	Medium	Medium	Medium	Combustion Unit shall be subject to approval by the Environment Agency and shall be the subject of a Best Available Technique Assessment.	Not Significant
									Combustion unit temperature shall be monitored and support fuel, where applicable, to be adjusted to ensure efficient (>98%) combustion efficiency.	
									Equipment installed, serviced and maintained by competent and qualified contractors.	
									All working personnel to receive full site induction covering odour management.	
									An established flare monitoring operating procedure shall be implemented.	
									Records shall be kept of complaints and subsequent mitigation.	
									Dedicated Odour Management Plan for the site shall be established and implemented.	
02	Combustion of Natural Gas	Specified Generator Exhaust	Gas and Particulate Matter Emissions	Carried on Prevailing Winds	See Receptor Table	Low	Medium	Medium	Specified Generators shall be permitted by the Environment Agency and approved for use.	Low
									Equipment installed, serviced and maintained by competent and qualified contractors.	
									Specified Generators shall be assessed for compliance with Emission Limit Values as dictated by legislation and the environmental permit.	
									All working personnel to receive full site induction covering odour management.	
									Records shall be kept of complaints and subsequent mitigation.	
									Dedicated Odour Management Plan for the site shall be established.	
03	Well Clean Up / Cold Venting	Combustion Unit Stack	Wellbore Gas	Carried on Prevailing Winds	See Receptor Table	Low	High	Medium	Hydrogen Sulphide is not anticipated based on previous gas analysis, though potential for small volumes upon completion of acidisation.	Not Significant
									Well clean up anticipated to last no longer than 45 minutes per occurrence.	
									Propane shall be used to increase the calorific value of the gas whilst heavy with nitrogen / carbon dioxide.	
									All working personnel to receive full site induction covering odour management.	
									Records shall be kept of complaints and subsequent mitigation.	
									Dedicated Odour Management Plan for the site shall be established.	

ID	Activity / Event Leading to Emission	Potential Release Point	S-P-R Linkage			Exposure Probability	Impact Severity	Risk Magnitude	Risk Management	Residual Risk
			Source	Pathway	Receptor					
<b>ASSESSMENT OF ODOUR EMISSIONS - MINOR</b>										
04	Storage of Crude Oil	Dedicated Vent Line(s)	Crude Oil Vapour	Carried on Prevailing Winds	See Receptor Table	Very Low	Low	Not Significant	Vent lines shall be the subject of a drum filter vessel used to remove VOC's.	Very Low
									Breather line shall be elevated to aid in the dispersion of residual vapours.	
									Equipment installed, serviced and maintained by competent and qualified contractors.	
									All working personnel to receive full site induction covering odour management.	
									Records shall be kept of complaints and subsequent mitigation.	
									Dedicated Odour Management Plan for the site shall be established.	
05	Breaking of Containment	<ul style="list-style-type: none"> <li>Storage Tanks.</li> <li>Pipework.</li> <li>Wellhead.</li> <li>Pumpjack.</li> <li>Separator.</li> <li>Any Other Equipment.</li> </ul>	<ul style="list-style-type: none"> <li>Oil.</li> <li>Formation Water.</li> <li>Drilling Fluids.</li> <li>Well Treatment Fluids.</li> <li>Natural Gas.</li> </ul>	Carried on prevailing winds	See Receptor Table	Low	Low	Low	Plant and pipework shall be installed by competent and qualified contractors and shall be suitable for its intended use.	Not Significant
									Plant and pipework shall be tested for leaks prior to first use.	
									Breaking containment of tanks and pipework systems shall be minimised.	
									Equipment shall be cleaned / purged where possible prior to breaking containment.	
									All working personnel to receive full site induction covering odour management.	
									Records shall be kept of complaints and subsequent mitigation.	
Dedicated Odour Management Plan for the site shall be established.										
06	Storage of Low Volume Odorous Products	Damaged / Unsealed Storage Containers	<ul style="list-style-type: none"> <li>Hydraulic Oil.</li> <li>Diesel.</li> <li>Lubricating Oil.</li> <li>Proppant Carrier Fluid and constituents.</li> </ul>	Carried on prevailing winds	See Receptor Table	Very Low	Low	Not Significant	Odourless products shall be used ahead of those which give rise to odour where reasonably practicable.	Not Significant
									Quantities of odorous products to be kept to a minimum.	
									Damaged / leaking containers shall be segregated and used as a priority where possible.	
									Chemicals shall be segregated and stored correctly and sealed when not in use.	
									Containers shall be checked on delivery, pre-use and periodically for signs of damage/leaks.	
									All working personnel to receive full site induction covering odour management.	
									Dedicated Odour Management Plan for the site shall be established.	
									Dedicated Emergency Response Plan for the site established and tested routinely.	

ID	Activity / Event Leading to Emission	Potential Release Point	S-P-R Linkage			Exposure Probability	Impact Severity	Risk Magnitude	Risk Management	Residual Risk
			Source	Pathway	Receptor					
07	Produced fluids on the surface of wellbore equipment	<ul style="list-style-type: none"> <li>• Drilling Rig.</li> <li>• Drill Pipe.</li> <li>• Wellhead.</li> <li>• Any Other Equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Oil.</li> <li>• Formation Water.</li> <li>• Drilling Fluids.</li> <li>• Well Treatment Fluids.</li> </ul>	Carried on prevailing winds	See Receptor Table	Low	Low	Low	Cleaning and purging where possible prior to pulling out of hole.	Not Significant
									Records shall be kept of complaints and subsequent mitigation.	
									All working personnel to receive full site induction covering odour management.	
									Volume expected to be minimal.	
									Dedicated Odour Management Plan for the site shall be established.	
08	Use / Decanting of Low Volume Odorous Products	Containment Unit / Canister	<ul style="list-style-type: none"> <li>• Hydraulic Oil.</li> <li>• Diesel.</li> <li>• Lubricating Oil.</li> <li>• Proppant Carrier Fluid and constituents.</li> </ul>	Carried on prevailing winds	See Receptor Table	Very Low	Low	Not Significant	Odourless products shall be used ahead of those which give rise to odour where reasonably practicable.	Not Significant
									Quantities of odorous products to be kept to a minimum.	
									Products shall be kept within their dedicated storage area when not in use.	
									Drip trays shall be utilised for the transfer / decanting of fuels or small volume liquids such as engine oil etc.	
									All working personnel to receive full site induction covering odour management.	
									Dedicated Odour Management Plan for the site shall be established.	
Dedicated Emergency Response Plan for the site established and tested routinely.										
09	Storage of Sewage	Sewage Tanks	Sewage	Carried on prevailing winds	See Receptor Table	Very Low	Low	Not Significant	Tanks shall be self-contained / enclosed to prevent emissions.	Not Significant
									Tanks and pipework shall be inspected prior to use to ensure complete integrity.	
									Tanks shall be monitored daily and emptied as required.	
									Breaking containment of tanks and pipework systems shall be minimised.	
									Tanks shall be cleaned / purged where possible prior to breaking containment.	
									Plug / cap tanks, pipes, hoses etc. after breaking containment.	
									All working personnel to receive full site induction covering odour management.	
Dedicated Odour Management Plan for the site shall be established.										
10	Storage of General Waste	Waste Skips	General Waste	Carried on prevailing winds	See Receptor Table	Very Low	Low	Not Significant	Skips shall be self-contained / enclosed to prevent emissions.	Not Significant
									Skips shall be clearly marked to ensure that waste is kept segregated and cross contamination does not occur.	
									Skips shall be monitored daily and emptied as required.	
									All working personnel to receive full site induction covering odour management.	
									Dedicated Odour Management Plan for the site shall be established.	

ID	Activity / Event Leading to Emission	Potential Release Point	S-P-R Linkage			Exposure Probability	Impact Severity	Risk Magnitude	Risk Management	Residual Risk
			Source	Pathway	Receptor					
11	Storage of Odorous Waste Products	Waste Receptacles including: • Waste Containers. • Waste Storage Tanks. • Waste Skips.	<ul style="list-style-type: none"> <li>Hydraulic Oil.</li> <li>Diesel.</li> <li>Lubricating Oil.</li> <li>Proppant Carrier Fluid.</li> <li>Proppant Sand.</li> </ul>	Carried on Prevailing Winds	See Receptor Table	Very Low	Low	Not Significant	Waste Receptacles shall be self-contained / enclosed to prevent odorous emissions.	Not Significant
									Waste Receptacles shall be clearly marked to ensure that waste is kept segregated and cross contamination does not occur.	
									Skips shall be monitored daily and emptied as required.	
									All working personnel to receive full site induction covering odour management.	
									Dedicated Odour Management Plan for the site shall be established.	
<b>ASSESSMENT OF FUGITIVE ODOUR EMISSIONS</b>										
12	Potential for Sour Gas	Exploration and Production Equipment. • Storage Tanks • Pipeworks • Wellhead • Pumpjack • Separator • Any Other Equipment	Hydrogen Sulphide (H <sub>2</sub> S)	Carried on prevailing winds	See Receptor Table	Very Low	Medium	Low	Hydrogen Sulphide (H <sub>2</sub> S) is not anticipated based on previous gas analysis.	Not Significant
									If present, it is likely to be of a short duration during well clean up.	
									Area and personal gas detectors shall be deployed with an alarm trigger of 5ppm / 7mg.m <sup>3</sup> (EH40 WELs).	
									Dedicated scrubbers shall be in place to remove H <sub>2</sub> S from natural gas before onward incineration within a combustion unit/engine.	
									Filter drums shall be in place to remove H <sub>2</sub> S from storage tank breather lines.	
									Records shall be kept of complaints and subsequent mitigation.	
									All working personnel to receive full site induction covering odour management.	
									Dedicated Odour Management Plan for the site shall be established.	
Dedicated Leak Detection and Repair Plan for the site shall be established.										
Dedicated Emergency Response Plan for the site established and tested routinely.										
13	Containment Failure	Exploration and Production Equipment. • Storage Tanks • Pipeworks • Wellhead • Pumpjack • Separator • Any Other Equipment	Natural Gas  Entrained Vapours From: • Oil; • Formation Water; • Drilling Fluids; • Well Treatment Fluids.	Carried on Prevailing Winds	See Receptor Table	Very Low	Medium	Low	H <sub>2</sub> S and Mercaptans not anticipated to be present in large volumes.	Not Significant
									If present, it is likely to be of a short duration during well clean up.	
									Area and personal gas detectors shall be deployed with an alarm trigger of 5ppm / 7mg.m <sup>3</sup> (EH40 WELs).	
									Dedicated scrubbers shall be in place to remove H <sub>2</sub> S from natural gas before onward incineration within a combustion unit/engine.	
									Filter drums shall be in place to remove H <sub>2</sub> S from storage tank breather lines.	
									Records shall be kept of complaints and subsequent mitigation.	
									Dedicated Leak Detection and Repair Plan for the site shall be established.	
Dedicated Emergency Response Plan for the site established and tested routinely.										

**APPENDIX 2 – SUPPORTING DOCUMENTATION**

\*\*\*Page Left Blank Intentionally\*\*\*

## Odour Report Form

<b>Site:</b>		<b>Date:</b>	
<b>Time:</b>		<b>Location of odour:</b>	
<b>Weather Conditions</b>		<b>Wind Direction:</b>	
<b>Wind Strength:</b>		<b>Temperature:</b>	
<b>Intensity of the Odour:</b>	1 – Very faint odour <input type="checkbox"/>	2 – Faint odour <input type="checkbox"/>	3 – Distinct odour <input type="checkbox"/>
	4 – Strong odour <input type="checkbox"/>	5 – Very strong odour <input type="checkbox"/>	6 – Extremely strong odour <input type="checkbox"/>
<b>Odour Release Point Identified:</b>		<b>Constant or intermittent odour:</b>	
<b>Receptor sensitivity:</b>	Low (e.g. footpath, road) <input type="checkbox"/>	Medium (e.g. industrial) <input type="checkbox"/>	High (e.g. housing, hotel etc.) <input type="checkbox"/>
<b>Is the source of the odour evident:</b>		<b>Description of the Odour:</b>	
<b>Activities being undertaken:</b>		<b>Odorous Substance Identified:</b>	
<b>Emission Points Sampled:</b>		<b>Method of Sampling:</b>	
<b>Method of Sample Preservation:</b>		<b>Laboratory undertaking sample analysis:</b>	
<b>Details of Sample Analysis:</b>			
<b>Odour Control Measures:</b>			
<b>Other comments or observations:</b>			

Sketch a plan of where the odour was reported and any potential odour sources:



Name:		Company:	
-------	--	----------	--

Signature:	
------------	--

## Odour Complaint Form

<b>Rathlin Energy Odour Complaint #</b>	
<b>Time of complaint:</b>	<b>Date of complaint:</b>
<b>Name of complainant:</b>	
<b>Address of complainant:</b>	
<b>Telephone number of complainant:</b>	

<b>Date of odour:</b>		<b>Time of odour:</b>	
<b>Location of odour:</b>			
<b>Weather Conditions</b>		<b>Temperature:</b>	
<b>Wind Direction:</b>		<b>Wind Strength:</b>	
<b>Complainants description of the odour:</b>			
<b>What does it smell like?</b>			
<b>Intensity of the Odour:</b>	0 – No Odour	1 – Very faint odour	2 – Faint odour
	3 – Distinct odour	4 – Strong odour	5 – Very strong odour
	6 – Extremely strong odour		
<b>Duration of the odour:</b>			
<b>Does the complainant have any other comments about the odour?</b>			
<b>Constant or intermittent in this period or persistence:</b>			
<b>Are there any other complaints relating to the installation, or to that location? (either previously or relating to the same exposure):</b>			
<b>Any other relevant information:</b>			
<b>Do you accept that the odour is likely to be from your activities:</b>			
<b>What was happening on site at the time the odour occurred:</b>			
<b>Operating conditions at time the odour occurred:</b>			

**Actions taken:**

Large empty rectangular area for recording actions taken.

<b>Name:</b>		<b>Company:</b>	
<b>Date:</b>		<b>Time:</b>	
<b>Signature:</b>			

## Odour Diary Form

Name:					Telephone Number:		
Address:							
Date of odour:							
Time of odour:							
Location of odour:							
Weather Conditions							
Temperature:							
Wind Strength:							
Wind Direction:							
What does it smell like:							
How unpleasant is it:							
Do you consider this smell offensive:							
Intensity of the odour (see below)							
Duration of odour:							
Odour constant or intermittent:							
What do you believe the source / cause to be:							
Any actions taken or other comments:							
Intensity of the Odour:	0 – No Odour			1 – Very faint odour		2 – Faint odour	
	3 – Distinct odour			4 – Strong odour		5 – Very strong odour	
	6 – Extremely strong odour						

**APPENDIX 3 – ODOUR SAMPLING AND ANALYSIS**

\*\*\*Page Left Blank Intentionally\*\*\*

# *Rathlin Energy*

Odour Sampling and  
Analysis

Environmental Permit  
Variation

West Newton A  
Wellsite

East Riding of Yorkshire

PEDL 183

July 2019

Revision 1



## APPROVAL LIST

	<b>Title</b>	<b>Name</b>	<b>Signature</b>
Prepared By	HSE & Permit Advisor	Sean Smart	
Reviewed By	HSE and Planning Manager	Jonathan Foster	
Approved By	Country Manager	Tom Selkirk	

### **COPYRIGHT**

© 2019 Rathlin Energy (UK) Limited. All Rights Reserved.

The contents of this document may not be reproduced or copied without the express written permission of Rathlin Energy (UK) Limited.

**Table of Contents**

<b>1.</b>	<b>Introduction.....</b>	<b>5</b>
<b>2.</b>	<b>Odour Sampling .....</b>	<b>6</b>
2.1	Sampling Parameters .....	6
2.2	Sampling Locations.....	6
2.3	Sampling Frequency .....	6
2.4	Transport and Analysis.....	6
<b>3.</b>	<b>Sampling Methodology .....</b>	<b>8</b>

\*\*\*Page Left Blank Intentionally\*\*\*

## **1. INTRODUCTION**

In advance of the proposed West Newton A well testing operations Rathlin Energy (UK) Limited (Rathlin) have taken the provision to prepare an odour sampling and analysis plan in the event unidentified odours become apparent. The sampling and analysis of unidentified odours will assist Rathlin in deciding the most suitable control measures to eliminate the odour once identified.

For clarity, the proposed sampling and analysis process is consistent with the sampling methodologies that were previously agreed with the Environment Agency in 2014, during previous well testing operations undertaken at the West Newton A wellsite.

Sampling and analysis is only proposed in the event an unidentified odour is apparent. Control measures will be implemented for any odours anticipated with the proposed forthcoming well testing operations.

## 2. ODOUR SAMPLING

### 2.1 Sampling Parameters

This document describes the methodology and analytical methods to be employed to monitor for the following substances:

- 1,3 Butadiene
- Benzene
- Carbon Disulphide
- Carbonyl Sulphide
- Diethyl Sulphide
- Ethyl Benzene
- Hydrogen Sulphide
- m-p Xylene
- Methylcyclohexane
- Methylcyclopentane
- Sulphur Dioxide
- Toluene
- Volatile Suite including C1 - C8

All samples collected will display details such as the location, time, and any additional pertinent information that may affect the result.

### 2.2 Sampling Locations

Sampling will be undertaken both within the West Newton A wellsite and the surrounding area.

Internal Locations:

- Within 5m of the combustion unit(s);
- Within 1m of any scrubbers;
- Nearby of any 'identified' sources of odour; and
- The Perimeter of the site, (dependant on wind direction).

External Locations:

- East side of Withernwick;
- West side of Withernwick;
- Presbytery on Marton Lane; and
- West Newton

External sample locations may change dependant on wind direction. Prior to sampling, an assessment of the wind direction and identification of the nearest sensitive receptor is to be established by the Wellsite Supervisor.

### 2.3 Sampling Frequency

In the event odour sampling is required, Rathlin will adopt the same frequency that was agreed with the Environment Agency in 2014.

Odour sampling will be undertaken twice a week and is to be conducted on Monday and Thursday to enable sufficient time for the transportation and analysis of the collected sample to an MCERTs, or where this is not feasible, UKAS accredited laboratory.

### 2.4 Transport and Analysis

Samples will be transported from the West Newton A wellsite to the laboratory in packaging / carriage agreed by the appointed laboratory to ensure that sample integrity is maintained. The samples will be collected and delivered by a Rathlin approved courier.

Upon receipt at the laboratory the samples will be logged as received by the laboratory and the relevant laboratory staff will be informed of their arrival.

Samples taken using personal sampling pumps will undergo a post sampling flow rate check before the sample tubes are removed for booking in; the average flow rate calculated from the pre and post sampling flow checks will be used to calculate the sample volume for each individual sample.

The samples will then be stored in ambient conditions in a solvent free environment prior to being booked in via the laboratory system and submitted for analysis as appropriate.

The agreed turnaround time will be up to 10 working days from receipt of the samples at the laboratory depending on the parameters being monitored.

Rathlin will request that the results be reported as factual tabulated data on MCERTS and/or UKAS Test Reports with accredited results indicated accordingly. The test reports will be forwarded as pdf documents by e-mail to an agreed distribution list.

### 3. SAMPLING METHODOLOGY

#### 3.1 BTEX and Organo-Sulphur Compounds, Sulphur Dioxide, Hydrogen Sulphide & Carbonyl Sulphide

Rathlin are proposing to use the same methodologies that were previously agreed with the Environment Agency. It is proposed to use a personal sampling pump (Casella APEX, Casella TUF or SKC Sidekick) connected to an SKC triple sorbent tube holder as illustrated in Figure 1. The sampling system will incorporate a low flow pressure controller and tygon tubing; suitable tube covers will also be provided to protect each sampling tube. The sampling methodology for each parameter is presented below.

<b>BTEX Compounds, Diethyl Sulphide, Methycyclohexane, Methylcyclopentane, Carbon Disulphide, 1,3-Butadiene</b>	
Analytical Method	ATD-GC-MS
Sample Media	Dual Bed Sulfinert (Tenax TA/Spherocarb) ATD Tube
Analysis Preparation	1.5 litre dry nitrogen purge
Instrument Calibration	5 level calibration for all compounds reported
Analytical Instrument(s)	Perkin Elmer Turbo Matrix ATD/Agilent 6890/5973N GC-MS (Scan Mode)
Reference Method(s)	In house method ASC/SOP/210
Expected Analysis Laboratory	Socotec Specialist Chemistry, Bretby
Accreditation	UKAS for mass BTEX
Sampling	Low flow sorbent tube holder, flow set @ 25 ml.min <sup>-1</sup>
Sample Duration	240 minutes

<b>Hydrogen Sulphide</b>	
Analytical Method	Ion Chromatography
Sample Media	Orbo 34 Specially Treated Activated Charcoal Tube
Analysis Preparation	Ammonium Hydroxide/Hydrogen Peroxide Extraction
Instrument Calibration	5 level calibration
Analytical Instrument(s)	Dionex IC20 Ion Chromatograph
Reference Method(s)	In House method ASC/SOP/110 (NIOSH 6013)
Expected Analysis Laboratory	Socotec Specialist Chemistry, Bretby
Accreditation	UKAS for mass of Sulphate
Sampling	Low flow sorbent tube holder, flow set @ 100 ml.min <sup>-1</sup>
Sample Duration	240 minutes

<b>Sulphur Dioxide</b>	
Analytical Method	Ion Chromatography
Sample Media	SKC 226-80 KOH treated Anasorb Tube
Analysis Preparation	Alkalised Hydrogen Peroxide
Instrument Calibration	5 level calibration
Analytical Instrument(s)	Dionex IC20 Ion Chromatograph
Reference Method(s)	Reference Method(s) In House method ASC/SOP/110 (OSHA ID 200)
Expected Analysis Laboratory	Socotec Specialist Chemistry, Bretby
Accreditation	UKAS for mass of Sulphate
Sampling	Low flow sorbent tube holder, flow set @ 100 ml.min <sup>-1</sup>
Sample Duration	240 minutes

<b>Carbonyl Sulphide</b>	
Analytical Method	ATD-GC-MS
Sample Media	Triple bed (Tenax/Carbon/Molecular Sieve) ATD tube
Analysis Preparation	-
Instrument Calibration	-
Analytical Instrument(s)	-
Reference Method(s)	-
Expected Analysis Laboratory	Socotec Specialist Chemistry, Bretby
Accreditation	None
Sampling	Low flow sorbent tube holder, flow set @ 50 ml.min <sup>-1</sup>
Sample Duration	240 minutes

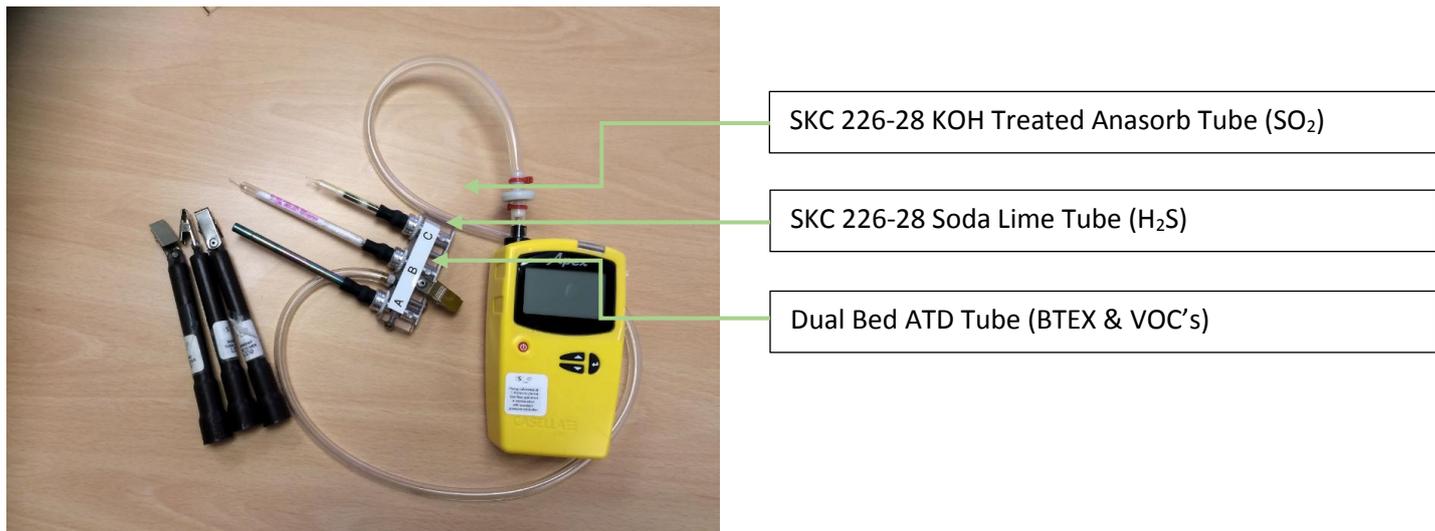


Figure 1

### 3.2 Bulk Gas & C1 – C8 Compounds

Air samples will be collected into Tedlar bags by means of a hand aspirator/lung box device as illustrated in Figure 2.

Analysis will be undertaken in the Socotec Bretby Gas Analysis laboratory using the technique of GC-FID; in accordance with in house UKAS accredited methods Gas 01 & Gas 03.

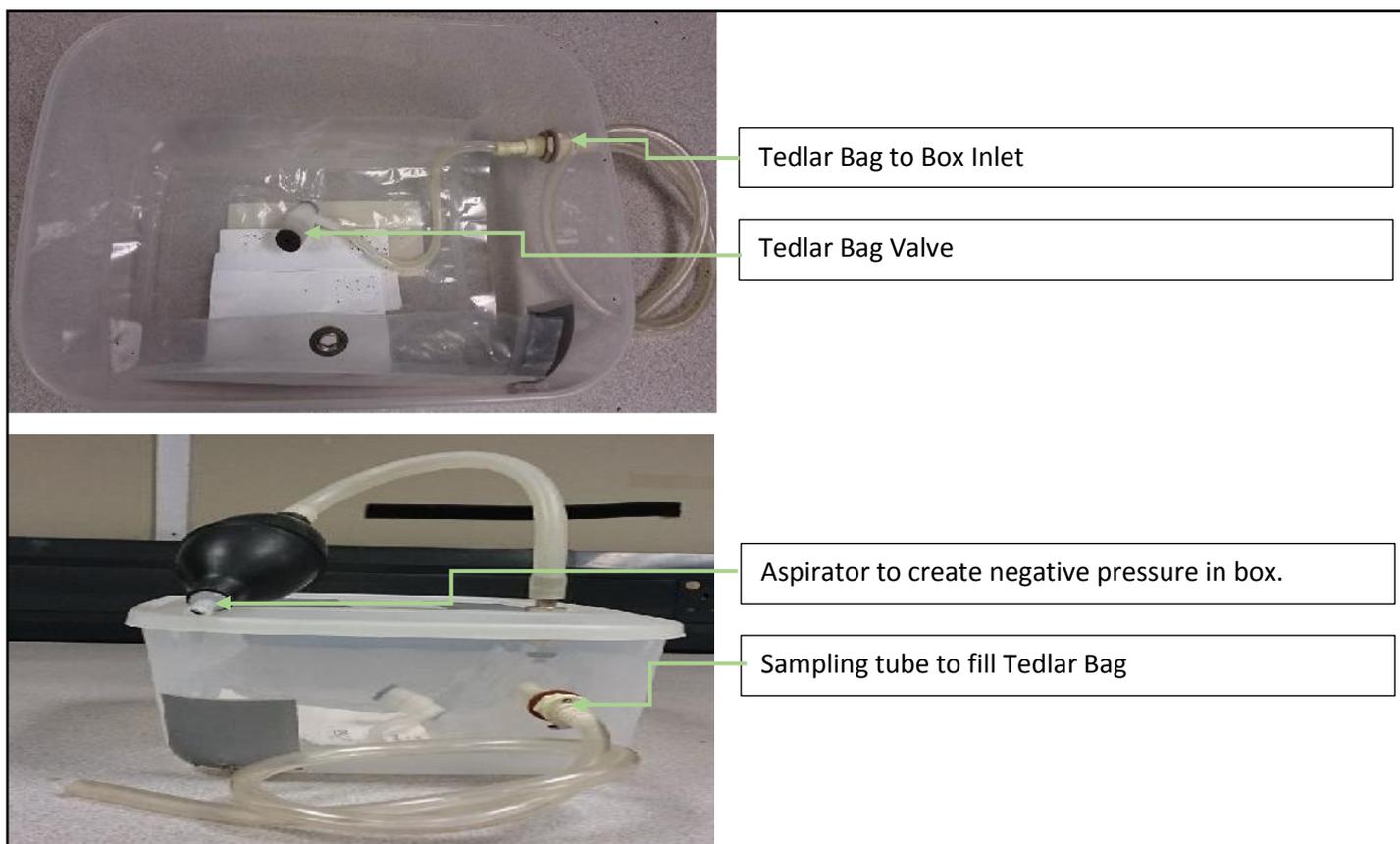


Figure 2

#### **4. APPOINTMENT OF SERVICE PROVIDER**

At the time of writing this document Rathlin have not appointed a service provider to undertake odour monitoring at the West Newton A wellsite. Should it be deemed necessary by Rathlin or the Environment Agency to undertake odour monitoring then SOCOTEC UK Limited (formally ESG) would most likely be appointed to ensure a consistent approach to odour monitoring as what was undertaken in 2014.

SOCOTEC field staff will initially conduct baseline monitoring at the agreed external sampling locations identified above. During baseline monitoring, SOCOTEC will train the Rathlin Energy Wellsite Supervisor and other site personnel to operate sampling equipment and advise on locations, time duration for sampling etc.