



ANNUAL ENVIRONMENTAL REPORT

2010



ConocoPhillips Whitegate Refinery

Annual Environmental Report

2010

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Section 1 Introduction

This Annual Environmental Report is submitted to the Environmental Protection Agency for:

**ConocoPhillips Whitegate Refinery
Whitegate
Midleton
Co. Cork**

in compliance with Condition 2.9 of the

**Integrated Pollution Prevention Control Licence
Register No. P0266-01**

It has been developed with due regard to the Document “Integrated Pollution Control Licensing – Guidance Note for Annual Environmental Report” as issued by the Environmental Protection Agency.

Company Profile

ConocoPhillips Whitegate Refinery Ltd is part of the ConocoPhillips Company. ConocoPhillips is a multinational oil and gas exploration, production and refining company with exploration interests worldwide. It is the sixth largest publicly owned energy company worldwide, based on oil and gas reserves, and the fifth largest refiner. In total, the company has approximately 32,600 employees worldwide.

The Irish operation consists of the Refinery at Whitegate, Co. Cork and Bantry Terminals Limited (BTL), at Whiddy Island, Bantry, Co. Cork.

The Whitegate refinery commenced operations in 1959 as a joint operation between four major oil companies, Shell, Texaco, BP and Esso. It was acquired on behalf of the state in 1982 and operated under state ownership until 2001. In July 2001 IRC became part of the Tosco Company. Tosco, at the time, was the largest independent refining company in the USA, operating ten refineries across the United States. In September 2001 the Tosco Company including the Irish operations, was acquired by Phillips Petroleum and in August 2002 the company ConocoPhillips was founded, following the merger of Conoco Inc. and Phillips Petroleum.

The refinery at Whitegate was designed as a hydroskimming refinery, to process high-sulphur Middle East crudes. Since the North Sea began production in the early 1980s, low sulphur crudes from this area have predominantly been processed. Upgrades to the original processing capacity were made as necessary to meet increasing market demands. The nominal capacity is 75000 Barrels per day and the refinery is presently being upgraded to enable the processing of a wider range of crude oils, since stocks of the North Sea low sulphur crudes are near depletion.

The refinery at present supplies about 35% of the Irish fuels market. Products include gasolines (petrol), automotive diesel, kerosene, heating oil, LPGs and heavy fuel oil. It thus, plays a strategic role in the supply of oil products to the Irish economy.

Over the last 15 years the specifications of the products produced at Whitegate have consistently improved in line with and ahead of National and European specifications. The European Auto Oil Programmes, Auto Oil I and Auto Oil II, were developed for adoption between 2000 – 2005 and 2005 – 2010, respectively, across the European Union. These initiatives introduced a range of measures to improve the general air quality across the EU and included new environmental specifications for petrol and diesel fuels. The criteria of the Auto Oil I programme have already been implemented for Whitegate Refinery products and the construction of a new hydrofiner unit, commissioned in 2004 has enabled the Auto Oil II standards to be introduced ahead of schedule.

In 2009, one year ahead of the refinery's legal obligation, ConocoPhillips adopted the Whitegate facility to produce bio-road transport fuels (gasoline & diesel) and now ensures that the renewable content of these fuels is at a minimum 5%.

These and other similar improvements allow Whitegate Refinery to continue to contribute to an improved national and international environmental quality.

At present the refinery employs 150 skilled personnel. The commitment of all site personnel to maintaining the highest standards in the safe operation of the refinery have resulted in the achievement of numerous National and International awards over the years for its safety record. This is reinforced in the company HSE Policy, described below. ConocoPhillips as an organisation, has also recently developed a Commitment to Sustainable Development as part of the continuous drive towards the achievement of environmental excellence. It is available to view at the company global website, www.conocophillips.com.

Environmental Policy

Presented on the following page is the ConocoPhillips Health, Safety and Environment Policy which the refinery has adopted for application at the site in Whitegate, Co. Cork. It describes the commitment to protecting the health and safety of everyone who plays a part in company operations and to the carrying out of company business with respect and care for the environment. It is also available to view at the company global website, www.conocophillips.com.

HEALTH, SAFETY & ENVIRONMENT POLICY

Our Commitment...

ConocoPhillips is committed to protecting the health and safety of everybody who plays a part in our operations, lives in the communities in which we operate or uses our products. Wherever we operate, we will conduct our business with respect and care for both the local and global environment and systematically manage risks to drive sustainable business growth. We will not be satisfied until we succeed in eliminating all injuries, occupational illnesses, unsafe practices and incidents of environmental harm from our activities.

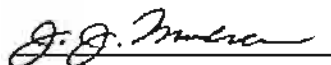
Our Plan...

To meet our commitment, ConocoPhillips will:

- Demonstrate visible and active leadership that engages employees and service providers and manage health, safety and environmental (HSE) performance as a line responsibility with clear authorities and accountabilities.
- Ensure that all employees and contractors understand that working safely is a condition of employment, and that they are each responsible for their own safety and the safety of those around them.
- Manage all projects, products and processes through their life-cycles in a way that protects safety and health and minimizes impacts on the environment.
- Provide employees with the capabilities, knowledge and resources necessary to instil personal ownership and motivation to achieve HSE excellence.
- Provide relevant safety and health information to contractors and require them to provide proper training for the safe, environmentally sound performance of their work.
- Measure, audit and publicly report HSE performance and maintain open dialogue with stakeholder groups and with communities where we operate.
- Work with both governments and stakeholders where we operate to develop regulations and standards that improve the safety and health of people and the environment.
- Maintain a secure work environment to protect ourselves, our contractors and the company's assets from risks of injury, property loss or damage resulting from hostile acts.
- Communicate our commitment to this policy to our subsidiaries, affiliates, contractors and governments worldwide and seek their support.

Our Expectations...

Through implementation of this policy, ConocoPhillips seeks to earn the public's trust and to be recognized as the leader in HSE performance.

J. J. Mulva
President and Chief Executive Officer




Neil O'Carroll
Lead Executive

Environmental Management Organisation

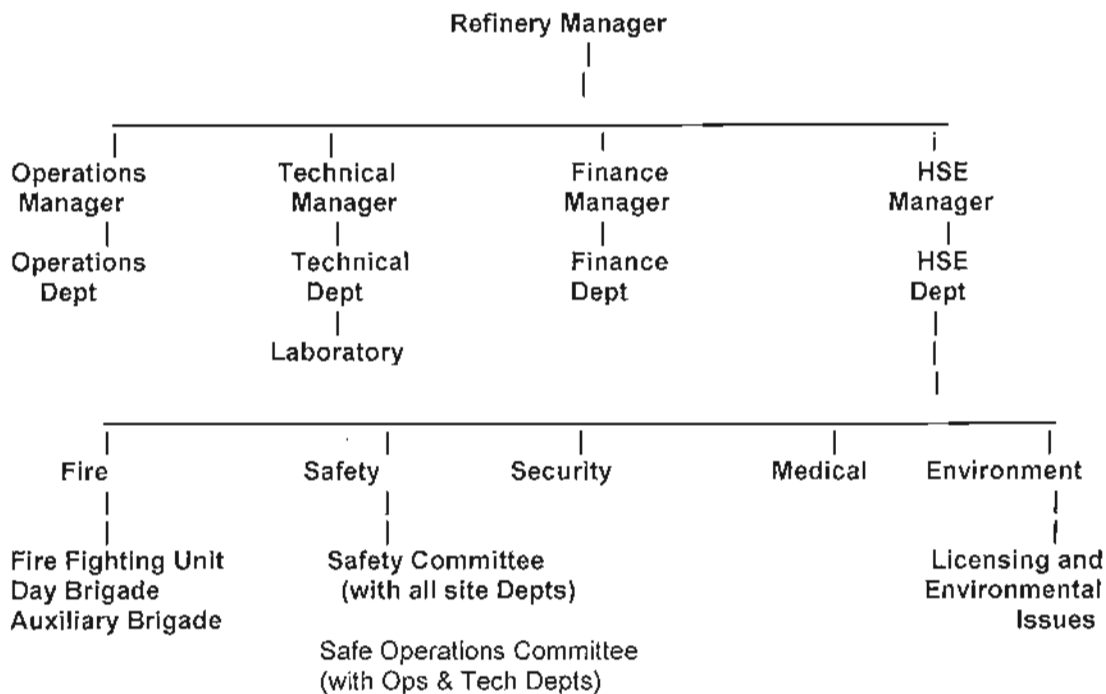
The following is a schematic representation of the organisational structure at ConocoPhillips Whitegate Refinery, showing the position of the Health, Safety and Environment, (HSE), Department.

Within the HSE Dept a number of critical services are maintained. These include the site Fire Fighting Unit, which forms a major part of emergency response planning.

Both the Safety Committee and the Safe Operations Committee, which are concerned with General Employee Safety and Safety Aspects of Site Operations respectively, also fall within the organisation of the HSE Dept.

The site also operates a Management HSE Committee, which coordinates policy and strategy for Health, Safety and Environmental issues.

Environmental issues play an increasing role in refinery operations and the HSE Dept operates in an advisory capacity to all sections of the Refinery. The HSE Dept reports directly to the Refinery Manager.



**Section 2a The Environmental Management Programme
- Schedule of Environmental Objectives and Targets**

This section details the company's Environmental Management Programme (EMP). This Environmental Management Programme was submitted to the Environmental Protection Agency in compliance with Condition 2.3.1 of the Integrated Pollution Control Licence and forms the basis of company strategy for management of environmental issues.

A report on performance with respect to the present programme is detailed in the subsequent pages.

Environmental Management Programme - Overview

The environmental impact potential of refinery processes is categorised under the following headings:

- 1.0 Emissions to Water
- 2.0 Emissions to Air
- 3.0 Solid Waste
- 4.0 Surface and Ground Water Quality
- 5.0 Noise
- 6.0 Other Environmental Impact Issues

Closely related to these issues are

- 7.0 Emergency Response
- 8.0 Environmental Management System

Company strategy in developing long term environmental performance objectives and targets was, therefore, to consider each of areas 1 to 6 and to assess these in terms of monitoring, control, reduction and improvement. Area 7 must be assessed primarily in terms of response capability and effectiveness. Point 8 will provide the framework within which all issues come together.

Objectives, Targets and Projects for good Environmental Performance

- Company **Objectives** within each of the above categories have been determined and will be described.

Company **Objectives** may be seen as long term goals towards which the company will work. They determine a standard of environmental excellence and ConocoPhillips is committed to demonstrating continuous improvement in environmental performance on the way to achieving these goals.

- **Targets** to be achieved in fulfilment of these **Objectives** will be defined.

Environmental **Targets** are well-defined action items, which will be implemented over the time-span of the EMP. They are determined with the Company **Objectives** in view and usually have a direct link to IPPC Licence Conditions.

- A **Programme of Projects** then follows to detail how, when and by whom each of these targets will be achieved.

The **Programme of Projects** contains the details describing how each **Target** will be met. Projects may range from large-scale engineering projects to smaller projects detailing monitoring or documentation that are tackled on a routine basis.

In all cases, however, the following points are included:

a short project description, responsibility or ownership of the project and a timescale for which project completion is aimed.

Each **Project** is linked to a corresponding **Target**.

Objectives and Targets of the EMP

1.0 Emissions to Water

Objectives

- No specified emission to water will exceed the emission limit values set out in Schedule 2 of the IPPC Licence.
- No other emissions to water of environmental significance will occur.
- All operations on site will be carried out in such a manner as to ensure that no water emissions result in any significant impairment of, or interference with, the environment or amenities beyond the site boundary.
- Site effluent emissions will compare favourably with European refinery performance.

Targets

1.1 Improve quality of Site Water Effluent

- 1.1.1 Operate an effluent sampling and monitoring programme according to the site sampling and monitoring procedure and IPPC Licence conditions. (Licence Conditions 6.1, 6.2, 6.3, 6.4)

1.2 Improve efficiency and operation of the Waste Water Treatment Plant.

- 1.2.1 Maintain and operate the Waste Water Treatment Plant to ensure all waste water is treated to a high standard and to allow full compliance with the conditions of our IPPC Licence. (Licence Conditions 6.3, 6.4, 6.12)

1.3 Benchmark refinery effluent quality versus European Refining Standards.

2.0 Emissions to Air

Objectives

- No specified emission to air will exceed the emission limit values as set out in Schedule 1 of the IPPC Licence.
- No other emissions of environmental significance to the atmosphere will occur.
- All operations on site will be carried out in such a manner as to ensure that no air emissions or odours result in any significant impairment of or interference with the environment and amenities beyond the site boundary
- Emissions to air from the site will compare favourably with European industry performance

Targets

2.1 Controlled emissions

- 2.1.1 Operate a full programme of emission monitoring and documentation in accordance with IPPC Licence.
(Licence Conditions 5.1, 5.2, 5.9, 5.10, 5.12, 5.13, 5.14)
- 2.1.2 Refinery fuel gas system will be managed so as to minimise SO₂ emissions from specified furnace stacks and to ensure full compliance with Air Quality Standards and IPPC Licence Schedules.
(Licence Condition 5.8)
- 2.1.3 Operation of the Sulphur Recovery Unit (SRU) will be maximised in terms of online time and recovery efficiency.
(Licence Condition 5.7)
- 2.1.4 Refinery NO_x emission sources will be managed to ensure full compliance with Air Quality Standards and Licence schedules.
(Licence Condition 5.11)
- 2.1.5 Gas flaring will be minimised as far as practicable – flare operations will be documented for inclusion in Quarterly reports to the Environmental Protection Agency.
(Licence Condition 5.15)

- 2.2 Fugitive emissions - Sources of possible fugitive emissions will be identified and quantified. Opportunities for reduction will be continually assessed.
(Licence Condition 10.2)

- 2.3 The Road Loading Terminal will be operated with due regard to the control of VOCs. The Vapour Recovery Unit will be maintained and operated to a high standard in order to comply with the conditions defined in our VOC license V0001-04. (Licence Condition 5.6)
- 2.4 Continue weather-monitoring programme as agreed with EPA. (Licence Condition 10.9)

3.0 Solid Waste Management

Objectives

- Disposal or Recovery of waste will take place only as specified in the IPPC Licence and in accordance with the appropriate local and European legislation.
- Minimisation of waste generation will be a continuous focus of company effort.
- Segregation of waste streams on site to minimise cross contamination.
- All relevant Safety Legislation regarding Waste Disposal or Recovery will be implemented at all times.

Targets

3.1 Waste Management

Maintain a comprehensive Waste Management Record (WMR) in accordance with IPPC Licence requirements.
(Licence Condition 7.5)

3.2 Hazardous Waste Control

3.2.1 Comply with site procedures for off-site disposal of hazardous waste to ensure adherence to IPPC requirements.
(Licence Conditions 7.2, 7.3)

3.2.2 Comply with hazardous waste analysis programme as per IPPC requirements.
(Licence Condition 7.4)

3.3 Non-Toxic Waste Control

Comply with site procedures for off-site disposal of non-hazardous waste to ensure adherence to IPPC requirements.
(Licence Conditions 7.1, 7.2, 7.5)

4.0 Surface and Ground Water Protection

Objectives

- No potentially polluting substance will be permitted to discharge to off-site surface waters or off-site storm drains.
- No potentially polluting substance will be permitted to discharge to ground or groundwater under the site.

Targets

- 4.1 Continue to implement the site programme of monitoring surface and ground water qualities.
(Licence Conditions 9.1.2 and 9.2.6)
- 4.3 Implement recommendations of the Hydrogeological Assessment carried out on the refinery site.
(Licence Conditions 9.2.3 and 9.4)

5.0 Noise

Objectives

- Activities on site will not give rise to noise levels off site, at any noise sensitive location, which exceed those limits set out in the IPPC Licence for the refinery.
- All operations on site will be carried out in a manner that ensures that there will be no impact on the surrounding environment and amenities as a result of noise generated by onsite operations.

Targets

- 5.1 A noise survey of site operations will be carried out on an annual basis in compliance with the IPPC Licence requirements.
(Licence Condition 8.3)
- 5.2 Every opportunity will be availed of during the ongoing replacement/refurbishment of plant and machinery to reduce existing noise sources. As well as minimising ambient noise levels in the surrounding environment, this will also ensure that refinery personnel will be afforded increased protection from operational noise.

6.0 Other Environmental Impact Issues

Residuals Management

Objectives

- Provision will be made for the proper closure of any site activity so as to ensure protection of the environment.

Targets

- 6.1 Residuals Management – a detailed procedure for the decommissioning or closure of the refinery site or any part of the refinery site will be prepared and submitted to the Environmental Protection Agency for agreement. This document will be reviewed on an annual basis and updated as necessary (Licence Condition 13.2)

Financial Provisions

Objectives

- Provision will be made for adequate financing of monitoring and other measures to protect the environment

Targets

- 6.2 Standard annual contributions towards the cost of monitoring, will be made to the EPA. (Licence Condition 14.1.1)
- 6.3 The Environmental Liabilities Risk Assessment documented for the refinery site will be reviewed on a regular basis and updated as necessary, (Licence Condition 14.2.1).
Financial provisions made as set out in IPPC Licence Condition 14.2.2 will be revised as appropriate.
(Licence Condition 14.2.3)

Environmental Initiatives

- **Objectives**

To take the opportunity of introducing measures which will contribute to the overall long-term safety and environmental performance of the refinery, of refinery technology and refinery products.

Targets

- 6.4 To continue with the development & production of “greener” fuels in response to EU Directives
- 6.5 Fuel consumption and Energy efficiency
Continue with routine monitoring of fuel consumption. Identify possibilities for fuel economy.
- 6.6 Continue participation in the Annual Audit of energy consumption co-ordinated by the Irish Energy Centre. This is a national scheme to promote energy conservation and reduction of the environmental impact of energy use among large industrial fuel consumers.
- 6.7 Jetty shipping of butane gas
To date, LPG gases are mainly sent off-site by pipeline or road truck. Achieving summer vapour pressure specifications for gasoline sometimes results in flaring of excess gas. An upgraded jetty shipping capability will enable more efficient export of butane by ship and thus, less flaring of excess gas.
- 6.8 Good Neighbour Scheme – continue membership of this Health and Safety Authority scheme in which large, well organised companies provide support and training in the areas of workplace health and safety to smaller companies with whom they have a business relationship.
- 6.9 Continue to be active in maintaining good relationships with the surrounding community in which the company operates.

7.0 Emergency Response

Objectives

- Emergency response capability will be in place at all times to ensure that the Refinery can quickly and adequately respond to any emergency situation, which might arise on site. Response procedures will be fully documented.

Targets

- 7.1 The existing Emergency Response Procedure will be maintained and updated as necessary. Ongoing training will be provided for Emergency Response Teams. (Licence Condition 12.2)
- 7.2 The existing Oil Spill Contingency Plan will be maintained and updated as necessary. Ongoing training will be provided for Emergency Response Teams. (Licence Condition 12.1)
- 7.3 Continue to participate in Cork Harbour Emergency Plan simulations and exercises

8.0 Environmental Management System

Objectives

- Environmental issues will at all times be managed in accordance with IPPC requirements and local legislation.
- Best industry performance in European refining will be defined and used as a guideline for company performance.
- A site-wide, system for co-ordination and management of environmental issues will be developed and implemented on site.
- Awareness of environmental issues and promotion of good environmental practice will be a major focus of company operational performance.

Targets

- 8.1 Maintain a Register of Environmental Legislation to detail all legislation applicable to the refinery site.
- 8.2 Identify best industry performance guidelines for the environmental Objectives and targets relevant to the company.
- 8.3 Develop and implement a comprehensive, structured Environmental Management System.
(Licence Condition 2.1)
- 8.4 Initiate a programme of environmental awareness for site personnel.
(Licence Condition 2.7)
- 8.5 Prepare an annual Pollution Emissions Register (PER) in accordance with IPPC Licence conditions and EPA guidelines.
(Licence Condition 2.4)
- 8.6 Prepare an Annual Environmental Report (AER) for submission to the Environmental Protection Agency in accordance with IPPC Licence conditions and EPA guidelines.
(Licence Condition 2.9.2)
- 8.7 Maintain the site programme to ensure that members of the public can obtain information concerning the environmental performance of the site at all reasonable times.
(Licence Condition 2.9.1)

Yearly Objectives

Water Emissions

- 1 Continue to implement full effluent monitoring programme as defined in the IPPC Licence and included in the site Environmental Manual.
(Target 1.1.1)

Responsibility : Environmental Group and Operations Dept.

Timing : Ongoing

- 2 The annual toxicity study of undiluted effluent to nominated aquatic species will be carried out as per Licence requirements.
(Target 1.1.1)

Responsibility : Environmental Group

Timing : Ongoing - annually

- 3 Carry out annual screening for organic components in the site effluent.

Responsibility : Environmental Group

Timing : Ongoing - annually

Air Emission Projects

- 4 Continue existing programme of SO_x and NO_x emission monitoring and reporting.
(Target 2.1.1)

Responsibility : Environmental Group

Timing : monitoring and reporting ongoing

- 5 Continue to monitor CO stack emissions as per Licence conditions.
(Target 2.1.1)

Responsibility : Environmental Group

Timing : ongoing

- 6 Continue to monitor and measure quantities of CO₂ generated as per the conditions defined in EPA GHG permit number GHG013-1
- Responsibility : Environmental Group, Operations & Technical Depts
Timing : ongoing
- 7 Operation of the SRU (sulphur recovery unit) will be maximised as far as practicable to ensure removal of sulphur components in released gases. Records of SRU operation will be documented and reported quarterly to the EPA.
(Target 2.1.3)
- Responsibility : Environmental Group, Operations & Technical Depts
Timing : ongoing
- 8 Flare usage – flare usage will be kept to a minimum as far as practicable. In normal operation the demand is greater than the supply of by-product fuel gases but in some circumstances this situation is reversed and surplus gas is flared. Operation will be documented and reported weekly to refinery management and also quarterly to the Environmental Protection Agency as per IPPC conditions.
(Target 2.1.5)
- Responsibility : Environmental Group and Operations Dept
Timing : ongoing
- 9 The Petrol Storage and Distribution facilities (Gasoline storage and Road Loading Terminal) will be operated with due regard to the control of VOCs as per the current EPA permit No. V0001-04. Operation of the Vapour Recovery Unit (VRU) will continue to be a normal part of roadloading operations.
(Target 2.3)
- Responsibility : Environmental Group and Operations Dept
Timing : ongoing
- 10 Continue existing programme of local Weather Conditions monitoring – as agreed with EPA.
(Target 2.4)
- Responsibility : Environmental Group
Timing : ongoing

Solid Waste

- 11 Maintain the site Waste Management Records (WMR) as per Condition 7 of the IPPC Licence.
(Target 3.1)

Responsibility : Environmental Group and Operations Dept
Timing : ongoing

- 12 A register of Waste Disposal Contractors will be maintained for the site.
(Target 3.1)

Responsibility : Environmental Group
Timing : ongoing

- 13 On-site management of waste awaiting disposal
Delineated areas for storage of waste awaiting disposal will be defined. This will include but not be limited to timber, metal, sludges, batteries, oils, fluorescent tubes and chemicals. Preparation and cleaning / cutting areas for some wastes may be necessary.
(Target 3.6)

Responsibility : Environmental Group and Operation Dept, Maintenance Group
Timing : Ongoing

Surface and Ground Water Protection

- 14 Continue the existing programme of sampling and monitoring of surface and groundwater positions throughout the site.
(Target 4.1)

Responsibility : Environmental Group
Timing : ongoing

- 15 SRU solution will be stored and managed correctly during plant shutdown and overhauls in dedicated storage facilities .

(Target 4.1 and Site Objective)

Responsibility: Environmental and Project Eng Group

Timing : ongoing

- 16 The water run off systems from product and intermediate tanks on the main refinery site will be operated in a manner which eliminates the potential for oil contamination of substrate or surface water.

(Target 4.2 and Site Objective)

Responsibility: Environmental and Project Eng. Group, Operations Dept

Timing : ongoing

Noise

- 17 The annual Noise Survey will be carried out for the refinery site.

(Target 5.1)

Responsibility : Environmental Group

Timing : ongoing annually.

Community Relations

- 18 Develop a procedure to 1/ identify operating practices that could possibly be a nuisance to refinery neighbours so that mitigation measures are taken to ensure these practices do not become a source of annoyance and 2/ investigate complaints from the community and take remediation measures if it is clear that the reason for the complaint can be attributed to refinery operations.

Responsibility Environmental Group

Timing New procedure in place Q4 2010.

Other Environmental Impact Issues**Financial Provisions**

- 19 Agency Charges
The annual contribution towards the cost of monitoring the licensed activity will be paid by ConocoPhillips.
(Target 6.2)
- Responsibility : Environmental Group and Financial Dept
Timing : Ongoing
- 20 Other annual charges, including charges for the Herd Monitoring Programme, will be met as appropriate by ConocoPhillips.
(Site Objective and Target 6.2)
- Responsibility : Environmental Group and Financial Dept
Timing : ongoing annually
- 20 An Environmental Liabilities Risk Assessment has been carried out for the refinery site and submitted to the Environmental Protection Agency. Liabilities from past and present activities have been addressed.
Financial provision covering the above are detailed as set out in IPPC Licence Condition 14.2.2.
(Target 6.3)
- Responsibility : Environmental Group, Financial Dept. and Refinery Management
- Timing : complete – review to be carried out annually
- 21 Where possible butane gas which was previously combusted in the flare will now be exported by ship as well as by landline and LPG truck. Stricter summer gasoline Vapour Pressure specifications have led to more butane being surplus to gasoline requirements and upgraded jetty shipping line will result in more efficient shipping of butane and thus reduce flaring levels.
(Targets 6.9 and 2.1.5)
- Responsibility : Environmental Group and Operations Dept
Timing : ongoing

- 22 Continue participation in the audit of energy consumption. This is a national scheme to promote energy conservation and reduction of the environmental impact of energy use among large industrial fuel consumers.(Target 6.8)

Responsibility : Environmental Group and Technical Dept

Timing : ongoing

Emergency Response Projects

- 23 The existing Emergency Response Procedure will be updated and maintained on an annual basis.

(Target 7.1)

Responsibility : Environmental and Safety Group with Refinery Management

Timing : ongoing

- 24 The existing Oil Spill Contingency Plan will be updated and maintained as necessary.

(Target 7.2)

Responsibility : Environmental and Safety Group with Refinery Management

Timing : ongoing

- 25 Training exercises

A ConocoPhillips Emergency Team will continue to participate in simulation and exercises of the Cork Harbour Emergency Plan. These simulations involve all major harbour authorities and relevant industries.

Oil spill and Emergency Plan exercises will also continue as part of routine ConocoPhillips training.

(Target 7.3)

Responsibility : Environmental and Safety Group

Timing : ongoing

Environmental Management System

- 26 Maintain the register of current environmental legislation relevant to the company.
(Target 8.1)
- Responsibility : Environmental Group
Timing : ongoing
- 27 Environmental awareness training for site personnel:
Continue to increase personnel understanding and awareness of environmental issues relevant to site operations
(Target 8.4)
- Responsibility : Environmental Group, Human Resources, all Dept Training
Timing : ongoing
- 28 Prepare a Pollution Emissions Register (PER) in accordance with IPPC Licence conditions and EPA guidelines.
(Target 8.5)
- Responsibility : Environmental Group
Timing : ongoing annually
- 29 Prepare an Annual Environmental Report as per conditions defined in the IPPC license. The AER will cover all operations from January to December and will be submitted annually by March of the following year.
(Target 8.6)
- Responsibility : Environmental Group
Timing : ongoing annually
- 30 Maintain the site programme for ensuring the availability of environmental information to the public.
(Target 8.7)
- Responsibility : Environmental Group
Timing : ongoing

Environmental Management Programme – Report

This section reports on progress to the year 2010 on the EMP.

A project summary is presented in tabular form below and a brief report is also given on individual projects.

| <i>Targeted area: Emissions to Water</i> | | | | |
|--|--|-----------------|-------------------|--------------|
| Project number | Brief description | Completion date | Status 2010 | Comments |
| 1 | continue effluent monitoring programme | ongoing | complete for 2010 | ongoing |
| 2 | toxicity study of effluent | Q3 2010 | complete for 2010 | annual study |
| 3 | Effluent screening | Q3 2010 | complete for 2010 | annual study |

| <i>Targeted area: Emissions to Atmosphere</i> | | | | |
|---|--|-----------------|-------------------|---|
| Project Number | Brief description | Completion date | Status 2010 | Comments |
| 4 | SO ₂ & NO ₂ monitoring – continue site programme | ongoing | complete for 2010 | |
| 5 | SRU operation – maximise | ongoing | Ongoing | included in refinery performance criteria |
| 6 | NOx emission reduction from specified sources | ongoing | Ongoing | |
| 7 | flare usage – minimise | ongoing | Ongoing | included in refinery performance criteria |
| 8 | fugitive emissions – reduction opportunities | ongoing | Ongoing | |
| 9 | road loading & storage operations as per Permit | ongoing | Ongoing | |
| 10 | monitor local weather conditions | ongoing | complete for 2010 | data obtained from Met Eireann & Onsite station |

| Targeted area: Solid Waste Projects | | | | |
|--|---|---|-------------------|---|
| Project Number | Brief description | Completion date | Status 2009 | Comments |
| 12 | Maintain Waste Mgt Records | ongoing | complete for 2010 | |
| 13 | register of waste disposal contractors - maintain | ongoing | complete for 2010 | |
| 14 | waste segregation / recycling opportunities | glass/tins added. Canteen food wastes now segregated | complete | paper, bulbs, batteries, toners, metals recycling |

| Targeted area: Surface and Ground Water Protection | | | | |
|---|---|-----------------|-------------------|----------|
| Project Number | Brief description | Completion date | Status 2010 | Comments |
| 16 | surface & groundwater monitoring programmes | ongoing | complete for 2010 | |

| Targeted area: Noise | | | | |
|-----------------------------|-------------------|------------------|-------------------|---|
| Project Number | Brief description | Completion date | Status 2010 | Comments |
| 17 | noise survey | ongoing annually | complete for 2010 | Day & night time noise levels at site boundary below stipulated levels in IPPC Lic. |

| Targeted area: Other Environmental Impact Issues | | | | |
|---|--|-----------------|-------------------|----------|
| Project Number | Brief description | Completion date | Status 2010 | Comments |
| 18 | Agency charges to be paid | ongoing | complete for 2010 | |
| 19 | other annual charges to be paid (herd monitoring etc) | ongoing | complete | |
| 20 | environmental liabilities risk assessment & financial coverage | ongoing | complete for 2010 | |
| 22 | Energy Audit | ongoing | ongoing | |

| <i>Targeted area: Emergency Response Projects</i> | | | | |
|---|---|-----------------|-------------|---|
| Project Number | Brief description | Completion date | Status 2010 | Comments |
| 23 | emergency response procedure – maintain & update as necessary | ongoing | complete | document is reviewed on a regular basis |
| 24 | oil spill contingency plan – maintain & update as necessary | ongoing | complete | document fully updated in 2010 |
| 25 | training exercises | ongoing | complete | Table top exercise and field exercise completed in 2010 |

| <i>Targeted area: Environmental Management System</i> | | | | |
|---|--|-----------------|-------------------|---|
| Project Number | Brief description | Completion date | Status 2010 | Comments |
| 26 | environmental legislation register – maintain | ongoing | complete for 2010 | |
| 27 | EMS – develop & implement | Q2 2011 | in progress | in progress with new corporate guidelines |
| 28 | environmental awareness training | ongoing | complete | |
| 29 | PER – prepare for 2010 | Q1 2011 | complete for 2010 | |
| 30 | AER – prepare for 2010 | Q1 2011 | complete for 2010 | |
| 31 | public access system to site environmental info – maintain | ongoing | complete for 2010 | all new material for 2010 added to Public Files |

EMP Ongoing IPPC Requirements Reports

1 – Effluent monitoring programme

The effluents at designated monitoring points have been sampled and analysed at the required time intervals during 2010. Results of this monitoring have been submitted to the EPA as part of the quarterly reports from the refinery site.

Status: project complete for 2010, monitoring programme will continue on a routine basis

2 - Effluent Toxicity Study

Effluent toxicity studies were undertaken in 2010 as per Licence requirements. Results are reported in the AER for 2010.

Status: complete for 2010. The work will be repeated annually.

3 – Effluent Performance – European Benchmarking

Effluent quality information has been submitted to CONCAWE in 2009 for inclusion in a comparative study of European Refineries Liquid Effluent Standards.

The next round of data correlation by CONCAWE began in Jan 2009 to cover performance in 2008-2009. Data has already been submitted by the refinery for this round.

Status: complete, will be repeated as requested by CONCAWE.

4 – SO₂ and NO₂ monitoring programme

A full programme of SO₂ and NO₂ monitoring has been carried out in 2010. Full reports are made to the EPA on the results of this monitoring on a quarterly basis.

Status: complete for 2010, monitoring programme will continue on a routine basis

5 – CO monitoring programme

Continuous monitoring of stack CO emissions is now in place on a number of stacks accounting for ca. 80% of site fuel consumption. Alarms have been incorporated to give immediate indication of high-level events and enable prompt intervention. Stack monitoring has also been carried out at stack sampling points using portable monitoring equipment.

Status: complete for 2010. Monitoring will continue on a routine basis.

6 – maximise SRU operation

SRU performance data is included in the weekly Refinery Performance Meetings to ensure ongoing monitoring and review. SRU performance data has been submitted to the EPA on a quarterly basis in 2010.

Status: complete for 2010, to continue on a routine basis

7- Flare usage

Flare operations data have been included in the weekly Refinery Performance Meetings to ensure ongoing monitoring and review. Flare data have been submitted to the EPA on a quarterly basis in 2010.

Status: complete for 2010, to continue on a routine basis

8 – Fugitive emissions of VOCs – identify and quantify

A full assessment of fugitive hydrocarbon emissions has been made as part of the PER for the refinery site. Each source has been quantified.

A number of measures are in place to counteract such losses, eg Vapour Recovery Unit at Road Loading Terminal, floating roofs on storage tanks, and secondary seals on floating roof storage tanks.

Fuel and loss performance is monitored on site on a daily and weekly basis thus, any deviations are noted and appropriate action can be taken so that unaccounted losses are minimised.

Status: to continue on an ongoing basis

9 – Road Loading and storage to operate as per current Permit

Monitoring of emissions at the Road Loading Terminal are performed on a quarterly basis and submitted to the EPA as required. On expiry of the present permit, No V000-04, a new permit was applied for and granted in 2010 under registration No V0001-05. This new permit will be in effect from 31/12/2010 to 31/12/2013.

Status: work complete for 2010. Monitoring will continue on a routine basis.

10 – Weather Conditions Monitoring

As agreed with the EPA the refinery uses data from Met Eireann at Roche's Point Meteorological Station as an alternative to operating a weather station on site. In 2009 a fully functional weather station was installed onsite.

Roche's Point is within 2 km of the refinery.

Status: this work is complete for 2010. It will continue on a routine basis.

11 – Waste Management Record

Waste material, both hazardous and non-hazardous, leaving the refinery site is tracked and recorded as per Condition 7 of the site IPPC Licence. Full records are kept and archived in compliance with current legislation. A summary of waste leaving the site during 2009 is provided in this AER.

Status: complete for 2010. Waste tracking will continue on a routine basis.

12– Register of Waste Disposal Contractors

A register of Waste Disposal Contractors operating for the refinery is continuously maintained and updated. No waste contractor may remove waste material from site until added to the register of Waste Disposal Contractors.

Status: complete for 2010. Will continue on a routine basis.

13 – Management of on-site waste

Since some waste materials cannot be disposed of immediately, specific areas for the storage of such “wastes-awaiting-disposal” have been designated. These are documented in the new Site Waste Management SOP. Chemical waste, scrap metal, asbestos waste, sulphur cake, C & D waste all have specific “awaiting disposal” areas as do segregated waste streams such as waste paper, batteries, fluorescent tubes etc.

Status: complete for 2010, ongoing

14 – Waste segregation and recycling

A number of waste streams are segregated on-site to enable them be recycled. Included are: batteries, fluorescent tubes, scrap metal, paper, aluminium cans and sulphur-cake. Computer parts, cartridges and toners are also now segregated and sent for recycling. C & D material is segregated to a defined area and stored for future re-usage as per Licence conditions.

Status: complete for 2010

15– Groundwater and surface water monitoring programmes

The programme for monitoring and sampling of surface and ground water has been continued in 2010. Results on surface water have been routinely submitted to the EPA as part of the quarterly reports from site. Ground water monitoring results are presented in this AER.

Status: complete for 2010 Will continue on a routine basis.

16 – Residuals Management Plan

An external consultancy agency was commissioned to draw up a detailed, costed plan for decommissioning part of or all of the refinery site. This report has been submitted to the EPA in July 2002. The Plan has been reviewed in 2009 and remains in place.

Status: complete

17 – Agency Charges

The annual cost of monitoring the licensed activity has been paid to the EPA for the year 2010

Status: complete

18 – Other annual charges

The annual charge for the Herd Monitoring Programme has been paid to the EPA.

Status : complete

19 – Financial Provision for Environmental Liabilities

Following an Environmental Liabilities Risk Assessment, financial provision has been made to cover potential risk from environmental liabilities.

This has been reviewed in 2010 and remains in place.

Status : complete

20 – SRU : future operations

Production of lower sulphur content diesel will have an impact on the operations of the SRU. It is planned to replace the existing SRU with a new unit. This project is to be reviewed.

Status: The SRU is to be replaced in Q4 2011 with an amine acid plant. Construction of this plant is to start in Mar. '11.

21 – Maintain Emergency Response Procedure

A documented Emergency Response Manual has been in existence for many years at the refinery. The document addresses foreseeable emergency situations, which could arise on site. Provision for minimising the effects of any emergency on the environment is an integral part of these procedures, by ensuring that emergencies are brought under control as soon as possible. It is reviewed on a regular basis and issued to all departments on site.

Status: complete. ongoing review.

22 – Oil Spill Contingency Plan update

A documented Oil Spill Contingency Plan is in place at the refinery to cover oil spill emergency situations. This document has been reviewed, updated and reissued in 2008.

Status: complete. ongoing review.

23 – Training exercises

A major oil-spill exercise was performed during 2010 involving refinery personnel, Cork Harbour authorities and Cork County Council.

Further exercises will continue on an ongoing basis

24 – Maintain a Register of Environmental Legislation

In order to ensure full compliance with environmental legislation, a Register of Irish and European Environmental Legislation relevant to the refinery has been compiled. This Register has been reviewed and updated in 2010.

A tracking system is in place in conjunction with IBEC, the Irish Business Employers Confederation, to ensure refinery compliance with this Licence requirement.

Status: complete for 2010 – ongoing review

25 – Develop and implement an Environmental Management System

Many elements of an EMS already exist in site procedures. The coordination of these and other procedures as required, into a formal management system is the goal of this project. The initial stages, development of a company Environmental Policy and implementation of an EMP had been implemented in 2002. Further EMS progress was carried out in 2003 in conjunction with ConocoPhillips corporate HSE systems and requirements. The system was audited as part of a Corporate Audit Exercise in 2004 and found to be in compliance with the requirements of the company.

Status: complete - an EMS is now in place to conform with company standards commitment to ongoing compliance will continue on a permanent basis

26 – Environmental Training and Awareness

Aside from the technical training necessary for each individual job category on site, training in Health and Safety issues has always been a priority at the refinery. Each new employee participates in a Safety Induction course and external contract workers are also given a safety briefing before being allowed to work on site. Environmental issues, e.g. waste water treatment & nuisance odour management, have now been integrated into this existing system.

Training for site personnel with respect to major oil spill emergencies has been described in Project 43.

Status: complete for 2010. Environmental training was provided to a number of new personnel during the year.

27 – Preparation of a Pollution Emission Register

A Pollution Emission Register has been prepared for 2010 and is included in this AER. The potential pollutant that has been tracked is Hydrocarbon material, since that, by the nature of refinery business, is the major potential pollutant from site.

Status: complete for 2010. This work will be performed annually.

28 – Preparation of an Annual Environmental Report

This document is the 7th Annual Environmental Report for the refinery site. It has been developed in compliance with Condition 2.9.2 of the IPPC Licence and with due regard to the document "Integrated Pollution Control Licensing - Guidance Note for: Annual Environmental Report" as issued by the Environmental Protection Agency.

Status: complete for 2010. This work will be repeated annually.

29 – Public Access to Environmental Data

A system to allow for public access to refinery environmental data has been implemented in 2001 and has continued in operation since then. All relevant documentation is added to the Public File as it becomes available according to site procedure.

Status: complete for 2010

30 – CO2 Emissions Programme

All CO2 emissions are monitored and reported as part of our GHG License IE-GHG013-04 and the requirements of our Monitoring and Reporting Plan 2008-2012. Verification of our 2010 data has been conducted and surrender of allowance is due to be conducted before 31 March 2011.

Status: Complete for 2010

**Section 2b The Environmental Management Programme
- Schedule of Environmental Objectives and Targets**

This section details the company's Environmental Management Programme (EMP) for 2007 - 2010.

This Environmental Management Programme is submitted in compliance with Condition 2.3.1 of the Integrated Pollution Control Licence and forms the basis for management of environmental issues.

Environmental Management Programme

Overview

The environmental impact potential of refinery processes is categorised under the following headings:

- 1.0 Emissions to Water
- 2.0 Emissions to Air
- 3.0 Solid Waste
- 4.0 Surface and Ground Water Quality
- 5.0 Noise
- 6.0 Other Environmental Impact Issues - Including
 - Resource conservation
 - Energy Reduction

Closely related to these issues are

- 7.0 Emergency Response
- and
- 8.0 Environmental Management System

Company strategy in developing long term environmental performance objectives and targets was, therefore, to consider each of areas 1 to 6 and to assess these in terms of monitoring, control, reduction and improvement.

Company goals have been documented for each of the above areas and environmental projects will be undertaken as appropriate to ensure that the refinery site is at all times achieving these goals.

Environmental Goals

Emissions to Water

- No specified emission to water will exceed the emission limit values set out in Schedule 2 of the IPC Licence.
- No other emissions to water of environmental significance will occur.
 - All operations on site will be carried out in such a manner as to ensure that no water emissions result in any significant impairment of, or interference with the environment or amenities beyond the site boundary.

Emissions to Air

- No specified emission to air will exceed the emission limit values as set out in Schedule 1 of the IPC Licence.
- No other emissions of environmental significance to the atmosphere will occur.
 - All operations on site will be carried out in such a manner as to ensure that no air emissions or odours result in any significant impairment of or interference with the environment and amenities beyond the site boundary

Solid Waste Management

- Disposal or Recovery of waste will take place only as specified in the IPC Licence and in accordance with the appropriate local and European legislation.
- Minimisation of waste generation will be a continuous focus of company effort.
- All relevant Safety Legislation regarding Waste Disposal or Recovery will be implemented at all times.

Surface and Ground Water Protection

- No potentially polluting substance will be permitted to discharge to off-site surface waters or off-site storm drains.
- No potentially polluting substance will be permitted to discharge to ground or groundwater under the site.

Noise

- Activities on site will not give rise to noise levels off site, at any noise sensitive location, which exceed those limits set out in the IPPC Licence for the refinery.
- All operations on site will be carried out in such a manner as to ensure that no impairment due to noise of the environment and amenities beyond the site boundary will occur.

Energy Conservation & Resource Conservation

- The total energy requirements / usage are to be tracked and audited to identify areas of wastage. Full records of all energy used and energy use reductions are to be fully documented.
- A procedure is to be in place to identify all resource use and programmes initiated to minimise all resource use.

Emergency Response

- Emergency response capability will be in place at all times to ensure that the Refinery can quickly and adequately respond to any emergency situation, which might arise on site. Response procedures will be fully documented.

Environmental Management System

- Environmental issues will at all times be managed in accordance with IPPC requirements and local legislation.
- A site-wide, system for co-ordination and management of environmental issues will be implemented on site.

EMP Projects

1 Replacement Sulphur Recovery Unit

As per condition 5.13 of the site IPPC licence COPI must assess options for the abatement / reduction of ammonia emissions from the sulphur recovery unit..

In Q4 2010 the refinery was granted permission & resources from its American parent company to replace the sulphur recovery unit with an amine acid plant. This will completely eliminate ammonia emissions.

Responsibility : Technical Dept- projects

Timing: Construction start Q1 2011

Completion: Q4 2011

Commissioning Dec 2011.

2 Boiler Feed water Treatment

Installation of a Boiler feedwater demineralisation plant to reduce fuel & water consumption of the boilers by 20%

Responsibility: Technical Dept- projects

Timing: Complete – demineralisation plant constructed, commissioned and in operation

3 Energy Reduction Project

An engineering and cost study is to be carried out on an overall improvement in the energy efficiency of certain process units. This should lead to a significant reduction in overall plant energy consumption. F801/802 additional tubes in convection section.

Responsibility: Technical Dept- projects

Timing: Front end engineering at an advanced stage.

Completion: Completed Q3 2009

4 Biofuels Production

Bio diesel is to be produced to an EN 590 standard road diesel. This will be carried out using our existing Hydrotreater. The production of bio gasoline using imported ethanol as a blend stock is to be engineered. This will involve upgrading our storage and emergency response facilities.

Responsibility: Technical Dept- Projects

Timing: Complete Q1 2010

5 Road culverts

Ongoing programme of excavation and inspection of buried pipelines where the cross under access roadways. Involves the construction of a re-enforced concrete culvert and removable slabs to allow ongoing pipeline inspections.

Timing: Front End Engineering Stage Ongoing

Completion: One culvert to be completed annually.

Status end 2010: 2 road culverts remain to be constructed.

6 Groundwater data base

All information contained in groundwater monitoring reports dating back to 2000 to be incorporated into an electronic database which will allow better interrogation and trending of available data. All new groundwater survey data will be added to the data base on an ongoing basis.

Timing: 2007

Complete for 2010

7 VOC reduction on tankage

Tank roof leg sleeves to be fitted to tankage as and when floating roof tanks become available. Trialling of guide pole sleeves to be carried out to establish the reliability of design.

Timing: Guide pole sleeve trial 2009 – postponed to 2011 as advise suggests present available sleeves lack durability.

Completion: Roof leg sleeves ongoing.

8 Water re-use study

Carry out investigation and subsequent engineering works to establish the viability of reusing water effluent and groundwater in specific refinery services. This would lead to a reduction in overall freshwater consumption.

Timing: Design and engineering Q2 2009

Completion: Q3 2010

9 Metering improvements on main fuel gas system

Improve overall meter accuracy of main fuel gas metering systems. This is to be achieved by replacing all orifice plates with certified units, improvements to DCS calculations, improvements to gas main system etc.

Timing: Design and engineering Q3 2008. Complete

Completion: Completed Q3 2009

10 Water management at western end of site

Engineer and install improved surface water and groundwater management systems at the western end of the site.

Timing: Design and engineering Q2 2008

Completion: Q3 2008. Complete

11 Tankage maintenance programme

An ongoing maintenance programme of storage tanks will lead to an overall improvement in mechanical integrity of product storage tanks.

Timing: Design and engineering Q2 2008

Completion: Ongoing

12 Replacement of Sub 2 and Sub 3 oil filled circuit breakers.

A programme for the replacement of all oil filled circuit breakers is planned to reduce the safety risks associated with these units but to also eliminate the need for oil changes and subsequent generation of waste oil for disposal.

Timing: Design and engineering Q3 2008

Completion: Complete Q1 2010

13 Improvements to C 201 A/B gas combustion & control system

Replacement of the propane mixing valves with improved design carburettors will lead to a reduction in gas consumption and reduced NOx emissions.

Timing: Design and engineering complete.

Completion: Complete Q3 2009

14 PECO Filter piping modifications.

The drain piping from the PECO filters is to be modified such that product being drained will no longer be directed to the oily water sewer. The discharge will be diverted to the close drain header for direct recovery

Timing: Design and engineering complete.

Completion: Q3 2008. Complete

15 Replace Non Permeate OP Meter

The single orifice plate meter measuring non-permeate gas flow to the CHP is unable to meet the accuracy levels required in our GHG reporting structure. This meter needs to be changed to a more accurate meter type capable of meeting +/- 1.5 % accuracy.

Timing: Design and engineering complete.

Completion: Complete Q4 2009.

Section 3 Emissions to Atmosphere – Summary

Emissions to atmosphere have been routinely monitored during the year 2010 as per Schedules 1(i) and 1(ii) of the company's IPPC Licence and having regard to Licence Conditions 3 and 5. Reports on these emissions have been submitted to the EPA as required, at the end of each calendar quarter.

A summary of the information contained in these reports is given below in tabular format.

| Parameter | Unit | Licensed level | Q1 average | Q2 average | Q3 average | Q4 average |
|-------------------------|------|----------------|------------|------------|------------|------------|
| SO ₂ | kg/h | 245 | 116.48 | 45.14 | 72.32 | 71.48 |
| NO ₂ process | kg/h | 98.7 * | 76.34 | 79.07 | 72.98 | 54.05 |
| NO ₂ engines | kg/h | 130 | 26.48 | 25.59 | 14.45 | 16.24 |
| CO | kg/h | 24 | - | - | - | - |
| NH ₃ | kg/h | 8.5 | 0.16 | 0.16 | 0.16 | 0.16 |

* Sum of total licensed stack levels

| Parameter | Unit | Licensed level | 2010 | Compliance |
|-------------------------|------|----------------|-----------|------------|
| SO ₂ | kg | 2,152,080 | 665,957 | 100% |
| NO ₂ process | kg | 866,981 | 616,314 | 100% |
| NO ₂ engines | kg | 1,141,920 | 180,499 | 100% |
| CO | kg | 210,838 | 194,010 | 100% |
| NH ₃ | kg | 74,664 | 1,402 | 100% |
| CO ₂ | t | --- | 310,127.0 | --- |

SO₂ and NO₂ values are obtained by calculation from daily operational data. CO₂ is calculated from fuel usage and flared gas.

Section 4 Emissions to Water – Summary

Emissions to water have been routinely monitored during the year 2010 as per Schedules 2(i) and 2(ii) of the company's IPPC Licence and having regard to Licence Conditions 3 and 6. Reports on these emissions have been submitted to the EPA as required, at the end of each calendar quarter.

A summary of the information contained in these reports is given below in tabular format and subsequently presented in total mass format.

Skimpond Effluent, SW1 Emissions to sea

| Parameter | Unit | Licensed level | Q1 average | Q2 average | Q3 average | Q4 average |
|--------------------|---------|----------------|------------|------------|------------|------------|
| pH | pH unit | 6.0 – 9.0 | 7.2 | 7.2 | 7.3 | 7.1 |
| Sus. Solids | mg/l | 60 | 15.6 | 10.3 | 7.3 | 4 |
| Hydrocarbons | mg/l | 50 | 4 | 6.1 | 4.8 | 5.7 |
| BOD | mg/l | 150 | 78.6 | 52.6 | 22.33 | 79.5 |
| COD | mg/l | 450 | 135.33 | 111.0 | 81.33 | 115.0 |
| TDS | mg/l | --- | --- | --- | --- | --- |
| Ammonia | mg/l | 20 | 12.26 | 5.9 | 8.6 | 1.8 |
| Phenols | kg/l | 1 | 0.143 | 0.208 | 0.234 | 0.119 |
| Hg | mg/l | 1 | 0.00012 | 0.0002 | 0.0001 | 0.0001 |
| Cd | mg/l | 0.05 | 0.0004 | 0.0004 | 0.0004 | 0.0002 |
| Zn | mg/l | 0.5 | 0.039 | 0.056 | 0.049 | 0.056 |
| Total heavy metals | mg/l | 1 | 0.233 | 0.080 | 0.015 | 0.03 |

| Parameter | Unit | Licensed level | 2010 total |
|------------------------|----------------|----------------|------------|
| Volume | m ³ | 4 380 000 | 619594 |
| pH | pH unit | 6.0 – 9.0 | 7.2 |
| Suspended Solids | kg | 262 800 | 6083 |
| Hydrocarbons | kg | 219 000 | 3160 |
| BOD | kg | 657 000 | 34,923 |
| COD | kg | 1 971 000 | 68279 |
| Total Dissolved Solids | kg | --- | --- |
| Ammonia | kg | 87 600 | 4726 |
| Phenols | kg | 4 380 | <112 |
| Hg | kg | 43.8 | <0.084 |
| Cd | kg | 219 | <0.023 |
| Zn | kg | 2 190 | <3.61 |
| Total heavy metals | kg | 4 380 | <24.78 |

The above monitoring results show a general improvement on 2009 results, when the mass emissions are compared. This is a result of ongoing improvements to the waste water treatment facilities.

Ballast Water Effluent, SW2 Emissions to sea

Ballast Water effluent is generated by the unloading of ballast water from ships mooring at Whitegate. Ballast water is stored in site tanks, settled, skimmed to recover oil content and released in batches. Licensed flow rates of 6000m³/day during usage are used to obtain the yearly equivalent licensed level.

Reports on these emissions have been submitted to the EPA as required, at the end of each calendar quarter. A summary of the information contained in these reports is given below in tabular format and subsequently presented in total mass format.

| Parameter | Unit | Licensed level | Q1 average | Q2 Average | Q3 average | Q4 average |
|--------------------|---------|----------------|------------|---------------|---------------|---------------|
| pH | pH unit | 6.0 – 9.0 | | <i>Note 1</i> | <i>Note 1</i> | <i>Note 1</i> |
| Suspended Solids | mg/l | 30 | | | | |
| Hydrocarbons | mg/l | 40 | | | | |
| BOD | mg/l | 25 | | | | |
| COD | mg/l | --- | | | | |
| Phenols | mg/l | 1 | | | | |
| Total heavy metals | mg/l | 1 | | | | |

| Parameter | Unit | Licensed level | 2009 total |
|--------------------|----------------|----------------|---------------|
| Volume | m ³ | 2 190 000 | <i>Note 1</i> |
| pH | pH unit | 6.0 – 9.0 | |
| Suspended Solids | kg | 65 700 | |
| Hydrocarbons | kg | 87 600 | |
| BOD | kg | 54 750 | |
| COD | kg | --- | |
| Phenols | kg | 2 190 | |
| Total heavy metals | kg | --- | --- |

Note 1: No ballast water was discharged at SW2 in Q1, Q2, Q3 & Q4 in 2010. From the end of February 2006 onwards all ballast water was diverted to the Waste Water Treatment Plant and subsequently discharged via SW1.

Non-Compliances

During 2010 there were no non-compliances, with the conditions of the IPPC licence, in the emissions to water

Effluent Toxicity

In September 2010, an undiluted refinery skimpond effluent, SW1, was tested for toxicity to selected marine species. The analysis was carried out at the Enterprise Ireland Laboratories in Shannon, Co. Clare.

Microtox studies on the sample indicated toxic unit values for the effluent of between <3.1 to <2.2 toxic units. Species used were *Vibrio fisheri* and *Tisbe battagliai*. The full results of the study are presented in the following pages.

Effluent Screening for Organic Compounds

Effluent screening for organic compounds was carried out on a sample of undiluted effluent from the refinery skim pond outlet, SW1 during 2010.

Testing for a full selection of chemicals relevant to trade effluents was carried out by National Laboratory Services of the UK Environment Agency

The results of this testing is also presented in the following pages.

CONFIDENTIAL REPORT
SHANNON AQUATIC TOXICITY LABORATORY

Front Cover Report Sheet

Dept. Toxicity
Sheet no. 1 of 3 sheets

Tox F020 Ver. 2.2

Customer
ConocoPhillips
Whitegate
Midleton
Co. Cork

Title
Toxicological analysis of an
effluent sample

Attn: Mr. John O' Keeffe

Report reference: 10T109

Order no.: 4513889821

Report by: Kathleen O' Rourke *KORourke*
Robert Hernan

Date received: 15.09.10

Approved by: Ann Harte *Ann Harte*
Quality Manager

Copies to: R.6. Files

Date of issue: 06.10.10

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7. This contract is governed by the laws of Ireland whose courts shall have exclusive jurisdiction.

Test report relates only to the sample(s) tested

TOXICOLOGICAL ANALYSIS REPORT

Form No.: Toxf035-1 Ver 2.1

TEST RESULTS

Customer: ConocoPhillips

Customer sample description: Final effluent, 14.09.10

Tox. Ref. No.: 10T109

Test Date: 15.09.10 - *Tisbe battagliai*
16.09.10 - *Vibrio fischeri*

| Test Parameter | Test Results | | 95% Confidence Limits % vol./vol. | Method of Calculation |
|--|------------------------------|-------------|--------------------------------------|-----------------------|
| | Concentration % vol./vol. | Toxic Units | | |
| 48 h LC ₅₀ to <i>Tisbe battagliai</i> | >32 | <3.1 | n/a | n/a |
| 15 min EC ₅₀ to <i>Vibrio fischeri</i> | >45 | <2.2 | n/a | n/a |
| 30 min EC ₅₀ to <i>Vibrio fischeri</i> | >45 | <2.2 | n/a | n/a |

Comments:

48 h LC₅₀ to *Tisbe battagliai*

No mortality occurred at 32% vol./vol.

15,30 min EC₅₀ to *Vibrio fischeri*

Less than 28% light inhibition occurred at 45% vol./vol.
- compared to the control.

Test Method(s): (see Appendix on back of page 3)

Method 3: *Tisbe battagliai*

Method 2: *Vibrio fischeri*

TOXICOLOGICAL ANALYSIS REPORT

Form No.: ToxF035-2 Ver 2.2

SAMPLE INFORMATION

| | SATL | Customer | Other |
|----------------------|--------------------------|-------------------------------------|--------------------------|
| Sampled by: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Collected by: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

| | |
|--|----------|
| Tox Ref. No. | 10T109 |
| Sampling procedure | n/a |
| Date of analysis | 15.09.10 |
| Storage conditions (°C) | 3±3 |
| Temperature (°C) | 19.1 |
| pH (at 19.2°C) | 7.4 |
| Dissolved oxygen (mg/l) | 6.9 |
| Dissolved oxygen (% saturation) | 75 |
| Conductivity (µS/cm at 25°C) | 1109 |
| Salinity (ppt at 20°C) | <1 |

Toxicity Test Methods and Procedures

1. Freshwater Crustacean

Method 6.1 based on ISO 6341:1996/Cor.1:1998: 'Water quality - Determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea) - Acute toxicity test'

2. Marine Bacterium

Method 6.2 based on BS EN ISO 11348-3:1999: 'Water quality - Determination of the Inhibitory effect of water samples on the light emission of *Vibrio fischeri* (Luminescent bacteria test) - Part 3: Method using freeze-dried bacteria'

3. Marine Copepod

Method 6.3 based on ISO 14669:1999: 'Water quality - Determination of acute lethal toxicity to marine copepods (*Copepoda*, Crustacea)'

4. Marine Algae

Method 6.4 based on ISO 10253:2006: 'Water quality - Marine algal growth inhibition test with *Skeletonema costatum* and *Phaeodactylum tricornutum*'

5. Freshwater Algae

Method 6.5 based on ISO 8692:2004: 'Water quality - Freshwater algal growth inhibition test with unicellular green algae' [*Pseudokirchneriella subcapitata*]

6. Freshwater Plant

Method 6.6 based on ISO 20079:2005: 'Water quality - Determination of the toxic effect of water constituents and waste water to duckweed (*Lemna minor*) - Duckweed growth inhibition test'

7. Marine Fish

Method 6.7 based on OECD 1992: Guideline 203: - 'Fish, acute toxicity test'

8. Freshwater Fish

Method 6.8 based on OECD 1992: Guideline 203: - 'Fish, acute toxicity test'

9. Estuarine Crustacean

Method 6.9 based on MAFF SOP No. BEG/030:1996: 'Brown Shrimp (*Crangon crangon*) 96 h acute toxicity for liquid effluents and wastes'

10. Marine Amphipod

Method 6.10 based on ICES, No. 28, 2001: 'Biological effects of contaminants: *Corophium* sp. sediment bioassay and toxicity test'

11. Eluate Generation

Procedure 4.7.8. "Eluate Generation" based on DIN 38 414 part 4, 1984: - 'Sludge and Sediments (Group S) - Determination of leachability by water (S4)'

Dan Callanan
ConocoPhillips Whitegate Refinery
Whitegate
Midleton
County Cork

Dear Dan

Please find attached the results for the batch of samples described below.

Samples Registered on: 20-Aug-2010
Results for Batch Number 20022747
Your Purchase Order Number 4513889612
You will be invoiced shortly by our accounts department

If we can be of further assistance then please do not hesitate to contact us.

Yours sincerely



William Fardon
Customer Services Team Leader
Tel: (0113) 231 2177
nls@environment-agency.gov.uk

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation. Details of analytical procedures and performance data are available on request. The date of sample analysis is available on request.

The Environment Agency carries out analytical work to high standards and within the scope of its UKAS accreditation, but has no knowledge of whether the circumstances or the validity of the procedures used to obtain the samples provided to the laboratory were representative of the need for which the information was required.

The Environment Agency and/or its staff does not therefore accept any liability for the consequences of any acts or omissions made on the basis of the analysis or advice or interpretation provided.

Client: ConocoPhillips Whitegate Refinery
Folder No: 001405331
Comments: ANNUAL SCREENING
Quote No: 5527

Project: Annual Testing
Sampled on: 18-Aug-10 @ (Time not supplied)

Matrix: Trade to receiving waters

| Analyte | Result | Units | MRV | Accred | Lab ID | Testcode |
|--|---------|-------|-------|--------|--------|----------|
| Calcium, Dissolved | 82.6 | mg/l | 1 | UKAS | NM | 37 |
| 123TriClBenzene | <0.200 | ug/l | 0.01 | UKAS | NM | 848 |
| 124TriClBenzene | <0.200 | ug/l | 0.01 | UKAS | NM | 848 |
| 135TriClBenzene | <0.200 | ug/l | 0.01 | UKAS | NM | 848 |
| Aldrin | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| chHeptachlor epoxide | <0.0600 | ug/l | 0.003 | UKAS | NM | 848 |
| DDE -pp | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| DDT -pp | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| Dieldrin | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| Endosulfan A | <0.400 | ug/l | 0.001 | UKAS | NM | 848 |
| Endosulfan B | <0.0600 | ug/l | 0.002 | UKAS | NM | 848 |
| Endrin | <0.0800 | ug/l | 0.003 | UKAS | NM | 848 |
| HCH -alpha | <0.0600 | ug/l | 0.003 | UKAS | NM | 848 |
| HCH -beta | <0.0600 | ug/l | 0.003 | UKAS | NM | 848 |
| HCH -gamma | <0.0600 | ug/l | 0.003 | UKAS | NM | 848 |
| Heptachlor | <0.0600 | ug/l | 0.001 | UKAS | NM | 848 |
| Hexachlorobenzene | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| Hexachlorobutadiene | <0.0600 | ug/l | 0.003 | UKAS | NM | 848 |
| Isodrin | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| PCB 028 | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| PCB 052 | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| PCB 101 | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| PCB 118 | <0.0400 | ug/l | 0.001 | UKAS | NM | 848 |
| PCB 138 | <0.0200 | ug/l | 0.001 | UKAS | NM | 848 |
| PCB 153 | <0.0400 | ug/l | 0.001 | UKAS | NM | 848 |
| PCB 180 | <0.0400 | ug/l | 0.001 | UKAS | NM | 848 |
| TDE -pp | <0.0800 | ug/l | 0.001 | UKAS | NM | 848 |
| tHeptachlor epoxide | <0.0600 | ug/l | 0.003 | UKAS | NM | 848 |
| Trifluralin | <0.400 | ug/l | 0.02 | UKAS | NM | 848 |
| B(b)fluoranthene | <0.200 | ug/l | 0.01 | UKAS | NM | 852 |
| B(ghi)perylene | <0.200 | ug/l | 0.01 | UKAS | NM | 852 |
| B(k)fluoranthene | <0.200 | ug/l | 0.01 | UKAS | NM | 852 |
| Fluoranthene | <0.200 | ug/l | 0.01 | UKAS | NM | 852 |
| Indeno123cdPyrene | <0.200 | ug/l | 0.01 | UKAS | NM | 852 |
| 1,2-Dichloroethane | <1.00 | ug/l | 0.1 | UKAS | NM | 54 |
| 1,2-Dimethylbenzene :- (o-Xylene) | 40.2 | ug/l | 0.1 | UKAS | NM | 54 |
| Benzene | 2.89 | ug/l | 0.1 | UKAS | NM | 54 |
| Carbon tetrachloride :- (Tetrachloromethane) | <0.100 | ug/l | 0.1 | None | NM | 54 |
| Chloroform :- (Trichloromethane) | 0.365 | ug/l | 0.1 | UKAS | NM | 54 |
| DiMeBenzene 13+14 | 31.1 | ug/l | 0.2 | UKAS | NM | 54 |
| Toluene :- (Methylbenzene) | <2.00 | ug/l | 0.1 | UKAS | NM | 54 |
| Trichloroethylene :- (Trichloroethene) | <0.100 | ug/l | 0.1 | None | NM | 54 |

Method Description Summary for all samples in batch Number 20022747

| Testcode | Method Reference and Description |
|----------|---|
| 37 | SX M ICPOES Routine or NM M ICPOES - Metals - filtered; acid digested; determined by ICPOES |
| 54 | SX O VOLATILES 1 or NM O Volatiles - VOCs - determined by HS-GCMS |
| 848 | SX O OCP - OCPs, PCBs - solvent extracted; determined by GCMS (SIM) |
| 852 | SX O PAH - (speciated) - solvent extracted; determined by GCMS |



Mark Gale
Laboratory Site Manager

All reporting limits quoted are those achievable for clean samples of the relevant matrix. No allowance is made for instances when dilutions are necessary owing to the nature of the sample or insufficient volume of the sample being available. In these cases higher reporting limits may be quoted and will be above the MRV.

Solid sample results are determined on a "dried" sample fraction except for parameters where the method description identifies that "as received" sample was used.

Please note all samples will be retained for thirty working days after reporting unless otherwise agreed with Customer Services.

Key to Accreditation: UKAS = Methodology accredited to ISO/IEC 17025:2005, MCertS = Methodology accredited to MCertS Performance Standard for testing of soils, none = Methodology not accredited.

Key to Lab ID: LE = Leeds, LL = Llanelli, NM = Nottingham, SX = Starcross, SC = Sub-Contracted outside NLS, FI = Field Data, NLS = Calculated

END OF TEST REPORT

Surface Water Discharge – Summary

Surface water discharges from the refinery site have been routinely monitored during the year 2010 as per Schedule 4(i) of the company's IPPC Licence and having regard to Licence Conditions 3 and 9.1. Reports on these emissions have been submitted to the EPA as required, at the end of each calendar quarter.

A summary of the information contained in these reports is given below.

Surface Water Discharge Point – White Bay Discharge

| Parameter | Unit | Q1 Average | Q2 Average | Q3 Average | Q4 Average |
|-----------------------------|---------|---------------|---------------|---------------|---------------|
| pH | pH unit | 7.4 | 7.4 | 7.7 | 7.43 |
| BOD | mg/l | <4 | <4.0 | 3.3 | 3.33 |
| Total Ammonia | mg/l | 0.1 | <0.1 | <0.1 | 0.20 |
| Total Nitrogen | mg/l | 3.0 | 1.9 | 1.07 | 1.60 |
| Conductivity | uS/cm | 478 | 463 | 448 | 450 |
| Total Petroleum Hydrocarbon | mg/l | <0.01 | 0.075 | 0.716 | 0.01 |

Surface Water Discharge Point – Driscoll's Drive

| Parameter | Unit | Q1 Average | Q2 Average | Q3 Average | Q4 Average |
|-----------------------------|---------|---------------|---------------|---------------|-------------------------------------|
| pH | pH unit | 7.2 | 7.2 | 7.2 | 7.1 |
| BOD | mg/l | 7.3 | <4.0 | 3.7 | 3.5 |
| Total Ammonia | mg/l | 0.5 | 0.9 | 0.3 | 0.43 |
| Total Nitrogen | mg/l | <1.0 | 1.0 | <1.0 | 1.35 |
| Conductivity | uS/cm | 511 | 549 | 531 | 495 |
| Total Petroleum Hydrocarbon | mg/l | 0.05 | 0.14 | 0.064 | Not Available Ref: Q 4 report |

The following reports detail results of surface water monitoring undertaken in March & October 2010



WYG Ref: CE06673/SW/Mar2010

Mr. John O'Keeffe,
Environmental Lead,
ConocoPhillips Whitegate Refinery Ltd.
Whitegate,
Co. Cork.

28 June 2010

Re: IPPC Bi-annual Surface Water Monitoring – March 2010

Dear John,

ConocoPhillips Whitegate Refinery (COP) retained WYG Environmental and Planning (Ireland) Ltd. (WYG) to undertake bi-annual surface water quality surveying of their oil refining facility located at Whitegate, Co. Cork. This round of surface water monitoring was completed in March 2010 and is the first of two surface water quality surveys scheduled in 2010. The second round is scheduled for October 2010. The surface water monitoring was in compliance with Condition 9.2 and Schedule 4(ii) of the company's Integrated Pollution Prevention Control (IPPC) licence, Register No P0266-01. This report is submitted as part of the March 2010 WYG groundwater bi-annual report. The report conditions from the WYG groundwater report apply also to this report.

There are two water courses on the COP Whitegate site – the Driscoll Drive stream and the Glanagow Stream as presented in Figure 1. Both are sampled as part of the bi-annual monitoring.

Driscoll Drive stream

The Driscoll Drive stream flows from the north western part of the site to Whitegate Bay. Sampling location AS1 (Driscoll Drive Stream) is located adjacent to the main access road from the refinery to Corkbeg Island. This stream normally has good water quality.

Glanagow Stream

The Glanagow Stream flows from the south eastern part of the site to Whitestrand Beach. DS1 is located on the Glanagow stream along the southern boundary of the main refinery. A site boundary alteration at the COP facility has occurred in 2008 due to the leasing of the south western portion of the site to Bord Gáis Éireann (BGE). The Glanagow stream surface water sampling location (DS1) is now located at the new boundary between the sites. Refer to Figure 1 for surface water monitoring locations.



Elevated concentrations of trichloroethene (TCE) have been detected in the groundwater and surface water catchment of the Glanagow Stream in south western portion of the site. In order to decrease the concentrations in the Glanagow Stream, remediation infrastructure, in the form of settlement ponds and weirs, have been installed along the water course. Further details of these works are reported in *Soil and Surface Water Improvement Works at ConocoPhillips Whitegate Refinery* (WYG 2008).

Three new trial production wells (800 series) were drilled in the south western part of the site in January 2010. The drilling was conducted as part of a hydrogeological investigation to determine the feasibility of obtaining a groundwater supply to help augment the existing mains water supply to the site. Further information on these wells is provided in WYG report issued earlier this year called *Hydrogeological Groundwater Development Investigation for ConocoPhillips, Whitegate Refinery* (WYG 2010).

Environmental Standards

For comparative purposes surface water results are presented with recognised environmental standards. The surface water results are compared to the Environmental Protection Agency's (EPA) Environmental Quality Standards (EQS) published in the *'Environmental Quality Objectives and Environmental Quality Standards, The Aquatic Environment'* (1997).

The current version of the COP database uses groundwater comparative concentrations as the main 'Trigger Value'. Therefore the 'Trigger Value' for surface water results in the database are the EPA Interim Guideline Values (IGVs), proposed in the *Interim Report Towards Setting Guideline Values for the Protection of Groundwater in Ireland* (EPA 2003).

Where there are no EQS or IGVs for hydrocarbon parameters, for example mineral oil, results are compared to the Dutch Guidelines for Groundwater (RIVM 2000). Dutch Target (S) Values are considered typical of normal or background concentrations whereas the Intervention (I) Values are those concentrations above which further investigation and/or remediation are recommended. The Dutch values are only used for guideline purposes in this country as they have no statutory basis outside the Netherlands; however, the Dutch values are recognised as guideline standards by Irish regulatory authorities.

Where no IGV, EQS or Dutch Standards are available for such parameters as Diesel Range Organic (DRO) and Petrol Range Organic (PRO) concentrations then the DRO and PRO are compared to typical background concentrations for greenfield sites. In surface water DRO and PRO concentrations are expected to be normally less than 0.1mg/l.



Surface Water Monitoring

Sampling was undertaken on the 23rd March 2010 in conjunction with the biannual groundwater monitoring programme and in accordance with the WYG surface water sampling protocol. Surface water sampling was carried out by full submergence of designated sample containers into the surface water body. To prevent sediment disturbance, during submergence, every effort is made to keep the container steady. Samples were stored in cooler boxes to maintain sample temperature below 4°C.

The two surface water samples were dispatched to an UKAS accredited laboratory for analysis. Each sample was analysed for the following parameters;

- Diesel Range Organics (DRO) and Mineral Oil
- Petrol Range Organics (PRO) and MTBE
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX)
- Major Anions and Cations
- Metals
- Volatile Organic Compounds (VOCs)

The suite of chemical analysis for both samples was selected using the information provided from previous monitoring rounds and the requirements of the IPPC Licence.

Field parameters and visual properties of the surface water on site were noted as part of the sampling process and are presented in Table 1.

Table 1 Surface Water Field Results March 2010

| Monitoring Locations | Temp °C | Conductivity $\mu\text{S}/\text{cm}$ | pH Units | Visual Properties |
|-----------------------------|---------|--------------------------------------|----------|-------------------|
| DS1 (Glanagow Stream) | 12 | 520 | 7.6 | Clear, no odour |
| AS1 (Driscoll Drive Stream) | 11 | 546 | 7.34 | Clear, no odour |

Surface Water COP Database

COP appointed WYG to generate a computerised "Environmental Management Database", which was developed during 2007 in which all historic surface water analytical results have been inputted. The March 2010 bi-annual surface water laboratory results have been inputted into the data base. The analytical results are included at the end of this report.



Analytical Results

In AS1 all parameters were below laboratory detection limits.

In DS1 in recent sampling rounds TCE was detected at concentration exceeding the EQS Trigger Level (10ug/l) for surface water. In March 2010, TCE was detected below the Trigger Level, at 8ug/l, for the first time since May 2007. The decrease in TCE concentrations may relate to low baseflow level due to the low rainfall in the early part of 2010. It may also be attributed to the pumping of the new trial production wells (800 series) drilled in the area.

In DS1 DRO was detected at elevated concentration in October 2009. In March 2010 it was at concentrations below laboratory detection limits.

Findings and Conclusions

- Two surface water streams are located on the COP site. The Glanagow Stream flows from the south western area to Whitebay and the Driscoll Drive Stream drains north east to Whitegate Bay. DS1 is located in the Glanagow Stream on the site boundary and AS1 is located on the Driscoll Drive Stream.
- Water conditions are generally of good quality and similar to previous rounds.
- There was no exceedance of analysed parameters in AS1.
- The TCE concentration in DS1 was below the surface water EQS Trigger Level for the first time since May 2007.
- The DRO concentration in Glanagow Stream (DS1) was below the comparative Trigger Level which is an improvement on the previous sampling round.

Recommendations

- While there has been a decrease in the TCE concentration in DS1, it is recommended that the Glanagow stream is continued to be monitored with the TCE monitoring programme to help establish trends for the improvement in surface water quality.

Yours sincerely,

Handwritten signature of Mark Masterson in black ink.

Mark Masterson

Senior Scientist

For and on behalf of WYG Ireland

Handwritten signature of Darragh Musgrave in black ink.

Darragh Musgrave

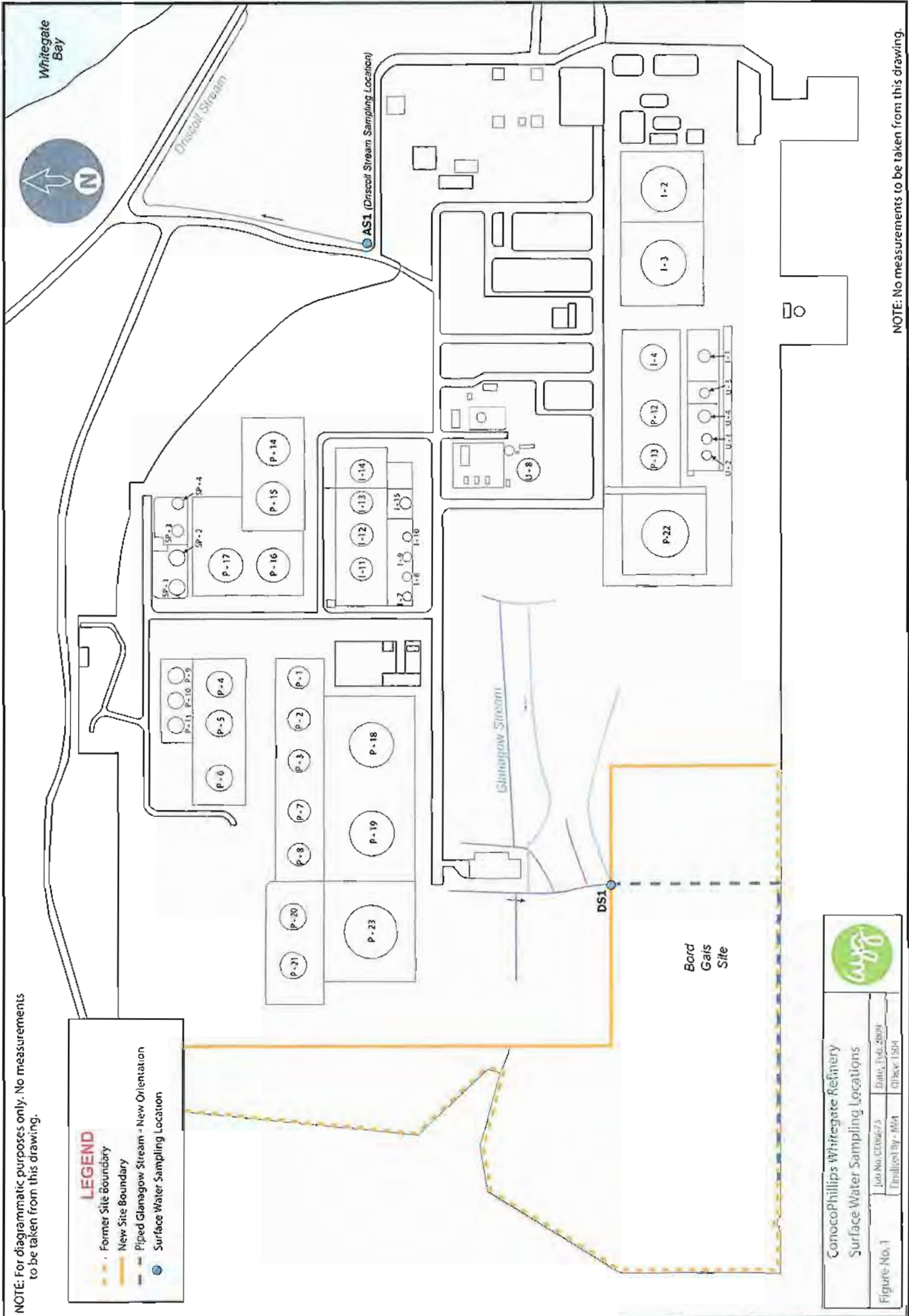
Regional Director

Figures

NOTE: For diagrammatic purposes only. No measurements to be taken from this drawing.

LEGEND

- Former Site Boundary
- New Site Boundary
- Piped Glanagow Stream - New Orientation
- Surface Water Sampling Location




ConocoPhillips Whitegate Refinery
 Surface Water Sampling Locations

Figure No. 1

Job No. CCB0673
 Emplaced by: M/A

Date: Feb. 2009
 (1) Base: 1504



NOTE: No measurements to be taken from this drawing.

Appendix A

ConocoPhillips - Whitegate Groundwater Monitoring Programme

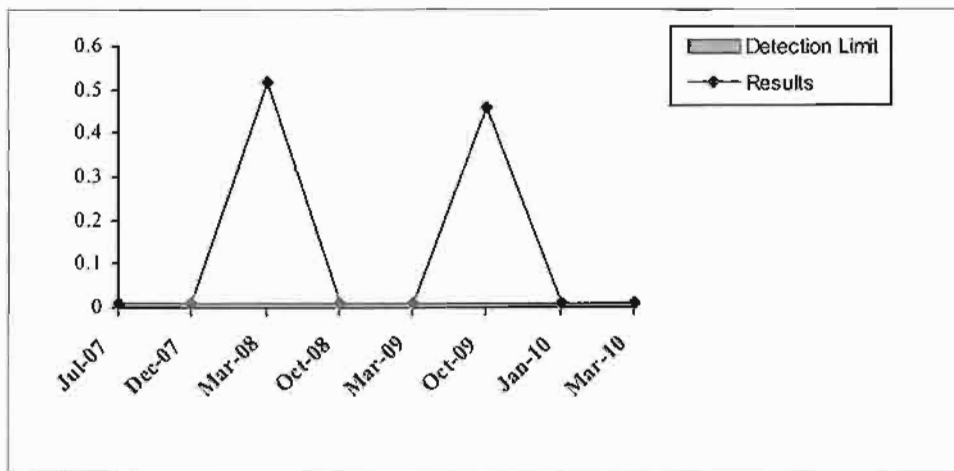


16-Jun-10

Borehole: SW02/DS1
 Borehole Series: Surface water
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 26/07/2007 | < 0.01 | mg/l | 0.01 |
| 04/12/2007 | < 0.01 | mg/l | 0.01 |
| 05/03/2008 | 0.517 | mg/l | 0.01 |
| 30/10/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.01 | mg/l | 0.01 |
| 29/10/2009 | 0.458 | mg/l | 0.01 |
| 27/01/2010 | < 0.01 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



16-Jun-10

Borehole: SW02/DS1
 Borehole Series: Surface water
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|-------|
| 26/02/2007 | 0.111 | mg/l | 0.001 |
| 26/03/2007 | 0.155 | mg/l | 0.001 |
| 26/03/2007 | 0.155 | mg/l | 0.001 |
| 26/04/2007 | < 0.001 | mg/l | 0.001 |
| 30/05/2007 | 0.006 | mg/l | 0.001 |
| 28/06/2007 | 0.107 | mg/l | 0.001 |
| 28/07/2007 | 0.062 | mg/l | 0.001 |
| 04/12/2007 | 0.082 | mg/l | 0.001 |
| 10/01/2008 | 0.042 | mg/l | 0.001 |
| 14/02/2008 | 0.196 | mg/l | 0.001 |
| 05/03/2008 | 0.042 | mg/l | 0.001 |
| 09/04/2008 | 0.156 | mg/l | 0.001 |
| 07/05/2008 | 0.107 | mg/l | 0.001 |
| 10/09/2008 | 0.069 | mg/l | 0.001 |
| 30/10/2008 | 0.027 | mg/l | 0.001 |
| 05/12/2008 | 0.079 | mg/l | 0.003 |
| 07/01/2009 | 0.051 | mg/l | 0.003 |
| 12/02/2009 | 0.213 | mg/l | 0.003 |
| 25/03/2009 | 0.031 | mg/l | 0.003 |
| 28/05/2009 | 0.043 | mg/l | 0.003 |
| 01/07/2009 | 0.023 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

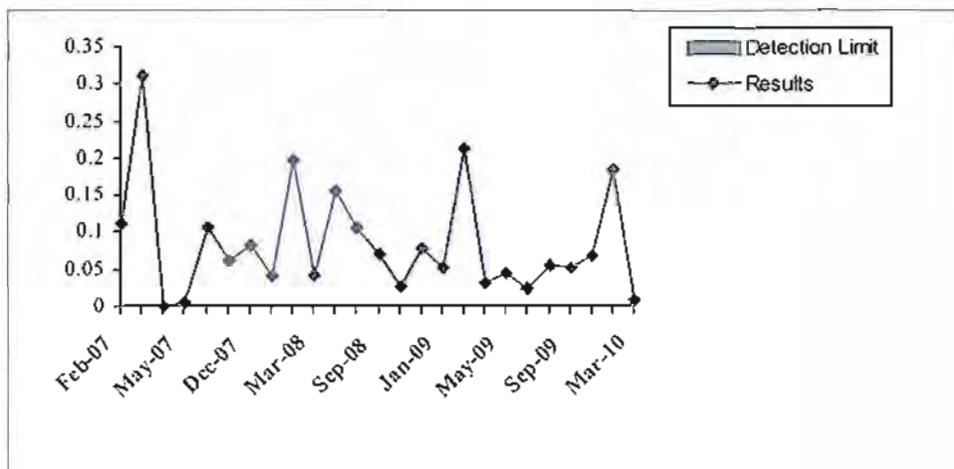


16-Jun-10

Borehole: SW02/DS1
 Borehole Series: Surface water
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 29/07/2008 | 0.054 | mg/l | 0.003 |
| 30/09/2009 | 0.052 | mg/l | 0.003 |
| 29/10/2009 | 0.067 | mg/l | 0.003 |
| 27/01/2010 | 0.183 | mg/l | 0.003 |
| 23/03/2010 | 0.008 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection



Jones Environmental Laboratory

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781



No.4225

WYG
Unit 2 University Technology Centre
Curraheen Road
Cork

Attention : Mark Masterson
Date : 8th April 2010
Your reference : CEO 6673
Our reference : Test Report 10/1358
Location : COP Whitegate IPPC
Date samples received : 29th March 2010
Status : Final Report
Issue : 1

One sample was received for analysis on 29th March 2010 which was completed on 8th April 2010. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced.
All interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

J W Farrell- Jones CChem FRSC
Chartered Chemist



NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

SOILS

Please note we are only MCERTS accredited for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. Your final report will reflect this, with non-MCERTS results on separate pages.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. If we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Asbestos screens where requested will be undertaken by a UKAS accredited laboratory.

WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory. It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to tap water, surface water and groundwater only, any other liquids are outside our scope of accreditation

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples. All samples are treated as groundwaters and analysis performed on settled samples unless we are instructed otherwise.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.

The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:

- \$ sample temperature on receipt considered inappropriate for analysis requested
- ^ samples exceeding recommended holding times
- & samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials)
- ~ no sampling date given, unable to confirm if samples are with acceptable holding times

ABBREVIATIONS and ACRONYMS USED

- UKAS accredited

M - MCERTS accredited

NAD - No Asbestos Detected

ND - None Detected (usually refers to VOC and/SVOC TICs)

SS - Calibrated against a single substance

* - analysis subcontracted to a Jones Environmental approved laboratory.

W - Results expressed on as received basis

+ Failed AQC results should be considered as indicative only and are not accredited.

++ Result outside calibration range, may be possible to re-run with higher detection limits



WYG Ref: CE06673/SW/Oct2010

Mr. John O'Keeffe,
Environmental Lead,
ConocoPhillips Whitegate Refinery Ltd.
Whitegate,
Co. Cork.

16th December 2010

Re: IPPC Bi-Annual Surface Water Monitoring – October 2010

Dear John,

ConocoPhillips Whitegate Refinery (COP) retained WYG Environmental and Planning (Ireland) Ltd. (WYG) to undertake bi-annual surface water quality surveying of their oil refining facility located at Whitegate, Co. Cork. This round of surface water monitoring was completed in October 2010 and is the second of two surface water quality surveys scheduled in 2010. The surface water monitoring was in compliance with Condition 9.2 and Schedule 4(ii) of the company's Integrated Pollution Prevention Control (IPPC) licence, Register No P0266-01. This report is submitted as part of the October 2010 WYG groundwater bi-annual report. The report conditions from the WYG groundwater report apply also to this report.

There are two water courses on the COP Whitegate site – the Driscoll Drive stream and the Glanagow Stream as presented in Figure 1. Both are sampled as part of the bi-annual monitoring.

Driscoll Drive stream

The Driscoll Drive stream flows from the north western part of the site to Whitegate Bay. Sampling location AS1 (Driscoll Drive Stream) is located adjacent to the main access road from the refinery to Corkbeg Island. This stream normally has good water quality.

Glanagow Stream

The Glanagow Stream flows from the south eastern part of the site to Whitestrand Beach a couple kilometers away. DS1 is located on the Glanagow stream along the southern boundary of the main refinery. A site boundary alteration at the COP facility occurred in 2008 due to the leasing of the south western portion of the site to Bord Gáis Éireann (BGE). The Glanagow stream surface water sampling location (DS1) is now located at the new boundary between the two sites. Refer to Figure 1 for surface water monitoring locations.



Elevated concentrations of trichloroethene (TCE) have been detected in the groundwater and surface water catchment of the Glanagow Stream in south western portion of the site over the last few years. In order to decrease the concentrations in the Glanagow Stream, remediation infrastructure, in the form of settlement ponds and weirs, have been installed along the water course. Further details of these works are reported in *Soil and Surface Water Improvement Works at ConocoPhillips Whitegate Refinery* (WYG 2008).

Environmental Standards

For comparative purposes surface water results are presented with recognised environmental standards. The current version of the COP database uses groundwater comparative concentrations as the main 'Trigger Value'. Therefore the 'Trigger Value' for surface water results in the database are the EPA Interim Guideline Values (IGVs), proposed in the *Interim Report Towards Setting Guideline Values for the Protection of Groundwater in Ireland* (EPA 2003). Note, although these are surface waters the IGV limits tend to be more conservative or equal to the majority of the parameter limits outlined in Environmental Communities Environmental Objectives (Surface Water) Regulation 2009 (SI 272 of 2009).

Where there are no EQS or IGVs for hydrocarbon parameters, for example mineral oil, results are compared to the Dutch Guidelines for Groundwater (RIVM 2000). Dutch Target (S) Values are considered typical of normal or background concentrations whereas the Intervention (I) Values are those concentrations above which further investigation and/or remediation are recommended. The Dutch values are only used for guideline purposes in this country as they have no statutory basis outside the Netherlands; however, the Dutch values are recognised as guideline standards by Irish regulatory authorities.

Where no IGV, EQS or Dutch Standards are available for such parameters as Diesel Range Organic (DRO) and Petrol Range Organic (PRO) concentrations then the DRO and PRO are compared to typical background concentrations for greenfield sites. In surface water DRO and PRO concentrations are expected to be normally less than 0.1mg/l.

Surface Water Monitoring

Sampling was undertaken on the 10th October 2010 in conjunction with the biannual groundwater monitoring programme and in accordance with the WYG surface water sampling protocol. Surface water sampling was carried out by full submergence of designated sample containers into the surface water body. To prevent sediment disturbance, during submergence, every effort is made to keep the container steady. Samples were stored in cooler boxes to maintain sample temperature below 4°C.

The two surface water samples were dispatched to an UKAS accredited laboratory for analysis. Each sample was analysed for the following parameters;



- Diesel Range Organics (DRO) and Mineral Oil
- Petrol Range Organics (PRO) and MTBE
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX)
- Major Anions and Cations
- Metals
- Volatile Organic Compounds (VOCs)

The suite of chemical analysis for both samples was selected using the information provided from previous monitoring rounds and the requirements of the IPPC Licence.

Field parameters and visual properties of the surface water on site were noted as part of the sampling process and are presented in Table 1.

Table 1 Surface Water Field Results March 2010

| Monitoring Locations | Temp °C | Conductivity $\mu\text{S}/\text{cm}$ | pH Units | Visual Properties |
|-----------------------------|---------|--------------------------------------|----------|---|
| DS1 (Glanagow Stream) | 12.9 | 561 | 6.81 | Clear, red suspended solids, chemical odour |
| AS1 (Driscoll Drive Stream) | 11.2 | 360 | 7.49 | Clear, green algae, no odour |

Surface Water COP Database

COP appointed WYG to generate a computerised "Environmental Management Database", which was developed during 2007 in which all historic surface water analytical results have been inputted. The October 2010 bi-annual surface water laboratory results have been inputted into the data base. The original laboratory analytical results are included at the end of this report.

Analytical Results

In AS1 all parameters were below laboratory detection limits, which is consistent with previous monitoring rounds.

In DS1 TCE was recorded at 7ug/l which is below the EPA groundwater Trigger Level and the EU Drinking water standard of 10ug/l.



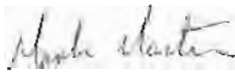
Findings and Conclusions

- Two surface water streams are located on the COP site. The Glanagow Stream flows from the south western area to Whitebay and the Driscoll Drive Stream drains north east to Whitegate Bay. DS1 is located in the Glanagow Stream on the site boundary and AS1 is located on the Driscoll Drive Stream.
- Water conditions are generally of good quality and similar to previous rounds.
- There was no exceedance of analysed parameters in AS1 and DS1.
- In DS1 the TCE concentrations was below the EPA Groundwater Trigger Level in October 2010 as it was in March 2010. There has been a general decrease in TCE concentrations in DS1 in 2010 which may relate to natural breakdown of TCE over time and/or low baseflow level due to the low rainfall in the summer and early autumn 2010. It may also be attributed to the pumping of groundwater from the new process water production wells (800 series) drilled in this area of the site.

Recommendations

- While the TCE concentrations in DS1 and the upstream locations seem to be decreasing, it is recommended that the Glanagow stream is continued to be monitored as part of the TCE monitoring programme to help further establish and confirm the improving trend in surface water quality.

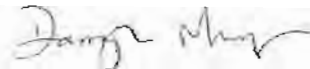
Yours,

pp 

Krzysztof Pniewczuk

Field Technician

For and on behalf of WYG Ireland



Darragh Musgrave

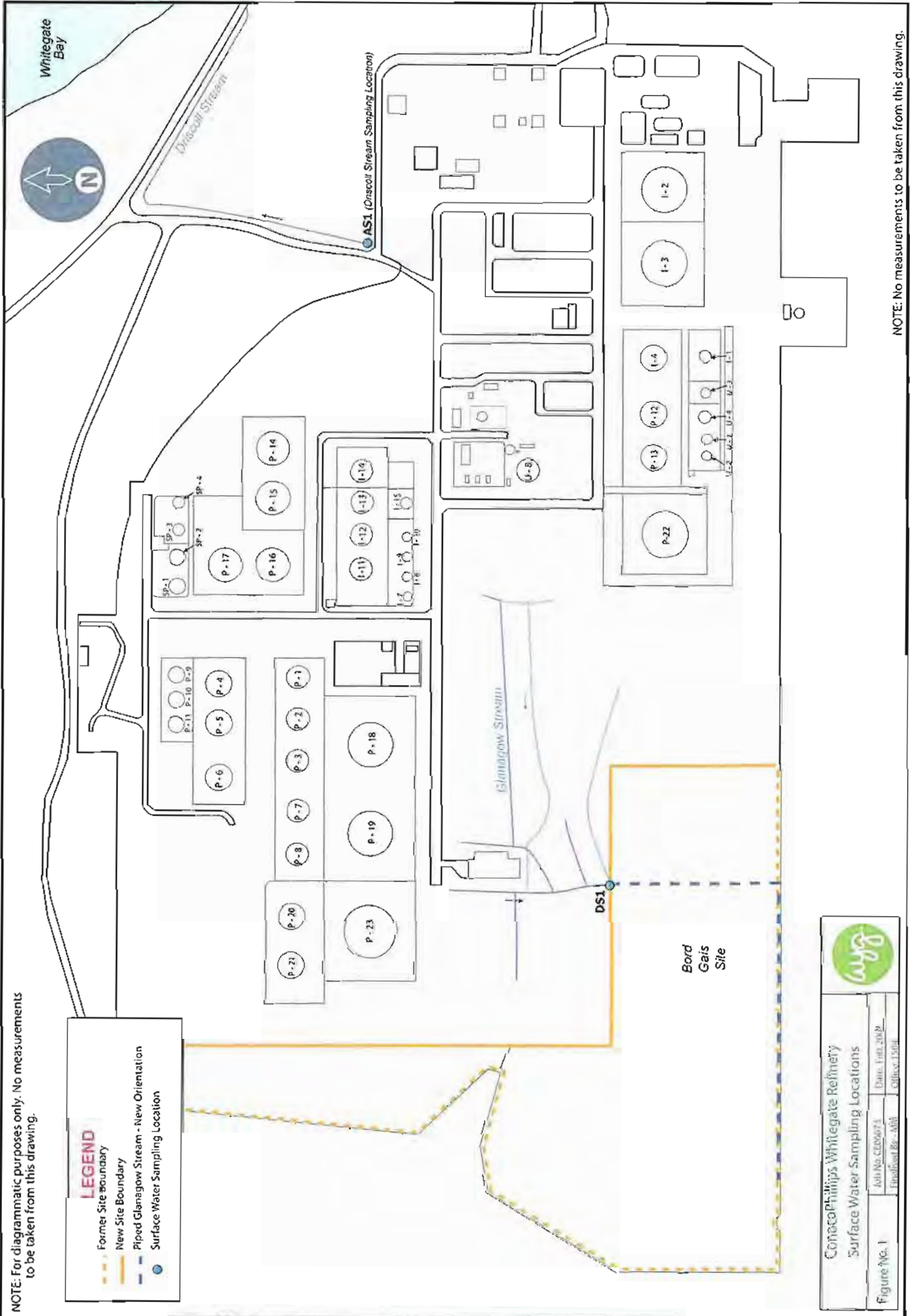
Regional Director


Figures

NOTE: For diagrammatic purposes only. No measurements to be taken from this drawing.

LEGEND

-  Former Site Boundary
-  New Site Boundary
-  Piped Glamagow Stream - New Orientation
-  Surface Water Sampling Location





ConocoPhillips Whitegate Refinery
Surface Water Sampling Locations

| | | |
|--------------|-----------------|-----------------|
| Figure No. 1 | Job No. C000073 | Date: Feb. 2012 |
| | Enfield Be. M01 | Office: 1501 |

Appendix A

Section 5 Groundwater Monitoring

Initial groundwater monitoring studies were carried out at ConocoPhillips in August and in December 2000 as part of a site wide Hydrogeological Survey carried out in accordance with Condition 9.2.3 of the refinery IPC licence. Subsequent to the findings of these initial studies, a programme of groundwater monitoring was initiated in 2001 in accordance with Condition 9.2.6 and Schedule 4 (ii) of the Licence and has continued on a biannual basis. The results of the groundwater monitoring for March and October 2010 are presented in the following pages.



ConocoPhillips Whitegate Refinery

Biannual Groundwater Monitoring

March 2010

ENVIRONMENTAL REPORT

28 June 2010



REPORT CONTROL

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| 1 | 18 May 2010 | Draft | MM |
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1.0 INTRODUCTION

ConocoPhillips Whitegate Refinery Ltd. (COP) retained WYG Environmental and Planning (Ireland) Ltd. (WYG) to undertake bi-annual groundwater monitoring at a number of borehole locations at the oil refinery facility in Whitegate, Co. Cork.

Groundwater monitoring at the site was conducted on 23rd March 2010 by WYG. It was the first of two groundwater quality surveys scheduled for 2010. The second round is scheduled for October 2010. This monitoring forms part of the COP's compliance with Condition 9.2 and Schedule 4 (ii) of their Integrated Pollution Prevention and Control (IPPC) Licence, Register No. P0266-01. The report conditions are presented in Appendix A.

The COP site consists of the refining site area on the mainland and crude oil storage tanks on Corkbeg Island. The approximate outline of the site boundary is presented in Figure 1 and monitoring borehole locations in Figures 2 & 3.

Three new trial production wells (800 series) were drilled in the south western part of the site in January 2010. The drilling was conducted as part of a hydrogeological investigation to determine the feasibility of obtaining a groundwater supply to augment the existing mains water supply to the site. Further information on these wells is presented in *Hydrogeological Groundwater Development Investigation for ConocoPhillips, Whitegate Refinery* (WYG 2010). The position of the wells is presented in Figure 2.

2.0 METHODOLOGY

2.1 SAMPLING SCHEDULE

Historically the particular borehole sampled and the total number of boreholes sampled varied from monitoring round to monitoring round. In the March 2009 COP requested that WYG establish the status of all boreholes on site and review historical analytical results. Based on this information a monitoring schedule for subsequent monitoring rounds was established. It was proposed that all accessible boreholes on site were visited during each visit. A total of 20 boreholes were selected from which water samples would be obtained. These boreholes were selected based on historic groundwater conditions and to obtain a good spatial coverage of groundwater conditions. Groundwater level was obtained from a further seven



boreholes, floating product levels from six boreholes and temperature from one borehole. The proposed monitoring schedule is presented in Table 1. It was adhered to in the March 2010 sampling round.

Table 1: Monitoring Schedule

| Sampling status (number of boreholes) | Borehole number |
|---------------------------------------|--|
| Water sample (20) | BH102, BH104, BH106, BH201, BH202, BH203, BH302, BH303, BH305, BH307, BH308, BH309, BH502, BH505, BH602, BH609, BH701, BH702, BH703, BH801 |
| Water level and temperature only (1) | BH508 |
| Water level only (14) | BH103, BH105, BH301, BH504, BH507, BH601, BH605, BH801, BH802, BH803, BH1, BH3, BH4, BH6 |
| Floating product (7) | BH101, BH204, BH205, BH606, BH704, BH705, BH5 |

*BH101R was recommended for monitoring on the original schedule. Due to hydrocarbon droplets on the surface of BH101R during the site monitoring it was not sampled. BH801, which is located in close proximity to BH101R, was sampled to provide a representative sample of groundwater conditions in the area.

2.2 GROUNDWATER SAMPLING METHODOLOGY

Groundwater monitoring was undertaken in accordance with the WYG groundwater sampling protocol. This protocol involves the purging of at least three borehole volumes of groundwater from the monitoring borehole prior to collection of a sample. The sample is then decanted into laboratory issued containers. Appropriate measures were taken to prevent cross contamination between sampling locations (e.g. use of dedicated bailers/tubing and change of sampler's gloves between sampling locations).

2.3 LABORATORY ANALYSIS

The groundwater samples were stored in cooler boxes prior to dispatch to an independent UKAS accredited laboratory for analysis. Each sample was analysed for a selection of the following parameters;

- Diesel Range Organics (DRO) and Mineral Oil
- Petrol Range Organics (PRO) and methyl-tertiary-butyl-ether (MTBE)
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX compounds)
- Volatile Organic Compounds (VOC)
- Major cations & anions
- Metals



The suite of analysis for each sample was selected based on the requirements of the IPPC license and a review of analytical results from previous monitoring rounds.

3.0 RESULTS

3.1 ENVIRONMENTAL MANAGEMENT DATABASE

COP appointed WYG to generate a computerised "Environmental Management Database" which was developed during 2007. The analytical results of the bi-annual IPPC groundwater monitoring programmes dating back to 2001 and other monitoring events completed in the interim, such as the Landfill Decommissioning Plan (LDP) monitoring, have been entered into the database. The March 2010 bi-annual analytical results, which are presented in Appendix B, has also been inputted and the trend graphs and historical results presented in Appendix C are taken from this database.

3.2 ENVIRONMENTAL STANDARDS

For comparative purposes the groundwater results are presented with recognised environmental standards.

The Environmental Protection Agency's (EPA) Interim Guideline Values (IGVs) proposed in the *Interim Report Towards Setting Guideline Values for the Protection of Groundwater in Ireland* (2003) are the primary standards included for comparison in the COP database.

The recently issued European Communities Environmental Objectives (Groundwater) Regulations, 2010 are intended for drinking water and as such are only used in this report for comparative purposes when an IGV for a particular parameter are not available.

In the absence of IGV parameters, the EPA Environmental Quality Standards (EQS) published in the *Environmental Quality Objectives and Environmental Quality Standards, The Aquatic Environment* (1997) have been used as an indication of water quality but primarily derived for surface waters.

Where there are no IGV values for hydrocarbon parameters, for example mineral oil, results are compared to the Dutch Guidelines for Groundwater (RIVM 2000). Dutch Target (S) Values are considered typical of normal or background concentrations where as the Intervention (I) Values are those concentrations above which further investigation and/or remediation are recommended. The Dutch values are only used for guideline purposes in this country as they have no statutory basis outside the Netherlands; however, the Dutch values are recognised as guideline standards by the environmental industry and by Irish regulatory authorities.



Where no IGV, EQS or Dutch Standards are available for such parameters as Diesel Range Organic (DRO) and Petrol Range Organic (PRO) concentrations then the DRO and PRO are compared to typical background concentrations for greenfield sites. In groundwater, DRO and PRO concentrations are expected to be normally less than 0.1mg/l.

In summary, the 'Trigger Value' used in the COP database represents the IGV where available, then the Groundwater regulations, the relevant EQS, Dutch value or expected natural conditions. In the results tables presented in Appendix C, results are in bold where they exceed the assigned 'Trigger Value' and in red where they exceed the IGV or EQS standard.

3.3 FIELD PARAMETERS RESULTS

Field results such as physical observations and field measurements are presented in Table 2. Boreholes which showed conditions outside the IGV standard for pH, conductivity and temperature are outlined below.

3.2.1 pH

The EPA IGV pH limit is greater than 6.5 and less than 9.5. All the pH levels in boreholes sampled were within the comparative value.

3.2.2 Conductivity

The EPA IGV conductivity maximum limit is 1,000 μ S/cm. Conductivity levels in all were below the limit value with the exception of BH201 (1,507 μ S/cm) on Corkbeg Island, which is similar to previous rounds. The elevated conductivity may relate to saline influence in groundwater from adjacent harbour.

3.2.3 Field Temperatures

The field temperature values recorded at the site generally fell within or slightly above the range of typical Irish groundwater (10°C-12°C). Four of the 20 borehole temperatures ranged from 13°C to 14°C. BH508 had elevated temperature of 14.6°C which is similar to previous rounds.

3.4 ANALYTICAL RESULTS

As agreed with COP, following the implementation of the new Environmental Management Database, the methodology for presenting and discussing the analytical results has changed from report writing to displaying results in data tables, graphs and figures. The emphasis is placed on showing the trends of any monitoring boreholes exhibiting elevated concentrations of parameters in the current and historical



analytical results. This should enable a clearer, more graphical assessment of the results, especially in boreholes with elevated concentrations of parameters.

Table 3 presents a summary of the boreholes and parameters in which elevated concentrations are identified. The range of previous concentrations and apparent trends are also presented. The historical data and trend graphs are presented in Appendix C for each borehole / parameter exceeded. The original data set of the laboratory analytical results for this round of monitoring is presented in full in Appendix B.

4.0 FINDINGS AND CONCLUSIONS

- The monitoring schedule consisted of obtaining water samples from 20 boreholes. Water levels were obtained from an additional fifteen boreholes and floating product levels were obtained from six other boreholes.
- The general status of the groundwater in areas of the site is good, with nine of the 20 boreholes sampled having no parameters with levels above the proposed 'Trigger Values'. Groundwater quality across the site is generally similar to previous sampling rounds. There are a number of boreholes with exceedences of certain parameters and a few locations with free product in the boreholes which is consistent with recent trends and historical events at the site.
- The field measured pH values were within the recommended standard in all boreholes.
- The EPA IGV conductivity maximum limit is 1,000µS/cm. Conductivity levels in all were below the limit value with the exception of BH201 (1507 µS/cm), which is similar to previous rounds. This may be caused by saline intrusion due to close proximity of the wells to Cork Harbour.
- The field temperature values recorded at the site were within the typical Irish groundwater (10°C-12°C) in 15 of the boreholes monitored. Four of the 20 borehole temperatures ranged from 13°C to 14°C.
- The temperature at BH508 was 14.6°C which is consistent with pervious rounds, and is interpreted to be a result of steam water discharge to ground from pipeline heating system in this area.
- Floating product was encountered in six boreholes (BH101, BH204, BH205, BH606, BH704 and BH705). This is consistent with previous rounds and is the result of historical events.
- Six boreholes had improvements in hydrocarbon concentrations compared to the October 2009 round, namely BH104, BH307, BH505, BH701, BH702 and 8H703.
- BH505 had elevated hydrocarbon parameters in October 2009 but during this sampling round all parameters were below their respective target levels.
- Six boreholes experienced a disimprovement in hydrocarbon concentrations since the October 2009 round, namely BH102, BH106, BH201, BH309, BH502 and BH609.



- BH201 had an exceedance of DRO, the first since 2004. BH106 had a slight increase in DRO which is consistent with previous rounds. BH309 had a slight increase in PRO concentrations but a decrease in DRO concentrations. BH502 had increased levels of PRO, benzene, toluene and MTBE although DRO and mineral oil decreased.
- BH102 and BH609 are located relatively close to each other in the south western section of the site. BH609 did not historically have elevated concentrations of any hydrocarbon parameter. In October 2009 BH102 had elevated hydrocarbon parameters.
- TCE was detected at concentrations exceeding the EPA IGV in four monitoring boreholes (BH104, BH701, BH702 and BH703) in the south western area of the site. These concentrations are consistent with the results from previous monitoring rounds. There has been a significant decrease in the concentrations in all four boreholes, with concentrations in BH104, BH701 and BH702 at the lowest concentration to date. The decrease in TCE concentrations may relate to low baseflow level due to the low rainfall in the early part of 2010. It may also be attributed to the pumping of the new trial production wells (800 series) drilled in the area.
- BH602 had elevated concentrations of copper and zinc. Copper had not been detected at elevated concentrations in this borehole previously. Zinc had been detected previously at elevated concentrations.

5.0 RECOMMENDATIONS

- The monitoring schedule used in this sampling round should be continued in future sampling rounds. This consists of obtaining water samples from 20 boreholes, checking water levels in a further seven boreholes, floating product levels in six boreholes and the temperature level in one borehole.
- A number of wells require upgrading to facilitate monitoring. In BH605 the outer casing is damaged making sampling/obtaining the water level very difficult. The outer casing in BH601 and BH608 is damaged and sampling is not possible.
- Boreholes located in areas of site activity/traffic should be protected by a concrete plinth and bollards around the borehole casing or if not in use be properly decommissioned. Boreholes located at ground level should be more clearly marked so they can be more easily located.
- It is recommended that dedicated 'Waterra' tubing be installed in all monitoring boreholes. This will facilitate the efficient and standard collection of samples from the boreholes.
- Sampling and analysis of the historic oil identified in the groundwater on Corkbeg Island (BH204, BH205, BH704 and BH705) should be undertaken so that remediation options can be considered and a risk assessment of its potential to mobilise to receptors can be assessed.

ConocoPhillips – Groundwater Monitoring March 2010



- The pumping of the new trial wells (800 series) in the south west section of the site may act as a pump and treat (P&T) system and thus improve groundwater and surface water TCE concentrations in the area. Regular sampling of the trial wells, boreholes and surface water in this area should be carried out to monitor the effects of the groundwater pumping.
- BH102 and BH609 should be re-sampled for hydrocarbon parameters to establish if there are any trends in the occurrence of hydrocarbon parameters in the boreholes. If elevated concentrations persist, an investigation into the source of the potential hydrocarbons is recommended.

Figures



0 200 400 600
Approx. Scale Metres

NOTE: For diagrammatic purposes only. No measurements to be taken from this drawing.

LEGEND
 — BGE Power Plant Boundary (Approximate)
 - - - - Piped Glanagow Stream - New Orientation



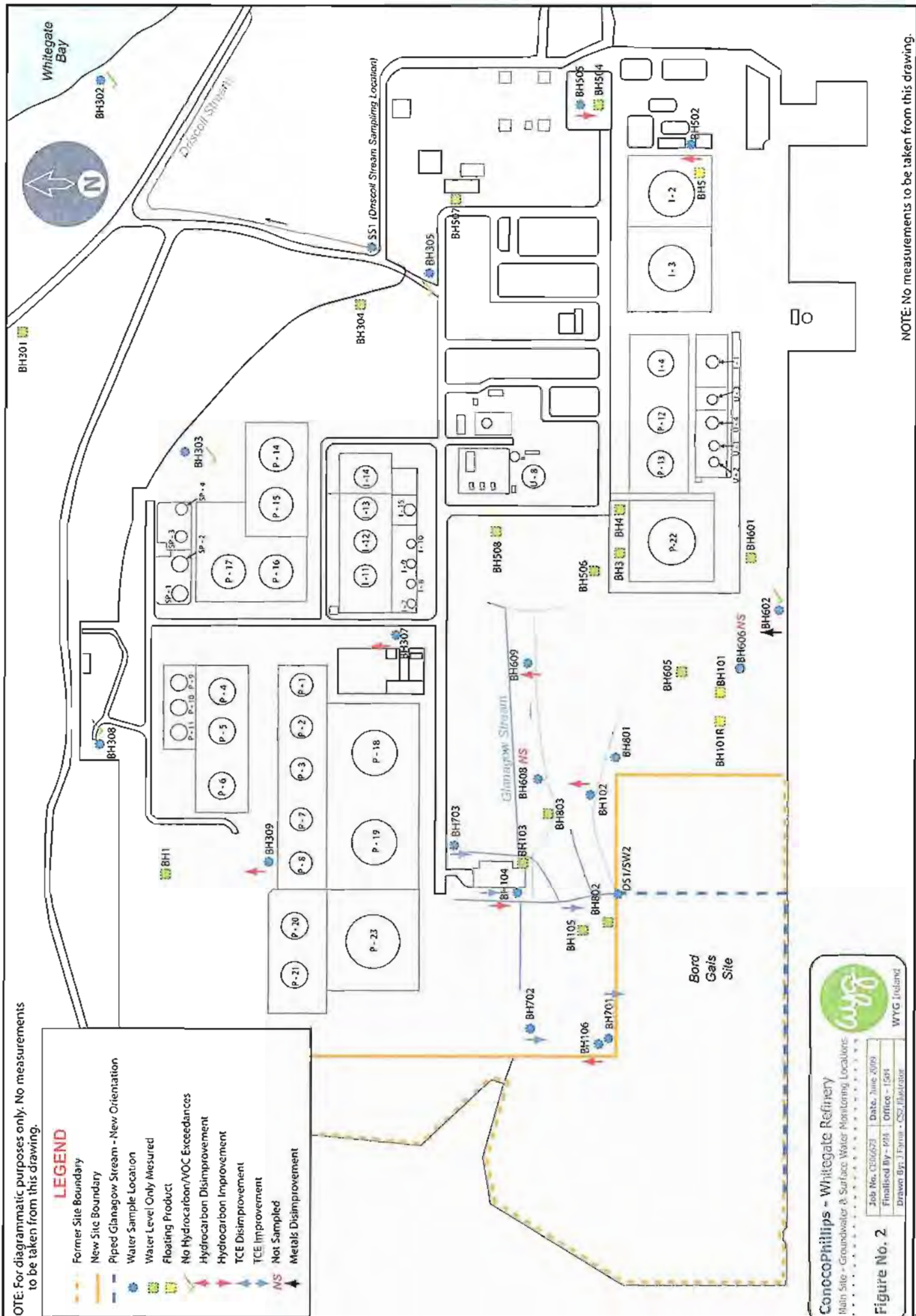
ConocoPhillips Whitegate Refinery
 General Site Layout

| | | |
|--------------|-------------------|-----------------|
| Figure No. 1 | Job No. CE05573 | Date: Oct. 2018 |
| | Finalised By: DJM | Office: 1204 |

NOTE: For diagrammatic purposes only. No measurements to be taken from this drawing.

LEGEND

- Former Site Boundary
- New Site Boundary
- Piped Glanagow Stream - New Orientation
- Water Sample Location
- Water Level Only Measured
- Floating Product
- No Hydrocarbon/VOC Exceedances
- Hydrocarbon Disimprovement
- Hydrocarbon Improvement
- TCE Disimprovement
- TCE Improvement
- Not Sampled
- Metals Disimprovement
- Metals Improvement



NOTE: No measurements to be taken from this drawing.

ConocoPhillips - Whitegate Refinery
 Main Site - Groundwater & Surface Water Monitoring Locations

Figure No. 2

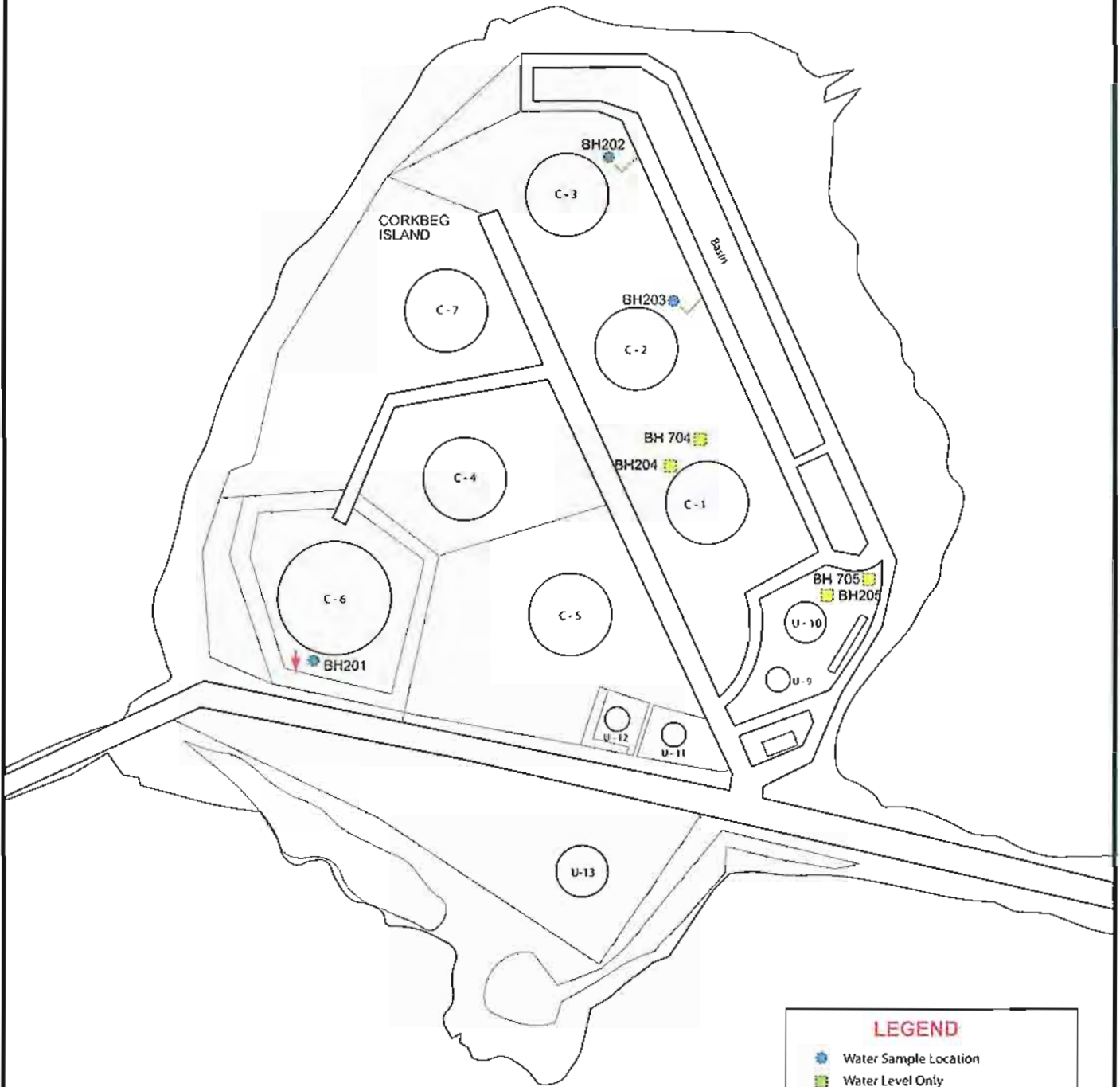
Job No. CS06023 | Date: June 2009
 Finalised By: 1718 | Office: 1504
 Drawn By: J.Finnon - CS2/Illustrator

WYG Ireland

NOTE: No measurements to be taken from this drawing.



Whitegate Bay



Cork Harbour

LEGEND

- Water Sample Location
- Water Level Only
- Floating Product Level Only
- No Hydrocarbon / VOC Exceedances
- Exceedance of Hydrocarbon

ConocoPhillips - Whitegate Refinery
Corkbeg Island Borehole Sampling Map

Figure No. 3

| | |
|---------------------|------------------|
| Job No. CE06673 | Date: June 2009 |
| Finalised By: 1111 | Office: 1504 |
| Drawn By: J. Finner | CS2, Illustrator |

WYG Ireland

Tables

Table 2: CoP Bi-annual Groundwater Monitoring - March 2010 - Field Measurements

| Well Number | Sampling status | Water level (mBTOC) | Temp C | pH | EC ug/m3 | Colour | Odour |
|-------------|--------------------------------|--------------------------|--------|------|----------|--|-------------------------|
| BH101 | Floating Product/ Not sampled | 12.58 | | | | | |
| BH101R | Sampled | 6.02 | 11.6 | 6.85 | 566 | Clear, black suspended solids | Hydrocarbon odour |
| BH102 | Sampled | 3.07 | | | | | |
| BH103 | Water level only | | | | | | |
| BH104 | Sampled | 2.97 | 9 | 6.86 | 436 | Clear, black suspended solids/ Slight sheen | |
| BH105 | Water level only | 2.81 | | | | | |
| BH106 | Sampled | 6.62 | 12.35 | 7.35 | 851 | Clear, suspended solids | Strong Chemical odour |
| BH201 | Sampled | 16.6 | 11.2 | 7.05 | 1507 | Slight silty | Slight Chemical odour |
| BH202 | Sampled | 7.1 | 11.3 | 6.72 | 990 | Slight silty | Slight Chemical odour |
| BH203 | Sampled | 6.16 | 11.6 | 6.7 | 175 | Slight silty | Slight Chemical odour |
| BH204 | Floating Product / Not sampled | 25cm | | | | | |
| BH205 | Floating Product / Not sampled | 60cm | | | | | |
| BH301 | Water level only | 7.88 | | | | | |
| BH302 | Sampled | 2.37 | 9.7 | 7.86 | 580 | Brown, slightly silty | |
| BH303 | Sampled | 9.09 | 10.9 | 7.39 | 240 | Brown, silty | |
| BH305 | Sampled | 4.04 | 11.2 | 6.8 | 580 | Brown, silty | Slight Chemical odour |
| BH307 | Sampled | 1.61 | 13.9 | 6.87 | 660 | Black, silty | Moderate chemical odour |
| BH308 | Sampled | 2.68 | 10.6 | 7.01 | 136 | Brown, silty | |
| BH309 | Sampled | 1.89 | 9.4 | 7.03 | 420 | Black, slightly silty | Slight Chemical odour |
| BH502 | Sampled | 11.08 | 12.8 | 7.23 | 450 | Black, silty, slight sheen | H2S odour |
| BH504 | Water level only | 3.54 | | | | | |
| BH505 | Sampled | 3.78 | 13.5 | 7.22 | 220 | Black, slightly silty | Slight Chemical odour |
| BH507 | Water level only | 3.98 | | | | | |
| BH508 | Temperature only | 2.23 | 14.6 | | | | |
| BH602 | Sampled | 11.63 | | | | | |
| BH605 | Water level only | 13.18 | | | | | |
| BH606 | Floating Product/ Not sampled | | | | | | |
| BH609 | Sampled | 5.41 | 10.9 | 6.92 | 784 | Grey, cloudy | Stale water odour |
| BH701 | Sampled | 4.93 | 11.1 | 6.86 | 511 | Brown, suspended solids | |
| BH702 | Sampled | 2.3 | 11.7 | 6.85 | 497 | Clear | |
| BH703 | Sampled | 1.4 | 11.6 | | 345 | Orange suspended solids | |
| BH704 | Floating Product / Not sampled | 25cm | | | | | |
| BH705 | Floating Product / Not sampled | Dry, no floating product | | | | | |
| BH801 | Water level only | 14.8 | | | | | |
| BH802 | Water level only | 2.94 | | | | | |
| BH803 | Water level only | 4.7 | | | | | |
| BH1 | Water level only | 4.8 | | | | | |
| BH3 | Water level only | 20.2 | | | | | |
| BH4 | Water level only | 5.1 | | | | | |
| BH5 | Water level only | Floating product | | | | | |
| BH6 | Water level only | 5.25 | | | | Floating product | |

Table 3: CoP Bi Annual Groundwater Monitoring - March 2010 - Summary of Elevated Parameters (Part 1 of 3)

| Borehole No. | Parameter | Concentration (mg/l) | Historical Range (mg/l) | Trigger Value (mg/l) | Trend |
|---------------|-----------------------|----------------------|-------------------------|----------------------|--|
| BH-102 | Petrol Range Organics | 6.553 | <0.01 to 6.553 | 0.1 | Disimprovement on previous round |
| | Diesel Range Organics | 0.115 | <0.01 to 1.381 | 0.1 | Disimprovement on previous round |
| | MTBE | 0.763 | <0.01 to 2.192 | 0.03 | Disimprovement on previous round |
| BH-104 | Petrol Range Organics | <0.01 | <0.01 to 0.368 | 0.1 | Improvement on elevated levels in previous three rounds |
| | cDCE | 0.032 | <0.003 to 0.04 | 0.03 | First exceedance since March 2007 |
| | TCE | 0.038 | 0.038 to 0.736 | 0.01 | Improvement, lowest concentration recorded to date |
| BH106 | Diesel Range Organics | 0.166 | <0.01 to 1.516 | 0.1 | Slight increase on previous round. Exceedance consistent with previous monitoring rounds |
| | Diesel Range Organics | 0.185 | <0.01 to 2.643 | 0.1 | First exceedance since 2004 |
| BH-307 | Petrol Range Organics | 1.368 | <0.01 to 70.155 | 0.1 | Improvement on previous round. Exceedance consistent with previous monitoring rounds |
| | Diesel Range Organics | 1.294 | 0.204 to 1.846 | 0.1 | Improvement on previous round. Exceedance consistent with previous monitoring rounds |
| BH-309 | Diesel Range Organics | <0.01 | <0.01 to 1.618 | 0.1 | Improvement on previous round. |
| | Petrol Range Organics | 0.643 | <0.01 to 0.666 | 0.1 | Disimprovement on previous round. Fluctuations in PRO levels in previous rounds |

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Job Number: CE06733

Legend
IGV = EPA Interim Guidance Values for Groundwater
EQS = Environmental Quality Standard
Trigger Value = IGV where available or EQS or Dutch value if required
mg/l = milligrams per litre

Table 3: CoP BI Annual Groundwater Monitoring - March 2010 - Summary of Elevated Parameters (Part 2 of 3)

| Borehole No. | Parameter | Concentration (mg/l) | Historical Range (mg/l) | Trigger Value (mg/l) | Trend |
|---------------|-----------------------|----------------------|-------------------------|----------------------|--|
| BH-502 | MTBE | 1.031 | <0.01 to 155 | 0.03 | Increase on previous round. Fluctuations in MTBE concentrations in previous rounds |
| | Benzene | 0.491 | 0.016 to 0.07 | 0.001 | Increase on previous round. Fluctuations in MTBE concentrations in previous rounds |
| | Toluene | 0.033 | <0.001 to 0.033 | 0.01 | First exceedance of toluene |
| | Petrol Range Organics | 4.328 | <0.01 to 4.328 | 0.1 | Increase on previous round. Fluctuations in MTBE concentrations in previous rounds |
| BH-505 | Diesel Range Organics | <0.01 | <0.01 to 0.185 | 0.1 | No exceedance. Improvement on previous round |
| | Mineral Oil | <0.01 | <0.01 to 0.081 | 0.01 | No exceedance. Improvement on previous round |
| | Petrol Range Organics | <0.01 | <0.01 to 18.494 | 0.1 | No exceedance. Improvement on previous round |
| | Diesel Range Organics | <0.01 | <0.01 to 4.96 | 0.1 | No exceedance. Improvement on previous round |
| | Mineral Oil | <0.01 | <0.01 to 2.976 | 0.05 | No exceedance. Improvement on previous round |
| | Copper | 0.046 | <0.001 to 0.046 | 0.03 | First exceedance of copper |
| BH602 | Zinc | 0.159 | <0.03 to 0.159 | 0.01 | Increase on previous round. Fluctuations of zinc concentrations in previous rounds |
| | Benzene | 0.074 | <0.001 to 0.074 | 0.001 | First exceedance of benzene |
| | Petrol Range Organics | 6.374 | <0.01 to 6.374 | 0.1 | First exceedance of PRO |
| | MTBE | 0.863 | <0.003 to 0.863 | 0.03 | First exceedance of MTBE |

WYG Environmental and Planning (Ireland) Ltd
Job Number: CE06733

Legend
IGV = EPA Interim Guidance Values for Groundwater
EQS = Environmental Quality Standard
Trigger Value = IGV where available or EQS or Dutch value if required
mg/l = milligrams per litre

Table 3: CoP BI Annual Groundwater Monitoring - March 2010 - Summary of Elevated Parameters (Part 3 of 3)

| Borehole No. | Parameter | Concentration (mg/l) | Historical Range (mg/l) | Trigger Value (mg/l) | Trend |
|--------------|-----------------------|----------------------|-------------------------|----------------------|--|
| BH-701 | TCE | 0.016 | 0.016 to 0.156 | 0.01 | Improvement, lowest concentration recorded to date |
| | p/m xylene | 0.013 | <0.01 to 0.013 | 0.01 | First time exceedance occurred |
| BH-702 | TCE | 0.02 | 0.02 to 0.706 | 0.01 | Improvement, lowest concentration recorded to date |
| BH-703 | TCE | 0.074 | <0.001 to 0.115 | 0.01 | Improvement, lowest concentration since July 2009 |
| | Petrol Range Organics | <0.01 | <0.01 to 0.39 | 0.1 | No exceedance. Improvement on previous round |
| | | | | | |
| | | | | | |
| | | | | | |

WYG Environmental and Planning (Ireland) Ltd
700 Number: CE06733

Legend
 IGV = EPA Interim Guidance Values for Groundwater
 EQS = Environmental Quality Standard
 Trigger Value = IGV where available or EQS or Dutch value if required
 mg/l = milligrams per litre

Appendix A

WYG Environmental and Planning (Ireland) Ltd

REPORT CONDITIONS

ENVIRONMENTAL INVESTIGATION

This report is produced solely for the benefit of ConocoPhillips Whitegate Refinery Ltd. (COP) and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, the physical investigation as detailed, information supplied by those parties referenced in the text, and preliminary discussions with local and statutory authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. The test results that are available can only be regarded as a limited but likely representative sample assessed against current guidelines.

WYG take no responsibility for conditions that have not been revealed by the borings, or which occur below or between the borings. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site or the possibility of encountering ground conditions at variance with our exploratory hole logs elsewhere on the site cannot be discounted. Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative and liability cannot be accepted for its accuracy.

With reference to ground contamination, whilst the findings detailed within this report reflect our best assessment, because there are no exact Irish definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by authorities or funds without question as such bodies have unpublished, more stringent objectives. This report is prepared and written for the uses stated in the report and should not be used in a different context without reference to WYG. In time, improved practices or amended legislation may necessitate a re-assessment.

The report is limited to the environmental aspects specifically reported on, and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief, the nature of geology and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further research will be required before the effects can be better determined.

Appendix B



Jones Environmental Laboratory

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

WYG
Unit 2 University Technology Centre
Curraheen Road
Cork



No.4225

Attention : Mark Masterson
Date : 13th May 2010
Your reference : CEO 6673
Our reference : Test Report 10/1304
Location : Cop Whitegate - IPPC - March 2010
Date samples received : 25th March 2010
Status : Final Report
Issue : 2

Twenty five samples were received for analysis on 25th March 2010 which was completed on 13th May 2010. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. All interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

J W Farrell- Jones CChem FRSC
Chartered Chemist

Jones Environmental Laboratory

Client Name: WYG
 Reference: CEO 6673
 Location: Cop Whitegate - IPPC - March 2010
 Contact: Mark Masterson
 JE Job No.: 10/1304

Report : Liquids

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HN0₃

| J E Sample No. | 1-3 | 4-7 | 8-10 | 11-15 | 16-20 | 21,24,25,27 | 22,23,26,28 | 29-31 | 32-34 | 35-40 | | | |
|--|----------|----------|----------|----------|----------|-------------|-------------|----------|----------|----------|-------|-------|---------------|
| Sample ID | BH102 | BH104 | BH106 | BH201 | BH202 | BH203 | BH302 | BH303 | BH305 | BH307 | | | |
| Depth | - | - | - | - | - | - | - | - | - | - | | | |
| COC No / misc | | | | | | | | | | | | | |
| Containers | V G | V G | V G | V G H | V G H | V G H | V | V G | V G | V G H | | | |
| Sample Date | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | | | |
| Sample Type | Water | Water | Water | Water | Water | Water | Water | Water | Water | Water | | | |
| Batch Number | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Date of Receipt | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | LOD | Units | Method No. |
| Please see attached notes for all abbreviations and acronyms | | | | | | | | | | | | | |
| BTEX GC-FID | | | | | | | | | | | <5 | µg/l | TM031W |
| MTBE | 763 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | 19 | <5 | µg/l | TM031W |
| Benzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| Toluene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| Ethyl benzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| m/p-Xylene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| o-Xylene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| Total Xylenes | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | µg/l | TM031W |
| | | | | | | | | | | | <100 | µg/l | TM36/PM12 |
| GRO (C4-12) | | | | | | | | | | | | | |
| GRO (C4-C8) | 6334 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | 353 | <100 | µg/l | TM36/PM12 |
| GRO (C8-C12) | 219 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | 1015 | <100 | µg/l | TM36/PM12 |
| GRO (C4-12) | 6553 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | 1368 | <100 | µg/l | TM36/PM12 |
| EPH (C8-C40) (dissolved) *SS | 115 | <10 | 166 | 185 | <10 | <10 | <10 | <10 | <10 | 1294 | <10 | µg/l | TM5/PM9 |
| Mineral Oil (interpretation & calculation) | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | µg/l | TM5/PM9 |
| Fluoride | - | - | - | <0.3 | <0.3 | <0.3 | - | - | - | <0.3 | <0.3 | mg/l | TM027W |
| Total Cyanide* | - | - | - | <40 | <40 | <40 | - | - | - | <40 | <40 | µg/l | subcontracted |
| Sulphate ^e | - | - | - | 653.30 | 13.70 | 16.18 | - | - | - | 10.91 | <0.05 | mg/l | TM038W |
| Nitrate as NO ₃ ^e | - | - | - | <0.2 | 2.1 | <0.2 | - | - | - | <0.2 | <0.2 | mg/l | TM038W |
| Nitrite as NO ₂ ^e | - | - | - | 0.08 | 0.08 | <0.02 | - | - | - | 0.06 | <0.02 | mg/l | TM038W |
| Amn N2/Tot Ammonia as N ^e | - | - | - | 0.34 | 0.11 | 0.50 | - | - | - | 0.42 | <0.03 | mg/l | TM038W |
| Ortho phosphate as PO ₄ ^e | - | - | - | <0.06 | <0.06 | <0.06 | - | - | - | <0.06 | <0.06 | mg/l | TM038W |
| Total Alkalinity as CaCO ₃ ^e | - | - | - | 199 | 266 | 299 | - | - | - | 170 | <1 | mg/l | TM032W |
| VOCs^e | - | see lab | see lab | - | - | - | - | - | - | see lab | <1.5 | µg/l | TM15/PM10 |
| Arsenic - dissolved ^a | - | - | - | <2.5 | 2.9 | 3.9 | - | - | - | <2.5 | <2.5 | µg/l | TM 030W |
| Cadmium - dissolved ^e | - | - | - | <0.5 | <0.5 | <0.5 | - | - | - | <0.5 | <0.5 | µg/l | TM 030W |
| Calcium - dissolved | - | - | - | 135.20 | 117.60 | 91.25 | - | - | - | 43.09 | <0.03 | mg/l | TM 030W |
| Chromium - dissolved ^e | - | - | - | <1.5 | <1.5 | <1.5 | - | - | - | <1.5 | <1.5 | µg/l | TM 030W |
| Lead - dissolved ^e | - | - | - | <5 | <5 | <5 | - | - | - | <5 | <5 | µg/l | TM 030W |
| Iron - dissolved ^e | - | - | - | <20 | <20 | <20 | - | - | - | <20 | <20 | µg/l | TM 030W |
| Magnesium - dissolved | - | - | - | 201.80 | 13.46 | 23.10 | - | - | - | 8.07 | <0.02 | mg/l | TM 030W |
| Zinc - dissolved ^a | - | - | - | <3 | <3 | <3 | - | - | - | <3 | <3 | µg/l | TM 030W |
| Copper - dissolved ^a | - | - | - | <7 | <7 | <7 | - | - | - | <7 | <7 | µg/l | TM 030W |
| Manganese - dissolved ^a | - | - | - | <2 | <2 | 300 | - | - | - | 4103 | <2 | µg/l | TM 030W |

Jones Environmental Laboratory

Client Name: WYG
 Reference: CEO 6673
 Location: Cop Whitegate - IPPC - March 2010
 Contact: Mark Masterson
 JE Job No.: 10/1304

Report : Liquids

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

| J E Sample No. | 41-43 | 44-47 | 48-53 | 54-57 | 58-62 | 63-65 | 66-68 | 69-71 | 72-74 | 79 | Please see attached notes for all abbreviations and acronyms | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|-------|---------------|
| Sample ID | BH308 | BH309 | BH502 | BH505 | BH602 | BH809 | BH701 | BH702 | BH703 | BH3 | LOD | Units | Method No. |
| Depth | - | - | - | - | - | - | - | - | - | - | | | |
| COC No / misc | | | | | | | | | | | | | |
| Containers | V G | V G | V G H | V G | V G H | V G | V G | V G | V G | P | | | |
| Sample Date | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | 23/03/10 | | | |
| Sample Type | Water | Water | Water | Water | Water | Water | Water | Water | Water | Water | | | |
| Batch Number | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Date of Receipt | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | 25/03/10 | | | |
| BTEX GC-FID | | | | | | | | | | | | | |
| MTBE | <5 | <5 | 1031 | <5 | <5 | 866 | <5 | <5 | <5 | - | <5 | µg/l | TM031W |
| Benzene | <5 | <5 | 491 | <5 | <5 | 74 | <5 | <5 | <5 | - | <5 | µg/l | TM031W |
| Toluene | <5 | <5 | 33 | <5 | <5 | <5 | <5 | <5 | <5 | - | <5 | µg/l | TM031W |
| Ethyl benzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | - | <5 | µg/l | TM031W |
| m/p-Xylene | <5 | <5 | 51 | <5 | <5 | <5 | <5 | <5 | <5 | - | <5 | µg/l | TM031W |
| o-Xylene | <5 | <5 | 5 | <5 | <5 | <5 | <5 | <5 | <5 | - | <5 | µg/l | TM031W |
| Total Xylenes | <10 | <10 | 56 | <10 | <10 | <10 | <10 | <10 | <10 | - | <10 | µg/l | TM031W |
| GRO (C4-12) | | | | | | | | | | | | | |
| GRO (C4-C8) | <100 | <100 | 3257 | <100 | <100 | 6103 | <100 | <100 | <100 | - | <100 | µg/l | TM36/PM12 |
| GRO (C8-C12) | <100 | 643 | 1071 | <100 | <100 | 271 | <100 | <100 | <100 | - | <100 | µg/l | TM36/PM12 |
| GRO (C4-12) | <100 | 643 | 4328 | <100 | <100 | 6374 | <100 | <100 | <100 | - | <100 | µg/l | TM36/PM12 |
| EPH (C8-C40) (dissolved) *53 | | | | | | | | | | | | | |
| Mineral Oil (interpretation & calculation) | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | - | <10 | µg/l | TM5/PM9 |
| Fluoride | - | - | <0.3 | - | <0.3 | <0.3 | - | - | - | - | <0.3 | mg/l | TM027W |
| Total Cyanide* | - | - | <40 | - | <40 | <40 | - | - | - | - | <40 | µg/l | subcontracted |
| Sulphate* | - | - | 5.83 | - | 492.41 | 12.85 | - | - | - | - | <0.05 | mg/l | TM038W |
| Nitrate as NO ₃ ⁻ | - | - | <0.2 | - | 13.0 | <0.2 | - | - | - | - | <0.2 | mg/l | TM038W |
| Nitrite as NO ₂ ⁻ | - | - | 0.07 | - | 0.10 | 0.07 | - | - | - | - | <0.02 | mg/l | TM038W |
| Ammonia/Tot Ammonia as N ³ | - | - | 0.13 | - | 0.08 | 0.38 | - | - | - | - | <0.03 | mg/l | TM038W |
| Ortho phosphate as PO ₄ ³⁻ | - | - | <0.06 | - | <0.06 | <0.06 | - | - | - | - | <0.06 | mg/l | TM038W |
| Total Alkalinity as CaCO ₃ ³ | - | - | 119 | - | 16 | 307 | - | - | - | - | <1 | mg/l | TM032W |
| VOCs* | | | | | | | | | | | | | |
| Arsenic - dissolved* | - | - | <2.5 | - | <2.5 | - | - | - | - | - | <2.5 | µg/l | TM 030W |
| Cadmium - dissolved* | - | - | <0.5 | - | 1.9 | - | - | - | - | - | <0.5 | µg/l | TM 030W |
| Calcium - dissolved | - | - | 18.50 | - | 139.20 | - | - | - | - | - | <0.03 | mg/l | TM 030W |
| Chromium - dissolved* | - | - | <1.5 | - | 3.4 | - | - | - | - | - | <1.5 | µg/l | TM 030W |
| Lead - dissolved* | - | - | <5 | - | <5 | - | - | - | - | - | <5 | µg/l | TM 030W |
| Iron - dissolved* | - | - | <20 | - | <20 | - | - | - | - | <20 | <20 | µg/l | TM 030W |
| Magnesium - dissolved | - | - | 10.69 | - | 19.86 | - | - | - | - | - | <0.02 | mg/l | TM 030W |
| Zinc - dissolved* | - | - | <3 | - | 159 | - | - | - | - | - | <3 | µg/l | TM 030W |
| Copper - dissolved* | - | - | <7 | - | 46 | - | - | - | - | - | <7 | µg/l | TM 030W |
| Manganese - dissolved* | - | - | 8017 | - | 4471 | - | - | - | - | 788 | <2 | µg/l | TM 030W |
| Iron - total | - | - | - | - | - | - | - | - | - | 121 | <20 | µg/l | TM 030W |
| Ferrous Iron | - | - | - | - | - | - | - | - | - | <0.02 | <0.02 | mg/l | TM048W |
| Ferric Iron | - | - | - | - | - | - | - | - | - | 0.12 | <0.02 | mg/l | TM048W |
| Manganese - total | - | - | - | - | - | - | - | - | - | 877 | <2 | µg/l | TM 030W |
| Manganese II | - | - | - | - | - | - | - | - | - | 0.56 | <0.02 | mg/l | TM062W |

Jones Environmental Laboratory

Client Name: WYG
 Reference: CEO 6673
 Location: Cop Whitegate - IPPC - March 2010
 Contact: Mark Masterson
 JE Job No.: 10/1304

VOC Report : LIQUID

| J E Sample No. Sample ID Depth COC No / misc Containers Sample Date Sample Type Batch Number Date of Receipt | 4-7 | 8-10 | 35-40 | 48-53 | 58-62 | 66-88 | 69-71 | 72-74 | LOD | Units | Method No. |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-----|-------|------------|
| | BH104 | BH106 | BH307 | BH502 | BH602 | BH701 | BH702 | BH703 | | | |
| Dichlorodifluoromethane | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Methyl Tertiary Butyl Ether | <2 | <2 | <2 | 1013 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Chloromethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Vinyl Chloride | <2 | 4 | <2 | <2 | <2 | 4 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Bromomethane | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | µg/l | TM15/PM10 |
| Chloroethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Trichlorofluoromethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1-Dichloroethene # | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | µg/l | TM15/PM10 |
| Carbon Disulphide # | NA | NA | NA | NA | NA | NA | NA | NA | <3 | µg/l | TM15/PM10 |
| Dichloromethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| trans-1-2-Dichloroethene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1-Dichloroethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| cis-1-2-Dichloroethene # | 32 | 14 | <3 | <3 | <3 | 25 | <3 | 9 | <3 | µg/l | TM15/PM10 |
| 2,2-Dichloropropane | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | µg/l | TM15/PM10 |
| Bromochloromethane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Chloroform # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1,1-Trichloroethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1-Dichloropropene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Carbon tetrachloride # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2-Dichloroethane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Benzene # | <3 | <3 | <3 | 436 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Trichloroethene # | 38 | 6 | <3 | <3 | <3 | 16 | 20 | 74 | <3 | µg/l | TM15/PM10 |
| 1,2-Dichloropropane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Dibromomethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Bromodichloromethane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| cis-1-3-Dichloropropene # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Toluene # | <3 | <3 | <3 | 28 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| trans-1-3-Dichloropropene # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,1,2-Trichloroethane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Tetrachloroethene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,3-Dichloropropane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Dibromochloromethane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2-Dibromoethane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Chlorobenzene # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,1,1,2-Tetrachloroethane # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Ethylbenzene # | <3 | <3 | <3 | 4 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| p/m-Xylene # | <5 | <5 | <5 | 33 | <5 | 13 | <5 | <5 | <5 | µg/l | TM15/PM10 |
| o-Xylene # | <3 | <3 | <3 | <3 | <3 | 4 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Styrene # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Bromoform # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Isopropylbenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1,2,2-Tetrachloroethane | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | µg/l | TM15/PM10 |
| Bromobenzene # | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2,3-Trichloropropane # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Propylbenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 2-Chlorotoluene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,3,5-Trimethylbenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 4-Chlorotoluene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| tert-Butylbenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,2,4-Trimethylbenzene # | <3 | <3 | <3 | 13 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| sec-Butylbenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 4-Isopropyltoluene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,3-Dichlorobenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,4-Dichlorobenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| n-Butylbenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,2-Dichlorobenzene # | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced

| | | | | | | | | | | | |
|-----------------------------|----|----|----|----|----|----|----|----|----|------|-----------|
| 1,2-Dibromo-3-chloropropane | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2,4-Trichlorobenzene | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Hexachlorobutadiene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Naphthalene | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2,3-Trichlorobenzene | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |

Appendix C

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: 8H102
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 1.381 | mg/l | 0.01 |
| 01/11/2004 | 0.136 | mg/l | 0.01 |
| 01/03/2006 | 0.067 | mg/l | 0.01 |
| 01/10/2006 | 0.214 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.158 | mg/l | 0.01 |
| 08/04/2008 | < 0.01 | mg/l | 0.01 |
| 15/04/2008 | < 0.01 | mg/l | 0.01 |
| 24/04/2008 | 0.04 | mg/l | 0.01 |
| 07/05/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | 0.076 | mg/l | 0.01 |
| 29/10/2009 | 0.121 | mg/l | 0.01 |
| 23/03/2010 | 0.115 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

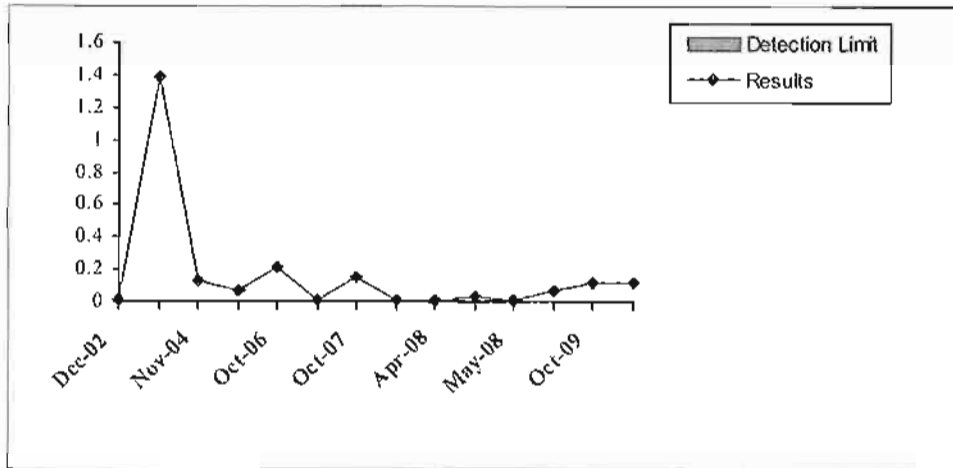


13-May-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 01/12/2003 | 0.835 | mg/l | 0.01 |
| 01/11/2004 | 4.428 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.553 | mg/l | 0.01 |
| 08/04/2008 | < 0.01 | mg/l | 0.01 |
| 15/04/2008 | < 0.01 | mg/l | 0.01 |
| 24/04/2008 | < 0.01 | mg/l | 0.01 |
| 07/05/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 29/10/2009 | 0.296 | mg/l | 0.1 |
| 23/03/2010 | 6.553 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

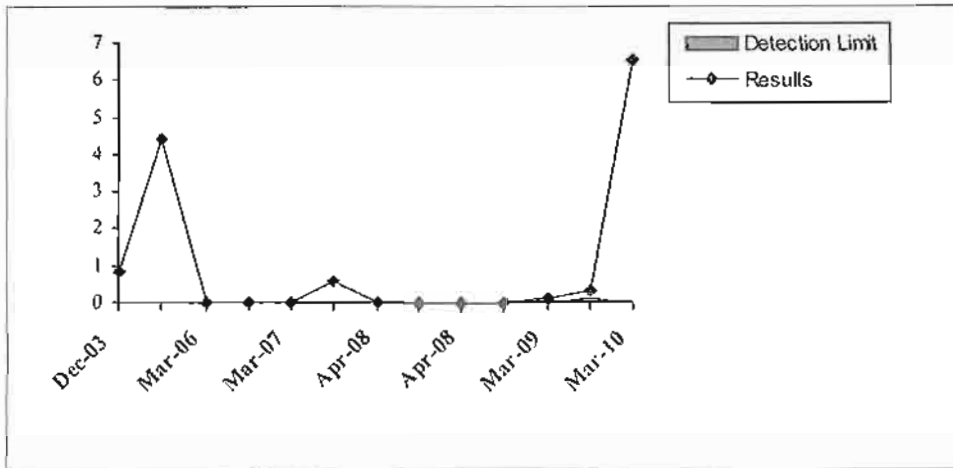


13-May-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

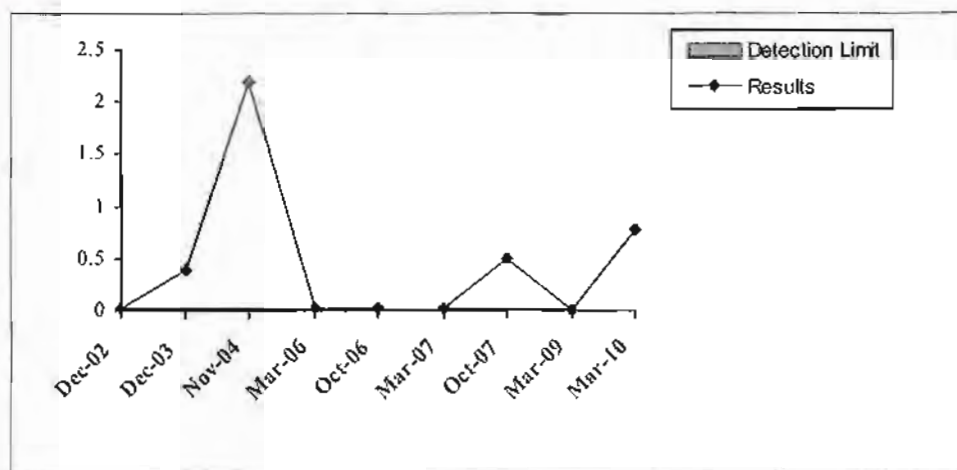


13-May-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: MTBE by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 0.384 | mg/l | 0.01 |
| 01/11/2004 | 2.192 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.494 | mg/l | 0.01 |
| 25/03/2009 | < 0.002 | mg/l | 0.002 |
| 23/03/2010 | 0.763 | mg/l | 0.005 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 06/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | 1.279 | mg/l | 0.01 |
| 15/03/2005 | < 0.01 | mg/l | 0.01 |
| 13/06/2005 | 0.834 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 26/07/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 04/12/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 28/10/2008 | 0.812 | mg/l | 0.01 |
| 25/03/2009 | 0.368 | mg/l | 0.01 |
| 29/10/2009 | 0.125 | mg/l | 0.1 |
| 23/03/2010 | < 0.001 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

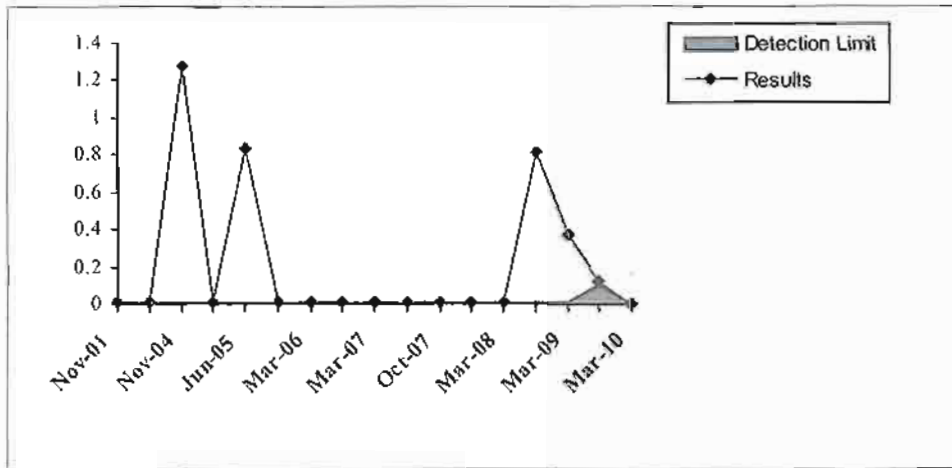


13-May-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 15/03/2005 | 0.559 | mg/l | 0.001 |
| 13/06/2005 | 0.447 | mg/l | 0.001 |
| 01/11/2005 | 0.736 | mg/l | 0.001 |
| 01/03/2006 | 0.387 | mg/l | 0.001 |
| 15/06/2006 | 0.304 | mg/l | 0.001 |
| 01/08/2006 | 0.233 | mg/l | 0.001 |
| 31/08/2006 | 0.279 | mg/l | 0.001 |
| 01/10/2006 | 0.281 | mg/l | 0.001 |
| 26/02/2007 | 0.413 | mg/l | 0.001 |
| 01/03/2007 | 0.605 | mg/l | 0.001 |
| 26/04/2007 | 0.199 | mg/l | 0.001 |
| 30/05/2007 | 0.153 | mg/l | 0.001 |
| 28/06/2007 | 0.346 | mg/l | 0.001 |
| 26/07/2007 | 0.433 | mg/l | 0.001 |
| 04/10/2007 | 0.334 | mg/l | 0.001 |
| 04/12/2007 | 0.312 | mg/l | 0.001 |
| 10/01/2008 | 0.29 | mg/l | 0.001 |
| 14/02/2008 | 0.328 | mg/l | 0.001 |
| 07/03/2008 | 0.383 | mg/l | 0.001 |
| 08/04/2008 | 0.326 | mg/l | 0.001 |
| 07/05/2008 | 0.239 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 10/09/2008 | 0.222 | mg/l | 0.001 |
| 28/10/2008 | 0.2 | mg/l | 0.001 |
| 05/12/2008 | 0.354 | mg/l | 0.003 |
| 07/01/2009 | 0.251 | mg/l | 0.003 |
| 12/02/2009 | 0.19 | mg/l | 0.003 |
| 25/03/2009 | 0.225 | mg/l | 0.003 |
| 23/04/2009 | 0.062 | mg/l | 0.003 |
| 28/05/2009 | 0.225 | mg/l | 0.003 |
| 01/07/2009 | 0.151 | mg/l | 0.003 |
| 29/07/2009 | 0.121 | mg/l | 0.003 |
| 30/09/2009 | 0.146 | mg/l | 0.003 |
| 29/10/2009 | 0.144 | mg/l | 0.003 |
| 27/01/2010 | 0.124 | mg/l | 0.003 |
| 23/03/2010 | 0.038 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

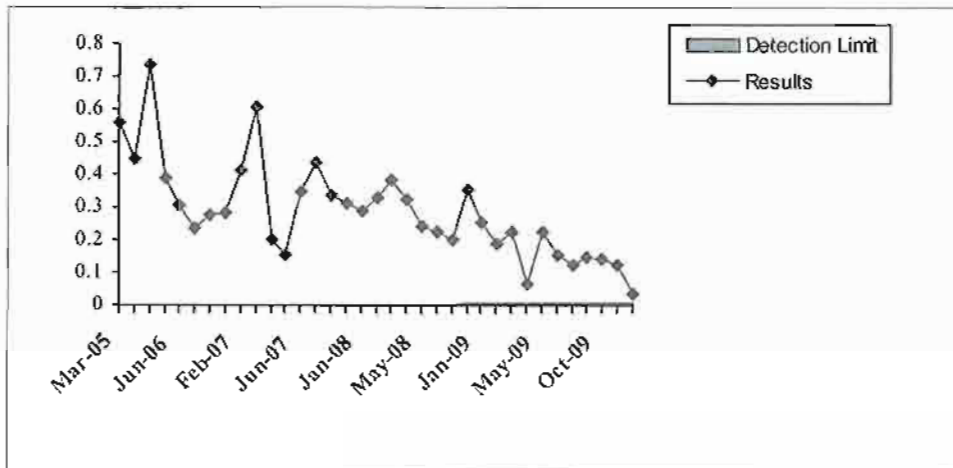


13-May-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: cis-1,2-Dichloroethene (cDCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 15/03/2005 | 0.0407 | mg/l | 0.001 |
| 13/06/2005 | 0.029 | mg/l | 0.001 |
| 01/11/2005 | 0.05 | mg/l | 0.001 |
| 01/03/2006 | 0.031 | mg/l | 0.001 |
| 15/06/2006 | 0.045 | mg/l | 0.001 |
| 01/08/2006 | 0.032 | mg/l | 0.001 |
| 31/08/2006 | 0.037 | mg/l | 0.001 |
| 01/10/2006 | 0.039 | mg/l | 0.001 |
| 26/02/2007 | 0.026 | mg/l | 0.001 |
| 01/03/2007 | 0.043 | mg/l | 0.001 |
| 26/04/2007 | 0.011 | mg/l | 0.001 |
| 30/05/2007 | 0.009 | mg/l | 0.001 |
| 28/06/2007 | 0.005 | mg/l | 0.001 |
| 26/07/2007 | 0.028 | mg/l | 0.001 |
| 04/10/2007 | 0.021 | mg/l | 0.001 |
| 04/12/2007 | 0.018 | mg/l | 0.001 |
| 10/01/2008 | 0.018 | mg/l | 0.001 |
| 14/02/2008 | 0.024 | mg/l | 0.001 |
| 07/03/2008 | 0.028 | mg/l | 0.001 |
| 08/04/2008 | 0.021 | mg/l | 0.001 |
| 07/05/2008 | 0.016 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH104
Borehole Series: 100 Series
Parameter: cis-1,2-Dichloroethene (cDCE)
Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------|-------|
| 10/09/2008 | < 0.001 | mg/l | 0.001 |
| 28/10/2008 | 0.0017 | mg/l | 0.001 |
| 05/12/2008 | 0.039 | mg/l | 0.003 |
| 07/01/2009 | 0.026 | mg/l | 0.003 |
| 12/02/2009 | 0.018 | mg/l | 0.003 |
| 25/03/2009 | 0.016 | mg/l | 0.003 |
| 23/04/2009 | 0.005 | mg/l | 0.003 |
| 28/05/2009 | 0.02 | mg/l | 0.003 |
| 01/07/2009 | 0.018 | mg/l | 0.003 |
| 29/07/2009 | 0.012 | mg/l | 0.003 |
| 30/09/2009 | 0.016 | mg/l | 0.003 |
| 29/10/2009 | 0.013 | mg/l | 0.003 |
| 27/01/2010 | 0.011 | mg/l | 0.003 |
| 23/03/2010 | 0.032 | mg/l | 0.003 |

EPA IGV:
EQS:
Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
Results are in bold where they exceed the Trigger Value
LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

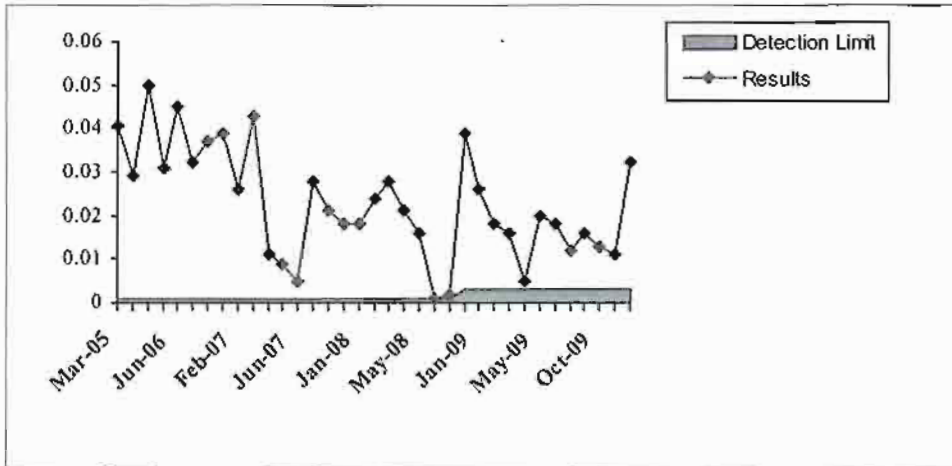


13-May-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: cis-1,2-Dichloroethene (cDCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



18-May-10

Borehole: BH106
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 06/11/2001 | 1.516 | mg/l | 0.01 |
| 01/06/2002 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | 1.51 | mg/l | 0.01 |
| 01/12/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | 0.751 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 15/03/2005 | 0.434 | mg/l | 0.01 |
| 13/06/2005 | 0.396 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 15/06/2006 | 0.306 | mg/l | 0.01 |
| 01/08/2006 | 0.588 | mg/l | 0.01 |
| 31/08/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 0.275 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 26/07/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.234 | mg/l | 0.01 |
| 04/12/2007 | 0.602 | mg/l | 0.01 |
| 06/03/2008 | 0.235 | mg/l | 0.01 |
| 28/10/2008 | 0.08 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

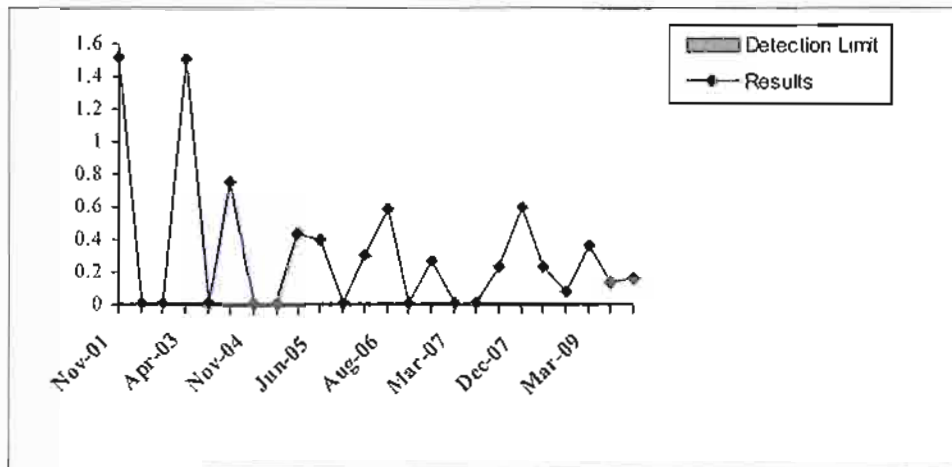


18-May-10

Borehole: BH106
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 25/03/2009 | 0.364 | mg/l | 0.01 |
| 29/10/2009 | 0.146 | mg/l | 0.01 |
| 23/03/2010 | 0.166 | mg/l | 0.01 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH201
 Borehole Series: 200 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 09/11/2001 | 0.195 | mg/l | 0.01 |
| 01/12/2002 | 0.424 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | 2.643 | mg/l | 0.01 |
| 01/05/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 28/10/2008 | < 0.01 | mg/l | 0.01 |
| 28/10/2009 | < 0.01 | mg/l | 0.01 |
| 23/03/2010 | 0.185 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

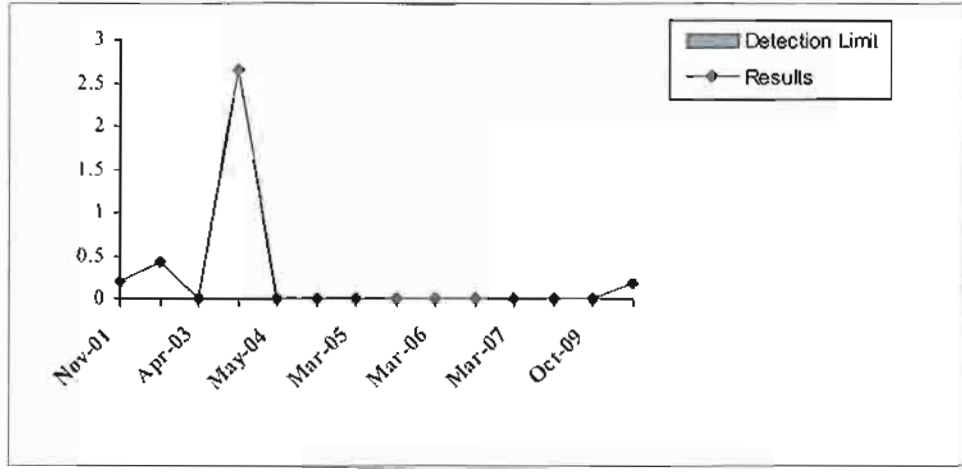


13-May-10

Borehole: BH201
 Borehole Series: 200 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 06/11/2001 | 70.155 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 0.27 | mg/l | 0.01 |
| 01/03/2004 | 4.644 | mg/l | 0.01 |
| 01/11/2004 | 3.413 | mg/l | 0.01 |
| 01/03/2005 | 1.901 | mg/l | 0.01 |
| 01/11/2005 | 7.946 | mg/l | 0.01 |
| 01/03/2006 | 15.491 | mg/l | 0.01 |
| 01/10/2006 | 2.451 | mg/l | 0.01 |
| 01/03/2007 | 9.733 | mg/l | 0.01 |
| 04/10/2007 | 1.314 | mg/l | 0.01 |
| 07/03/2008 | 6.973 | mg/l | 0.01 |
| 29/10/2008 | 6.522 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 28/10/2009 | 3.149 | mg/l | 0.1 |
| 27/01/2010 | 3.379 | mg/l | 0.01 |
| 23/03/2010 | 1.368 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

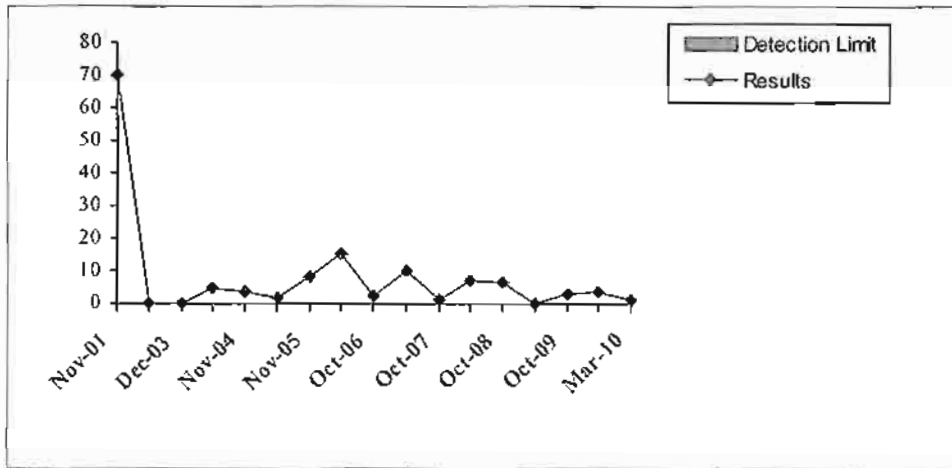


13-May-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 06/11/2001 | 0.694 | mg/l | 0.01 |
| 01/12/2002 | 0.204 | mg/l | 0.01 |
| 01/04/2003 | 1.846 | mg/l | 0.01 |
| 01/12/2003 | 0.768 | mg/l | 0.01 |
| 01/03/2004 | 0.67 | mg/l | 0.01 |
| 01/11/2004 | 0.777 | mg/l | 0.01 |
| 01/03/2005 | 0.874 | mg/l | 0.01 |
| 01/11/2005 | 1.498 | mg/l | 0.01 |
| 01/03/2006 | 0.749 | mg/l | 0.01 |
| 01/10/2006 | 0.995 | mg/l | 0.01 |
| 01/03/2007 | 1.161 | mg/l | 0.01 |
| 04/10/2007 | 0.397 | mg/l | 0.01 |
| 07/03/2008 | 1.042 | mg/l | 0.01 |
| 29/10/2008 | 1.81 | mg/l | 0.01 |
| 25/03/2009 | 0.906 | mg/l | 0.01 |
| 28/10/2009 | 1.137 | mg/l | 0.01 |
| 27/01/2010 | 1.943 | mg/l | 0.01 |
| 23/03/2010 | 1.294 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

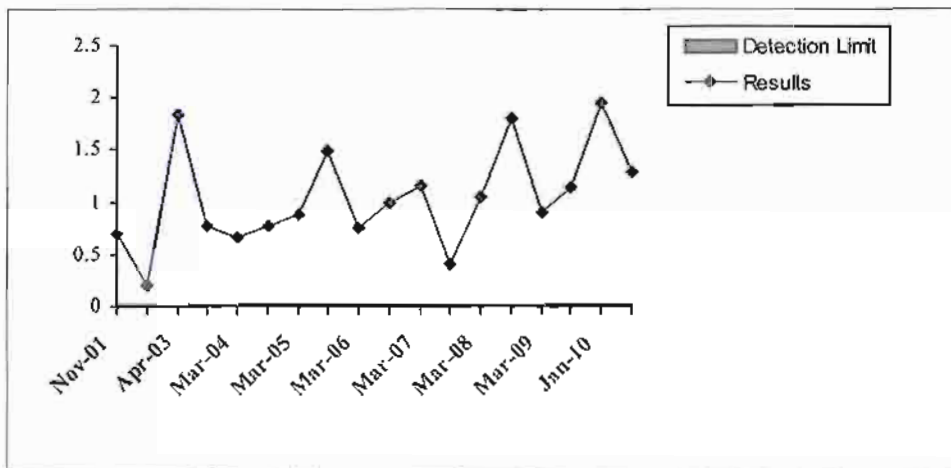


13-May-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH309
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 01/10/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | 0.666 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 29/10/2008 | 0.389 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 28/10/2009 | 0.157 | mg/l | 0.1 |
| 23/03/2010 | 0.643 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

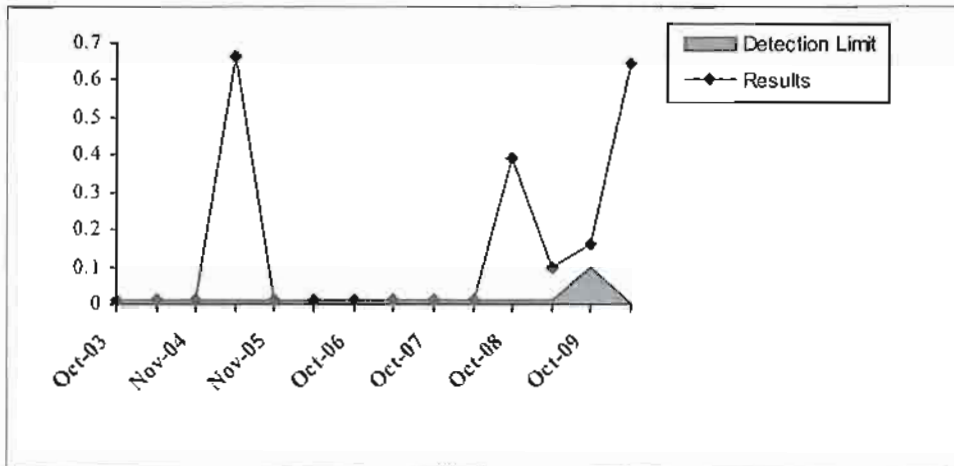


13-May-10

Borehole: BH309
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



14-May-10

Borehole: **BH502**
 Borehole Series: 500 Series
 Parameter: Benzene by GC
 Parameter Class: Hydrocarbon indicators & PAHs

| Standards | |
|---------------|-------|
| EPA IGV | 0.001 |
| EQS | 0.05 |
| Trigger Value | 0.001 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 09/11/2001 | 0.016 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 0.068 | mg/l | 0.001 |
| 25/03/2009 | 0.028 | mg/l | 0.001 |
| 29/10/2009 | < 0.005 | mg/l | 0.005 |
| 23/03/2010 | 0.491 | mg/l | 0.005 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards.
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

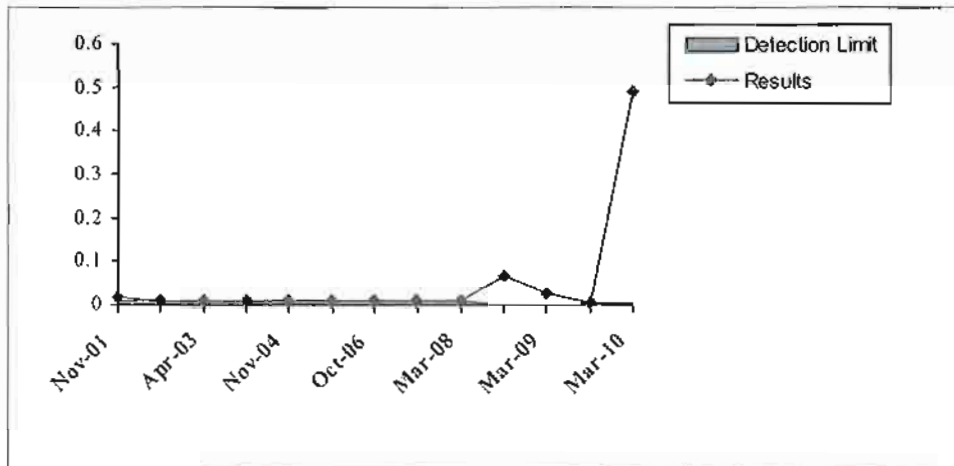


14-May-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Benzene by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-------|
| EPA IGV | 0.001 |
| EQS | 0.05 |
| Trigger Value | 0.001 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: **BH502**
 Borehole Series: 500 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------------|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|------|
| 09/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | 0.185 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 0.029 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 0.17 | mg/l | 0.01 |
| 25/03/2009 | 0.052 | mg/l | 0.01 |
| 29/10/2009 | 0.269 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

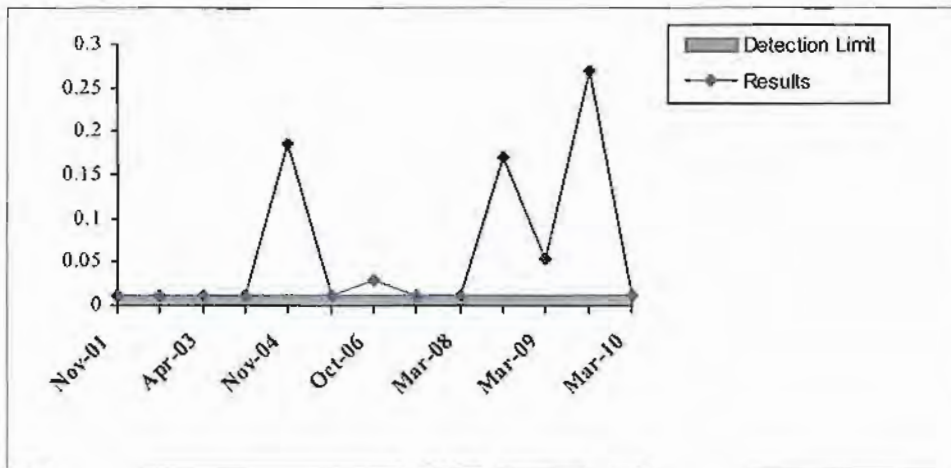


13-May-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

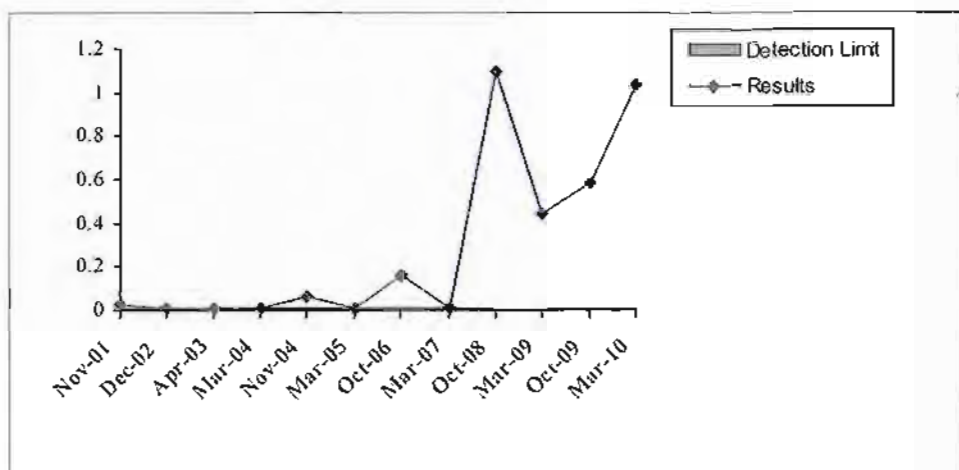


14-May-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: MTBE by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 09/11/2001 | 0.028 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | 0.062 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 0.155 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 1.09 | mg/l | 0.002 |
| 25/03/2009 | 0.444 | mg/l | 0.002 |
| 29/10/2009 | 0.578 | mg/l | 0.005 |
| 23/03/2010 | 1.031 | mg/l | 0.005 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

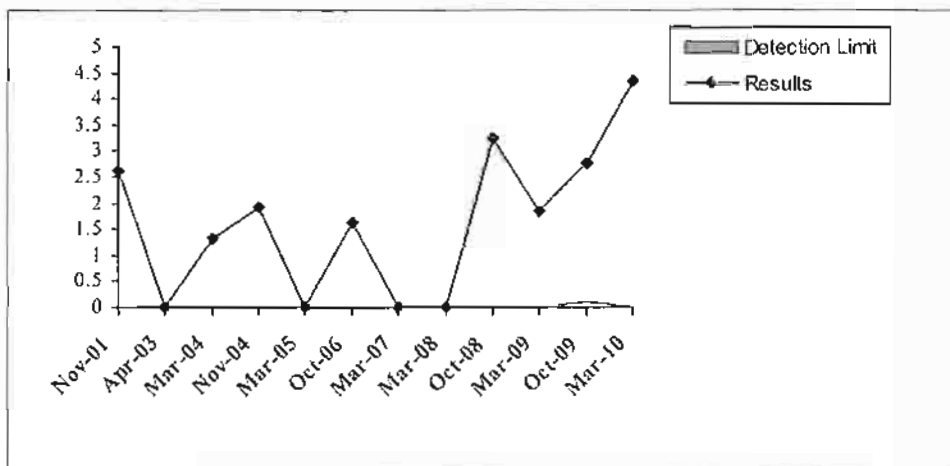


13-May-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 09/11/2001 | 2.618 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | 1.337 | mg/l | 0.01 |
| 01/11/2004 | 1.911 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 1.602 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 3.219 | mg/l | 0.01 |
| 25/03/2009 | 1.85 | mg/l | 0.01 |
| 29/10/2009 | 2.77 | mg/l | 0.1 |
| 23/03/2010 | 4.328 | mg/l | 0.001 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



14-May-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Toluene by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 09/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 0.005 | mg/l | 0.002 |
| 25/03/2009 | < 0.002 | mg/l | 0.002 |
| 29/10/2009 | < 0.005 | mg/l | 0.005 |
| 23/03/2010 | 0.033 | mg/l | 0.005 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

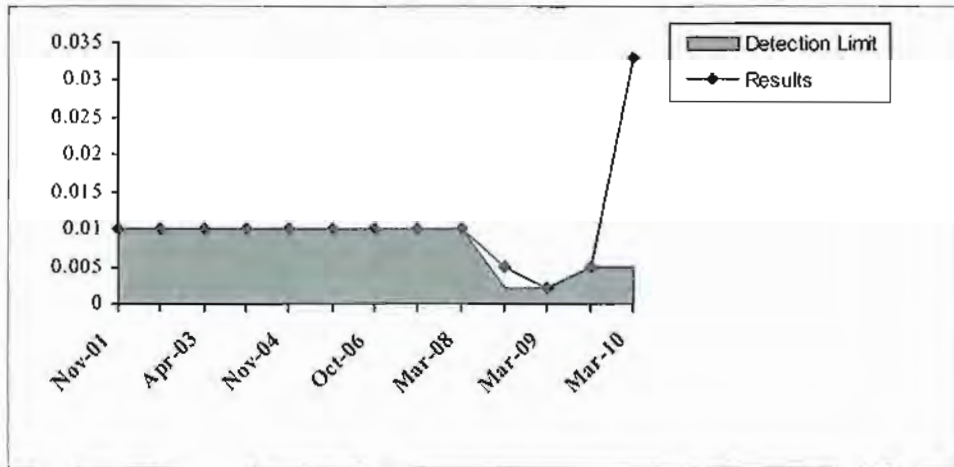


14-May-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Toluene by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH505
 Borehole Series: 500 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|------|
| 09/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/10/2003 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | 0.314 | mg/l | 0.01 |
| 29/10/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.01 | mg/l | 0.01 |
| 29/10/2009 | 4.96 | mg/l | 0.01 |
| 27/01/2010 | 0.24 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |

EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

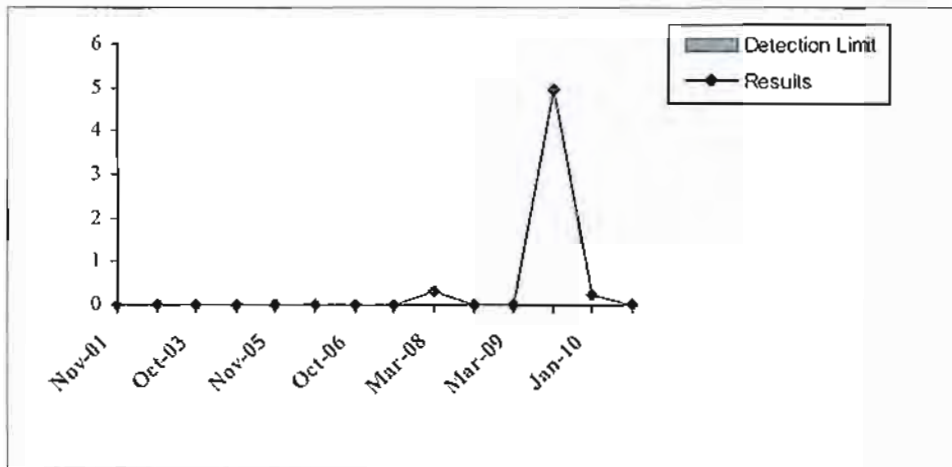


13-May-10

Borehole: BH505
 Borehole Series: 500 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH505
 Borehole Series: 500 Series
 Parameter: Mineral Oils
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.05 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 09/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/10/2003 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | 0.11 | mg/l | 0.01 |
| 29/10/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.01 | mg/l | 0.01 |
| 29/10/2009 | 2.976 | mg/l | 0.01 |
| 27/01/2010 | < 0.01 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

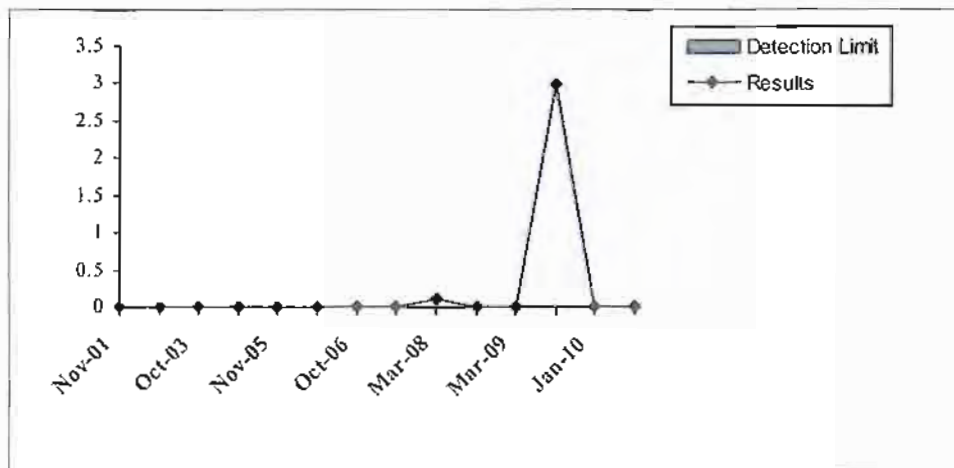


13-May-10

Borehole: BH505
 Borehole Series: 500 Series
 Parameter: Mineral Oils
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | |
| EOS | |
| Trigger Value | 0.05 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH505
 Borehole Series: 500 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|-------|
| 09/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/10/2003 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2005 | 1.948 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 29/10/2008 | 0.1 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 29/10/2009 | 18.494 | mg/l | 0.1 |
| 27/01/2010 | 1.836 | mg/l | 0.01 |
| 23/03/2010 | < 0.001 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

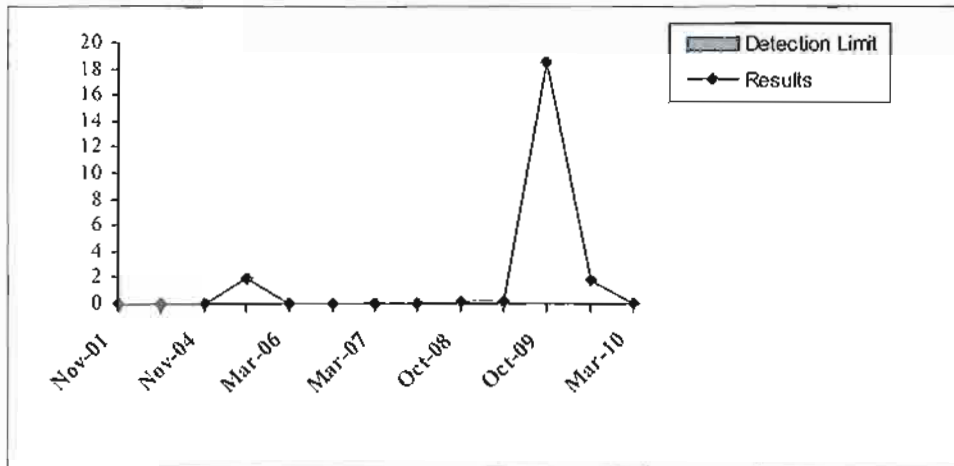


13-May-10

Borehole: BH505
 Borehole Series: 500 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

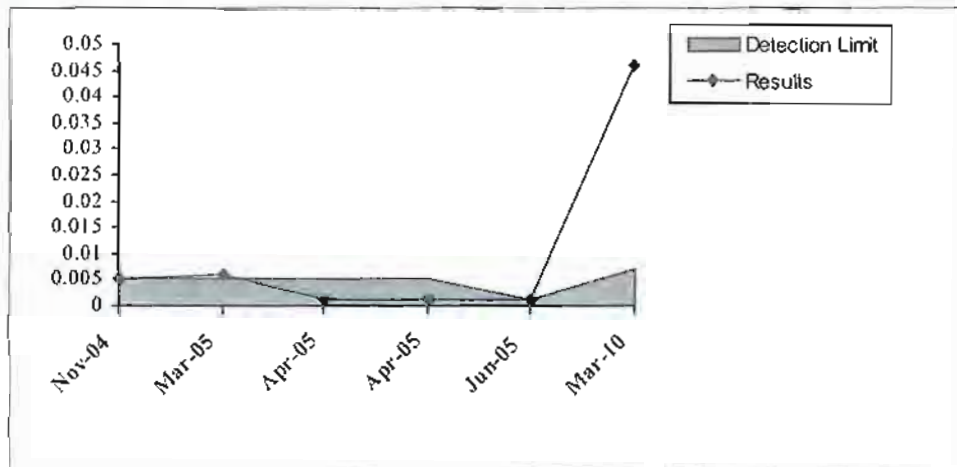


14-May-10

Borehole: BH602
 Borehole Series: 600 Series
 Parameter: Copper
 Parameter Class: Metals

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | 0.03 |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------|-------|
| 01/11/2004 | < 0.005 | mg/l | 0.005 |
| 15/03/2005 | 0.006 | mg/l | 0.005 |
| 18/04/2005 | < 0.001 | mg/l | 0.005 |
| 27/04/2005 | < 0.001 | mg/l | 0.005 |
| 13/06/2005 | 0.001 | mg/l | 0.001 |
| 23/03/2010 | 0.046 | mg/l | 0.007 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

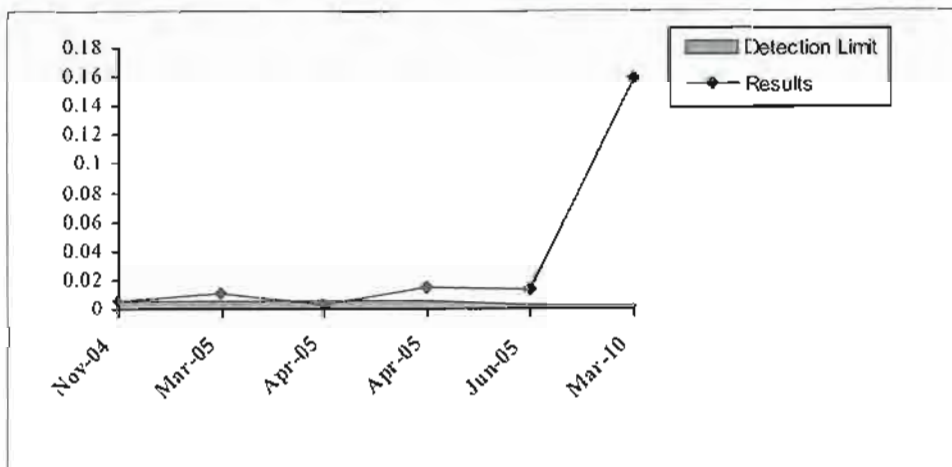


14-May-10

Borehole: BH602
 Borehole Series: 600 Series
 Parameter: Zinc
 Parameter Class: Metals

| Standards | |
|---------------|------|
| EPA IGV | 0.1 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 01/11/2004 | < 0.005 | mg/l | 0.005 |
| 15/03/2005 | 0.01 | mg/l | 0.005 |
| 18/04/2005 | < 0.003 | mg/l | 0.005 |
| 27/04/2005 | 0.015 | mg/l | 0.005 |
| 13/06/2005 | 0.013 | mg/l | 0.003 |
| 23/03/2010 | 0.159 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

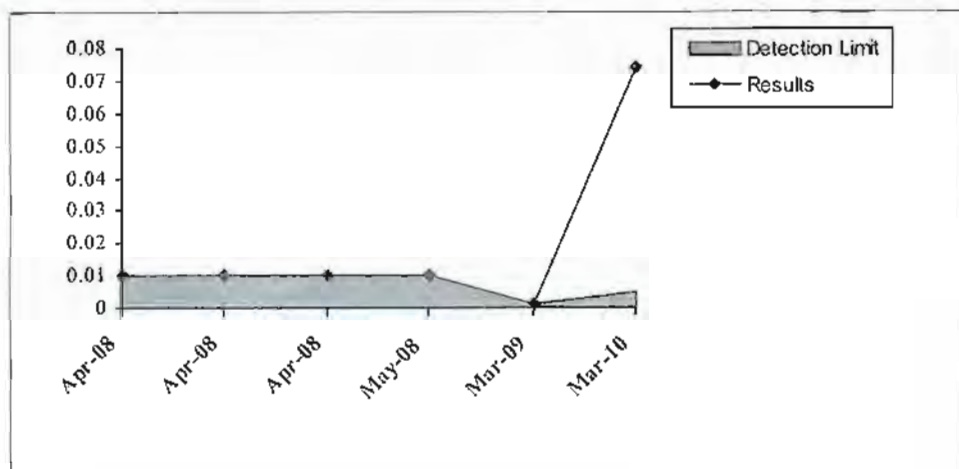


14-May-10

Borehole: BH609
 Borehole Series: 600 series
 Parameter: Benzene by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-------|
| EPA IGW | 0.001 |
| EQS | 0.05 |
| Trigger Value | 0.001 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 08/04/2008 | < 0.01 | mg/l | 0.01 |
| 15/04/2008 | < 0.01 | mg/l | 0.01 |
| 24/04/2008 | < 0.01 | mg/l | 0.01 |
| 07/05/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | 0.074 | mg/l | 0.005 |



EPA IGW:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGW or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

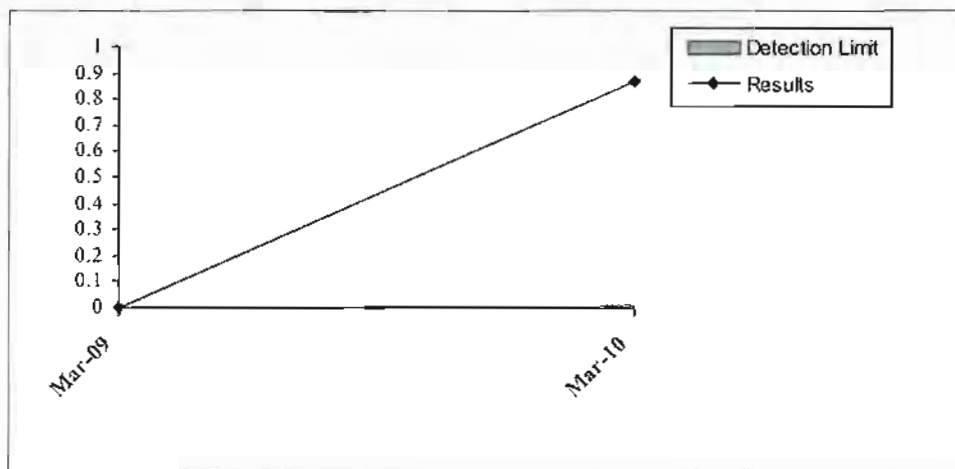


14-May-10

Borehole: BH609
 Borehole Series: 600 series
 Parameter: MTBE by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 25/03/2009 | < 0.002 | mg/l | 0.002 |
| 23/03/2010 | 0.866 | mg/l | 0.005 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

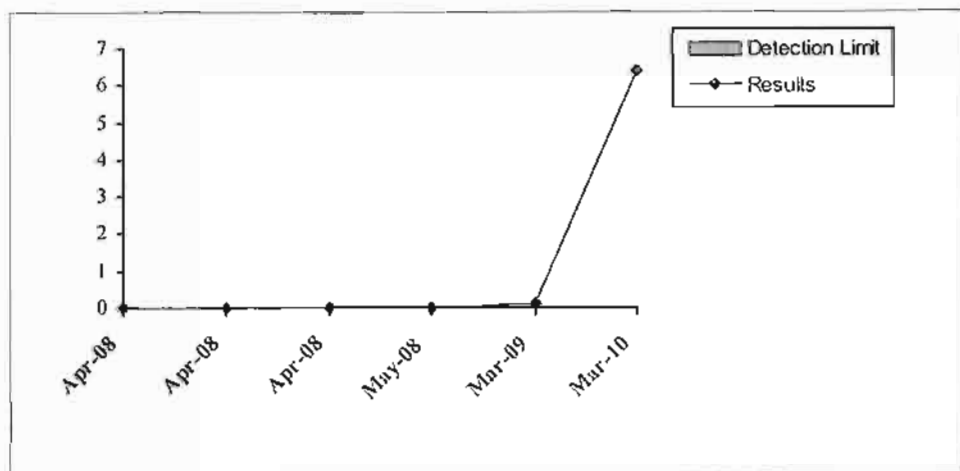


14-May-10

Borehole: BH609
 Borehole Series: 600 series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 08/04/2008 | < 0.01 | mg/l | 0.01 |
| 15/04/2008 | < 0.01 | mg/l | 0.01 |
| 24/04/2008 | < 0.01 | mg/l | 0.01 |
| 07/05/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 23/03/2010 | 6.374 | mg/l | 0.001 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme



13-May-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 04/10/2007 | 0.097 | mg/l | 0.001 |
| 04/12/2007 | 0.156 | mg/l | 0.001 |
| 10/01/2008 | 0.133 | mg/l | 0.001 |
| 14/02/2008 | 0.048 | mg/l | 0.001 |
| 06/03/2008 | 0.07 | mg/l | 0.001 |
| 08/04/2008 | 0.067 | mg/l | 0.001 |
| 07/05/2008 | 0.078 | mg/l | 0.001 |
| 05/12/2008 | 0.024 | mg/l | 0.003 |
| 07/01/2009 | 0.035 | mg/l | 0.003 |
| 12/02/2009 | 0.022 | mg/l | 0.003 |
| 25/03/2009 | 0.067 | mg/l | 0.003 |
| 23/04/2009 | 0.026 | mg/l | 0.003 |
| 26/05/2009 | 0.03 | mg/l | 0.003 |
| 01/07/2009 | 0.047 | mg/l | 0.003 |
| 29/07/2009 | 0.029 | mg/l | 0.003 |
| 03/09/2009 | 0.018 | mg/l | 0.003 |
| 30/09/2009 | 0.019 | mg/l | 0.003 |
| 29/10/2009 | 0.029 | mg/l | 0.003 |
| 23/03/2010 | 0.016 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

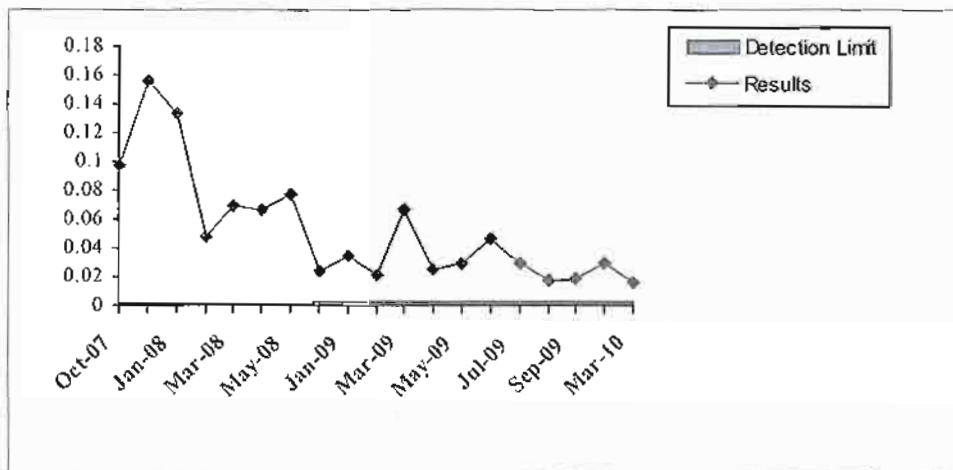


13-May-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards.

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: p/m-Xylene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 04/10/2007 | < 0.001 | mg/l | 0.001 |
| 04/12/2007 | < 0.001 | mg/l | 0.001 |
| 10/01/2008 | < 0.001 | mg/l | 0.001 |
| 14/02/2008 | < 0.001 | mg/l | 0.001 |
| 06/03/2008 | < 0.001 | mg/l | 0.001 |
| 08/04/2008 | < 0.001 | mg/l | 0.001 |
| 07/05/2008 | < 0.001 | mg/l | 0.001 |
| 05/12/2008 | < 0.001 | mg/l | 0.001 |
| 07/01/2009 | < 0.001 | mg/l | 0.001 |
| 12/02/2009 | < 0.001 | mg/l | 0.001 |
| 25/03/2009 | < 0.005 | mg/l | 0.005 |
| 23/04/2009 | < 0.005 | mg/l | 0.005 |
| 28/05/2009 | < 0.005 | mg/l | 0.005 |
| 01/07/2009 | < 0.005 | mg/l | 0.005 |
| 29/07/2009 | < 0.005 | mg/l | 0.005 |
| 03/09/2009 | < 0.005 | mg/l | 0.005 |
| 30/09/2009 | < 0.005 | mg/l | 0.005 |
| 29/10/2009 | < 0.005 | mg/l | 0.005 |
| 23/03/2010 | 0.013 | mg/l | 0.005 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

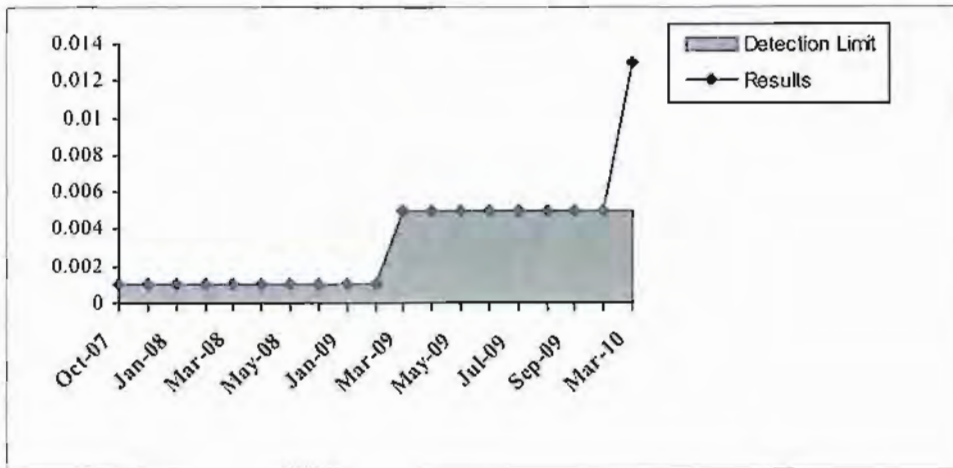


13-May-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: p/m-Xylene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards.
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



13-May-10

Borehole: BH702
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 04/10/2007 | 0.081 | mg/l | 0.001 |
| 04/12/2007 | 0.706 | mg/l | 0.001 |
| 10/01/2008 | 0.172 | mg/l | 0.001 |
| 14/02/2008 | 0.068 | mg/l | 0.001 |
| 06/03/2008 | 0.141 | mg/l | 0.001 |
| 08/04/2008 | 0.182 | mg/l | 0.001 |
| 07/05/2008 | 0.314 | mg/l | 0.001 |
| 10/09/2008 | 0.185 | mg/l | 0.001 |
| 28/10/2008 | 0.107 | mg/l | 0.001 |
| 05/12/2008 | 0.105 | mg/l | 0.003 |
| 07/01/2009 | 0.122 | mg/l | 0.003 |
| 12/02/2009 | 0.022 | mg/l | 0.003 |
| 25/03/2009 | 0.172 | mg/l | 0.003 |
| 23/04/2009 | 0.129 | mg/l | 0.003 |
| 28/05/2009 | 0.126 | mg/l | 0.003 |
| 01/07/2009 | 0.149 | mg/l | 0.003 |
| 29/07/2009 | 0.092 | mg/l | 0.003 |
| 03/09/2009 | 0.047 | mg/l | 0.003 |
| 30/09/2009 | 0.057 | mg/l | 0.003 |
| 29/10/2009 | 0.064 | mg/l | 0.003 |
| 27/01/2010 | 0.02 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

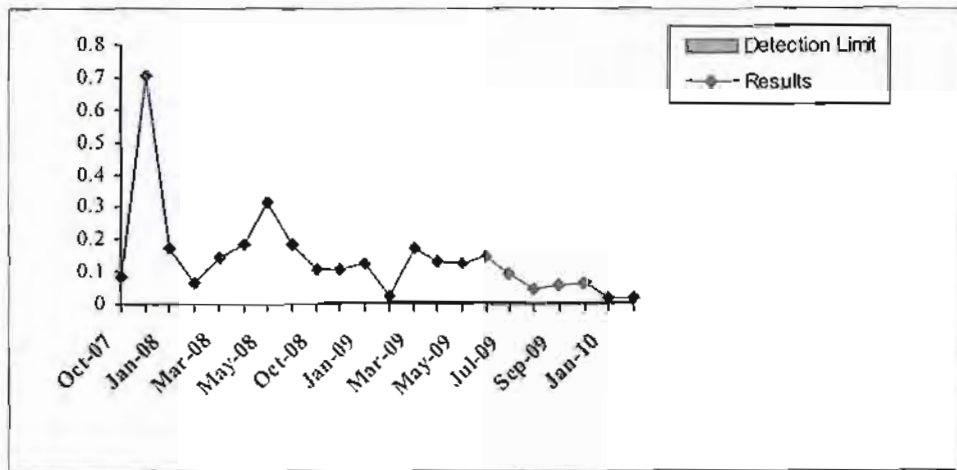


13-May-10

Borehole: BH702
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 23/03/2010 | 0.02 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection



ConocoPhillips Whitegate Refinery

Biannual Groundwater Monitoring
October 2010

ENVIRONMENTAL REPORT

16th December 2010



REPORT CONTROL

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1.0 INTRODUCTION

ConocoPhillips Whitegate Refinery Ltd. (COP) retained WYG Environmental and Planning (Ireland) Ltd. (WYG) to undertake bi-annual groundwater monitoring at a number of borehole locations at the oil refinery facility in Whitegate, Co. Cork.

Groundwater monitoring at the site was conducted on 21st October 2010 by WYG. It was the second of two groundwater quality surveys scheduled for 2010. This monitoring forms part of the COP's compliance with Condition 9.2 and Schedule 4 (ii) of their Integrated Pollution Prevention and Control (IPPC) Licence, Register No. P0266-01. The report conditions are presented in Appendix A.

The COP site consists of the refining site area on the mainland and crude oil storage tanks on Corkbeg Island. The approximate outline of the site boundary is presented in Figure 1 and monitoring borehole locations in Figures 2 & 3.

2.0 METHODOLOGY

2.1 SAMPLING SCHEDULE

Historically the particular borehole sampled and the total number of boreholes sampled varied from monitoring round to monitoring round. In March 2009 COP requested that WYG establish the status of all boreholes on site and review historical analytical results. Based on this information a monitoring schedule for subsequent monitoring rounds was established. It was proposed that all accessible boreholes on site were visited during each visit. A total of 20 boreholes were selected from which water samples would be obtained. These boreholes were selected based on historic groundwater conditions and to obtain a good spatial coverage of groundwater conditions. Groundwater level was obtained from a further three boreholes, floating product levels from four boreholes and temperature from one borehole. The proposed monitoring schedule is presented in Table 1. It was adhered to in the October 2010 sampling round, although BH602 boreholes casing was damaged since March 2010 and could not be sampled in this round.



Table 1: Monitoring Schedule

| Sampling status (number of boreholes) | Borehole number |
|---------------------------------------|--|
| Water sample (19) | BH101R, BH102, BH104, BH106, BH201, BH202, BH203, BH302, BH303, BH305, BH307, BH308, BH309, BH502, BH505, BH609, BH701, BH702, BH703 |
| Water level and temperature only (1) | BH508 |
| Water level only (3) | BH105, BH504, BH507 |
| Floating product (4) | BH204, BH205, BH704, BH705 |

2.2 GROUNDWATER SAMPLING METHODOLOGY

Groundwater monitoring was undertaken in accordance with the WYG groundwater sampling protocol. This protocol involves the purging of at least three borehole volumes of groundwater from the monitoring borehole prior to collection of a sample. The sample is then decanted into laboratory issued containers. Appropriate measures were taken to prevent cross contamination between sampling locations (e.g. use of dedicated bailers/tubing and change of sampler’s gloves between sampling locations).

2.3 LABORATORY ANALYSIS

The groundwater samples were stored in cooler boxes prior to dispatch to an independent UKAS accredited laboratory for analysis. Each sample was analysed for a selection of the following parameters;

- Diesel Range Organics (DRO) and Mineral Oil
- Petrol Range Organics (PRO) and methyl-tertiary-butyl-ether (MTBE)
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX compounds)
- Volatile Organic Compounds (VOC)
- Major cations & anions
- Metals

The suite of analysis for each sample was selected based on the requirements of the IPPC license and a review of analytical results from previous monitoring rounds.



3.0 RESULTS

3.1 ENVIRONMENTAL MANAGEMENT DATABASE

COP appointed WYG to generate a computerised "Environmental Management Database" which was developed during 2007. The analytical results of the bi-annual IPPC groundwater monitoring programmes dating back to 2001 and other monitoring events completed in the interim, such as the Landfill Decommissioning Plan (LDP) monitoring, have been entered into the database. The October 2010 bi-annual original laboratory analytical results, which are presented in Appendix B, have also been inputted. The trend graphs and historical results of elevated parameters presented in Appendix C are taken from this database.

3.2 ENVIRONMENTAL STANDARDS

For comparative purposes the groundwater results are presented with recognised environmental standards.

The Environmental Protection Agency's (EPA) Interim Guideline Values (IGVs) proposed in the *Interim Report Towards Setting Guideline Values for the Protection of Groundwater in Ireland* (2003) are the primary standards included for comparison in the COP database.

The recently issued European Communities Environmental Objectives (Groundwater) Regulations, 2010 are intended for drinking water and as such are only used in this report for comparative purposes when an IGV for a particular parameter are not available.

In the absence of IGV parameters, the EPA Environmental Quality Standards (EQS) published in the *Environmental Quality Objectives and Environmental Quality Standards, The Aquatic Environment* (1997) have been used as an indication of water quality but primarily derived for surface waters.

Where there are no IGV values for hydrocarbon parameters, for example mineral oil, results are compared to the Dutch Guidelines for Groundwater (RIVM 2000). Dutch Target (S) Values are considered typical of normal or background concentrations where as the Intervention (I) Values are those concentrations above which further investigation and/or remediation are recommended. The Dutch values are only used for guideline purposes in this country as they have no statutory basis outside the Netherlands; however, the Dutch values are recognised as guideline standards by the environmental industry and by Irish regulatory authorities.



Where no IGV, EQS or Dutch Standards are available for such parameters as Diesel Range Organic (DRO) and Petrol Range Organic (PRO) concentrations then the DRO and PRO are compared to typical background concentrations for greenfield sites. In groundwater, DRO and PRO concentrations are expected to be normally less than 0.1mg/l.

In summary, the 'Trigger Value' used in the COP database represents the IGV where available, then the Groundwater regulations, the relevant EQS, Dutch value or expected natural conditions. In the results tables presented in Appendix C, results are in bold where they exceed the assigned 'Trigger Value' and in red where they exceed the IGV or EQS standard.

3.3 FIELD PARAMETERS RESULTS

Field results such as physical observations and field measurements are presented in Table 2. Boreholes which showed conditions outside the IGV standard for pH, conductivity and temperature are outlined below.

3.2.1 pH

The EPA IGV pH limit between 6.5 and 9.5. All the pH levels in boreholes sampled were within the comparative value, with the exception of BH101R, BH102 and BH302 which had pH ranging from 6.1 to 6.32.

3.2.2 Conductivity

The EPA IGV conductivity maximum limit is 1,000 μ S/cm. Conductivity levels in all were below the limit value with the exception of BH201 (1,266 μ S/cm), BH202 (1,887 μ S/cm) and BH203 (1,183 μ S/cm) on Corkbeg Island, which is similar to previous rounds. The elevated conductivity may relate to saline influence in groundwater from adjacent harbour.

3.2.3 Field Temperatures

The field temperature values recorded at the site generally exceeded the range of typical Irish groundwater (10°C-12°C), with only five of the 19 boreholes water temperature readings were in that range. Eight boreholes were slightly elevated, not exceeding two degrees over typical range. Six boreholes had temperature levels elevated over two degrees. The warm weather during the summer may have caused the slightly elevated background temperature. The elevated temperatures in BH307 (21.2°C), BH505 (17.2°C) and BH508 (17.4°C) may be as result of loss of production heat to the ground.



3.4 ANALYTICAL RESULTS

As agreed with COP, following the implementation of the new Environmental Management Database, the methodology for presenting and discussing the analytical results has changed from report writing to displaying results in data tables, graphs and figures. The emphasis is placed on showing the trends of any monitoring boreholes exhibiting elevated concentrations of parameters in the current and historical analytical results. This should enable a clearer, more graphical assessment of the results, especially in boreholes with elevated concentrations of parameters.

Table 3 presents a summary of the boreholes and parameters in which elevated concentrations are identified. The range of previous concentrations and apparent trends are also presented. The historical data and trend graphs are presented in Appendix C for each borehole / parameter exceeded. The original data set of the laboratory analytical results for this round of monitoring is presented in full in Appendix B.

4.0 FINDINGS AND CONCLUSIONS

- The monitoring schedule consisted of obtaining water samples from 20 boreholes. In the end 19 were accessible for sampling (BH602 was blocked). Water levels were obtained from an additional three boreholes and floating product levels were obtained from four other boreholes.
- The general status of the groundwater in all areas of the site is good, with six of the 18 boreholes sampled having no parameters with levels above the proposed 'Trigger Values'. Groundwater quality across the site is generally similar to previous sampling rounds. There are a number of boreholes with exceedences of certain parameters and a few locations with free product in the boreholes which is consistent with recent trends and historical events at the site.
- The field measured pH values were within the recommended standard in most boreholes, with three boreholes with slightly lower pH levels.
- The EPA IGV conductivity maximum limit is 1,000 μ S/cm. Conductivity levels in most locations were below the limit value with the exception of BH201 (1,226 μ S/cm), BH202 (1,887 μ S/cm) and BH203 (1,183 μ S/cm). This is consistent with previous rounds and may be caused by saline intrusion due to close proximity of the boreholes to Cork Harbour.
- The field temperature values in many boreholes exceeded the typical Irish groundwater values (10°C-12°C). The temperature at BH508 was 17.4°C which is consistent with previous rounds, and is interpreted to be a result of steam water discharge to ground from pipeline heating system in this area. The elevated temperature in BH307 (21.2 °C) BH505 (17.2°C) are higher than the typical levels for these boreholes. This may be caused by a loss of production heat or site activities in this area.

ConocoPhillips – Groundwater Monitoring October 2010



- Floating product was encountered in four boreholes (BH204, BH205, BH502 and BH704). This is consistent with previous rounds and is the result of historical events.
- Four boreholes had improvements in hydrocarbon concentrations compared to the March 2010 round, namely BH102, BH104, BH201 and BH307.
- Four boreholes experienced a disimprovement in hydrocarbon concentrations since the March 2010 round, namely BH106, BH302, BH502 and BH703.
- Borehole BH302 is located off-site and this is the first time since 2003 that elevated hydrocarbons were detected. The source of the elevated hydrocarbon has not been detected but could be from a local spill incident as it is located close to a green keeper's shed.
- Levels of DRO in BH201 had decreased comparing to previous round of sampling. Same borehole experienced of increase of soluble sulphates to the second highest concentration recorded to date. Sulphate is a constitute of crude oil.
- DRO level in BH309 increased, but PRO concentration dropped down below detection level being elevated in two last rounds of sampling.
- Free hydrocarbon product was encountered in BH502. Several hydrocarbon parameters, including PRO, DRO, Mineral Oil, MTBE, Benzene, were recorded at the highest concentrations to date in this borehole.
- TCE was detected at concentrations exceeding the EPA IGV in four monitoring boreholes (BH104, BH701, BH702 and BH703) in the south western area of the site. In BH104 level of TCE improved to the lowest concentration recorded to date. There has been an increase in the concentrations in boreholes BH701, BH702 and BH703, with concentrations in BH701 and BH703 at the highest record to date. The concentrations had reduced in March 2010 following pumping of the new trial production wells (800 series) drilled in the area. However these wells have not been pumping for several months and there may be a remobilisation of TCE following the cessation of pumping.



5.0 RECOMMENDATIONS

- The monitoring schedule used in this sampling round should be continued in future sampling rounds. This consists of obtaining water samples from 20 boreholes, checking water levels in a further seven boreholes, floating product levels in six boreholes and the temperature level in one borehole.
- BH602, which is one of the 20 scheduled boreholes, has been damaged and cannot be sampled. This borehole should be repaired before the next monitoring round.
- In addition to BH602, a number of boreholes require upgrading to facilitate monitoring. In BH605 the outer casing is damaged making sampling/obtaining the water level very difficult. The outer casing in BH601 and BH608 is damaged and sampling is not possible.
- Boreholes located in areas of site activity/traffic should be protected by a concrete plinth and bollards around the borehole casing or if not in use be properly decommissioned.
- Boreholes located at ground level e.g. BH102 should be more clearly marked so they can be more easily located.
- Sampling and analysis of the historic oil identified in the groundwater on Corkbeg Island (BH204, BH205, BH704 and BH705) and BH 502 close to main production area should be undertaken so that remediation options can be considered and a risk assessment of its potential to mobilise to receptors can be assessed.
- BH302 which is an off-site borehole should be re-sampled for hydrocarbon parameters to establish if there are any trends in the occurrence of hydrocarbon parameters in this borehole. If elevated concentrations persist, an investigation into the source of the potential hydrocarbons is recommended.
- The pumping of the new trial wells (800 series) in the south west section of the site may improve groundwater and surface water TCE concentrations in the area. Regular sampling of the trial wells, boreholes and surface water in this area should be carried out to monitor the effects of the groundwater pumping over time.

Figures



NOTE: For diagrammatic purposes only. No measurements to be taken from this drawing.



LEGEND

- BGE Power Plant Boundary (Approximate)
- - - - - Piped Gas Stream - New Orientation

| | |
|---|--------------------------------|
|  | |
| ConocoPhillips Whitegate Refinery General Site Layout | |
| Figure No. 1 | Date: 06.12.2018 |
| | Prepared By: D.M. Office: 1504 |



- LEGEND:**
- MONITORING BOREHOLES
 - SITE BOUNDARY
 - WELL PUMPING
 - GROUNDWATER ABSTRACTION WELL

| REV | DESCRIPTION | BY | CHKD | DATE |
|-----|-------------|----|------|------|
| | | | | |

UNIVERSITY TECHNOLOGY CENTRE
 CURRANLEN ROAD
 COOK

WYG

TEL: +353 (0)21 482300
 EMAIL: info@wyg.com

Project:
ConocoPhillips Whitegate Refinery
 BI - Annual Groundwater Monitoring

Drawn by: **TK**

GROUNDWATER MONITORING BOREHOLES - MAIN SITE

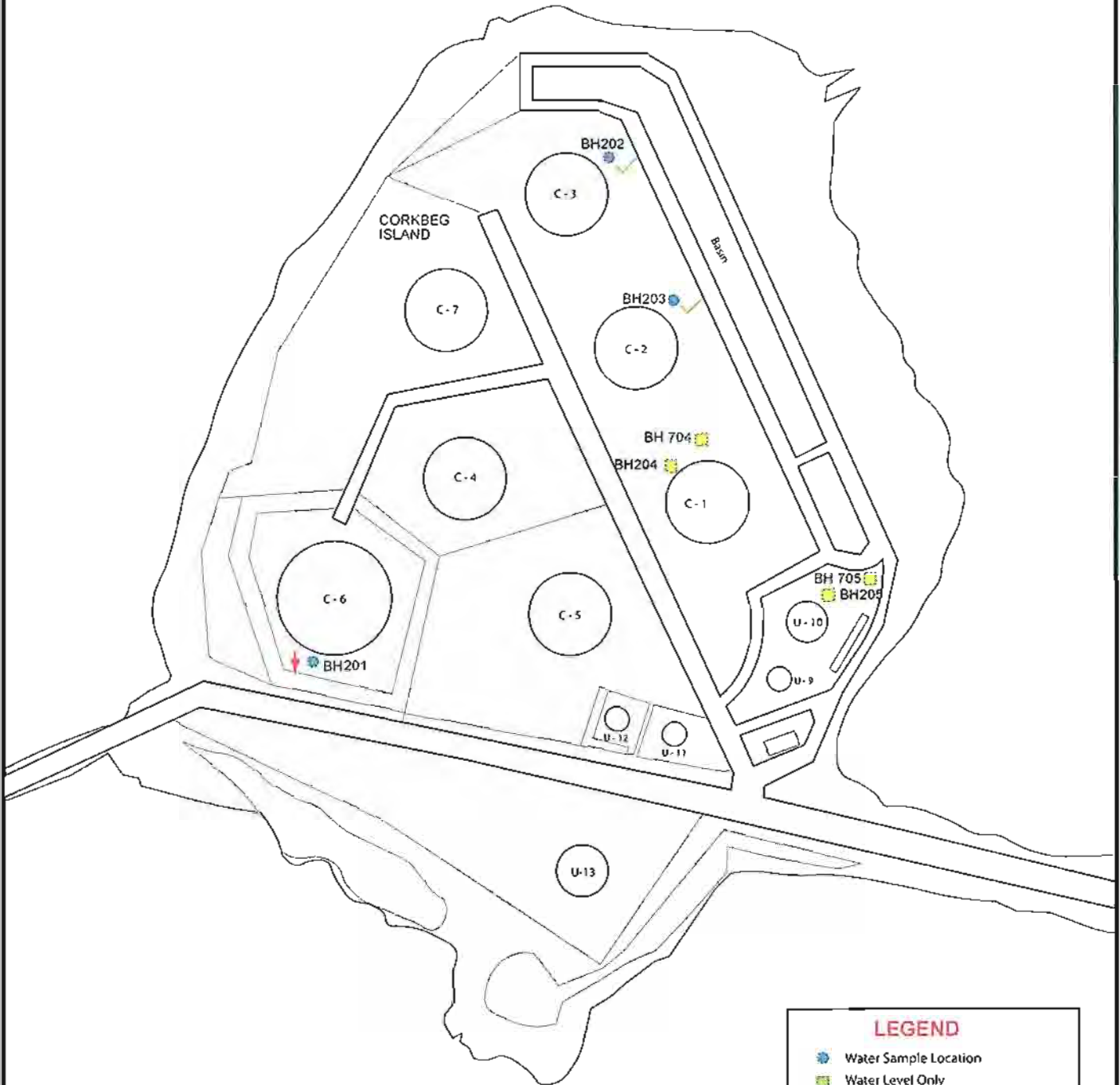
| Scale | A3 | Layout | Date | Checked | Date | Approved | Date |
|----------------------------|------|--------|------|----------|------|------------|----------|
| Project No. | 1504 | Type | E | Drawn by | TK | Checked by | TK |
| FIGURE 2 | | | | | | | A |
| PROJECT NO. CE08673 | | | | | | | A |

WPG-020-13-14 SHEET SIZE: A3-LANDSCAPE

NOTE: No measurements to be taken from this drawing.



Whitegate Bay



Cork Harbour

LEGEND

- Water Sample Location
- Water Level Only
- Floating Product Level Only
- No Hydrocarbon / VOC Exceedances
- Exceedance of Hydrocarbon

ConocoPhillips - Whitegate Refinery
Corkbeg Island Borehole Sampling Map

Figure No. 3

| | |
|--------------------|-----------------|
| Job No. CE00673 | Date: June 2009 |
| Finalised By: MM | Office: 1504 |
| Drawn By: J Finner | CSZ:Illustrator |

WYG Ireland

Appendix A

WYG Environmental and Planning (Ireland) Ltd

REPORT CONDITIONS

ENVIRONMENTAL INVESTIGATION

This report is produced solely for the benefit of ConocoPhillips Whitegate Refinery Ltd. (COP) and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, the physical investigation as detailed, information supplied by those parties referenced in the text, and preliminary discussions with local and statutory authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. The test results that are available can only be regarded as a limited but likely representative sample assessed against current guidelines.

WYG take no responsibility for conditions that have not been revealed by the borings, or which occur below or between the borings. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site or the possibility of encountering ground conditions at variance with our exploratory hole logs elsewhere on the site cannot be discounted. Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative and liability cannot be accepted for its accuracy.

With reference to ground contamination, whilst the findings detailed within this report reflect our best assessment, because there are no exact Irish definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by authorities or funds without question as such bodies have unpublished, more stringent objectives. This report is prepared and written for the uses stated in the report and should not be used in a different context without reference to WYG. In time, improved practices or amended legislation may necessitate a re-assessment.

The report is limited to the environmental aspects specifically reported on, and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief, the nature of geology and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further research will be required before the effects can be better determined.

Appendix B

Jones Environmental Laboratory

Client Name: WYG
 Reference: CEO 6673
 Location: -
 Contact: Mark Masterson
 JE Job No.: 10/4981

Report: Liquids

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HN0₃

| JE Sample No. | 1-4 | 5-9 | 10-13 | 14-17 | 18-20 | 21-23 | 24-26 | 27-28 | 29-30 | 31-32 | Please see attached notes for all abbreviations and acronyms | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|-------|---------------|
| Sample ID | BH101R | BH102 | BH104 | BH106 | BH201 | BH202 | BH203 | BH302 | BH303 | BH305 | | | |
| Depth | - | - | - | 0.4 | - | - | - | - | - | - | | | |
| COC No / misc | | | | | | | | | | | | | |
| Containers | V P G | V H P G | V P G | V P G | H P G | H P G | H P G | P G | P G | P G | | | |
| Sample Date | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | | | |
| Sample Type | Water | Water | Water | Water | Water | Water | Water | Water | Water | Water | | | |
| Batch Number | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Date of Receipt | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | LOD | Units | Method No. |
| BTEX GC-FID | | | | | | | | | | | | | |
| MTBE | <5 | 160 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| Benzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| Toluene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| Ethyl benzene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| m/p-Xylene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| o-Xylene | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | µg/l | TM031W |
| Total Xylenes | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | µg/l | TM031W |
| GRO (C4-12) | | | | | | | | | | | | | |
| GRO (C4-C8) | <100 | 1544 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | µg/l | TM36/PM12 |
| GRO (C8-C12) | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | µg/l | TM36/PM12 |
| GRO (C4-12) | <100 | 1544 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | µg/l | TM36/PM12 |
| EPH (C8-C10) (dissolved) ^{SS} | | | | | | | | | | | | | |
| Mineral Oil (interpretation & calculation) | <10 | <10 | <10 | 192 | <10 | <10 | <10 | 358 | <10 | <10 | <10 | µg/l | TM5/PM9 |
| Arsenic - dissolved ^a | 1.5 | 1.8 | 1.6 | 1.0 | <0.9 | 1.2 | <0.9 | <0.9 | 1.3 | 2.3 | <0.9 | µg/l | TM 030W |
| Cadmium - dissolved ^a | 0.10 | 0.10 | 0.58 | <0.03 | <0.03 | 0.03 | 0.04 | 0.09 | 0.11 | 0.17 | <0.03 | µg/l | TM 030W |
| Chromium - dissolved ^a | 1.3 | 0.7 | 0.4 | 0.3 | <0.2 | <0.2 | 0.7 | 0.3 | 0.9 | 7.4 | <0.2 | µg/l | TM 030W |
| Copper - dissolved ^a | <3.0 | <3.0 | 4.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | µg/l | TM 030W |
| Iron - dissolved ^a | 365.3 | 478.8 | 6.8 | 25.3 | 22.9 | 24.2 | 103.8 | 97.7 | 261.5 | 127.9 | <4.7 | µg/l | TM 030W |
| Manganese - dissolved ^a | 8261.0 | 21670.0 | 1222.0 | 1183.0 | 6.3 | 11.0 | 244.0 | 20.6 | 51.0 | 8856.0 | <1.5 | µg/l | TM 030W |
| Lead - dissolved ^a | 2.1 | 2.9 | 1.3 | 1.2 | 1.1 | 1.4 | 1.2 | 1.1 | 1.0 | 3.1 | <0.4 | µg/l | TM 030W |
| Zinc - dissolved ^a | 159.7 | 54.4 | 4.4 | 13.8 | <1.5 | <1.5 | <1.5 | 2.2 | 2.6 | 1.6 | <1.5 | µg/l | TM 030W |
| Calcium - dissolved ^a | 136.7 | 59.6 | 126.7 | 115.9 | 273.9 | 108.7 | 98.4 | 40.1 | 15.9 | 70.5 | <0.2 | mg/l | TM 030W |
| Magnesium - dissolved ^a | 11.5 | 28.1 | 9.9 | 16.6 | 626.3 | 34.5 | 19.0 | 6.1 | 6.0 | 7.5 | <0.1 | mg/l | TM 030W |
| Ortho phosphate as PO₄^a | | | | | | | | | | | | | |
| Sulphate ^a | - | 9.63 | - | - | 1334.98 | 21.66 | 4.65 | - | - | - | <0.05 | mg/l | TM038W |
| Fluoride | - | <0.3 | - | - | <0.3 | <0.3 | <0.3 | - | - | - | <0.3 | mg/l | TM027W |
| Nitrate as NO ₃ ^a | - | 0.4 | - | - | 0.3 | 0.8 | 0.5 | - | - | - | <0.2 | mg/l | TM038W |
| Nitrite as NO ₂ ^a | - | <0.02 | - | - | <0.02 | 0.02 | <0.02 | - | - | - | <0.02 | mg/l | TM038W |
| Total Cyanide ^a | - | <40 | - | - | <40 | <40 | <40 | - | - | - | <40 | µg/l | subcontracted |
| Ammonia N/Tot Ammonia as N ^a | - | 0.13 | - | - | 0.27 | 0.16 | 0.87 | - | - | - | <0.03 | mg/l | TM038W |
| Total Alkalinity as CaCO ₃ ^a | - | 303 | - | - | 236 | 401 | 375 | - | - | - | <1 | mg/l | TM032W |
| VOCs ^a | | | | | | | | | | | | | |
| | - | see lab | see lab | see lab | - | - | - | - | - | - | <1-5 | µg/l | TM15/PM10 |

Jones Environmental Laboratory

Client Name: WYG
 Reference: CEO 6673
 Location: -
 Contact: Mark Masterson
 JE Job No.: 10/4981

Report : Liquids

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

Please see attached notes for all abbreviations and acronyms

| JE Sample No. | 33-37 | 38-39 | 40-43 | 44-47 | 48-51 | 52-56 | 57-60 | 61-64 | 65-68 | | LOD | Units | Method No. |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|-------|-------|---------------|
| Sample ID | BH307 | BH308 | BH309 | BH502 | BH505 | BH609 | BH701 | BH702 | BH703 | | | | |
| Depth | - | - | - | - | - | - | - | - | - | | | | |
| COC No / misc | | | | | | | | | | | | | |
| Containers | VHPG | PG | VPG | VPG | VPG | VHPG | VPG | VPG | VPG | | | | |
| Sample Date | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | | | | |
| Sample Type | Water | Water | Water | Water | Water | Water | Water | Water | Water | | | | |
| Batch Number | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| Date of Receipt | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | | | | |
| BTEX GC-FID | | | | | | | | | | | <5 | µg/l | TM031W |
| MTBE | <5 | <5 | <5 | 1051 | <5 | 373 | <5 | <5 | <5 | | <5 | µg/l | TM031W |
| Benzene | <5 | <5 | <5 | 1018 | <5 | <5 | <5 | <5 | <5 | | <5 | µg/l | TM031W |
| Toluene | <5 | <5 | <5 | 5532 | <5 | <5 | <5 | <5 | <5 | | <5 | µg/l | TM031W |
| Ethyl benzene | <5 | <5 | <5 | 335 | <5 | <5 | <5 | <5 | <5 | | <5 | µg/l | TM031W |
| m/p-Xylene | <5 | <5 | <5 | 2908 | <5 | <5 | <5 | <5 | <5 | | <5 | µg/l | TM031W |
| o-Xylene | <5 | <5 | <5 | 1230 | <5 | <5 | <5 | <5 | <5 | | <5 | µg/l | TM031W |
| Total Xylenes | <10 | <10 | <10 | 4138 | <10 | <10 | <10 | <10 | <10 | | <10 | µg/l | TM031W |
| GRO (C4-12) | | | | | | | | | | | <100 | µg/l | TM36/PM12 |
| GRO (C4-C8) | 224 | <100 | <100 | 14142 | <100 | 4567 | <100 | <100 | 108 | | <100 | µg/l | TM36/PM12 |
| GRO (C8-C12) | 103 | <100 | <100 | 8091 | <100 | <100 | <100 | <100 | <100 | | <100 | µg/l | TM36/PM12 |
| GRO (C4-12) | 327 | <100 | <100 | 22233 | <100 | 4567 | <100 | <100 | 108 | | <100 | µg/l | TM36/PM12 |
| EPH (C8-C40) (dissolved) #55 | 405 | <10 | 416 | 877909** | <10 | <10 | <10 | <10 | <10 | | <10 | µg/l | TM5/PM9 |
| Mineral Oil (interpretation & calculation) | <10 | <10 | <10 | 614536 | <10 | <10 | <10 | <10 | <10 | | <10 | µg/l | TM5/PM9 |
| Arsenic - dissolved # | 2.4 | <0.9 | 3.9 | <0.9 | <0.9 | 3.3 | <0.9 | <0.9 | 1.4 | | <0.9 | µg/l | TM 030W |
| Cadmium - dissolved # | 0.1 | 0.03 | 0.07 | 0.05 | 0.05 | 0.35 | 0.11 | 0.07 | 0.08 | | <0.03 | µg/l | TM 030W |
| Chromium - dissolved # | 0.4 | 0.5 | 0.5 | <0.2 | 0.8 | 0.5 | <0.2 | <0.2 | <0.2 | | <0.2 | µg/l | TM 030W |
| Copper - dissolved # | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 | 7.0 | <3.0 | <3.0 | <3.0 | | <3.0 | µg/l | TM 030W |
| Iron - dissolved # | 284.9 | 41.8 | 412.2 | 7.8 | 233.2 | 545.0 | <4.7 | 9.3 | 42.5 | | <4.7 | µg/l | TM 030W |
| Manganese - dissolved # | 5720.0 | 3.7 | 402.0 | 9726.0 | 1889.0 | 30060.0 | 695.8 | 28.8 | 1469.0 | | <1.5 | µg/l | TM 030W |
| Lead - dissolved # | 1.1 | 1.1 | 0.8 | 1.8 | 4.8 | 6.3 | 0.8 | 0.8 | 1.7 | | <0.4 | µg/l | TM 030W |
| Zinc - dissolved # | <1.5 | 1.8 | <1.5 | <1.5 | 31.7 | 7.4 | 3.0 | 6.3 | 2.0 | | <1.5 | µg/l | TM 030W |
| Calcium - dissolved # | 47.6 | 41.4 | 42.9 | 28.4 | 52.4 | 101.2 | 49.6 | 29.5 | 35.8 | | <0.2 | mg/l | TM 030W |
| Magnesium - dissolved # | 13.8 | 4.5 | 3.0 | 14.6 | 9.4 | 31.2 | 30.4 | 24.0 | 17.1 | | <0.1 | mg/l | TM 030W |
| Ortho phosphate as PO4 # | <0.06 | - | - | <0.06 | - | <0.06 | - | - | - | | <0.06 | mg/l | TM038W |
| Sulphate # | 16.39 | - | - | 0.61 | - | 0.35 | - | - | - | | <0.05 | mg/l | TM038W |
| Fluoride | <0.3 | - | - | <0.3 | - | <0.3 | - | - | - | | <0.3 | mg/l | TM027W |
| Nitrate as NO3 # | 0.5 | - | - | 6.3 | - | <0.2 | - | - | - | | <0.2 | mg/l | TM038W |
| Nitrite as NO2 # | <0.02 | - | - | <0.02 | - | <0.02 | - | - | - | | <0.02 | mg/l | TM038W |
| Total Cyanide # | <40 | - | - | <40 | - | <40 | - | - | - | | <40 | µg/l | subcontracted |
| Amn N2/Tot Ammonia as N # | 0.18 | - | - | 0.03 | - | 0.48 | - | - | - | | <0.03 | mg/l | TM038W |
| Total Alkalinity as CaCO3 # | 199 | - | - | 166 | - | 423 | - | - | - | | <1 | mg/l | TM032W |
| VOCs # | see lab | - | see lab | see lab | see lab | see lab | see lab | see lab | see lab | | <1-5 | µg/l | TM15/PM10 |

Please include all sections of this report if it is reproduced

Jones Environmental Laboratory

Client Name: WYG

VOC Report : LIQUID

Reference: CEO 6673

Location: -

Contact: Mark Masterson

JE Job No.: 10/4981

| J E Sample No. | 5-9 | 10-13 | 14-17 | 33-37 | 40-43 | 44-47 | 48-51 | 52-56 | 57-60 | 61-64 | 65-69 | Please see attached notes for all abbreviations and acronyms | LOD | Units | Method No. |
|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|-----|-------|------------|
| Sample ID | BH102 | BH104 | BH106 | BH307 | BH309 | BH502 | BH505 | BH609 | BH701 | BH702 | BH703 | | | | |
| Depth | - | - | 0.4 | - | - | - | - | - | - | - | - | | | | |
| COC No / misc | | | | | | | | | | | | | | | |
| Containers | VHPG | VPG | VPG | VHPG | VPG | VPG | VPG | VHPG | VPG | VPG | VPG | | | | |
| Sample Date | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | 21/10/10 | | | | |
| Sample Type | Water | Water | Water | Water | Water | Water | Water | Water | Water | Water | Water | | | | |
| Batch Number | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| Date of Receipt | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | 25/10/10 | | | | |
| Dichlorodifluoromethane | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Methyl Tertiary Butyl Ether | <1 | <1 | <1 | <1 | <1 | 1254 | 5 | <1 | <1 | <1 | <1 | <1 | <1 | µg/l | TM15/PM10 |
| Chloromethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Vinyl Chloride | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | 8 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Bromomethane | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | µg/l | TM15/PM10 |
| Chloroethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Trichlorofluoromethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1-Dichloroethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Carbon Disulphide * | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | <3 | µg/l | TM15/PM10 |
| Dichloromethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| trans-1-2-Dichloroethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1-Dichloroethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| cis-1-2-Dichloroethane * | <3 | 17 | <3 | <3 | <3 | <3 | <3 | <3 | 98 | 12 | 18 | <3 | <3 | µg/l | TM15/PM10 |
| 2,2-Dichloropropane | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | µg/l | TM15/PM10 |
| Bromochloromethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Chloroform * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,1,1-Trichloroethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,1-Dichloropropene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Carbon tetrachloride * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2-Dichloroethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Benzene * | <1 | <1 | <1 | <1 | <1 | 1751 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | µg/l | TM15/PM10 |
| Trichloroethane * | <3 | 29 | <3 | <3 | <3 | <3 | <3 | <3 | 329 | 328 | 263 | <3 | <3 | µg/l | TM15/PM10 |
| 1,2-Dichloropropane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Dibromomethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Bromodichloromethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| cis-1-3-Dichloropropene * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Toluene * | <2 | <2 | <2 | <2 | <2 | 7466** | 6 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| trans-1-3-Dichloropropene * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,1,2-Trichloroethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Tetrachloroethane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,3-Dichloropropane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Dibromochloromethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2-Dibromoethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Chlorobenzene * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,1,1,2-Tetrachloroethane * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Ethylbenzene * | <2 | <2 | <2 | <2 | <2 | 394 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| p/m-Xylene * | <3 | <3 | <3 | <3 | <3 | 4436** | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| o-Xylene * | <2 | <2 | <2 | <2 | <2 | 1953 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Styrene * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Bromoform * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| Isopropylbenzene * | <3 | <3 | <3 | <3 | <3 | 9 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,1,2,2-Tetrachloroethane | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | <4 | µg/l | TM15/PM10 |
| Bromobenzene * | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2,3-Trichloropropane * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Propylbenzene * | <3 | <3 | <3 | <3 | <3 | 4 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 2-Chlorotoluene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,3,5-Trimethylbenzene * | <3 | <3 | <3 | <3 | <3 | 223 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 4-Chlorotoluene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| tert-Butylbenzene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,2,4-Trimethylbenzene * | <3 | <3 | <3 | <3 | <3 | 758 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| sec-Butylbenzene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 4-Isopropyltoluene * | <3 | <3 | <3 | <3 | <3 | 10 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,3-Dichlorobenzene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,4-Dichlorobenzene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| n-Butylbenzene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,2-Dichlorobenzene * | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| 1,2-Dibromo-3-chloropropane | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2,4-Trichlorobenzene | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Hexachlorobutadiene ** | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |
| Naphthalene | <2 | <2 | <2 | <2 | <2 | 111 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | µg/l | TM15/PM10 |
| 1,2,3-Trichlorobenzene | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | µg/l | TM15/PM10 |

Please include all sections of this report if it is reproduced

Appendix C

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



02-Dec-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 1.381 | mg/l | 0.01 |
| 01/11/2004 | 0.136 | mg/l | 0.01 |
| 01/03/2006 | 0.067 | mg/l | 0.01 |
| 01/10/2006 | 0.214 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.158 | mg/l | 0.01 |
| 08/04/2008 | < 0.01 | mg/l | 0.01 |
| 15/04/2008 | < 0.01 | mg/l | 0.01 |
| 24/04/2008 | 0.04 | mg/l | 0.01 |
| 07/05/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | 0.076 | mg/l | 0.01 |
| 29/10/2009 | 0.121 | mg/l | 0.01 |
| 23/03/2010 | 0.115 | mg/l | 0.01 |
| 12/08/2010 | 0.13 | mg/l | 0.01 |
| 21/10/2010 | < 0.01 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

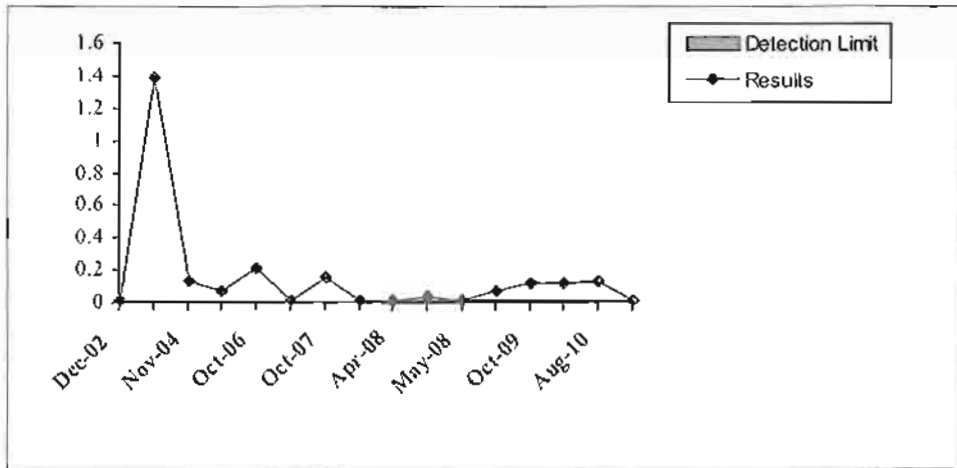


02-Dec-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

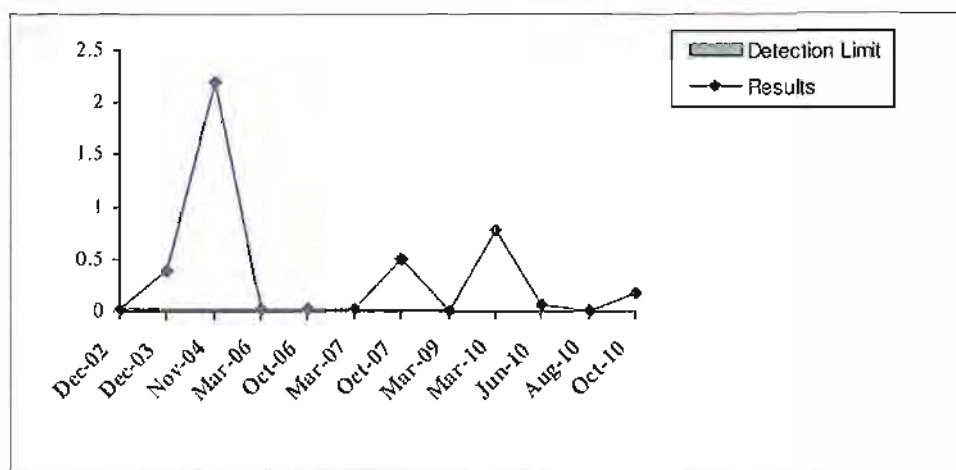


07-Dec-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: MTBE by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|-------|
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 0.384 | mg/l | 0.01 |
| 01/11/2004 | 2.192 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.494 | mg/l | 0.01 |
| 25/03/2009 | < 0.002 | mg/l | 0.002 |
| 23/03/2010 | 0.763 | mg/l | 0.005 |
| 11/06/2010 | 0.06 | mg/l | 0.005 |
| 12/08/2010 | < 0.005 | mg/l | 0.005 |
| 21/10/2010 | 0.16 | mg/l | 0.005 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



02-Dec-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 01/12/2003 | 0.835 | mg/l | 0.01 |
| 01/11/2004 | 4.428 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.553 | mg/l | 0.01 |
| 08/04/2008 | < 0.01 | mg/l | 0.01 |
| 15/04/2008 | < 0.01 | mg/l | 0.01 |
| 24/04/2008 | < 0.01 | mg/l | 0.01 |
| 07/05/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 29/10/2009 | 0.296 | mg/l | 0.1 |
| 23/03/2010 | 6.553 | mg/l | 0.001 |
| 11/06/2010 | 2.644 | mg/l | 0.1 |
| 12/08/2010 | 2.382 | mg/l | 0.1 |
| 21/10/2010 | 1.544 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

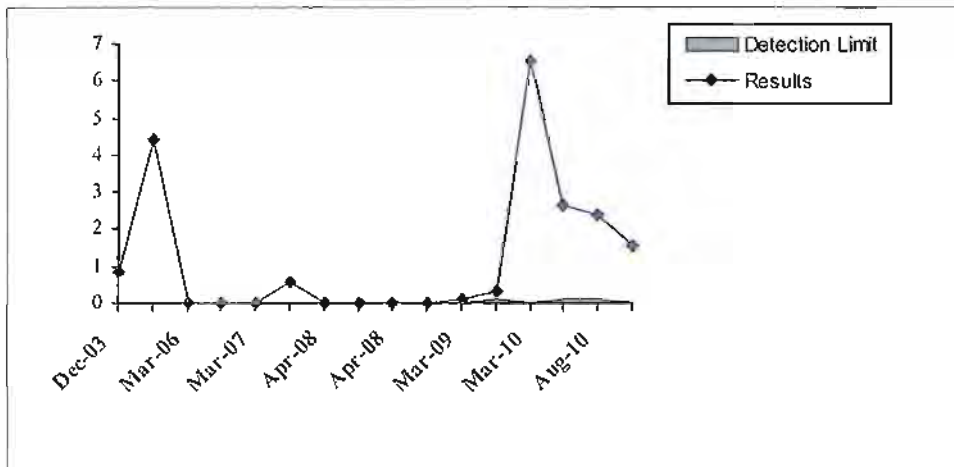


02-Dec-10

Borehole: BH102
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: cis-1,2-Dichloroethene (cDCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EOS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 15/03/2005 | 0.0407 | mg/l | 0.001 |
| 13/06/2005 | 0.029 | mg/l | 0.001 |
| 01/11/2005 | 0.05 | mg/l | 0.001 |
| 01/03/2006 | 0.031 | mg/l | 0.001 |
| 15/06/2006 | 0.045 | mg/l | 0.001 |
| 01/08/2006 | 0.032 | mg/l | 0.001 |
| 31/08/2006 | 0.037 | mg/l | 0.001 |
| 01/10/2006 | 0.039 | mg/l | 0.001 |
| 26/02/2007 | 0.026 | mg/l | 0.001 |
| 01/03/2007 | 0.043 | mg/l | 0.001 |
| 26/04/2007 | 0.011 | mg/l | 0.001 |
| 30/05/2007 | 0.009 | mg/l | 0.001 |
| 28/06/2007 | 0.005 | mg/l | 0.001 |
| 26/07/2007 | 0.028 | mg/l | 0.001 |
| 04/10/2007 | 0.021 | mg/l | 0.001 |
| 04/12/2007 | 0.018 | mg/l | 0.001 |
| 10/01/2008 | 0.018 | mg/l | 0.001 |
| 14/02/2008 | 0.024 | mg/l | 0.001 |
| 07/03/2008 | 0.028 | mg/l | 0.001 |
| 08/04/2008 | 0.021 | mg/l | 0.001 |
| 07/05/2008 | 0.016 | mg/l | 0.001 |

EPA IGV:
 EOS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EOS Standards;
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: cis-1,2-Dichloroethene (cDCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 10/09/2008 | < 0.001 | mg/l | 0.001 |
| 28/10/2008 | 0.0017 | mg/l | 0.001 |
| 05/12/2008 | 0.039 | mg/l | 0.003 |
| 07/01/2009 | 0.026 | mg/l | 0.003 |
| 12/02/2009 | 0.018 | mg/l | 0.003 |
| 25/03/2009 | 0.016 | mg/l | 0.003 |
| 23/04/2009 | 0.005 | mg/l | 0.003 |
| 28/05/2009 | 0.02 | mg/l | 0.003 |
| 01/07/2009 | 0.018 | mg/l | 0.003 |
| 29/07/2009 | 0.012 | mg/l | 0.003 |
| 30/09/2009 | 0.016 | mg/l | 0.003 |
| 29/10/2009 | 0.013 | mg/l | 0.003 |
| 27/01/2010 | 0.011 | mg/l | 0.003 |
| 23/03/2010 | 0.032 | mg/l | 0.003 |
| 11/06/2010 | 0.021 | mg/l | 0.003 |
| 12/08/2010 | 0.02 | mg/l | 0.003 |
| 21/10/2010 | 0.017 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

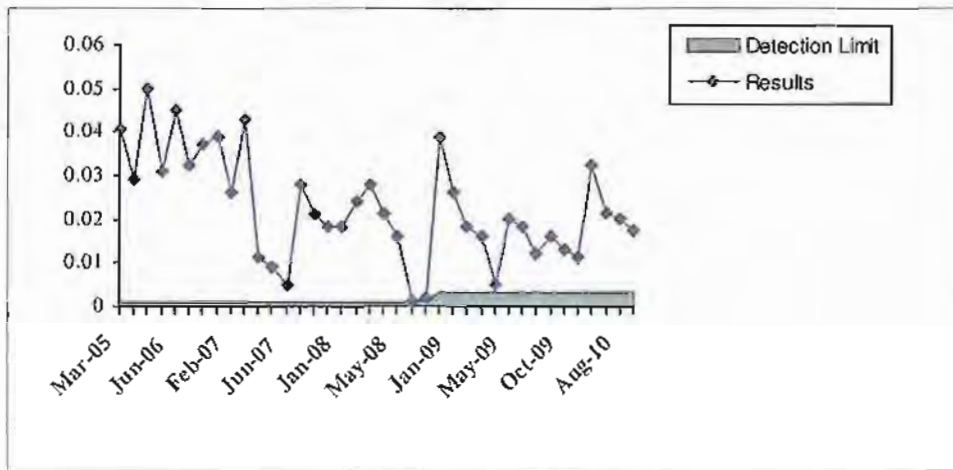


07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: cis-1,2-Dichloroethene (cDCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|-------|
| 06/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | 1.279 | mg/l | 0.01 |
| 15/03/2005 | < 0.01 | mg/l | 0.01 |
| 13/06/2005 | 0.834 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 26/07/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 04/12/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 28/10/2008 | 0.812 | mg/l | 0.01 |
| 25/03/2009 | 0.368 | mg/l | 0.01 |
| 29/10/2009 | 0.125 | mg/l | 0.1 |
| 23/03/2010 | < 0.001 | mg/l | 0.001 |
| 21/10/2010 | < 0.001 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

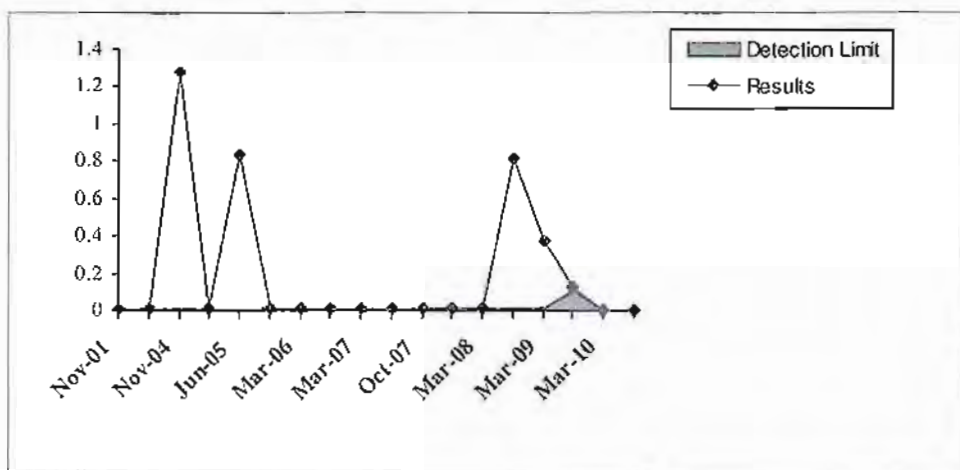


07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 15/03/2005 | 0.559 | mg/l | 0.001 |
| 13/06/2005 | 0.447 | mg/l | 0.001 |
| 01/11/2005 | 0.736 | mg/l | 0.001 |
| 01/03/2006 | 0.387 | mg/l | 0.001 |
| 15/06/2006 | 0.304 | mg/l | 0.001 |
| 01/08/2006 | 0.233 | mg/l | 0.001 |
| 31/08/2006 | 0.279 | mg/l | 0.001 |
| 01/10/2006 | 0.281 | mg/l | 0.001 |
| 26/02/2007 | 0.413 | mg/l | 0.001 |
| 01/03/2007 | 0.605 | mg/l | 0.001 |
| 26/04/2007 | 0.199 | mg/l | 0.001 |
| 30/05/2007 | 0.153 | mg/l | 0.001 |
| 28/06/2007 | 0.346 | mg/l | 0.001 |
| 26/07/2007 | 0.433 | mg/l | 0.001 |
| 04/10/2007 | 0.334 | mg/l | 0.001 |
| 04/12/2007 | 0.312 | mg/l | 0.001 |
| 10/01/2008 | 0.29 | mg/l | 0.001 |
| 14/02/2008 | 0.328 | mg/l | 0.001 |
| 07/03/2008 | 0.383 | mg/l | 0.001 |
| 08/04/2008 | 0.326 | mg/l | 0.001 |
| 07/05/2008 | 0.239 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 10/09/2008 | 0.222 | mg/l | 0.001 |
| 28/10/2008 | 0.2 | mg/l | 0.001 |
| 05/12/2008 | 0.354 | mg/l | 0.003 |
| 07/01/2009 | 0.251 | mg/l | 0.003 |
| 12/02/2009 | 0.19 | mg/l | 0.003 |
| 25/03/2009 | 0.225 | mg/l | 0.003 |
| 23/04/2009 | 0.062 | mg/l | 0.003 |
| 28/05/2009 | 0.225 | mg/l | 0.003 |
| 01/07/2009 | 0.151 | mg/l | 0.003 |
| 29/07/2009 | 0.121 | mg/l | 0.003 |
| 30/09/2009 | 0.146 | mg/l | 0.003 |
| 29/10/2009 | 0.144 | mg/l | 0.003 |
| 27/01/2010 | 0.124 | mg/l | 0.003 |
| 23/03/2010 | 0.038 | mg/l | 0.003 |
| 11/05/2010 | 0.043 | mg/l | 0.003 |
| 12/08/2010 | 0.054 | mg/l | 0.003 |
| 21/10/2010 | 0.029 | mg/l | 0.003 |

EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

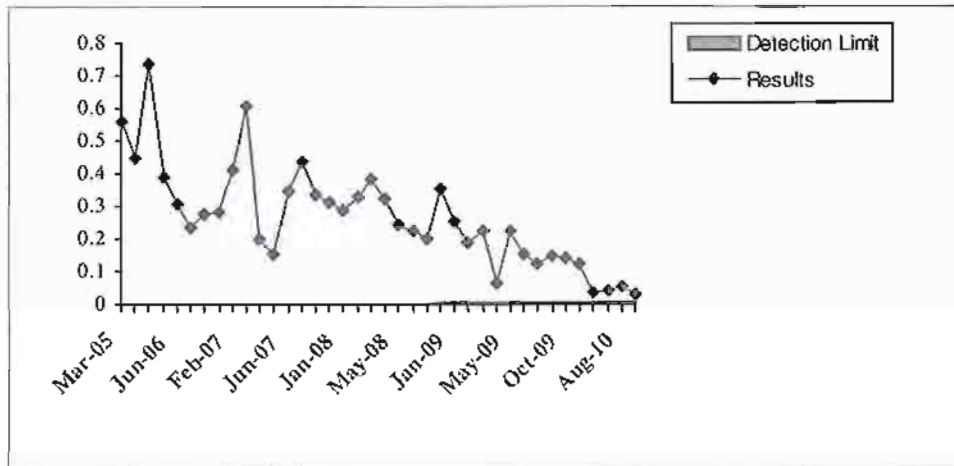


07-Dec-10

Borehole: BH104
 Borehole Series: 100 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:

EQS:

Trigger Value:

Results are in **red** where they exceed the EPA IGV or EQS Standards

Results are in **bold** where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme



07-Dec-10

Borehole: BH106
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 06/11/2001 | 1.516 | mg/l | 0.01 |
| 01/06/2002 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | 1.51 | mg/l | 0.01 |
| 01/12/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | 0.751 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 15/03/2005 | 0.434 | mg/l | 0.01 |
| 13/06/2005 | 0.396 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 15/06/2006 | 0.306 | mg/l | 0.01 |
| 01/08/2006 | 0.588 | mg/l | 0.01 |
| 31/08/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 0.275 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 26/07/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | 0.234 | mg/l | 0.01 |
| 04/12/2007 | 0.602 | mg/l | 0.01 |
| 06/03/2008 | 0.235 | mg/l | 0.01 |
| 28/10/2008 | 0.08 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Page 1 of 2

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

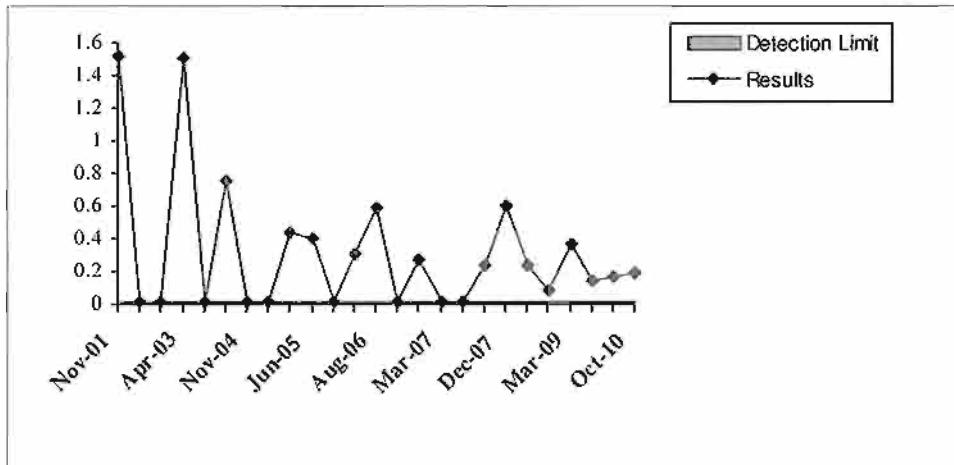


07-Dec-10

Borehole: BH106
 Borehole Series: 100 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 25/03/2009 | 0.364 | mg/l | 0.01 |
| 29/10/2009 | 0.146 | mg/l | 0.01 |
| 23/03/2010 | 0.166 | mg/l | 0.01 |
| 21/10/2010 | 0.192 | mg/l | 0.01 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH201
 Borehole Series: 200 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 09/11/2001 | 0.195 | mg/l | 0.01 |
| 01/12/2002 | 0.424 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | 2.643 | mg/l | 0.01 |
| 01/05/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 28/10/2008 | < 0.01 | mg/l | 0.01 |
| 28/10/2009 | < 0.01 | mg/l | 0.01 |
| 23/03/2010 | 0.185 | mg/l | 0.01 |
| 21/10/2010 | < 0.01 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

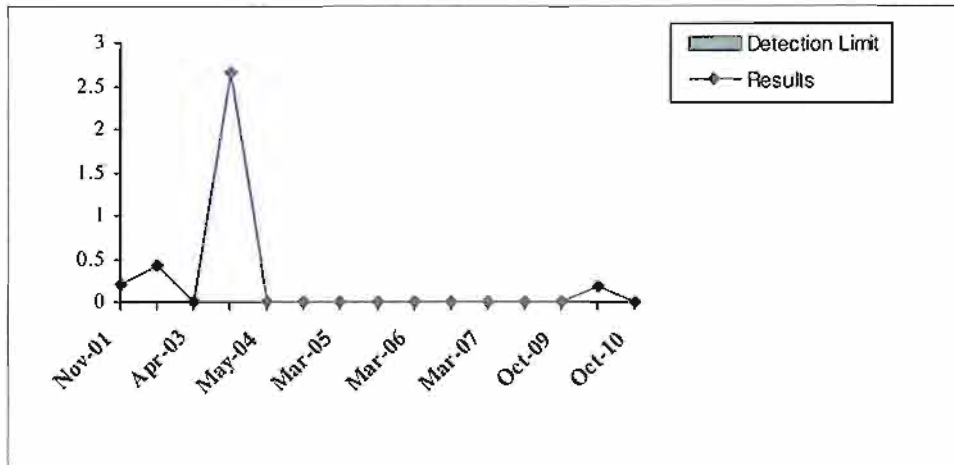


07-Dec-10

Borehole: BH201
 Borehole Series: 200 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

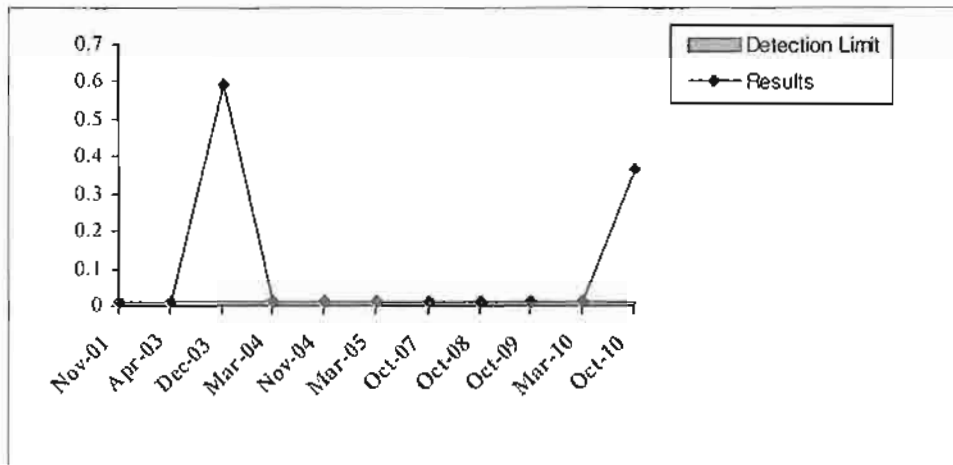


07-Dec-10

Borehole: BH302
 Borehole Series: 300 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 06/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 0.594 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 29/10/2008 | < 0.01 | mg/l | 0.01 |
| 28/10/2009 | < 0.01 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |
| 21/10/2010 | 0.368 | mg/l | 0.01 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

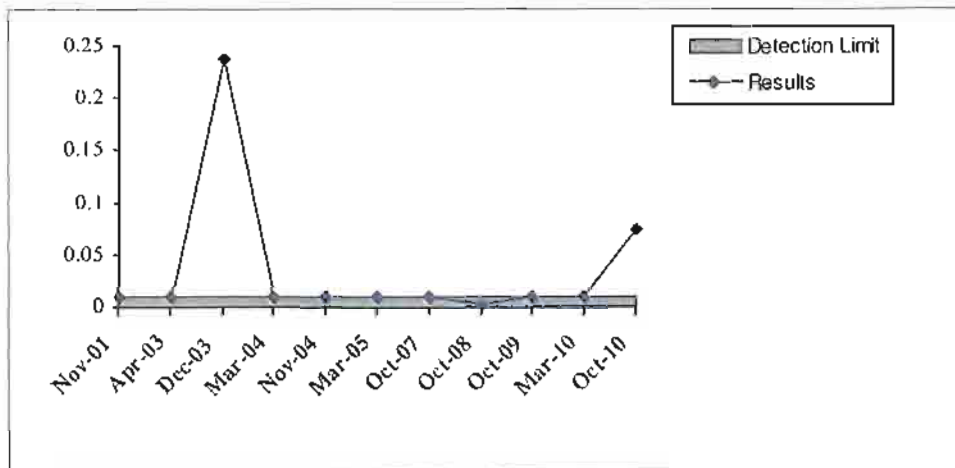


07-Dec-10

Borehole: BH302
 Borehole Series: 300 Series
 Parameter: Mineral Oils
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.05 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|------|
| 06/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 0.238 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 29/10/2008 | < 0.001 | mg/l | 0.01 |
| 28/10/2009 | < 0.01 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |
| 21/10/2010 | 0.0736 | mg/l | 0.01 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 06/11/2001 | 0.694 | mg/l | 0.01 |
| 01/12/2002 | 0.204 | mg/l | 0.01 |
| 01/04/2003 | 1.846 | mg/l | 0.01 |
| 01/12/2003 | 0.768 | mg/l | 0.01 |
| 01/03/2004 | 0.67 | mg/l | 0.01 |
| 01/11/2004 | 0.777 | mg/l | 0.01 |
| 01/03/2005 | 0.874 | mg/l | 0.01 |
| 01/11/2005 | 1.498 | mg/l | 0.01 |
| 01/03/2006 | 0.749 | mg/l | 0.01 |
| 01/10/2006 | 0.995 | mg/l | 0.01 |
| 01/03/2007 | 1.161 | mg/l | 0.01 |
| 04/10/2007 | 0.397 | mg/l | 0.01 |
| 07/03/2008 | 1.042 | mg/l | 0.01 |
| 29/10/2008 | 1.81 | mg/l | 0.01 |
| 25/03/2009 | 0.906 | mg/l | 0.01 |
| 28/10/2009 | 1.137 | mg/l | 0.01 |
| 27/01/2010 | 1.943 | mg/l | 0.01 |
| 23/03/2010 | 1.294 | mg/l | 0.01 |
| 21/10/2010 | 0.405 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

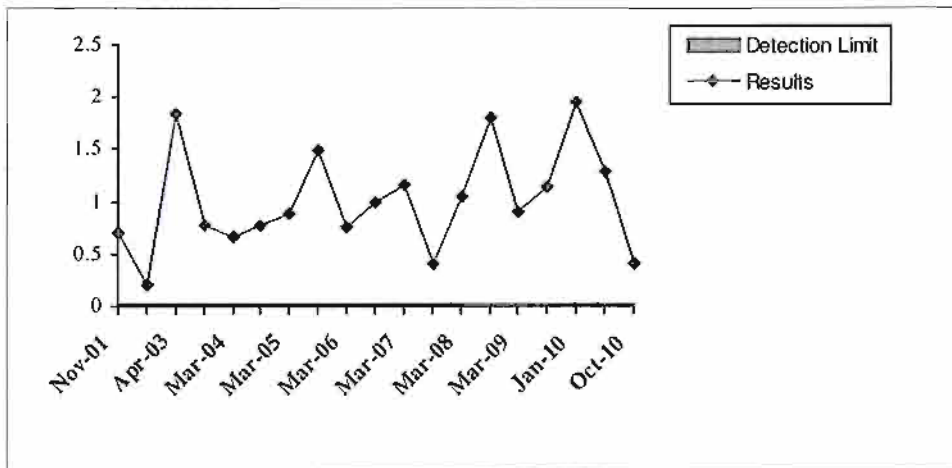


07-Dec-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 06/11/2001 | 70.155 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/12/2003 | 0.27 | mg/l | 0.01 |
| 01/03/2004 | 4.644 | mg/l | 0.01 |
| 01/11/2004 | 3.413 | mg/l | 0.01 |
| 01/03/2005 | 1.901 | mg/l | 0.01 |
| 01/11/2005 | 7.946 | mg/l | 0.01 |
| 01/03/2006 | 15.491 | mg/l | 0.01 |
| 01/10/2006 | 2.451 | mg/l | 0.01 |
| 01/03/2007 | 9.733 | mg/l | 0.01 |
| 04/10/2007 | 1.314 | mg/l | 0.01 |
| 07/03/2008 | 6.973 | mg/l | 0.01 |
| 29/10/2008 | 6.522 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 28/10/2009 | 3.149 | mg/l | 0.1 |
| 27/01/2010 | 3.379 | mg/l | 0.01 |
| 23/03/2010 | 1.368 | mg/l | 0.001 |
| 21/10/2010 | 0.327 | mg/l | 0.001 |

EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

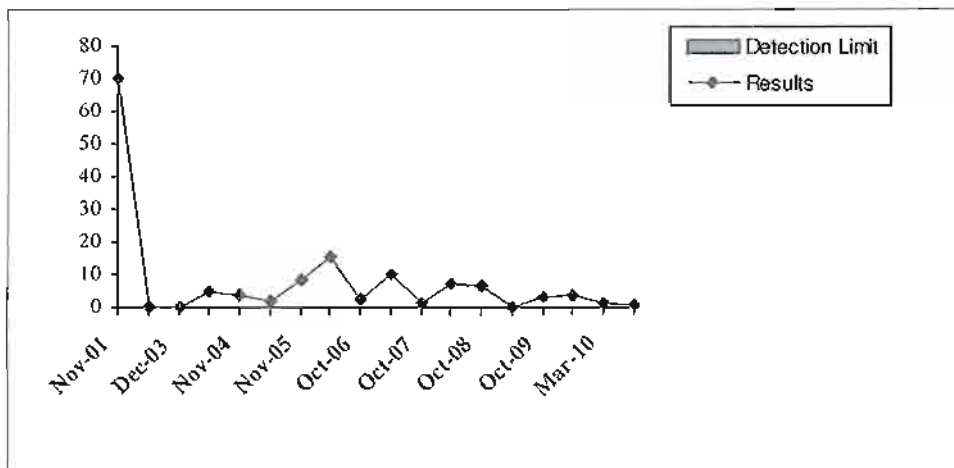


07-Dec-10

Borehole: BH307
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH309
 Borehole Series: 300 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|------|
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/10/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | 0.307 | mg/l | 0.01 |
| 01/11/2005 | 0.333 | mg/l | 0.01 |
| 01/03/2006 | 0.214 | mg/l | 0.01 |
| 01/10/2006 | 0.64 | mg/l | 0.01 |
| 01/03/2007 | 1.618 | mg/l | 0.01 |
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | 0.445 | mg/l | 0.01 |
| 29/10/2008 | 0.56 | mg/l | 0.01 |
| 25/03/2009 | 0.685 | mg/l | 0.01 |
| 28/10/2009 | 0.331 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |
| 21/10/2010 | 0.416 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

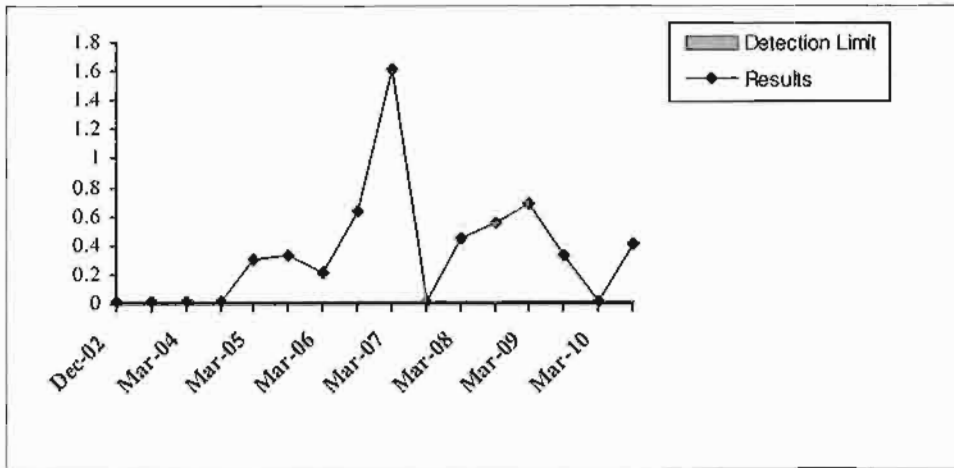


07-Dec-10

Borehole: BH309
 Borehole Series: 300 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme



07-Dec-10

Borehole: BH309
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 01/10/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | < 0.01 | mg/l | 0.01 |
| 01/03/2005 | 0.666 | mg/l | 0.01 |
| 01/11/2005 | < 0.01 | mg/l | 0.01 |
| 01/03/2006 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 29/10/2008 | 0.389 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 28/10/2009 | 0.157 | mg/l | 0.1 |
| 23/03/2010 | 0.643 | mg/l | 0.001 |
| 21/10/2010 | < 0.1 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Page 1 of 2

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

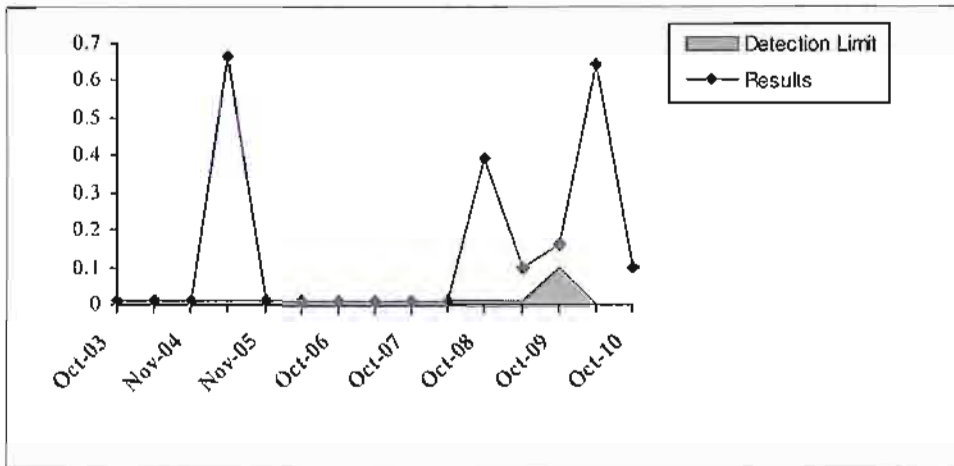


07-Dec-10

Borehole: BH309
 Borehole Series: 300 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

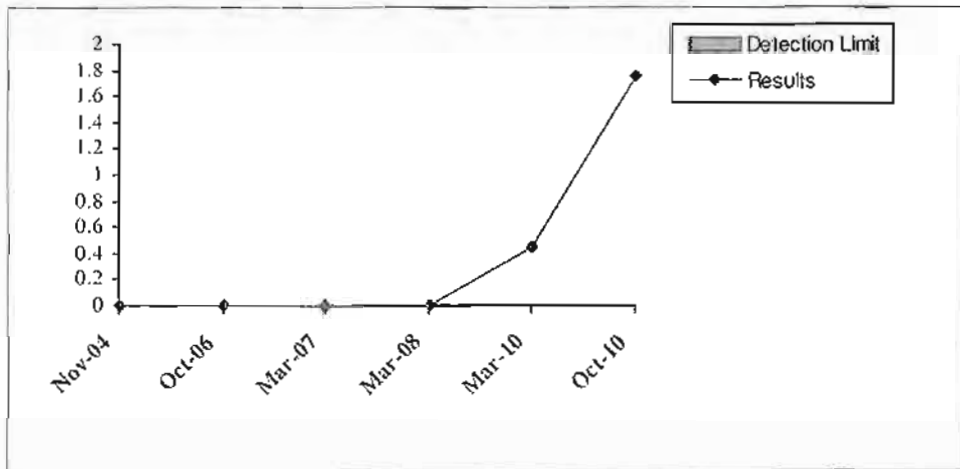


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Benzene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|-------|
| EPA IGV | 0.001 |
| EQS | 0.05 |
| Trigger Value | 0.001 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|-------|
| 01/11/2004 | < 0.001 | mg/l | 0.001 |
| 01/10/2006 | < 0.001 | mg/l | 0.001 |
| 01/03/2007 | < 0.001 | mg/l | 0.001 |
| 07/03/2008 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | 0.436 | mg/l | 0.003 |
| 21/10/2010 | 1.751 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|----------------|-------|------|
| 09/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | 0.185 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 0.029 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 0.17 | mg/l | 0.01 |
| 25/03/2009 | 0.052 | mg/l | 0.01 |
| 29/10/2009 | 0.269 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |
| 21/10/2010 | 877.909 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

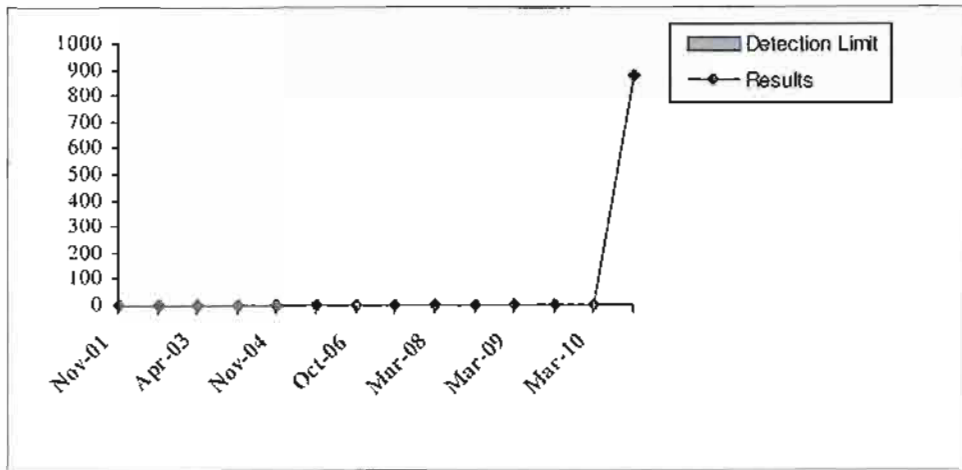


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Diesel Range Organics (DRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards.
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

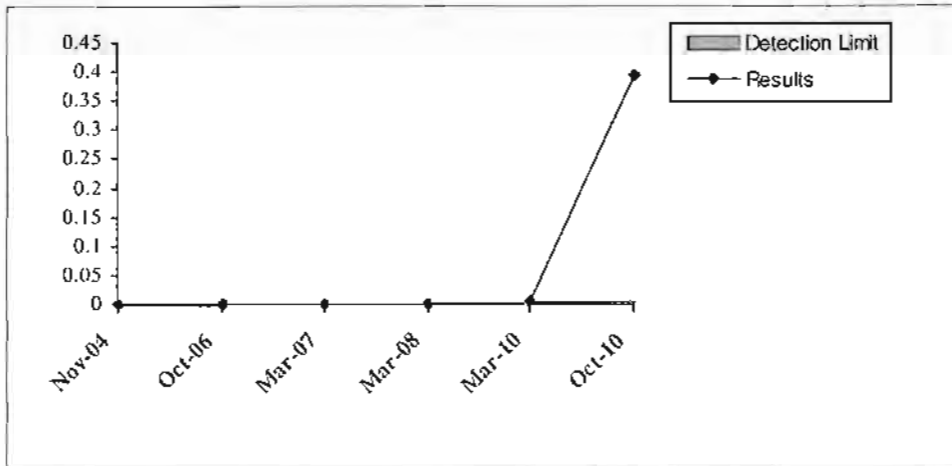


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Ethylbenzene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 01/11/2004 | < 0.001 | mg/l | 0.001 |
| 01/10/2006 | < 0.001 | mg/l | 0.001 |
| 01/03/2007 | < 0.001 | mg/l | 0.001 |
| 07/03/2008 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | 0.004 | mg/l | 0.003 |
| 21/10/2010 | 0.394 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA (IGV or EQS Standards)
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Mineral Oils
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.05 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|------|
| 09/11/2001 | < 0.01 | mg/l | 0.01 |
| 01/12/2002 | < 0.01 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | < 0.01 | mg/l | 0.01 |
| 01/11/2004 | 0.011 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | < 0.01 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.01 | mg/l | 0.01 |
| 29/10/2009 | 0.081 | mg/l | 0.01 |
| 23/03/2010 | < 0.01 | mg/l | 0.01 |
| 21/10/2010 | 614.536 | mg/l | 0.01 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

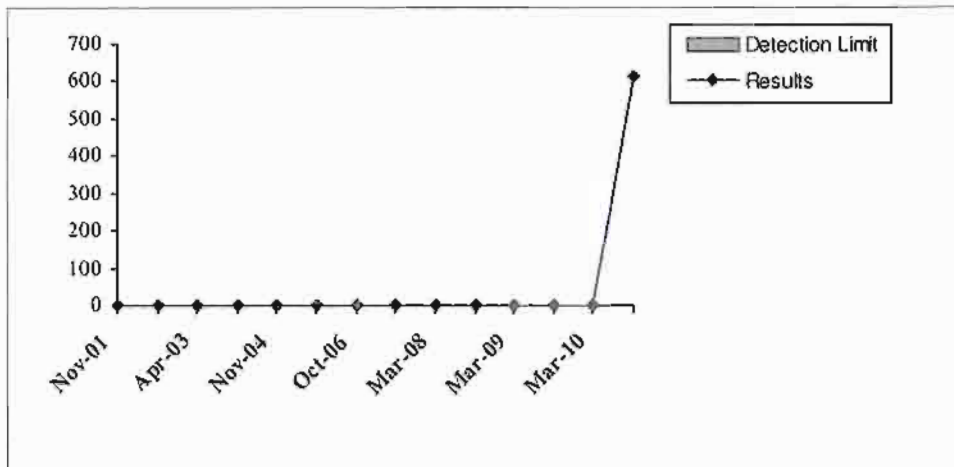


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Mineral Oils
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.05 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

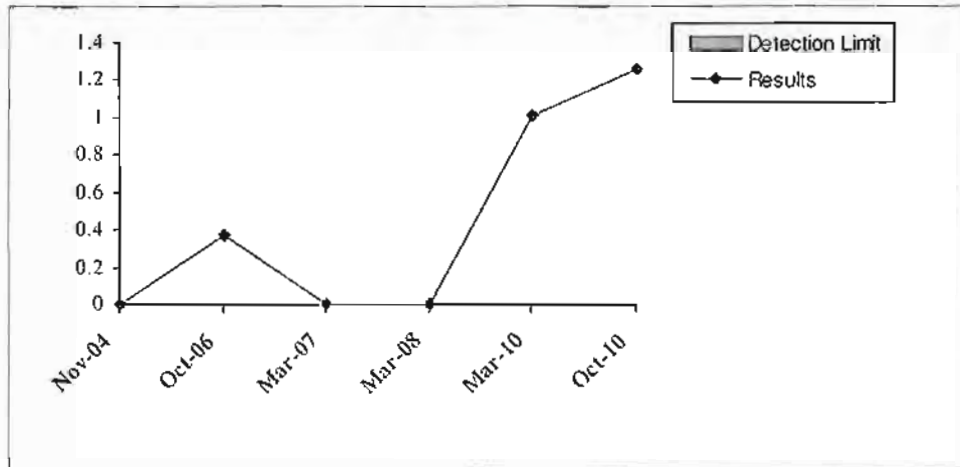


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: tert-butyl methyl ether (MTBE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|-------|
| 01/11/2004 | < 0.001 | mg/l | 0.001 |
| 01/10/2005 | 0.375 | mg/l | 0.001 |
| 01/03/2007 | < 0.001 | mg/l | 0.001 |
| 07/03/2008 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | 1.013 | mg/l | 0.002 |
| 21/10/2010 | 1.254 | mg/l | 0.002 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

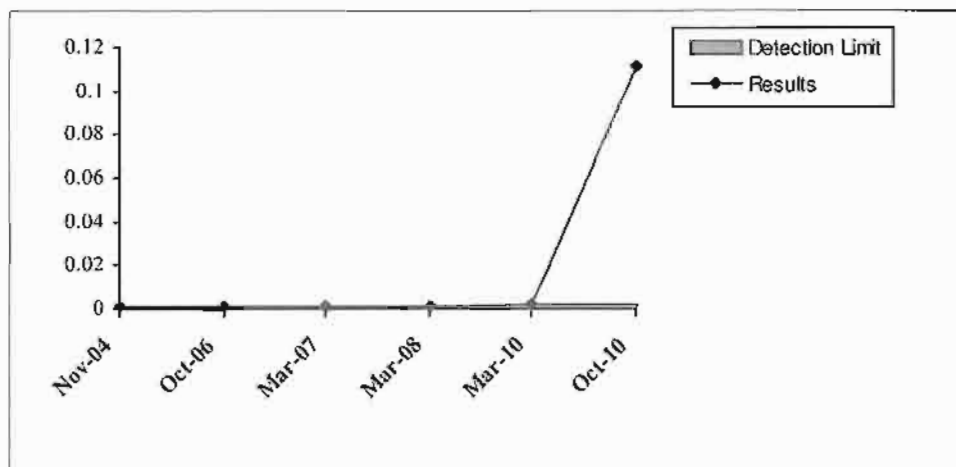


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Naphthalene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|--------|
| EPA IGV | 0.0024 |
| EQS | |
| Trigger Value | 0.0024 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 01/11/2004 | < 0.001 | mg/l | 0.001 |
| 01/10/2006 | < 0.001 | mg/l | 0.001 |
| 01/03/2007 | < 0.001 | mg/l | 0.001 |
| 07/03/2008 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | < 0.002 | mg/l | 0.002 |
| 21/10/2010 | 0.111 | mg/l | 0.002 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

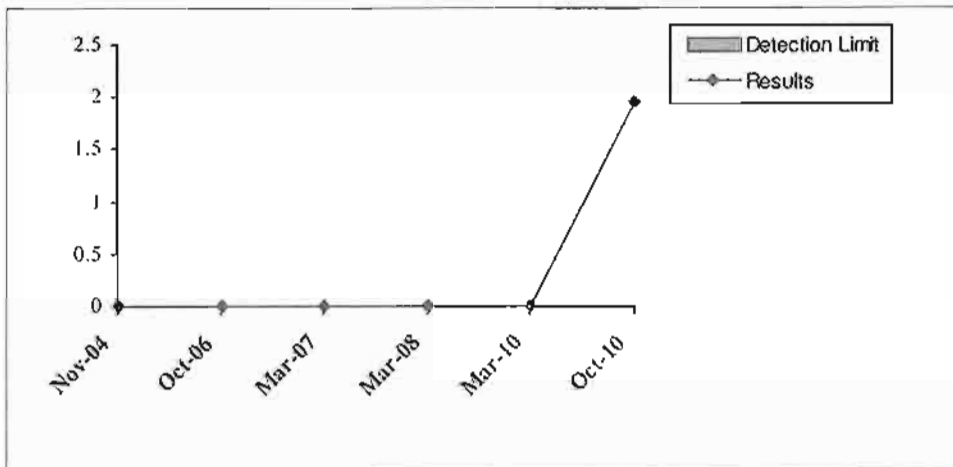


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: o-Xylene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 01/11/2004 | < 0.001 | mg/l | 0.001 |
| 01/10/2006 | < 0.001 | mg/l | 0.001 |
| 01/03/2007 | < 0.001 | mg/l | 0.001 |
| 07/03/2008 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | < 0.003 | mg/l | 0.003 |
| 21/10/2010 | 1.953 | mg/l | 0.003 |



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

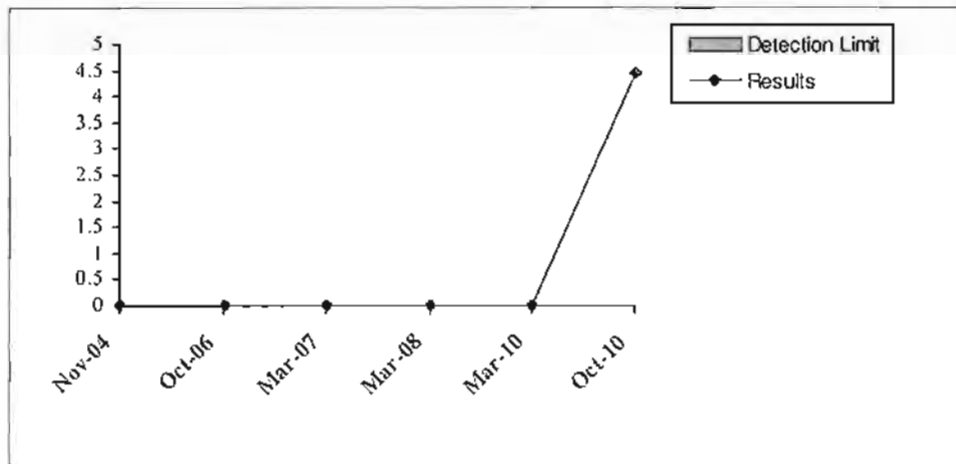


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: p/m-Xylene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 01/11/2004 | < 0.001 | mg/l | 0.001 |
| 01/10/2006 | < 0.001 | mg/l | 0.001 |
| 01/03/2007 | < 0.001 | mg/l | 0.001 |
| 07/03/2008 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | 0.001 | mg/l | 0.005 |
| 21/10/2010 | 4.436 | mg/l | 0.005 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 09/11/2001 | 2.618 | mg/l | 0.01 |
| 01/04/2003 | < 0.01 | mg/l | 0.01 |
| 01/03/2004 | 1.337 | mg/l | 0.01 |
| 01/11/2004 | 1.911 | mg/l | 0.01 |
| 01/03/2005 | < 0.01 | mg/l | 0.01 |
| 01/10/2006 | 1.602 | mg/l | 0.01 |
| 01/03/2007 | < 0.01 | mg/l | 0.01 |
| 07/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 3.219 | mg/l | 0.01 |
| 25/03/2009 | 1.85 | mg/l | 0.01 |
| 29/10/2009 | 2.77 | mg/l | 0.1 |
| 23/03/2010 | 4.328 | mg/l | 0.001 |
| 21/10/2010 | 22.233 | mg/l | 0.001 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards.
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

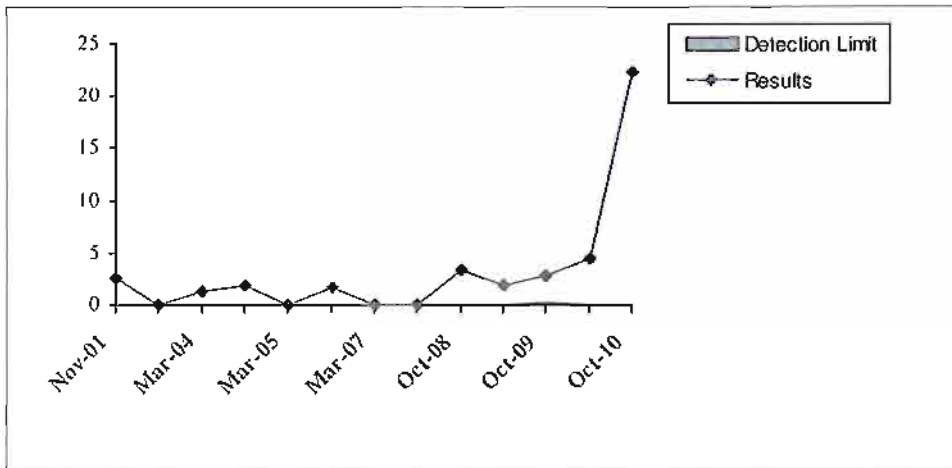


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-----|
|---------------|--------|-------|-----|



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

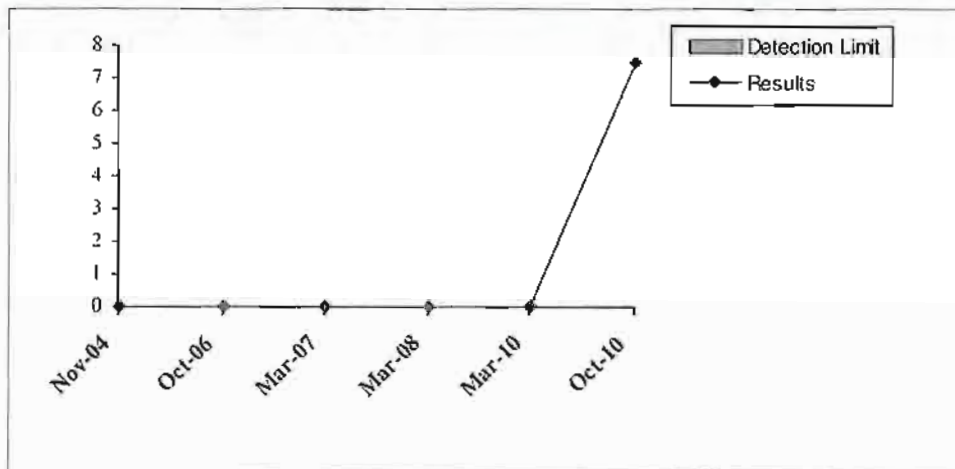


07-Dec-10

Borehole: BH502
 Borehole Series: 500 Series
 Parameter: Toluene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------|-------|
| 01/11/2004 | < 0.001 | mg/l | 0.001 |
| 01/10/2006 | < 0.001 | mg/l | 0.001 |
| 01/03/2007 | < 0.001 | mg/l | 0.001 |
| 07/03/2008 | < 0.001 | mg/l | 0.001 |
| 23/03/2010 | 0.028 | mg/l | 0.003 |
| 21/10/2010 | 7.466 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

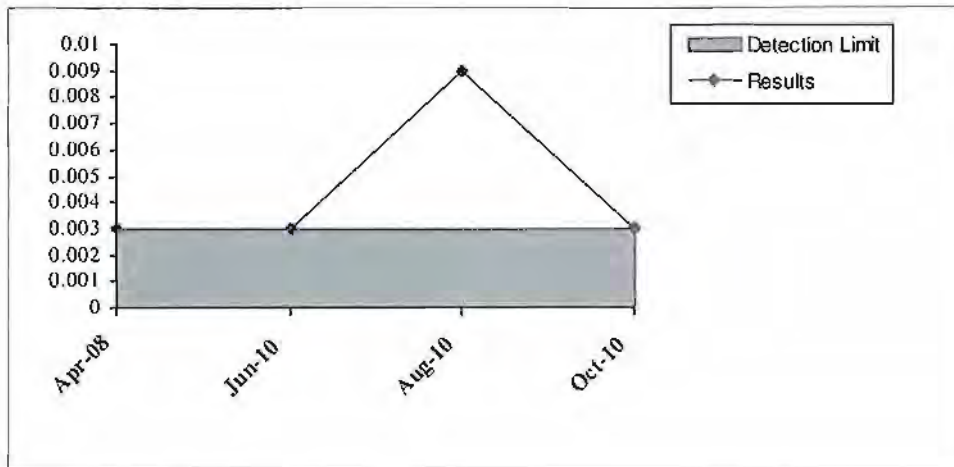


07-Dec-10

Borehole: BH609
 Borehole Series: 600 series
 Parameter: Benzene
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|-------|
| EPA IGV | 0.001 |
| EQS | 0.05 |
| Trigger Value | 0.001 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 08/04/2008 | < 0.003 | mg/l | 0.003 |
| 11/06/2010 | < 0.003 | mg/l | 0.003 |
| 12/08/2010 | 0.009 | mg/l | 0.003 |
| 21/10/2010 | < 0.003 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

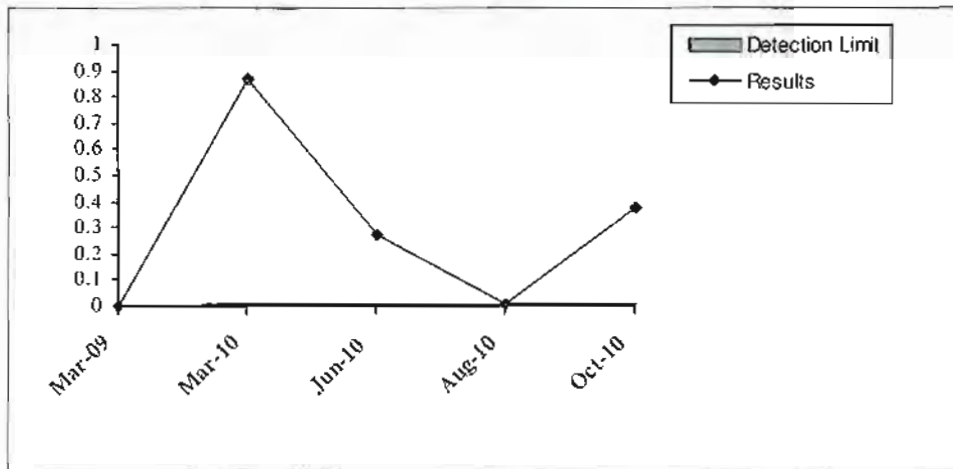


07-Dec-10

Borehole: BH609
 Borehole Series: 600 series
 Parameter: MTBE by GC
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 25/03/2009 | < 0.002 | mg/l | 0.002 |
| 23/03/2010 | 0.865 | mg/l | 0.005 |
| 11/06/2010 | 0.27 | mg/l | 0.005 |
| 12/08/2010 | < 0.005 | mg/l | 0.005 |
| 21/10/2010 | 0.373 | mg/l | 0.005 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

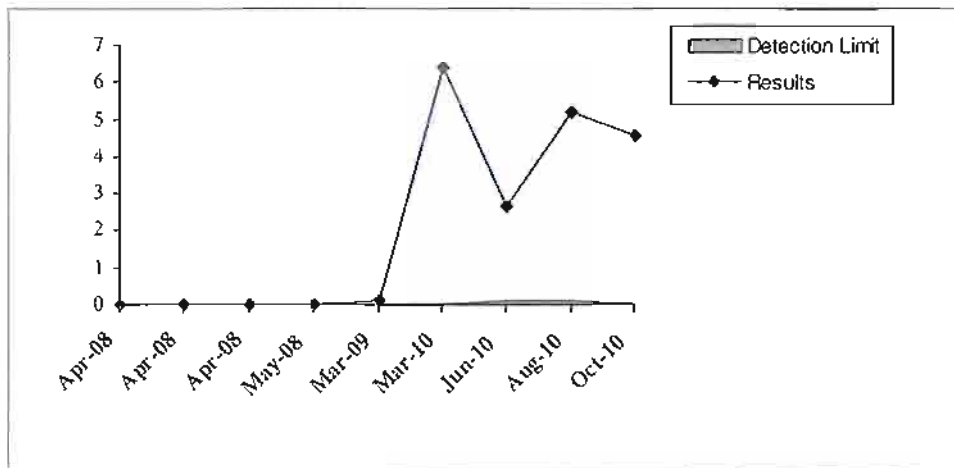


07-Dec-10

Borehole: BH609
 Borehole Series: 600 series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 08/04/2008 | < 0.01 | mg/l | 0.01 |
| 15/04/2008 | < 0.01 | mg/l | 0.01 |
| 24/04/2008 | < 0.01 | mg/l | 0.01 |
| 07/05/2008 | < 0.01 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 23/03/2010 | 6.374 | mg/l | 0.001 |
| 11/06/2010 | 2.644 | mg/l | 0.1 |
| 12/08/2010 | 5.166 | mg/l | 0.1 |
| 21/10/2010 | 4.567 | mg/l | 0.001 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: cis-1,2-Dichloroethene (cDCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 04/10/2007 | 0.025 | mg/l | 0.001 |
| 04/12/2007 | 0.052 | mg/l | 0.001 |
| 10/01/2008 | 0.029 | mg/l | 0.001 |
| 14/02/2008 | 0.011 | mg/l | 0.001 |
| 06/03/2008 | 0.019 | mg/l | 0.001 |
| 08/04/2008 | 0.022 | mg/l | 0.001 |
| 07/05/2008 | 0.054 | mg/l | 0.001 |
| 05/12/2008 | < 0.001 | mg/l | 0.001 |
| 07/01/2009 | 0.021 | mg/l | 0.003 |
| 12/02/2009 | 0.007 | mg/l | 0.003 |
| 25/03/2009 | 0.024 | mg/l | 0.003 |
| 23/04/2009 | 0.013 | mg/l | 0.003 |
| 28/05/2009 | 0.018 | mg/l | 0.003 |
| 01/07/2009 | 0.022 | mg/l | 0.003 |
| 29/07/2009 | < 0.003 | mg/l | 0.003 |
| 03/09/2009 | 0.007 | mg/l | 0.003 |
| 30/09/2009 | 0.009 | mg/l | 0.003 |
| 29/10/2009 | 0.011 | mg/l | 0.003 |
| 23/03/2010 | 0.025 | mg/l | 0.003 |
| 11/06/2010 | 0.031 | mg/l | 0.003 |
| 12/08/2010 | 0.011 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

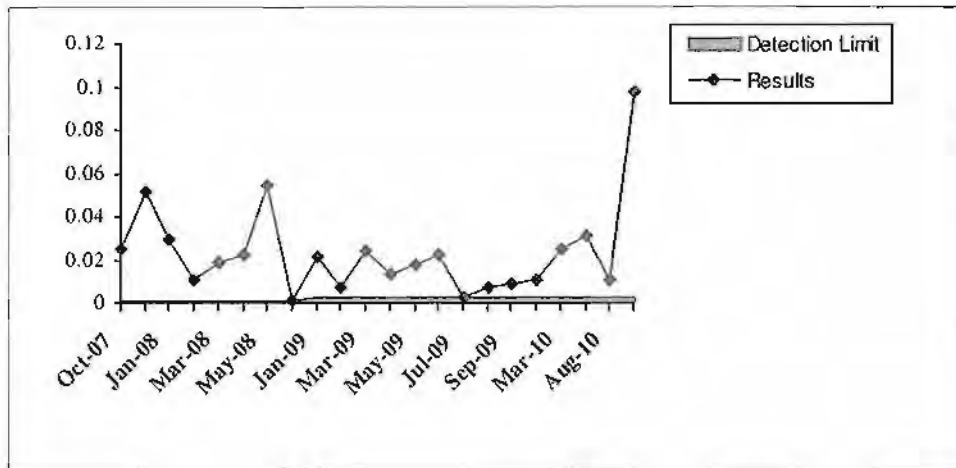


07-Dec-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: cis-1,2-Dichloroethene (cDCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.03 |
| EQS | |
| Trigger Value | 0.03 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 21/10/2010 | 0.098 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 04/10/2007 | 0.097 | mg/l | 0.001 |
| 04/12/2007 | 0.155 | mg/l | 0.001 |
| 10/01/2008 | 0.133 | mg/l | 0.001 |
| 14/02/2008 | 0.048 | mg/l | 0.001 |
| 06/03/2008 | 0.07 | mg/l | 0.001 |
| 08/04/2008 | 0.067 | mg/l | 0.001 |
| 07/05/2008 | 0.078 | mg/l | 0.001 |
| 05/12/2008 | 0.024 | mg/l | 0.003 |
| 07/01/2009 | 0.035 | mg/l | 0.003 |
| 12/02/2009 | 0.022 | mg/l | 0.003 |
| 25/03/2009 | 0.067 | mg/l | 0.003 |
| 23/04/2009 | 0.026 | mg/l | 0.003 |
| 28/05/2009 | 0.03 | mg/l | 0.003 |
| 01/07/2009 | 0.047 | mg/l | 0.003 |
| 29/07/2009 | 0.029 | mg/l | 0.003 |
| 03/09/2009 | 0.018 | mg/l | 0.003 |
| 30/09/2009 | 0.019 | mg/l | 0.003 |
| 29/10/2009 | 0.029 | mg/l | 0.003 |
| 23/03/2010 | 0.016 | mg/l | 0.003 |
| 11/06/2010 | 0.014 | mg/l | 0.003 |
| 12/08/2010 | 0.019 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

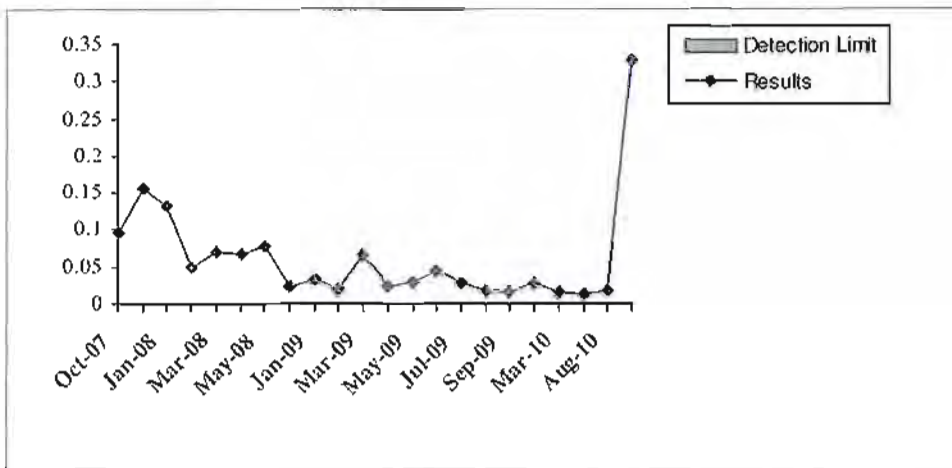


07-Dec-10

Borehole: BH701
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|-------------------|--------------|-------------|-------|
| 21/10/2010 | 0.329 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH702
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 04/10/2007 | 0.081 | mg/l | 0.001 |
| 04/12/2007 | 0.705 | mg/l | 0.001 |
| 10/01/2008 | 0.172 | mg/l | 0.001 |
| 14/02/2008 | 0.068 | mg/l | 0.001 |
| 06/03/2008 | 0.141 | mg/l | 0.001 |
| 08/04/2008 | 0.182 | mg/l | 0.001 |
| 07/05/2008 | 0.314 | mg/l | 0.001 |
| 10/09/2008 | 0.185 | mg/l | 0.001 |
| 28/10/2008 | 0.107 | mg/l | 0.001 |
| 05/12/2008 | 0.105 | mg/l | 0.003 |
| 07/01/2009 | 0.122 | mg/l | 0.003 |
| 12/02/2009 | 0.022 | mg/l | 0.003 |
| 25/03/2009 | 0.172 | mg/l | 0.003 |
| 23/04/2009 | 0.129 | mg/l | 0.003 |
| 28/05/2009 | 0.126 | mg/l | 0.003 |
| 01/07/2009 | 0.149 | mg/l | 0.003 |
| 29/07/2009 | 0.092 | mg/l | 0.003 |
| 03/09/2009 | 0.047 | mg/l | 0.003 |
| 30/09/2009 | 0.057 | mg/l | 0.003 |
| 29/10/2009 | 0.064 | mg/l | 0.003 |
| 27/01/2010 | 0.02 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**

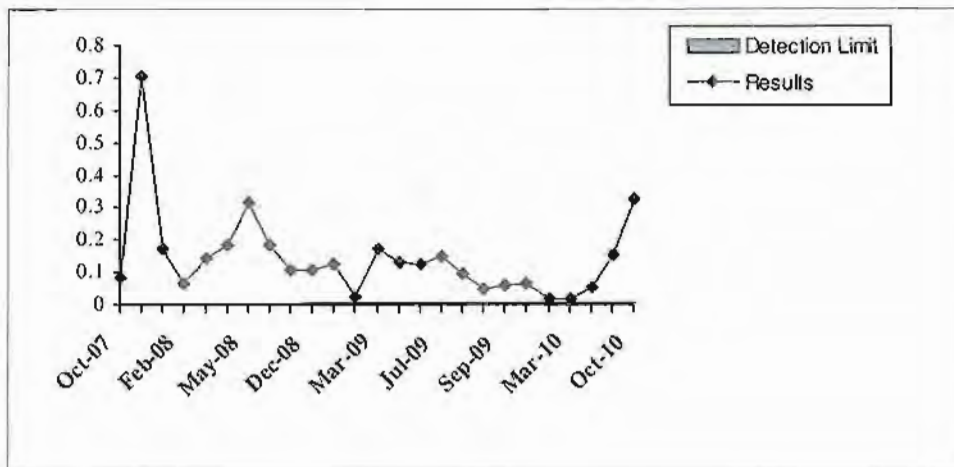


07-Dec-10

Borehole: BH702
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------|-------|-------|
| 23/03/2010 | 0.02 | mg/l | 0.003 |
| 11/06/2010 | 0.055 | mg/l | 0.003 |
| 12/08/2010 | 0.157 | mg/l | 0.003 |
| 21/10/2010 | 0.328 | mg/l | 0.003 |



EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

ConocoPhillips - Whitegate Groundwater Monitoring Programme

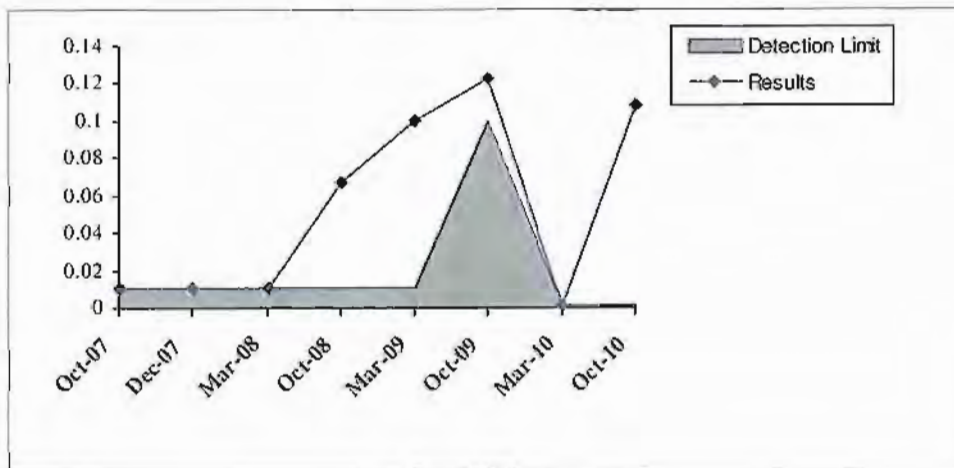


07-Dec-10

Borehole: BH703
 Borehole Series: 700 Series
 Parameter: Petrol Range Organics (PRO)
 Parameter Class: Hydrocarbon Indicators & PAHs

| Standards | |
|---------------|-----|
| EPA IGV | |
| EQS | |
| Trigger Value | 0.1 |

| Sampling Date | Values | Units | LoD |
|---------------|---------|-------|-------|
| 04/10/2007 | < 0.01 | mg/l | 0.01 |
| 04/12/2007 | < 0.01 | mg/l | 0.01 |
| 06/03/2008 | < 0.01 | mg/l | 0.01 |
| 30/10/2008 | 0.067 | mg/l | 0.01 |
| 25/03/2009 | < 0.1 | mg/l | 0.01 |
| 29/10/2009 | 0.122 | mg/l | 0.1 |
| 23/03/2010 | < 0.001 | mg/l | 0.001 |
| 21/10/2010 | 0.108 | mg/l | 0.001 |



EPA IGV:

EQS:

Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards

Results are in bold where they exceed the Trigger Value

LoD = Limit of Detection

**ConocoPhillips - Whitegate
Groundwater Monitoring Programme**



07-Dec-10

Borehole: BH703
 Borehole Series: 700 Series
 Parameter: Trichloroethene (TCE)
 Parameter Class: Volatile Organic Compounds (VOCs)

| Standards | |
|---------------|-------------|
| EPA IGV | 0.01 |
| EQS | 0.01 |
| Trigger Value | 0.01 |

| Sampling Date | Values | Units | LoD |
|---------------|--------------|-------|-------|
| 04/10/2007 | < 0.001 | mg/l | 0.001 |
| 04/12/2007 | < 0.001 | mg/l | 0.001 |
| 10/01/2008 | 0.008 | mg/l | 0.001 |
| 14/02/2008 | 0.024 | mg/l | 0.001 |
| 06/03/2008 | 0.017 | mg/l | 0.001 |
| 08/04/2008 | 0.008 | mg/l | 0.001 |
| 07/05/2008 | < 0.001 | mg/l | 0.001 |
| 30/10/2008 | 0.105 | mg/l | 0.001 |
| 05/12/2008 | 0.077 | mg/l | 0.003 |
| 12/02/2009 | 0.053 | mg/l | 0.003 |
| 25/03/2009 | 0.115 | mg/l | 0.003 |
| 28/05/2009 | 0.152 | mg/l | 0.003 |
| 01/07/2009 | 0.07 | mg/l | 0.003 |
| 29/07/2009 | 0.112 | mg/l | 0.003 |
| 03/09/2009 | 0.123 | mg/l | 0.003 |
| 30/09/2009 | 0.064 | mg/l | 0.003 |
| 29/10/2009 | 0.131 | mg/l | 0.003 |
| 27/01/2010 | 0.103 | mg/l | 0.003 |
| 23/03/2010 | 0.074 | mg/l | 0.003 |
| 11/06/2010 | 0.033 | mg/l | 0.003 |
| 12/08/2010 | 0.175 | mg/l | 0.003 |

EPA IGV:
 EQS:
 Trigger Value:

Results are in red where they exceed the EPA IGV or EQS Standards.
 Results are in bold where they exceed the Trigger Value
 LoD = Limit of Detection

Section 6 Pollution Emission Register - PER

Introduction

The Pollution Emissions Register, (PER), is an outline of pollution releases to air, effluent and waste streams, in addition to pollutants recovered.

The primary purpose of the PER is to ensure that the route of major potential pollutants is tracked.

The following PER has been prepared in accordance with Condition 2.4 of the company's IPC Licence. It covers the time period 01-01-2010 to 31-12-2010.

As specified in Licence Condition 2.4.1, the PER has been prepared in accordance with the "Guidance Note for Annual Environmental Report" issued by the EPA.

Substances included in the PER

In accordance with the AER Guidance Note, a Master List was drawn up of substances either used or generated on-site, which fall into one or more of the categories listed in the Pollution Emissions Register List (PERL). The PERL, as defined in the AER Guidance Note is based on Lists (i) and (ii) of the EC Directives 76/464/EEC on pollution to the aquatic environment and EC Directive 80/68/EEC on the protection of groundwater and on Annex III to Directive 96/61/EC concerning integrated pollution protection and control. The Master List is presented below.

Master List of PER candidate substances at ConocoPhillips Whitegate :

| List (i) substances | List (ii) substances |
|--|--|
| Persistent mineral oils and hydrocarbons | Non-persistent mineral oils and hydrocarbons |
| Perchloroethylene | Biocides / Herbicides |
| | |

From this Master List of substances, "mineral oils and hydrocarbons" was selected as the most appropriate material on which to return a full material balance for the PER.

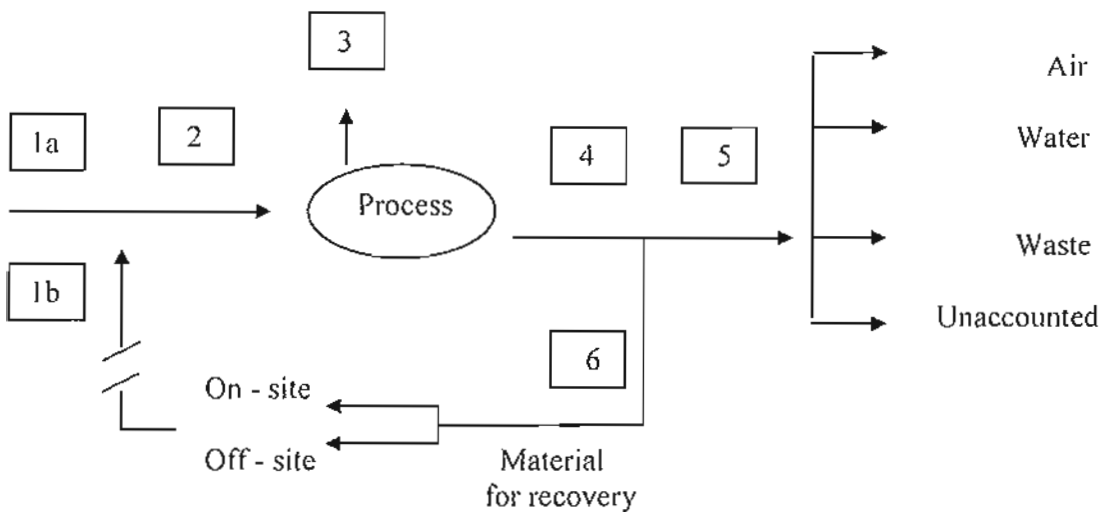
Methodology

Whitegate Refinery routinely performs mass balances on refinery operations to measure fuel consumption and product losses. Measurements of critical parameters are recorded on a continuous basis. This accurate control of oil movements is of significant commercial importance for the refinery.

The PER material balance will be based on these mass balance measurements and calculations that are already routinely performed on-site. This will integrate our economic and environmental performance.

A schematic representation of a generic PER process diagram is shown below.

Generic PER flow diagram



- 1a New Raw Material
- 1b Recovered Material
- 2 Gross Usage
- 3 Product
- 4 Gross Process Waste
- 5 Net Process waste
- 6 Material for recovery

The following describes how each stream of the above processes is measured at Whitegate.

1a – New raw materials

For the purposes of a hydrocarbon PER, new raw materials will refer to incoming crude oils, blendstocks, hydrocarbon additives and other hydrocarbon materials. The vast bulk of this category consists of incoming crude oil.

The volume of each incoming cargo is measured into independently calibrated storage tanks. Initial and final tank density measurements are performed to calculate the mass received. Any sediment or water, which was present in the cargo is measured separately and allowed for.

Thus, method of measurement: - direct measurement

1b – Recovered materials

Any recoverable oily material is held in one of the site stop tanks. These tanks allow oil / water mixtures time to settle out and oily material to gather on top of the aqueous layer. The oily material is then separated out by use of a skimming arm and reprocessed through the refining unit. The quantity of recovered material is measured on a monthly basis and included in the site mass balance.

Thus, method of measurement:- direct measurement

2 – Gross usage

Gross usage is the sum of New Materials and Recovered Materials, as described in categories 1a and 1b above.

3 - Products

- **Saleable products**

The purpose of the refining process is to convert crude oils into saleable products. Clearly, as high a proportion as possible of gross hydrocarbon usage will thus, be converted to products for optimal refinery performance.

All products from the refining process are stored in a series of dedicated product tanks. Each tank is fitted with continuous level-gauging instrumentation. Calibration of this instrumentation is carried out routinely by independent agencies. Inventory balances are carried out on a daily, monthly and annual basis. (Losses of volatile components are described under Category 5 below).

In addition to the above, all material leaving the refinery site by road tanker or by pipeline is measured by flow-meter. Flow-meters are regularly calibrated to the satisfaction of Customs & Excise who have representation on site. Variations in temperature and resulting product density are measured and allowed for.

Thus, method of measurement:- direct measurement

- **Refinery Fuel**

A percentage of refinery gasses and oils produced from incoming crude oil will be used internally as fuels to produce energy for the refining process itself. For the purposes of a PER, refinery fuel will be considered an internally used product. Fuel consumption is measured on a daily basis to optimise refinery performance.

Thus, method of measurement:- direct measurement

4 – Gross process waste

Gross process waste is a combination of Recovered Materials, as described in category 1b above and Net Process Waste which will be described in Category 5.

5 – Net process waste

5a – Air

Oil input, which is released as waste-to-air falls into a number of different categories.

- **Refinery Flare**

Excess gas produced during the refining process or which cannot be stored on-site is sent to the refinery flare for combustion. The quantity of gas flared is measured by flow-meter.

Thus, method of measurement:- direct measurement

- **Process Losses**

A quantity of fugitive volatile hydrocarbon components will be lost during the refining process through various exits in flanges, valves etc. Depending on the complexity of the site, it is generally accepted in industry standards that up to 0.05% of refinery throughput will be lost in this way.

Thus, method of measurement:- estimate by calculation

- **Tank Losses**

Losses from tanks used to store the more volatile refinery products are minimised by the use of floating roof tanks. All gasoline and light naphtha products are stored in this manner. Fugitive losses from these tanks are calculated according to the accepted international standard method: API 2517, 1989 - Evaporative loss from external floating-roof tanks. (American Petroleum Institute Standards)

Losses from cone-roofed tanks used for the storage of heavier products are calculated according to similar principles.

Thus, method of measurement:- estimate by calculation

- **Losses at Jetty**

Fugitive losses from jetty loading operations are calculated according to the accepted international standard method: API 2514a, 1981 - Atmospheric hydrocarbon emissions from marine vessel transfer operations. (American Petroleum Institute Standards)

Thus, method of measurement:- estimate by calculation

- **Losses at Road Loading**

Fugitive losses from tanker loading operations are calculated according to a modification of the standard method described above for marine operations: API 2514a, 1981. The same principles are applied and allowance is made for the workings of the Vapour Recovery Unit, which recovers approximately 98% of evaporative losses at the road loading terminal.

Thus, method of measurement:- estimate by calculation

5b – Water

Oil input, which is lost to effluent waters, outputs as one of the following:

- **Effluent from refinery skimpond**

Process waste water is directed via the sewer system to the main refinery skimpond where oil can be recovered or 'skimmed' from the pond surface. The level of hydrocarbon emissions in outlet from this effluent is measured on a daily basis. The effluent flow rate is also continuously monitored.

Fugitive losses from the skimpond surface are included in the estimation in section 5a above as process losses.

Fugitive losses from the sewer system are generally accepted to amount to 30% of recovered materials.

Thus, method of measurement:- direct measurement and estimate by calculation

- **Effluent from refinery ballast water discharge**

Discharge from this point is not continuous, it is dependent on levels of ballast intake from berthing ships. Each ballast discharged is analysed for hydrocarbon content and the quantity of ballast discharged is measured using level gauging instrumentation in the holding tank.

Thus, method of measurement = direct measurement

6 - Materials for recovery

Recoverable oily material is discussed in 1b above.

The only crude-oil generated waste sent for offsite recovery is a by-product of the desulphurisation process. Elemental sulphur is recovered from the gasoil fractions through a Sulphur Recovery Unit (SRU) and sent offsite for further processing. Gas flow rates through the SRU are continuously monitored allowing a direct measurement of the quantity of sulphur produced on a daily basis.

Thus, method of measurement:- direct measurement

Results

Mass Balance Results

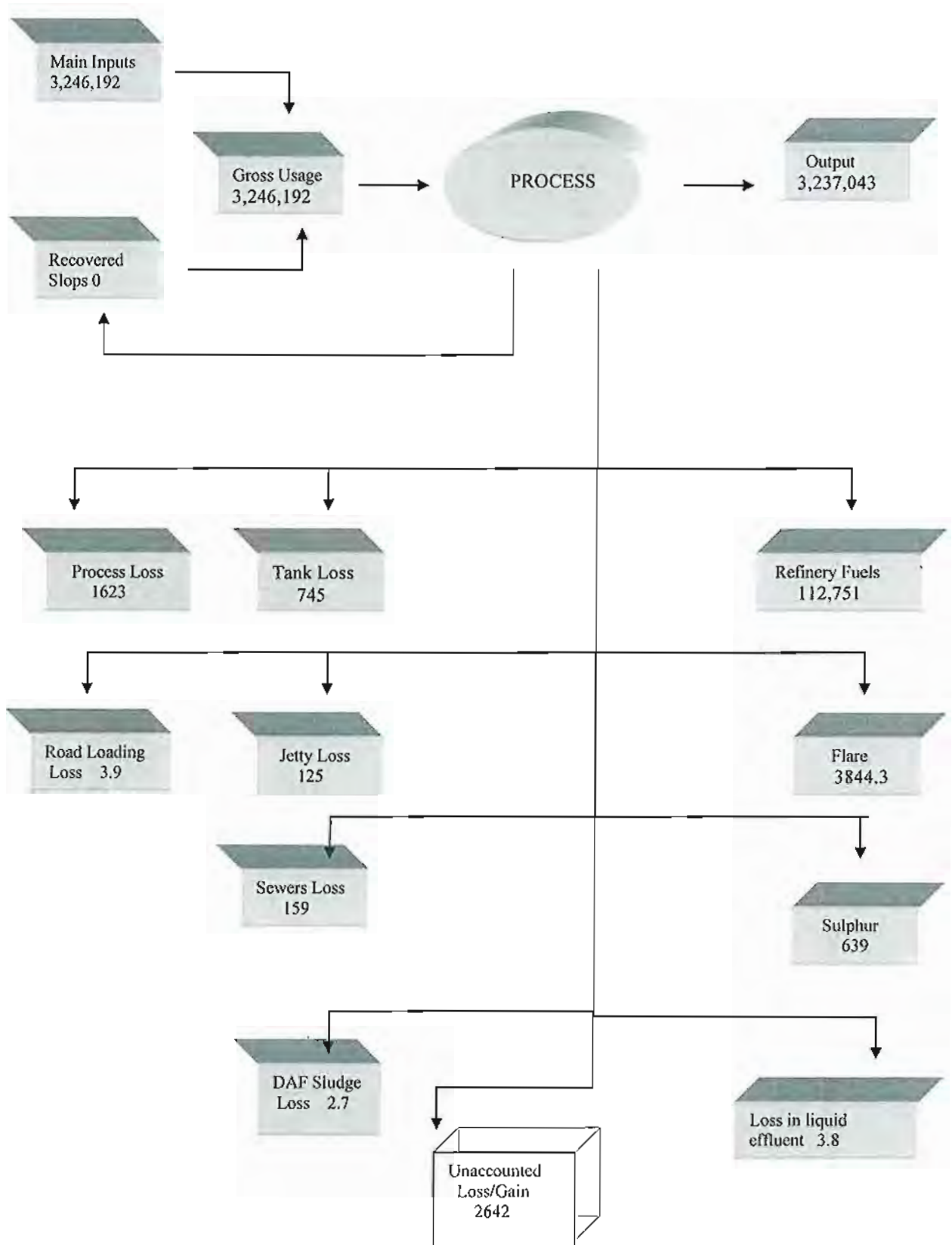
Using the data acquired as described above, the refinery hydrocarbon mass balance is as shown below. This data is also summarised in process flow format below.

Hydrocarbon Mass Balance Figures - 2010

| Inputs | Tonnes | Outputs | tonnes |
|------------------------------|------------------|------------------------|------------------|
| New crude in | 3,030,866 | Liftings | 3,123,489 |
| Pipestill slops in | 0 | Own use | 165,008 |
| Recovered slops in | 0 | Refinery fuel | 112,751 |
| Others in (blendstocks etc) | 286,207 | Inventory | |
| Change in inventory | -70,881 | Sulphur | 639 |
| | | | |
| Total inputs | 3,246,192 | | |
| Total inputs including slops | 3,246,192 | Measured output | 3,237,043 |
| | | | |
| Total Losses | 9,149 | | |
| (input – output) | | | |
| | | | |
| | | | |
| Measured losses | Tonnes | Fugitive losses | Tonnes |
| Oil in effluents | 3.8 | Process loss | 1623 |
| Flare | 3844.3 | Tank loss | 745 |
| Total measured losses | 3848.1 | Jetty loss | 125 |
| | | Road-load loss | 3.9 |
| | | Sewer loss | 159 |
| | | DAF Sludge loss | 2.7 |
| | | Total fugitive losses | 2659 |
| | | | |
| Balance | Tonnes | | |
| Total losses | 9149 | | |
| Measured losses | 3848 | | |
| Fugitive losses | 2659 | | |
| = Unaccounted loss / gain | 2,642 | | |
| | | | |

Hydrocarbon Mass Balance 2009

all values in tonnes



Mass Balance Closure

Unaccounted losses amount to 2642 tonnes over the PER timeframe. As a percentage of the combined crude oil throughput for refining and imported blendstocks, this amounts to 0.081 %. Total losses are calculated at 9149 tonnes. As a percentage of gross input, this amounts to 0.28%. This compares very favourably with the international refining industry.

Conclusions

As evidenced from the mass balance closure figures above, a relatively small proportion of hydrocarbon input to the refinery is unaccounted for over the timeframe of the PER. The unaccounted losses that do exist can be assigned to measurement errors, the main reason being crude import & product sales measurement errors. Inaccuracies in other site measurements will also contribute to a lesser degree. It is not envisaged that any of the above, unaccounted losses are in any way physical losses.

Section 7 Waste Management Report

The type and quantities of waste generated by the refinery site in the year 2010 are summarised in the tables below.

The site register of waste contractors is also presented.

| Waste Summary | 2010 | units |
|---|-------------|--------------|
| total quantity of waste produced in year | 1981 | tonnes |
| total quantity of waste disposed of on-site | 0 | tonnes |
| total quantity of waste disposed of off-site | 1981 | tonnes |
| total quantity of waste recovered on-site | 0 | tonnes |
| total quantity of waste recovered off-site | 1078 | tonnes |
| | | |
| quantity of non-hazardous waste produced in year | 1283 | tonnes |
| quantity of non-hazardous waste disposed of on-site | 0 | tonnes |
| quantity of non-hazardous waste disposed of off-site | 1283 | tonnes |
| quantity of non-hazardous waste recovered on-site | 0 | tonnes |
| quantity of non-hazardous waste recovered off-site | 1076 | tonnes |
| | | |
| quantity of hazardous waste produced in year | 698 | tonnes |
| quantity of hazardous waste disposed of on-site | 0 | tonnes |
| quantity of hazardous waste disposed of off-site | 698 | tonnes |
| quantity of hazardous waste recovered on-site | 0 | tonnes |
| quantity of hazardous waste recovered off-site | 0 | tonnes |

Note: Hazardous waste off-site disposal increased from 177 tonnes in 2009 resulting from shipment of spent caustic to ENVA, Shannon for treatment & disposal.

Additional waste detail is available in section 13 of this report.

Register of Approved Contractors for Waste Disposal

| Disposal of | Company | relevant licensed activity | Type of Authorisation | Permit / Licence Number | Issue Date | Issuing Authority |
|---|---|---|---|---|-------------------|------------------------------------|
| metals | AVR/Salway Ltd | storage & packaging – lead acetates | Waste Licence | 88 - 1 | 27 September 2009 | EPA |
| metals | Southern Transport Ltd | collection: industrial - hazardous | Waste Collection Permit | CK WMAC 07 - 01 | 12 June 2002 | CoR Co Co |
| batteries | Reunibat | recovery of scrap metal and recovery of waste containing mercury | Waste Management Permit | 97 - 2002 | 2902 | Kilgore Co Co |
| fluorescent tubes | Reunibat | refrigeration: batteries - hazardous | Waste Collection Permit | CK WMAC 80 - 1 | 17 June 2002 | CoR Co Co |
| fluorescent tubes | Irish Lamp Recycling Co | collection: commercial, industrial non-haz and fluorescent tubes - hazardous | Waste Management Permit | 02 - 2000A | 07 February 2002 | Kilgore Co Co |
| fluorescent tubes | Irish Lamp Recycling Co | recovery of scrap metal and recovery of waste containing mercury | Waste Collection Permit | CK WMAC 57 - 01 | 14 June 2002 | CoR Co Co |
| waste oils | Atlas Ireland | collection: waste oils - hazardous | Waste Collection Permit | CK WMAC 16 - 01 | 04 July 2002 | Loos Co Co |
| waste oils | Atlas Ireland | hazardous waste transfer facility | Waste Licence | 134 - 1 | 27-Jun-00 | EPA |
| waste oils | Atlas Ireland | biological and physico-chemical treatment, storage, oil-re-refining | Waste Licence | 134 - 1 | 27-Jun-00 | EPA |
| chemicals, oily wastes, electronics | AVR-Salway Ltd | storage, blending, physico-chemical treatment, repackaging | Waste Licence | 50-1 | 27 Sep 2002 | EPA |
| chemicals, oily wastes, electronics | Southern Transport Ltd | collection: industrial - hazardous | Waste Collection Permit | CK WMAC 07 - 01 | 12 June 2002 | CoR Co Co |
| chemicals, oily wastes | CoR Waste Management | haz-waste transfer station | Waste Licence | 185-1 | 27 Apr 2004 | EPA |
| chemicals, oily wastes | CoR Waste Management | storage, blending, physico-chemical treatment, repackaging, recycling & installation of inorganics, organics & metals | Waste Licence | 185-1 | 27 Apr 2004 | EPA |
| chemicals, oily wastes | RYE Umwelt Betriebs GmbH | incineration & other processes as specified in Anordnung über das Entsorgungswerk | Waste Licence | 185-1 | 27 Apr 2004 | EPA |
| chemicals, oily wastes | Compy Ring No.C7D000000 | acceptance of hazardous waste including EMC 05 category waste | Waste Licence | 185-1 | 27 Apr 2004 | EPA |
| chemicals, oily wastes | Blenderger Abfallentsorgungsgesellschaft mbH, Interberg | acceptance of hazardous waste including EMC 05 category waste | Waste Licence | 185-1 | 27 Apr 2004 | EPA |
| chemicals, oily wastes | Johnson Haulage Co Ltd | collection: industrial - hazardous waste | Waste Collection Permit | CK WMAC 59 - 01 | 10 June 2002 | CoR Co Co |
| chemicals, oily wastes | Solechem, Shannon Environmental Services Ltd | storage, blending, physico-chemical & biological treatment, reclamation of metals, organic & inorganics, re-refining of oils | Waste Licence | 41 - 1 | 05 May 2000 | EPA |
| chemicals, oily wastes | Shannon Environmental Services Ltd | collection: industrial-haz, biomedical, flammable, batteries | Waste Collection Permit | CK WMAC 30 - 01 | 07 May 2002 | CoR Co Co |
| chemicals, oily wastes | Enya Ireland | waste oils | Waste Licence | VM0745-02 | 19-Jun-06 | EPA |
| Clinical Wastes | Tinsdale Ltd | Collection and disposal of clinical wastes | Waste Collection Permit | CK WMAC 08/01 | 17-May-02 | CoR Co Co |
| spent catalyst | Catalyst Recovery Europe, Luxembourg | recycling of catalysts | Catalyst Regeneration Operations | Permit No 1/98/0204 Luxembourg | 30 December 1998 | Ministry of Environment Luxembourg |
| spent catalyst | Sedric N.V., Belgium | transfer and recycling of catalysts | Catalyst Transfer and Regeneration Operations | Decision of the Province of Ost-Vlanderen | 27 Nov 1997 | Province of Ost-Vlanderen Belgium |
| waste paper & IT equipment | Rehab - Information Security/Management | glass, steel cans, aluminium cans, paper, IT equipment - non-haz | Waste Management Permit | 08 - 04 (Reg No 639) | 10 Aug 2004 | CoR Co Co |
| waste paper & IT equipment | Rehab - Information Security/Management | electrical & electronic equipment, paper & cardboard, plastic | Waste Management Permit | WPR - 033 | 04 Nov 2003 | South Dublin Co Co |
| waste paper & IT equipment | Rehab - Information Security/Management | collection: commercial, industrial, household, electrical, non-haz | Waste Collection Permit | CK WMAC 146 - 03 | 25 July 2003 | CoR Co Co |
| scrap metal | CoR Metal Company Ltd | recycling / reclamation of metals and metal compounds | Waste Management Permit | 08-01 | 17 April 2002 | CoR Co Co |
| scrap metal | CoR Metal Company Ltd | storage & re-refining prior to disposal | Waste Collection Permit | CK WMAC 26-01 | 23 May 2002 | CoR Co Co |
| scrap equipment | Reynold Products Ltd | collection: industrial waste (scrap metal), non-haz only | Waste Collection Permit | TNE/278227/08 | 23-Jul-04 | Environment Agency |
| liquid waste | KIK Metals Recycling Ltd | recovery of metals (lead & non-haz) | Waste Licence | 143 - 1 | 20 December 2001 | EPA |
| liquid waste | KIK Metals Recycling Ltd | collection: commercial, industrial - hazardous, metals - hazardous | Waste Collection Permit | CK WMAC 94 - 01 | 11 June 2002 | CoR Co Co |
| scrap metal | Omex Agri Fertilisers | fertiliser manufacture | Agreement with EPA | L 143 (Operation Licence) | 22 July 1992 | Uncollected Co Co UK |
| scrap metal | Nature's Choice Compost | blending | Waste Management Permit | WPR 026 - 02 | 23 February 2003 | Levin Co Co |
| scrap metal | OTDarewin Transport | collection: industrial, non-hazardous waste | Waste Collection Permit | CK WMAC 115 - 02 | 18 July 2002 | CoR Co Co |
| general municipal | Malden Ship Hire | collection: household, commercial, industrial & sludge non-hazardous | Waste Collection Permit | CK WMAC 86 - 01 | 09 July 2002 | CoR Co Co |
| general municipal | ypede | collection: household, commercial, industrial & sludge non-hazardous | Waste Collection Permit | CK WMAC 10 - 01 | 07 May 2002 | CoR Co Co |
| general municipal | ypede | storage, blending & reprocessing, recycling & reclamation of metals, organics (excluding solvents and including composting & bioprocessing) & inorganics, non-haz | Waste Licence | 173 - 1 | 09 Sep 2003 | EPA |
| construction & demolition waste | Lotius Civil Eng Ltd | recovery of soil, stone, concrete, bricks, tiles & ceramics | Waste Permit | CK(S) 121/04 | 17/08/2004 | CoR Co Co |
| construction & demolition waste | Lotius Civil Eng Ltd | collection: cold waste | Waste Collection Permit | CK WMAC 150/03 | 09/06/2003 | CoR Co Co |
| construction & demolition waste | Martin O'Riordan | collection: industrial cold waste | Waste Collection Permit | CK WMAC 180/03 | 09/06/2003 | CoR Co Co |
| fly ash/contaminated - yellow classification BS | Ballygowry Landfill | licensed landfill | Waste Licence | W4076-03 | 15/05/2006 | EPA |

Section 8 Noise Monitoring

In accordance with Condition 8.3 of the IPPC Licence an annual noise survey has been carried out in 2010 to demonstrate compliance with Condition 8.1.1 and 8.1.2. In addition, the refinery underwent a planned shutdown of the processing units for the duration of 6 days in August 2010. A perimeter noise survey was also commissioned during this shutdown.

The surveys found the site to be in full compliance with the conditions of the IPPC License. The detailed results of the noise assessments and comparison between “running” & shutdown refinery noise levels are presented in the following pages.



The EDPAC Building, Carrigaline Industrial Estate, Carrigaline, Co. Cork.
Tel: + 353 (0)21 437 2850 Fax: + 353 (0)21 437 3975

2010 CONOCO PHILLIPS ANNUAL IPPC ENVIRONMENTAL NOISE SURVEY

Technical Report Prepared For

**John O' Keeffe
Conoco Phillips
Whitegate Oil Refinery
Whitegate
Co. Cork**

Technical Report Prepared By

Niall Vaughan, BSc, AMIOA

CLV Reference

NV/01092010NR01

Date of Issue

1st September 2010

EXECUTIVE SUMMARY

The Conoco Phillips oil refining facility in Whitegate, Co. Cork is subject to an Integrated Pollution Prevention Control (IPPC) licence which is issued by the Environmental Protection Agency (EPA). Under the terms of this licence the facility is required to have an annual environmental noise survey conducted at designated noise monitoring locations. There are four noise sensitive monitoring locations and one on site monitoring location. The specifics of these locations are detailed within this report. The purpose of this survey is to assess compliance with the noise criteria as stipulated in the Conoco IPPC licence.

Conoco commissioned CLV Consulting to conduct their 2010 annual environmental noise survey. The survey was carried out during the month of August 2010. For the duration of the survey it is understood that the facility was operating under normal production conditions. It can be concluded from the noise levels and observations during the survey that the Conoco facility would meet compliance with the appropriate noise sections of their IPPC Licence

Report Prepared By:

Niall Vaughan

NIALL VAUGHAN
Acoustic Consultant

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1.0 INTRODUCTION

Conoco Phillips operates an industrial oil refining facility at Whitegate, Co. Cork. The facility is licensed by the EPA and under the terms of this IPPC licence they are obliged to submit an Annual Environmental Report (AER). One of the requirements of the Conoco Phillips AER is that an environmental noise survey be carried out at the facility. The purpose of this survey is to quantify the noise levels emanating from the facility to the local receiving environment and to assess compliance with their IPPC Licence in relation to noise. CLV Consulting Limited has been commissioned to conduct the annual environmental noise survey at the Conoco Phillips facility.

This report seeks to meet the Annual Environmental Reporting (AER) requirements of the Conoco Phillips IPPC licence and determine the current ambient levels at the noise monitoring locations. Condition 8 of Conoco Phillips IPPC Licence sets out the following requirements in relation to noise:

- Activities on-site shall not give rise to noise levels off site at noise-sensitive locations that are in excess of the following limits:

Daytime (08:00hrs to 22:00hrs) – 55dB $L_{Aeq, 15min}$

Night-time (22:00hrs to 08:00hrs) – 45dB $L_{Aeq, 15min}$

- There shall be no clearly audible tonal or impulsive components at any noise-sensitive locations.
- A noise survey of site operations shall be carried out on an annual basis.

2.0 SURVEY DETAILS AND RESULTS

An environmental noise survey was conducted in order to assess the existing noise environment. The survey was conducted generally in accordance with ISO 1996: 1982: *Acoustics – Description and measurement of environmental noise* and the Environmental Protection Agency document *Environmental Noise Survey Guidance Document*. Specific details are set out below.

2.1 Choice of Measurement Locations

Five measurement locations were selected on and near the Conoco Phillips site boundary and are described below. Figure 1 shows their approximate positions.

- Position 1** Located on the main entrance road to the Conoco Phillips site. A number of houses are located to the east of this monitoring position.
- Position 2** Located at the front gate of Whitegate National School north east of the site. This is a noise sensitive location.
- Position 3** It should be noted that since the 2005 noise survey the noise monitoring equipment was located in the front garden of a private residence. This location is approximately 30m nearer to the facility than the normal Position 3. This move was originally requested by the occupants of the private residence however the residence is now un-occupied. This is a noise sensitive location and has a direct line of sight to the facility.
- Position 4** Is on the Conoco Phillips site itself, southwest of the main plant area.
- Position 5** Situated on a residential area opposite national school on the outskirts of the village of Whitegate. This is a noise sensitive location.

2.2 Survey Periods

Measurements were conducted over the course of two survey periods as follows:

- 09:00hrs to 18:30hrs on 26th August 2010;
- 22:50hrs on 26th August to 03:00hrs on 27th August 2010;

During the survey periods noted above the facility was in full operation.

The weather for the duration of the survey periods was dry and calm.

2.3 Personnel and Instrumentation

Niall Vaughan (CLV) conducted the noise level measurements during both the daytime and night-time survey periods.

The measurements were conducted using a Larson Davis Type 824 Sound Level Meter. Before and after the survey the measurement apparatus was check calibrated using a Larson Davis Type 250 Sound Level Calibrator.

2.4 Procedure

Measurements were conducted on a cyclical basis for the survey periods. Sample periods were 15 minutes long during both daytime and night-time periods. The results were saved to the instrument memory, where appropriate, for later analysis. Survey personnel noted all primary noise sources contributing to noise build-up.

2.5 Measurement Parameters

The survey results are presented in terms of the following five parameters:

- L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
- L_{Amax} is the instantaneous maximum sound level measured during the sample period.
- L_{Amin} is the instantaneous minimum sound level measured during the sample period.
- L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
- L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing.

All sound levels in this report are expressed in terms of decibels (dB) relative to 2×10^{-5} Pa.

2.6 Survey Results

2.6.1 Position 1

The results of measurements conducted at Position 1 are summarised in Table 1.

| Ref. | Start Time | Period | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|------|------------|--------|---|------------|------------|-----------|-----------|-----------------------------------|
| | | | L_{Aeq} | L_{Amax} | L_{Amin} | L_{A10} | L_{A90} | |
| 1 | 09:05 | Day | 55 | 75 | 40 | 56 | 43 | Road traffic. Facility. Birdsong. |
| 6 | 10:38 | | 53 | 72 | 40 | 52 | 42 | |
| 11 | 14:00 | | 54 | 81 | 40 | 53 | 41 | |
| 12 | 15:38 | | 56 | 80 | 39 | 55 | 41 | |
| 21 | 22:59 | Night | 44 | 65 | 40 | 46 | 41 | Facility. Road traffic. |
| 22 | 01:46 | | 49 | 68 | 38 | 50 | 40 | |

Table 1 Summary of results for Position 1

Noise emanating from traffic movements on the refinery approach road was the most dominant noise source during the daytime period. A significant volume of this traffic is comprised of road tanker traffic. Due to their size, and the approach road being uphill, there is a considerable amount of noise

associated with their movements. The refinery and birdsong noise were audible as background noise sources. The noise levels at this location were in the range of 53dB to 56dB L_{Aeq} and 41dB to 43dB L_{A90} .

The Conoco facility was regarded as the dominant noise source for the night-time period. During the night-time periods two road tanker movements contributed to the ambient noise environment. The noise emissions from the refinery were observed as broadband when viewed on the frequency spectrum. The noise levels at this location were in the range of 44dB to 49dB L_{Aeq} and 40dB to 41dB L_{A90} .

No impulsive or clearly audible tonal components were audible from site noise emissions at this location during the monitoring periods.

2.6.2 Position 2

The results for the measurements conducted at Position 2 are summarised in Table 2 below.

| Ref. | Start Time | Period | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|------|------------|--------|---|------------|------------|-----------|-----------|---|
| | | | L_{Aeq} | L_{Amax} | L_{Amin} | L_{A10} | L_{A90} | |
| 2 | 09:24 | Day | 58 | 77 | 41 | 60 | 45 | Road traffic. Children playing. Birdsong. |
| 7 | 10:58 | | 56 | 79 | 39 | 57 | 44 | |
| 13 | 14:19 | | 56 | 78 | 42 | 55 | 45 | |
| 14 | 16:00 | | 57 | 73 | 39 | 61 | 42 | |
| 23 | 23:18 | Night | 42 | 55 | 35 | 44 | 38 | Neighbouring facility. Local traffic. Facility. |
| 24 | 02:06 | | 43 | 62 | 33 | 45 | 37 | |

Table 2 Summary of results for Position 2

The ambient daytime noise environment at Position 2 was chiefly dominated by road traffic movements from the adjacent R630 and the refinery approach road. Background noise included children playing in a nearby playground, which is approximately 75m from the monitoring location, and birdsong. The noise levels at this location were in the range of 56dB to 58dB L_{Aeq} and 42dB to 45dB L_{A90} .

A "humming" noise emanating from a neighbouring facility was noted as the principal noise source for the night-time periods. A tonal component, which was thought to be associated with the "humming" noise, was present on the frequency spectrum at 315Hz. Operations from the refinery were regarded as a background noise source. A small amount of distant local traffic movements contributed to the L_{Aeq} values. The noise levels at this location were in the range of 42dB to 43dB L_{Aeq} and 37dB to 38dB L_{A90} .

No impulsive or clearly audible tonal components were audible from site noise emissions at this location during the monitoring periods.

2.6.3 Position 3

The results for the measurements conducted at Position 3 are summarised in Table 3 below.

| Ref. | Start Time | Period | Measured Noise Levels (dB re. 2×10^{-5} Pa) | Comments |
|------|------------|--------|---|----------|
|------|------------|--------|---|----------|

| | | | L _{Aeq} | L _{Amax} | L _{Amin} | L _{A10} | L _{A90} | |
|----|-------|-------|------------------|-------------------|-------------------|------------------|------------------|---------------------|
| 4 | 10:12 | Day | 47 | 65 | 40 | 47 | 43 | Facility. Birdsong. |
| 9 | 11:47 | | 47 | 63 | 43 | 49 | 44 | |
| 17 | 15:08 | | 49 | 71 | 42 | 48 | 44 | |
| 18 | 16:48 | | 46 | 59 | 40 | 48 | 44 | |
| 27 | 00:09 | Night | 34 | 51 | 30 | 34 | 33 | Facility. |
| 28 | 02:57 | | 33 | 49 | 31 | 33 | 32 | |

Table 3 Summary of results for Position 3.

Noise emissions from the production activities within the Conoco site were noted as being the foremost noise source during the daytime measuring periods. Birdsong noise coming from the nearby fields and hedges and noise from sea birds were audible as background sources. The noise levels at this location were in the range of 46dB to 49dB L_{Aeq} and 43dB to 44dB L_{A90}.

The Conoco Phillips oil refinery was again perceived as the dominant source for the duration of the night-time survey periods. The noise emissions from the refinery were steady state and were broadband in characteristic on the frequency spectrum. The noise levels at this location were in the range of 33dB to 34dB L_{Aeq} and 32dB to 33dB L_{A90}.

No impulsive or clearly audible tonal components were audible from site noise emissions at this location during the monitoring periods.

2.6.4 Position 4

The results for the measurements conducted at Position 4 are summarised in Table 4 below.

| Ref. | Start Time | Period | Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa) | | | | | Comments |
|------|------------|--------|---|-------------------|-------------------|------------------|------------------|-----------|
| | | | L _{Aeq} | L _{Amax} | L _{Amin} | L _{A10} | L _{A90} | |
| 5 | 12:45 | Day | 55 | 75 | 49 | 56 | 52 | Facility. |
| 10 | 13:06 | | 55 | 61 | 52 | 56 | 53 | |
| 19 | 18:22 | | 54 | 61 | 51 | 55 | 53 | |
| 20 | 18:30 | | 54 | 63 | 50 | 56 | 52 | |
| 29 | 00:44 | Night | 52 | 59 | 47 | 53 | 50 | |
| 30 | 01:00 | | 51 | 59 | 48 | 52 | 50 | |

Table 4 Summary of results for Position 4

The daytime and night-time ambient noise environment at this location was dominated by the various Conoco Phillips production activities. A neighbouring facility, which is located in close proximity to this location, was not operating and hence there was no noise impact from it. The noise emissions from the refinery were steady state and were broadband in characteristic on the frequency spectrum. The night-time values were less than the daytime due to there been no vehicles moving around the site while the noise levels were being recorded.

The noise levels at this location were in the range of 54dB to 55dB L_{Aeq} and 52dB to 53dB L_{A90} and 51dB to 52dB L_{Aeq} and 50dB L_{A90} daytime and night-time respectively.

No impulsive or clearly audible tonal components were audible from site noise emissions at this location during the monitoring periods.

2.6.4 Position 5

The results for the measurements conducted at Position 5 are summarised in Table 5 below.

| Ref. | Start Time | Period | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|------|------------|--------|---|-------------------|-------------------|------------------|------------------|---|
| | | | L _{Aeq} | L _{Amax} | L _{Amin} | L _{A10} | L _{A90} | |
| 3 | 09:45 | Day | 49 | 69 | 36 | 51 | 40 | Road traffic. Children playing. Birdsong. |
| 8 | 11:20 | | 47 | 64 | 35 | 49 | 39 | |
| 15 | 14:40 | | 48 | 61 | 35 | 51 | 39 | |
| 16 | 16:21 | | 49 | 65 | 38 | 53 | 41 | |
| 25 | 23:40 | Night | 46 | 63 | 35 | 50 | 36 | Facility. Road traffic. Youths in playground. |
| 26 | 02:27 | | 49 | 67 | 33 | 53 | 35 | |

Table 5 Summary of results for Position 5

Noise generated by the movements of road traffic on the R630 was regarded as being the principal source of noise for the daytime measurements at Position 5. Children playing in a nearby playground also provided contributions to the ambient noise environment. Birdsong was audible as an occasional background source. The noise levels at this location were in the range of 47dB to 49dB L_{Aeq} and 39dB to 41dB L_{A90}.

Vocal contributions from a large congregation of youths in the fore mentioned playground affected the L_{Aeq} values significantly. The production activities associated with the oil refinery were perceptible for the night-time monitoring periods. Distant traffic noise was also noticed for a couple of occasions during the monitoring. The noise levels at this location were in the range of 46dB to 49dB L_{Aeq} and 35dB to 36dB L_{A90}.

No impulsive or clearly audible tonal components were audible from site noise emissions at this location during the monitoring periods.

3.0 CONCLUSIONS

Condition 8 of the Conoco Phillips IPPC Licence stipulates the following noise limits for emissions associated with the facility, at nearest noise sensitive locations.

| | | |
|------------|-------------------------|---------------------------------|
| Daytime | (08:00hrs to 22:00hrs): | 55dB (A) L_{Aeq} (30 Minutes) |
| Night-time | (22:00hrs to 08:00hrs): | 45dB (A) L_{Aeq} (30 Minutes) |

Noise sensitive locations are located in the vicinity of measurement Positions 1, 2, 3 & 5.

It was noted at the monitoring locations, 1, 2 and 5, traffic movements and other sources contributed to the measured L_{Aeq} values. The L_{Aeq} is an equivalent continuous steady sound level, and is therefore affected by contributions from noisy events of short duration, such as a car driving by. We would therefore suggest that in order to provide a more accurate reflection of the Conoco Phillips noise levels the L_{A90} parameter should be reviewed.

The L_{Aeq} parameter is the equivalent continuous steady sound level and is affected by contributions from noisy events of short duration, such as passing traffic, people talking etc., whilst the background noise levels (the L_{A90} parameter) are a good measure of more continuous sources of noise such as those emanating from the Conoco Phillips facility. The L_{A90} parameter is therefore considered to provide a better indicator of the noise emissions from the Conoco Phillips facility at Positions 1, 2 and 5.

At Position 1 the L_{A90} parameter is considered to be a more useful indicator of daytime and night-time levels emanating from the facility due to traffic contributions. The daytime L_{A90} noise levels were in the order of 41dB to 43dB L_{A90} . The night-time L_{A90} noise levels were in the order of 40dB to 41dB L_{A90} .

At Position 2 road traffic noise was again regarded as being the primary noise source. Therefore the L_{A90} noise levels are considered to be a more indicative of site noise levels at this location during both the daytime and night-time periods. The daytime and night-time L_{A90} values were in the range of 42dB to 45dB and 37dB to 38dB L_{A90} respectively.

At Position 5 road traffic noise during the daytime and noise emissions from youths in a playground affected the night-time L_{Aeq} values. Therefore the L_{A90} parameter is regarded as the better measure of the noise levels from the facility. The daytime and night-time L_{A90} values were in the range of 39dB to 41dB L_{A90} and 35dB to 36dB L_{A90} .

Daytime and night-time noise levels at Position 3 were dominated by refinery activities. The L_{Aeq} value is regarded by us as the more appropriate parameter for this location. The daytime and night-time levels were in the range of 46dB to 49dB L_{A90} and 33dB to 34dB L_{A90} respectively.

It could therefore be concluded, from the above, that the Conoco Phillips noise facility, Whitegate, Co. Cork would meet compliance with Condition 8 of their IPPC licence.

APPENDIX A

| Ref | A-weighted One-third Octave Band Centre Frequency [Hz] | | | | | | | | | | | | | | | | | | | | A | | | | | | | | | | |
|-----|--|----|----|------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-------|----|------|----|------|-------|----|----|------|----|-----|-------|
| | 16 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k | | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k |
| 1 | 43 | 43 | 46 | 46 | 47 | 46 | 46 | 49 | 52 | 55 | 57 | 55 | 53 | 51 | 48 | 44 | 41 | 38 | 26 | 30 | 35 | 36 | 39 | 41 | 39 | 43 | 44 | 47 | 47 | 44 | 55 |
| 2 | 37 | 36 | 39 | 41 | 41 | 42 | 41 | 41 | 42 | 43 | 45 | 45 | 41 | 39 | 36 | 36 | 30 | 31 | 33 | 37 | 41 | 40 | 42 | 45 | 46 | 48 | 46 | 45 | 45 | 47 | 58 |
| 3 | 33 | 33 | 33 | 34 | 32 | 38 | 43 | 44 | 45 | 43 | 43 | 42 | 40 | 39 | 38 | 33 | 35 | 38 | 40 | 39 | 38 | 40 | 42 | 43 | 46 | 47 | 49 | 51 | 56 | 40 | 49 |
| 4 | 33 | 32 | 33 | 37 | 38 | 40 | 41 | 41 | 39 | 41 | 45 | 42 | 41 | 39 | 39 | 34 | 30 | 31 | 34 | 37 | 35 | 39 | 35 | 37 | 37 | 37 | 38 | 39 | 34 | 47 | |
| 5 | 40 | 42 | 42 | 42 | 41 | 40 | 42 | 44 | 47 | 47 | 48 | 48 | 46 | 45 | 42 | 40 | 37 | 34 | 34 | 33 | 33 | 36 | 40 | 41 | 42 | 43 | 46 | 46 | 48 | 34 | 55 |
| 6 | 36 | 44 | 43 | 34 | 37 | 39 | 41 | 38 | 38 | 39 | 39 | 37 | 34 | 33 | 31 | 28 | 27 | 28 | 29 | 31 | 33 | 36 | 37 | 37 | 40 | 40 | 42 | 44 | 29 | 53 | |
| 7 | 36 | 35 | 35 | 35 | 33 | 39 | 44 | 45 | 46 | 45 | 44 | 43 | 41 | 39 | 37 | 34 | 31 | 29 | 26 | 23 | 23 | 25 | 29 | 30 | 37 | 43 | 42 | 43 | 42 | 56 | |
| 8 | 40 | 40 | 43 | 42 | 36 | 37 | 38 | 38 | 40 | 39 | 35 | 35 | 34 | 33 | 30 | 29 | 32 | 31 | 31 | 33 | 35 | 35 | 37 | 39 | 41 | 43 | 43 | 42 | 44 | 47 | 47 |
| 9 | 41 | 42 | 43 | 44 | 43 | 43 | 43 | 46 | 49 | 50 | 51 | 51 | 50 | 50 | 46 | 44 | 41 | 38 | 32 | 28 | 26 | 28 | 29 | 34 | 39 | 36 | 38 | 39 | 43 | 42 | 47 |
| 10 | 33 | 40 | 36 | 37 | 37 | 38 | 40 | 40 | 43 | 46 | 46 | 44 | 42 | 39 | 36 | 33 | 32 | 35 | 34 | 33 | 33 | 36 | 40 | 41 | 42 | 43 | 46 | 48 | 48 | 55 | |
| 11 | 43 | 46 | 49 | 48 | 48 | 48 | 47 | 48 | 51 | 53 | 54 | 53 | 51 | 50 | 48 | 46 | 44 | 42 | 40 | 34 | 36 | 36 | 38 | 38 | 42 | 42 | 42 | 45 | 47 | 46 | 54 |
| 12 | 33 | 34 | 36 | 36 | 37 | 38 | 34 | 35 | 36 | 37 | 37 | 37 | 35 | 36 | 35 | 37 | 34 | 33 | 31 | 33 | 28 | 31 | 33 | 35 | 39 | 41 | 42 | 43 | 44 | 56 | |
| 13 | 34 | 34 | 35 | 35 | 36 | 38 | 38 | 38 | 39 | 39 | 40 | 40 | 39 | 38 | 41 | 37 | 39 | 39 | 42 | 42 | 42 | 44 | 45 | 46 | 48 | 49 | 51 | 52 | 53 | 54 | 56 |
| 14 | 25 | 24 | 27 | 33 | 29 | 31 | 31 | 31 | 29 | 29 | 31 | 31 | 31 | 29 | 30 | 29 | 33 | 36 | 38 | 36 | 35 | 36 | 39 | 42 | 44 | 46 | 47 | 49 | 49 | 57 | |
| 15 | 40 | 42 | 44 | 41 | 39 | 36 | 40 | 44 | 44 | 44 | 45 | 45 | 44 | 43 | 41 | 38 | 37 | 33 | 26 | 23 | 23 | 25 | 29 | 30 | 37 | 43 | 42 | 43 | 43 | 42 | 48 |
| 16 | 36 | 41 | 39 | 36 | 34 | 34 | 32 | 31 | 33 | 32 | 32 | 33 | 32 | 31 | 29 | 27 | 30 | 33 | 34 | 35 | 35 | 39 | 41 | 35 | 37 | 37 | 37 | 39 | 38 | 36 | 49 |
| 17 | 34 | 33 | 36 | 36 | 34 | 34 | 36 | 38 | 37 | 39 | 40 | 38 | 35 | 35 | 35 | 32 | 35 | 38 | 40 | 40 | 42 | 46 | 47 | 47 | 46 | 46 | 44 | 44 | 45 | 43 | 49 |
| 18 | 36 | 34 | 33 | 31 | 29 | 30 | 35 | 41 | 36 | 35 | 35 | 35 | 33 | 30 | 29 | 24 | 28 | 32 | 36 | 40 | 40 | 43 | 44 | 48 | 49 | 47 | 44 | 45 | 44 | 41 | 46 |
| 19 | 35 | 37 | 37 | 38 | 39 | 40 | 39 | 40 | 42 | 43 | 45 | 45 | 42 | 40 | 38 | 35 | 33 | 29 | 33 | 35 | 33 | 35 | 35 | 30 | 32 | 33 | 34 | 38 | 37 | 36 | 54 |
| 20 | 31 | 36 | 33 | 35 | 36 | 38 | 38 | 38 | 39 | 36 | 36 | 36 | 34 | 31 | 29 | 26 | 23 | 26 | 32 | 33 | 34 | 35 | 38 | 38 | 40 | 42 | 42 | 42 | 41 | 41 | 54 |
| 21 | 36 | 36 | 34 | 34 | 34 | 36 | 36 | 36 | 39 | 37 | 39 | 40 | 37 | 37 | 35 | 36 | 32 | 34 | 30 | 34 | 30 | 28 | 30 | 27 | 32 | 30 | 35 | 33 | 31 | 30 | 44 |
| 22 | 33 | 35 | 35 | 34 | 34 | 34 | 35 | 34 | 36 | 34 | 34 | 34 | 35 | 34 | 30 | 27 | 26 | 26 | 20 | 48 | 49 | 50 | 51 | 50 | 50 | 52 | 52 | 53 | 51 | 49 | 49 |
| 23 | 40 | 41 | 44 | 44 | 46 | 47 | 48 | 50 | 52 | 54 | 55 | 51 | 48 | 47 | 44 | 43 | 42 | 39 | 31 | 34 | 34 | 34 | 35 | 31 | 30 | 29 | 30 | 31 | 30 | 42 | 42 |
| 24 | 37 | 39 | 41 | 44 | 48 | 49 | 51 | 54 | 56 | 59 | 60 | 58 | 54 | 50 | 48 | 46 | 44 | 40 | 42 | 47 | 48 | 51 | 53 | 53 | 56 | 57 | 59 | 60 | 59 | 56 | 43 |
| 25 | 29 | 35 | 23 | 21 | 20 | 20 | 21 | 22 | 23 | 24 | 24 | 24 | 22 | 22 | 22 | 22 | 26 | 35 | 40 | 39 | 43 | 50 | 45 | 45 | 50 | 53 | 51 | 55 | 56 | 49 | 46 |
| 26 | 40 | 42 | 44 | 46 | 49 | 50 | 51 | 55 | 57 | 59 | 59 | 56 | 52 | 49 | 46 | 44 | 41 | 39 | 37 | 37 | 38 | 38 | 38 | 37 | 38 | 40 | 43 | 45 | 46 | 49 | 46 |
| 27 | 34 | 37 | 38 | 38 | 40 | 41 | 41 | 45 | 45 | 47 | 47 | 45 | 44 | 42 | 40 | 39 | 36 | 33 | 34 | 36 | 41 | 43 | 39 | 39 | 41 | 42 | 40 | 39 | 40 | 39 | 34 |
| 28 | 35 | 35 | 32 | 32 | 37 | 40 | 42 | 42 | 45 | 47 | 46 | 46 | 46 | 45 | 43 | 42 | 41 | 38 | 34 | 33 | 36 | 33 | 37 | 36 | 34 | 33 | 37 | 38 | 37 | 33 | 33 |
| 29 | 23 | 25 | 25 | 25 | 25 | 25 | 25 | 27 | 27 | 27 | 27 | 27 | 27 | 32 | 32 | 28 | 28 | 23 | 34 | 33 | 36 | 34 | 42 | 37 | 38 | 30 | 36 | 37 | 37 | 36 | 52 |
| 30 | 42 | 43 | 46 | 49 | 52 | 53 | 53 | 56 | 59 | 61 | 62 | 58 | 55 | 52 | 49 | 46 | 44 | 41 | 44 | 42 | 43 | 42 | 41 | 39 | 41 | 40 | 43 | 43 | 45 | 42 | 51 |



The EDPAC Building, Carrigalie Industrial Estate, Carrigaline, Co. Cork.
Tel: +353 (0)21 437 2850 Fax: +353 (0)21 437 3975

NV/02092010NL01

2nd September 2010

John O' Keeffe
Environmental Lead
Conoco Phillips
Whitegate
Cork

Dear John,

RE: COMPARISON OF NOISE LEVELS DURING A REFINERY PLANT SHUTDOWN

We are pleased to forward our comments in relation to the comparison of noise levels with the facility during a shutdown against the noise levels with the facility operating.

1.0 INTRODUCTION

During the week commencing 16th August 2010 a significant amount of the Conoco Phillips refinery plant underwent a planned shutdown for a period of one week. The Pipestill production area remained in operation however.

Conoco Phillips requested CLV Consulting to undertake an environmental noise survey at their designated noise monitoring locations during the shutdown period and another survey when the facility had returned to normal production operations. The purpose of these surveys was to ascertain the noise impact of the refinery at the designated noise monitoring locations.

The surveys were undertaken during two night-time periods, 22:00hrs to 08:00hrs, as the impact from road traffic noise and other non related noise sources would be minimal. The survey times and refinery status were as follows;

- 00:00hrs to 03:00hrs on 17th August 2010 Refinery Shutdown;
- 22:50hrs to 03:00hrs on 26th/27th August 2010 Refinery Operating.

2.0 SURVEY DETAILS AND RESULTS

An environmental noise survey was conducted in order to assess the existing noise environment. The survey was conducted generally in accordance with ISO 1996: 1982: *Acoustics – Description and measurement of environmental noise* and the Environmental Protection Agency document *Environmental Noise Survey Guidance Document*. Specific details are set out below.

2.1 Choice of Measurement Locations

Five measurement locations were selected on and near the Conoco Phillips site boundary and are described below. Figure 1 shows their approximate positions.

- Position 1** Located on the main entrance road to the Conoco Phillips site. A number of houses are located to the east of this monitoring position.
- Position 2** Located at the front gate of Whitegate National School north east of the site. This is a noise sensitive location.
- Position 3** It should be noted that since the 2005 noise survey the noise monitoring equipment was located in the front garden of a private residence. This location is approximately 30m nearer to the facility than the normal Position 3. This move was originally requested by the occupants of the private residence however the residence is now un-occupied. This is a noise sensitive location and has a direct line of sight to the facility.
- Position 4** Is on the Conoco Phillips site itself, southwest of the main plant area.
- Position 5** Situated on a residential area opposite national school on the outskirts of the village of Whitegate. This is a noise sensitive location.

2.2 Personnel and Instrumentation

Niall Vaughan (CLV) conducted the noise level measurements during both the daytime and night-time survey periods.

The measurements were conducted using a Larson Davis Type 824 Sound Level Meter. Before and after the survey the measurement apparatus was check calibrated using a Larson Davis Type 250 Sound Level Calibrator.

2.3 Procedure

Measurements were conducted on a cyclical basis for the survey periods. Sample periods were 15 minutes long during both daytime and night-time periods. The results were saved to the instrument memory, where appropriate, for later analysis. Survey personnel noted all primary noise sources contributing to noise build-up.

2.4 Measurement Parameters

The survey results are presented in terms of the following five parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{Amax} is the instantaneous maximum sound level measured during the sample period.

L_{Amin} is the instantaneous minimum sound level measured during the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing.

All sound levels in this report are expressed in terms of decibels (dB) relative to 2×10^{-5} Pa.

2.5 Survey Results

We have detailed the various noise parameters from the two survey periods however the L_{A90} parameter is in our opinion the best indicator of assessing the noise impact associated with the refinery. The L_{Aeq} parameter is the equivalent continuous steady sound level and is affected by contributions from noisy events of short duration, such as passing traffic, people talking etc., whilst the background noise levels (the L_{A90} parameter) are a good measure of more continuous sources of noise such as those emanating from the Conoco Phillips facility.

2.5.1 Position 1

The results of measurements conducted at Position 1 are summarised in Table 1.

| Period | Start Time | Refinery Status | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|--------|------------|-----------------|---|-----------|------------|------------|-----------|----------------------------------|
| | | | L_{A90} | L_{Aeq} | L_{Amax} | L_{Amin} | L_{A10} | |
| Night | 00:02 | Off | 38 | 42 | 59 | 34 | 42 | Facility. Neighbouring facility. |
| | 02:02 | | 37 | 40 | 55 | 33 | 40 | |
| | 22:59 | On | 41 | 44 | 65 | 40 | 46 | Facility. Road traffic. |
| | 01:46 | | 40 | 49 | 68 | 38 | 50 | |

Table 1 Summary of results for Position 1

During the shutdown period the Pipestill area of the refinery and a neighbouring facility, located in the Aghada area, were audible at this location during the shutdown period. The difference in the L_{A90} noise levels with and without the facility was on average 3dB.

2.5.2 Position 2

The results for the measurements conducted at Position 2 are summarised in Table 2 below.

| Period | Start Time | Refinery Status | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|--------|------------|-----------------|---|-----------|------------|------------|-----------|------------------|
| | | | L_{A90} | L_{Aeq} | L_{Amax} | L_{Amin} | L_{A10} | |
| Night | 00:20 | Off | 33 | 39 | 56 | 31 | 35 | General ambient. |
| | 02:22 | | 34 | 36 | 53 | 32 | 34 | |

| | | | | | | | | |
|--|-------|----|----|----|----|----|----|--|
| | 23:18 | On | 38 | 42 | 55 | 35 | 44 | Neighbouring facility. Local traffic. Facility. |
| | 02:06 | | 37 | 43 | 62 | 33 | 45 | |

Table 2 Summary of results for Position 2

The refinery was generally inaudible during the shutdown period at this location. The difference in the L_{A90} noise levels with and without the facility was on average 3dB.

2.5.3 Position 3

The results for the measurements conducted at Position 3 are summarised in Table 3 below.

| Period | Start Time | Refinery Status | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|--------|------------|-----------------|---|-----------|------------|------------|-----------|------------------------|
| | | | L_{A90} | L_{Aeq} | L_{Amax} | L_{Amin} | L_{A10} | |
| Night | 01:13 | Off | 31 | 33 | 44 | 29 | 32 | Neighbouring facility. |
| | 03:13 | | 31 | 33 | 49 | 28 | 33 | |
| | 00:09 | On | 33 | 34 | 51 | 30 | 34 | Facility. |
| | 02:57 | | 32 | 33 | 49 | 31 | 33 | |

Table 3 Summary of results for Position 3

During the shutdown period the Bord Gais facility was regarded as being the dominant noise source. The difference in the L_{A90} noise levels with and without the facility was on average 2dB. In our opinion this would be an accurate reflection.

2.5.4 Position 4

The results for the measurements conducted at Position 4 are summarised in Table 4 below.

| Period | Start Time | Refinery Status | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|--------|------------|-----------------|---|-----------|------------|------------|-----------|------------------------|
| | | | L_{A90} | L_{Aeq} | L_{Amax} | L_{Amin} | L_{A10} | |
| Night | 01:39 | Off | 52 | 54 | 63 | 49 | 55 | Neighbouring facility. |
| | 03:41 | | 52 | 54 | 67 | 50 | 55 | |
| | 00:44 | On | 50 | 52 | 59 | 47 | 53 | Facility. |
| | 01:00 | | 50 | 51 | 59 | 48 | 52 | |

Table 4 Summary of results for Position 4

During the shutdown period the Bord Gais facility was again regarded as being the dominant noise source at this location. Due to the close proximity of the monitoring location to the Bord Gais plant noise levels at this location are heavily influenced by its operations. The difference in the L_{A90} noise levels with and without the facility was on average 2dB. In our opinion this is considered to be an accurate reflection.

2.5.5 Position 5

The results for the measurements conducted at Position 5 are summarised in Table 5 below.

| Period | Start Time | Refinery Status | Measured Noise Levels (dB re. 2×10^{-5} Pa) | | | | | Comments |
|--------|------------|-----------------|---|--|--|--|--|----------|
|--------|------------|-----------------|---|--|--|--|--|----------|

| | | | L_{A90} | L_{Aeq} | L_{Amax} | L_{Amin} | L_{A10} | |
|-------|-------|-----|-----------|-----------|------------|------------|-----------|--|
| Night | 00:41 | Off | 32 | 43 | 61 | 30 | 43 | General ambient. |
| | 02:43 | | 31 | 41 | 59 | 29 | 42 | |
| | 23:40 | On | 36 | 46 | 63 | 35 | 50 | Facility. Road traffic. Youths in playground. |
| | 02:27 | | 35 | 49 | 67 | 33 | 53 | |

Table 5 Summary of results for Position 5

Operations from the Pipestill plant, within the refinery, were perceptible at Position 5 however noise levels were noticeably less than when the refinery is under normal production operations. This is reflected in the noise levels as the difference in the L_{A90} noise levels with and without the facility was on average 4dB.

I trust that the above is to your satisfaction however please do not hesitate to contact this office if you have any comments in relation to the content of this document.

Yours sincerely,

Niall Vaughan

NIALL VAUGHAN
Acoustic Consultant

Section 9 Tanks and Pipelines – Testing, Inspection and Preventative Maintenance Report

The construction, inspection and maintenance of storage tanks and pipelines for petroleum products is carried out according to internationally recognised codes and standards for the refining industry.

These are:

- American Petroleum Institute (API) Standards, API 653 and 650 which provide guidelines and standards for tank construction and in-service inspection.
- API 570 – Inspection, Repair, Alteration, Rerating, of in-service piping systems, which provide guidelines for inspection and repair of pipelines.
- American Society of Mechanical Engineers (ASME) standards, ASME B31.3 1993 – Refinery Piping for petroleum products

Tanks:

Operations.

Tanks are checked externally using an API 653 derived checklist by operations personnel according to a weekly schedule, which is revised annually. The scope of each tank check includes;

- a) Tank level manual check to confirm auto gauge is correct
- b) Tank shell for leaks, distortions, corrosion, paint condition. Insulation (if applicable)
- c) Tanks' attachments, e.g. nozzles, valves.
- d) Tanks' foundations.

Inspection Dept.

Tanks are checked externally by the Inspection Dept using detailed checklists adopted from API 653. Tanks are inspected per a defined schedule which also complies with the API standard.

Tanks are removed from service and inspected internally by the Inspection Dept according to a defined schedule derived from and in accordance with API 653 recommendations.

Pipelines:

Operations.

Offsite pipelines are checked externally by operations personnel according to a weekly schedule which is revised annually.

Inspection Dept.

Lines are given detailed inspections by the Inspection Dept using detailed checklists adopted from API 570. The lines are inspected per a defined schedule which also complies with the API standard.

An inspection line and tank schedule is held onsite and available for inspection. Inspection data records are recorded in a specific database "Credo". Historical records of

inspection related work associated with each item is recorded and compiled in electronic and / or hard files held by Inspection Group and available at all times for examination.

On the basis of the inspection information collected, recommendations are made by the Inspections Dept as to repairs that may be required to be carried out. These recommendations are submitted to the Maintenance Dept, who are responsible for follow-up actions.

General:

In addition to the above, "watch keeping" duties are an integral part of every shift technician's duties on site at Whitegate Refinery. Vigilance and good housekeeping in all aspects of the job contribute to maximising a safe environment by picking up signals before potential problems are allowed to develop.

A schedule detailing the tank / line populations on site and their corresponding checks and inspections to date is presented below. Inspection and Process reports are held on site.

The following product abbreviations are used:

| | |
|------|--|
| IBOB | Intermediate Blendstock for Oxygenated Blending (=unleaded gasoline minus its Ethanol content) |
| kero | kerosene |
| ado | automotive gas oil |
| fgo | finished gas oil |
| srar | straight run aromatic residue |
| lvn | light virgin naphtha |
| lpg | liquid petroleum gas |
| etbe | ethyl tertbutyl ether |



| Tank | Last Insp. | Interval | Due | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Updated | |
|------|------------|----------|------|------|------|------|------|------|------|------|--------------------|--------|------|------|------|------|----------|-----|
| | | | | | | | | | | | | | | | | | Jan 2011 | |
| C1 | 2001 | 15 | 2016 | | | | | | | | | | | | | | | |
| C2 | 2002 | 15 | 2017 | Comp | | | | | | | | | | | | | | |
| C3 | 2001 | 15 | 2016 | | | | | | | | | | | | | | | |
| C4 | 2003 | 15 | 2018 | | Comp | | | | | | | | | | | | | |
| C5 | 2007 | 15 | 2022 | | | | | | Comp | | | | | | | | | |
| C6 | 2005 | 15 | 2020 | | | | Comp | | | | | | | | | | | |
| C7 | 1997 | 15 | 2012 | | | | | | | | | | | | | | | |
| P1 | 2005 | 15 | 2020 | | | | Comp | | | | | | | | | | | |
| P2 | 2006 | 15 | 2021 | | | | | Comp | | | | | | | | | | |
| P3 | 2001 | 15 | 2016 | | | | | | | | | | | | | | | |
| P4 | 1995 | 15 | 2010 | | | | | | | | | In Pro | comp | | | | | |
| P5 | 2005 | 15 | 2020 | | | | Comp | | | | | | | | | | | |
| P6 | 2006 | 15 | 2021 | | | Due | | Comp | | | | | | | | | | |
| P7 | 1994 | 15 | 2009 | | | | | | | | Comp | | | | | | | |
| P8 | 2002 | 10 | 2012 | Comp | | | | | | | | | | Due | | | | |
| P9 | 2000 | 15 | 2015 | | | | | | | | | | | | | | | |
| P10 | 1999 | 15 | 2014 | | | | | | | | | | | | | | | Due |
| P11 | 1999 | 15 | 2014 | | | | | | | | | | | | | | | Due |
| P12 | 1997 | 15 | 2012 | | | | | | | | Comp b/f from 2012 | | | | | | | |
| P13 | 2008 | 15 | 2023 | | | | | | | Comp | | | | | | | | |
| P14 | 1994 | 15 | 2009 | | | | | | | | | | | | | | | Due |
| P15 | 1994 | 15 | 2009 | | | | | | | | | | | Due | | | | |
| P16 | 1993 | 15 | 2008 | | | | | | | | Comp | | | | | | | |

The following tables detail the routine process checks that were carried out during 2010.

| Tank | Inspected on - month - 2010 | | | | | | | | | | | |
|------|-----------------------------|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|
| | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sept | Oct | Nov | Dec |
| C1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| C2 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| C3 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| C4 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| C5 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| C6 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| C7 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P2 | √ | √ | √ | √ | √ | OS | OS | OS | OS | OS | OS | OS |
| P3 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P4 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | OS | OS |
| P5 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P6 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P7 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P8 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P9 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P10 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P11 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P12 | √ | OS | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P13 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P14 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P15 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P16 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P17 | √ | √ | √ | √ | √ | √ | √ | √ | √ | OS | OS | OS |
| P18 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P19 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P20 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P21 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P22 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| P23 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I2 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I3 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I4 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I7 | √ | OS | OS | OS | OS | OS | OS | OS | OS | OS | OS | OS |
| I8 | √ | √ | √ | √ | √ | √ | OS | OS | OS | OS | OS | OS |
| I9 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I10 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I11 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I12 | OS | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I13 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I14 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| I15 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U2 | √ | √ | X | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U3 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U4 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U5 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | OS | OS |
| U7 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U8 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U9 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U10 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| U13 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Sp-1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Sp-2 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Sp-3 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Sp-4 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 601 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

X = inspection not completed. OS = vessel out of service

Section 10 Resource Consumption – summary

Energy and water usage are monitored on site on a routine basis. A summary of site consumption during 2009 is given below.

| Water usage – 2010 | | |
|---------------------------|---------------|----------------------|
| | quantity | units |
| on-site groundwater use | 94,600 | m ³ |
| on-site surface water use | 0 | m ³ |
| municipal water use | 444,611 | m ³ |
| Total | 539211 | m³ |

| Fuel usage – 2010 | | |
|--------------------------|----------|--------|
| | quantity | units |
| heavy fuel oil | 14152 | tonnes |
| gas oil | 701 | tonnes |
| refinery gases | 92126 | tonnes |
| LPG | 5908 | tonnes |
| Natural gas | 1994 | tonnes |

| Electricity usage – 2010 | | |
|---------------------------------|----------|-------|
| | quantity | units |
| total site usage | 70,388 | MWhrs |
| imported supply | 25,433 | MWhrs |

Section 11 Environmental Expenditure

Major expenditure for environmental purposes during the year 2010 is described below.

| | | |
|----|--|--------------------|
| 1 | Standard Annual Environmental Operations (including routine atmosphere and effluent monitoring etc) | € 120,000 |
| 2 | Tier 2 & 3 Pollution Response | € 120,000 |
| 3 | Waste disposal costs –Operations | € 270,000 |
| 4 | VRU maintenance | € 70,000 |
| 5 | SOx abatement equipment maintenance and operation | € 400,000 |
| 6 | Asbestos programme | € 320,000 |
| 7 | New fans on SG-4 | € 92,000 |
| 8 | Waste Water Treatment Plant – operation & maintenance | € 300,000 |
| 9 | Fuel Metering improvements | € 30,000 |
| 10 | Closed loop sampling systems at spheres | € 75,000 |
| 11 | Ethanol Blending Road Loading | € 920,000 |
| 12 | Production of Biodiesel | € 520,000 |
| 13 | New closed loop gas sampling systems | € 75,000 |
| 14 | Water use reduction projects | € 192,000 |
| 17 | FAME Blending | € 24,000 |
| 18 | New closed loop tank sampling systems | € 36,000 |
| 19 | Odour Neutralising system at WWTP upgrade | € 22,000 |
| 20 | Oil spill response exercise | € 12,000 |
| 21 | Oil spill response leadership training | € 6,000 |
| 22 | Introduction of natural gas as primary refinery fuel | € 3,157,000 |
| | Total expenditure in the year 2010 which brings an environmental benefit. | € 6,761,000 |

Section 12 EPA Monitoring and Control

During the year 2010 representatives of the EPA sampled, and analysed at their laboratories, effluent from the site wastewater treatment plant, and surface water flows at Driscoll Drive & stream to Whitebay.

Results are detailed below.

| SW 1 | Units | Limit | Sample Date | | |
|------------------------------|---------|-------|---------------------|----------------------|----------|
| | | | 3 rd Mar | 28 th Apr | Sep 16th |
| pH | pH unit | 6-9 | 7.70 | 7.79 | 7.72 |
| BOD | mg/l | 150 | 3.2 | 15.9 | 38.0 |
| COD | mg/l | 450 | 14.0 | 41.0 | 82.0 |
| Total Petroleum Hydrocarbons | mg/l | 50 | 0.544 | 1.07 | 1.152 |
| Suspended Solids | mg/l | 60 | 4.0 | 2.0 | 5.0 |
| Ammonia as nitrogen | mg/l | 20 | 0.038 | 1.9 | 8.48 |
| VOC | ug/l | --- | 45.0 | 22.4 | 103 |
| Phenol content | mg/l | 1 | <0.03 | 0.09 | 0.20 |
| Cadmium | mg/l | 0.05 | <0.0001 | <0.0001 | <0.001 |
| Mercury | ug/l | 0.01 | <0.10 | <0.10 | 0.24 |
| Zinc | mg/l | 0.5 | 0.011 | 0.006 | 0.023 |
| Total Heavy Metals | mg/l | 1 | 0.011 | 0.006 | 0.121 |

| Whitebay | | | | | |
|------------------------------|---------|-----|--------|-------|-------|
| pH | pH unit | --- | 7.94 | 7.67 | 7.52 |
| BOD | mg/l | --- | <1.0 | 2.80 | <1.0 |
| COD | mg/l | --- | 10 | 22 | <10 |
| Total Petroleum Hydrocarbons | mg/l | --- | <0.042 | 0.032 | 0.157 |
| Ammonia | mg/l | --- | 0.045 | 0.192 | 0.047 |
| Total Nitrogen | mg/l | --- | 2.5 | 1.91 | 10.0 |
| Conductivity | uS/cm | --- | 444 | 453 | 457 |

| Driscoll Drive | | | | | |
|------------------------------|---------|-----|-------|----------|-------|
| pH | pH unit | --- | 7.40 | 8.67 | 7.41 |
| BOD | mg/l | --- | <7.0 | 1.5 | <1.0 |
| COD | mg/l | --- | 40 | <10 | <10 |
| Total Petroleum Hydrocarbons | mg/l | --- | 0.208 | 0.107 | 0.069 |
| Ammonia | mg/l | --- | 4.92 | Not done | 0.331 |
| Total Nitrogen | mg/l | --- | 6.79 | Not done | 29.6 |
| Conductivity | uS/cm | --- | 599 | Not done | 530 |

The above monitoring results show a sustained improvement on 2008/9 results, which is a result of ongoing improvements to the waste water treatment facilities. The improvements made have resulted in no non-conformance results during 2010 in the effluent discharged

We are currently studying effluent re-use in process water applications which would ultimately reduce our fresh water consumption levels.

Section 13 PRTR Summary

Summary Tables from E-PRTR Workbook

The following section contains a number of tables copied from the E-PRTR electronic workbook which is submitted to the Agency in addition to the Annual Environmental Report. This is as per EPA AER/PRTR Document No. 2.



Environmental Protection Agency

1. PRTR - P0266 Facility Name: ConocoPhillips Whitegate Refinery Limited
Reference: P0266, 2010-01-1 Refinery from 2010

10022011 1053

Guidance to complete the PRTR workbook

AER Returns Workbook

REFERENCE YEAR 2010

| | |
|-----------------------------------|---|
| 1. FACILITY IDENTIFICATION | |
| Parent Company Name | ConocoPhillips Whitegate Refinery Limited |
| Facility Name | ConocoPhillips Whitegate Refinery Limited |
| PRTR Identification Number | P0266 |
| Licence Number | P0266-01 |

| | | |
|-----------------------------------|-----|--|
| Waste or IPPC Classes of Activity | No. | class name |
| 9.3.1 | | The operation of mineral oil and gas refineries. |

| | |
|---|---|
| Address 1 | Whitegate |
| Address 2 | Midleton |
| Address 3 | Co. Cork |
| Address 4 | |
| Country | Ireland |
| Coordinates of Location | -8.24795 51.8206 |
| River Basin District | ESW |
| NACE Code | 1920 |
| Main Economic Activity | Manufacture of refined petroleum products |
| AER Returns Contact Name | John McCarthy |
| AER Returns Contact Email Address | John.McCarthy@ConocoPhillips.com |
| AER Returns Contact Position | HSE Lead |
| AER Returns Contact Telephone Number | 021 - 4622200 / 4622232 (Direct) |
| AER Returns Contact Mobile Phone Number | 021 - 4622222 |
| Production Volume | 0.0 |
| Production Volume Units | |
| Number of Installations | 0 |
| Number of Operating Hours in Year | 0 |
| Number of Employees | 0 |
| User Feedback/Comments | |
| Web Address | |

| | |
|---------------------------------|--------------------------------|
| 2. PRTR CLASS ACTIVITIES | |
| Activity Number | Activity Name |
| 1(a) | Mineral oil and gas refineries |

| | |
|--|----|
| 3. SOLVENTS REGULATIONS (S.I. No. 643 of 2002) | |
| Have you been granted an exemption? | No |
| Is it applicable? | No |
| If applicable which activity class applies (as per Schedule 2 of the regulations)? | |
| Is the reduction scheme compliance route being used? | |

SECTION A: SECTOR SPECIFIC PM10 POLLUTANTS

| No. Annex II | POLLUTANT | Name | M/C/E | Method Code | Method Used Designation or Description | Emission Point 1 | QUANTITY | | | | | |
|--------------|--|------|-------|-------------|---|--------------------------|-------------------|------------------------------|------------------------------|---------------------|-----------------|------------------|
| | | | | | | | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year | E (Exhaust) KG/Year | G (Gas) KG/Year | H (Heat) KG/Year |
| 02 | Carbon monoxide (CO) Carbon dioxide (CO2) | | E | OTH | Lic: IE-GHG-1304 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 03 | | | | | | M | NRB | 1940100 3102172800 0.0 | 1940100 3102172800 0.0 | 0.0 | 0.0 | 0.0 |
| 00 | Nitrogen oxides (NOx/NO2) | | C | MAB | | 796913.0 | 796913.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 11 | | | | | | Sulphur oxides (SO2/SO2) | C | MAB | 665957.0 | 665957.0 | 0.0 | 0.0 |
| 08 | Ammonia (NH3) Nitrous oxide (N2O) | | E | OTH | | 1402.0 | 1402.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 05 | | | | | | M | MAB | 3100.0 | 3100.0 | 0.0 | 0.0 | 0.0 |

* Select a row by double-clicking on the Pollutant Name (Column B) then click the data button

SECTION B: REMAINING PM10 POLLUTANTS

| No. Annex II | POLLUTANT | Name | M/C/E | Method Code | Method Used Designation or Description | Emission Point 1 | QUANTITY | | | | | |
|--------------|-----------|------|-------|-------------|---|------------------|-------------------|------------------------|----------------------|---------------------|-----------------|------------------|
| | | | | | | | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year | E (Exhaust) KG/Year | G (Gas) KG/Year | H (Heat) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |

* Select a row by double-clicking on the Pollutant Name (Column B) then click the data button

SECTION C: REMAINING POLLUTANT EMISSIONS (As required in your Licence)

| Pollutant No. | Pollutant | Name | M/C/E | Method Code | Method Used Designation or Description | Emission Point 1 | QUANTITY | | | | | |
|---------------|-------------------------------------|------|-------|-------------|---|------------------|-------------------|------------------------|----------------------|---------------------|-----------------|------------------|
| | | | | | | | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year | E (Exhaust) KG/Year | G (Gas) KG/Year | H (Heat) KG/Year |
| 237 | Volatile organic compounds (as TOC) | | C | MAB | Fugitive losses are calculated using industry standards such as API 2517, 1503, API 2514a, 1501 | 2659991.0 | 2659991.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | | | | | | | | | | | | |

* Select a row by double-clicking on the Pollutant Name (Column B) then click the data button

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on vented gas (Methane) based on the following information: Methane generation (as per site model), Methane utilised in engines, Net methane emission (as reported in Section A above)

| Landfill: | Methane generation (as per site model) | Methane utilised in engines | Net methane emission (as reported in Section A above) | Method Used | | Facility Total Capacity m3 Per hour |
|---|--|-----------------------------|---|-------------|-------------|-------------------------------------|
| | | | | M/C/E | Method Code | |
| Concochition Whitegate Refinery Limited | 0.0 | 0.0 | 0.0 | | | N/A |
| | | | | | | 0.0 (Total Filling Capacity) |
| | | | | | | 0.0 (Total Utilising Capacity) |
| | | | | | | N/A |

Please enter summary data on the quantities of methane flared and/or utilised

Total estimated methane generation (as per site model)

Methane utilised in engines

Net methane emission (as reported in Section A above)

SECTION A: SECTOR SPECIFIC PM10 POLLUTANTS

| No. Annex A | POLLUTANT | Name | M/C/E | Method Code | Destination or Description | Emission Point 1 | | Emission Point 2 | | QUANTITY | | |
|-------------|---|------|-------|-------------|----------------------------|-------------------|------------------------|----------------------|-------------------|------------------------|----------------------|-----|
| | | | | | | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year | |
| 17 | Agentic and compounds (as As), Chlorinated hydrocarbons (as Cl), Chromium and compounds (as Cr), Copper and compounds (as Cu), Lead and compounds (as Pb), Mercury and compounds (as Hg), Nickel and compounds (as Ni), Periodic (as total G), Total nitrogen, Total phosphorus, Zinc and compounds (as Zn) | | M | OTH | | 0.0 | 0.0 | 0.0 | 1.82 | 0.0 | 0.0 | |
| 18 | | M | OTH | | 0.23 | 0.0 | 0.0 | 0.23 | 0.0 | 0.0 | | |
| 19 | | M | OTH | | 0.518 | 0.0 | 0.0 | 0.518 | 0.0 | 0.0 | | |
| 20 | | M | OTH | | 81.34 | 0.0 | 0.0 | 81.34 | 0.0 | 0.0 | | |
| 21 | | M | OTH | | 0.319 | 0.0 | 0.0 | 0.319 | 0.0 | 0.0 | | |
| 22 | | M | OTH | | 0.004 | 0.0 | 0.0 | 0.004 | 0.0 | 0.0 | | |
| 23 | | M | OTH | | 7.46 | 0.0 | 0.0 | 7.46 | 0.0 | 0.0 | | |
| 24 | | M | OTH | | 112.0 | 0.0 | 0.0 | 112.0 | 0.0 | 0.0 | | |
| | | | | M | OTH | | 6996.0 | 0.0 | 0.0 | 6996.0 | 0.0 | 0.0 |
| | | | | M | OTH | | 37.74 | 0.0 | 0.0 | 37.74 | 0.0 | 0.0 |
| | | | | M | OTH | | 3.61 | 0.0 | 0.0 | 3.61 | 0.0 | 0.0 |

SECTION B: REMAINING PM10 POLLUTANTS

| No. Annex B | POLLUTANT | Name | M/C/E | Method Code | Destination or Description | Emission Point 1 | | Emission Point 2 | | QUANTITY | |
|-------------|-----------|------|-------|-------------|----------------------------|-------------------|------------------------|----------------------|-------------------|------------------------|----------------------|
| | | | | | | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | M | OTH | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

SECTION C: REMAINING POLLUTANT EMISSIONS (as defined in your license)

| Pollutant No | POLLUTANT | Name | M/C/E | Method Code | Destination or Description | Emission Point 1 | | Emission Point 2 | | QUANTITY | |
|--------------|--|------|-------|-------------|----------------------------|-------------------|------------------------|----------------------|-------------------|------------------------|----------------------|
| | | | | | | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| 228 | Acetone (as H) BOD COD Suspended Solids Total Heavy Metals Total petroleum hydrocarbons | | M | OTH | | 4726.0 | 0.0 | 0.0 | 4726.0 | 0.0 | 0.0 |
| 229 | | M | OTH | | 34923.0 | 0.0 | 0.0 | 34923.0 | 0.0 | 0.0 | |
| 230 | | M | OTH | | 68279.0 | 0.0 | 0.0 | 68279.0 | 0.0 | 0.0 | |
| 231 | | M | OTH | | 6083.0 | 0.0 | 0.0 | 6083.0 | 0.0 | 0.0 | |
| 247 | | M | OTH | | 24.78 | 0.0 | 0.0 | 24.78 | 0.0 | 0.0 | |
| 248 | | M | OTH | | 3160.0 | 0.0 | 0.0 | 3160.0 | 0.0 | 0.0 | |

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6. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Please enter all quantities on this sheet in Tonnes

| Transfer Destination | European Waste Code | Hazardous | Quantity (Tonnes per Year) | Description of Waste | Waste Treatment Operation | Method Used | | Location of Treatment | Lic/ Waste Name and Licence/ Permit No of Receiving/ Disposer | Lic/ Waste Address of Receiving/ Disposer | Name and Licence / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY) |
|----------------------|---------------------|-----------|----------------------------|---|---------------------------|-------------|-------------|-----------------------|---|---|--|
| | | | | | | M/COE | Method Used | | | | |
| Within the Country | 20 01 01 | No | 12 192 | paper and cardboard | R3 | M | Weighted | Offsite in Ireland | Rehab Recycle, CK WMC 146-03 | Monaghan Road, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 01 01 | No | 3 55 | paper and cardboard | R3 | M | Weighted | Offsite in Ireland | Midleton Ship hire Ltd, WMC | knockgriffin, Midleton Ship hire Ltd, Co. Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 01 40 | No | 0 285 | metals | R4 | M | Weighted | Offsite in Ireland | Rehab Recycle, CK WMC 146-03 | Monaghan Road, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 01 02 | No | 0 32 | discarded electrical and electronic equipment other than those mentioned in 20 | R5 | M | Weighted | Offsite in Ireland | Rehab Recycle, CK WMC 146-03 | Monaghan Road, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 01 36 | No | 0 916 | 01 21, 20 01 23 and 20 01 35 | R4 | M | Weighted | Offsite in Ireland | Rehab Recycle, CK WMC 146-03 | Monaghan Road, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| To Other Countries | 05 01 16 | No | 639 2 | sulphur-containing wastes from petroleum desulphurisation | R5 | M | Weighted | Abroad | Omex agril Ltd | Kings Lynn Norfolk, United Kingdom | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 05 01 16 | No | 0 005 | sulphur-containing wastes from petroleum desulphurisation | R5 | M | Weighted | Offsite in Ireland | Enva Ireland Ltd | Enna Ireland Ltd | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 05 01 10 | No | 13 3 | sludges from on-site effluent treatment other than those mentioned in 05 01 09 | R1 | M | Weighted | Offsite in Ireland | Enva Eco Ltd, W02711-1 | Enna Ireland Ltd | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 01 38 | No | 43 75 | wood other than that mentioned in 20 01 37 | R3 | M | Weighted | Offsite in Ireland | Midleton Ship hire Ltd, WMC 85-01 | knockgriffin, Midleton Ship hire Ltd, Co. Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 17 04 05 | No | 345 38 | iron and steel | R4 | M | Weighted | Offsite in Ireland | Cork Metal Co (one 511) WCP-LK-08-589- | Dublin Hill, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 03 01 | No | 127 5 | mixed municipal waste | R5 | M | Weighted | Offsite in Ireland | Veolia Env Services Ltd, WCP-DC-18-1120-01 | Forge Hill, Kinsale Rd, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 03 07 | No | 62 5 | bulky waste | R5 | M | Weighted | Offsite in Ireland | Midleton Ship hire Ltd, WMC | knockgriffin, Midleton Ship hire Ltd, Co. Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 03 01 | No | 5 64 | mixed municipal waste | R5 | M | Weighted | Offsite in Ireland | Veolia Env Services Ltd, WCP-DC-18-1120-01 | Forge Hill, Kinsale Rd, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 20 01 08 | No | 5 0 | biodegradable kitchen and canteen waste mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 | DS | M | Weighted | Offsite in Ireland | Midleton Ship hire Ltd, WMC 85-01 | knockgriffin, Midleton Ship hire Ltd, Co. Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| Within the Country | 17 01 07 | No | 24 0 | 01 06 | R5 | M | Weighted | Offsite in Ireland | Midleton Ship hire Ltd, WMC 85-01 | knockgriffin, Midleton Ship hire Ltd, Co. Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| To Other Countries | 19 12 11 | Yes | 50 806 | other wastes (including mixtures of materials) from mechanical treatment of waste containing dangerous substances other wastes (including mixtures of materials) from mechanical treatment of materials) from mechanical treatment of tank bottom sludges | D10 | M | Weighted | Abroad | Veolia Env Services, W00550-02 | Corn, Ferry, Cork, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |
| To Other Countries | 05 01 03 | Yes | 31 96 | waste containing dangerous substances | D15 | M | Weighted | Offsite in Ireland | Enva Env Services, W0184-1 | Clonnaman Ind Est, Portlaoise, Co. Laois, Ireland | Redmonds NL, Redmonds Ind Ser GmbH, Lic: 2395105 |

| | | | | | | | | | | |
|--------------------|----------|-----|--|-----|---|--------------------|-------------------|---|--|--|
| To Other Countries | 05 01 03 | Yes | 30 4 tank bottom sludges | D10 | M | Weighted | Abroad | Veolia Env Services, W0050-02 | Corrin, Fermoy, Cork, Ireland | A51 g00508 Osterweule 1 Brunsbüttel ..25541, Germany Sonderabfall Verbringungsanlage (SAVA) |
| To Other Countries | 17 05 03 | Yes | soil and slimes containing dangerous 1.653 substances | D10 | M | Weighted | Abroad | Veolia Env Services, W0050-02 | Corrin, Fermoy, Cork, Ireland | A51 g00508 Osterweule 1 Brunsbüttel ..25541, Germany Sonderabfall Verbringungsanlage (SAVA) |
| To Other Countries | 19 02 09 | Yes | solid combustible wastes containing 0.413 dangerous substances | D10 | M | Weighted | Abroad | Veolia Env Services, W0050-02 | Corrin, Fermoy, Cork, Ireland | A51 g00508 Osterweule 1 Brunsbüttel ..25541, Germany Sonderabfall Verbringungsanlage (SAVA) |
| To Other Countries | 15 02 02 | Yes | absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by 0.906 dangerous substances | D10 | E | Volume Calculation | Abroad | Erva Env Services, W0 184-1 | Clonnaman Ind Est, Portlaoise, Co Laoise, Ire land | A51 g00508 Osterweule 1 Brunsbüttel ..25541, Germany Sonderabfall Verbringungsanlage (SAVA) |
| To Other Countries | 07 01 04 | Yes | other organic solvents, washing liquids and 2.394 mother liquors | D10 | E | Volume Calculation | Abroad | Veolia Env Services, W0050-02 | Corrin, Fermoy, Cork, Ireland | A51 g00508 Osterweule 1 Brunsbüttel ..25541, Germany HJ Endhoven Darleydale Smelter, BL |
| To Other Countries | 16 05 01 | Yes | 1.538 lead batteries | R4 | M | Weighted | Abroad | Rita env, Wp-193-03 | Greenogue Business Park, Rathcoole Co Kildare, Ireland | United Kingdom |
| Within the Country | 06 02 04 | Yes | 576.8 sodium and potassium hydroxide | D9 | M | Weighted | Onsite in Ireland | Erva Env Services, W0 184-1 | Clonnaman Ind Est, Portlaoise, Co Laoise, Ire land | Erva Env Services, W0041- rd ..01 Shannon, Co Clare, Irela nd |
| Within the Country | 11 01 13 | Yes | degreasing wastes containing dangerous 0.75 substances | R1 | E | Volume Calculation | Onsite in Ireland | Safety Klean Ireland, WCP- DC-09-1223-01 | Unit 5 Arton Road, Tallaght Dublin, D24, Ireland | Safety Klean Ireland, WCP- DC-09-1223-01 Unit 5 Arton Road, Tallaght Dublin, D24, Ireland |

* Shaded in row by double checking the Description of Waste then check the correct number

Section 14 Reported Incidents – Summary

There were no incidents reported by the refinery during the year 2010 concerning releases to atmosphere from potential emission points.

Incident with potential for contamination of surface water / ground water

There were no incidents reported by the refinery during the year 2010 concerning contamination of surface water/groundwater.

Section 15 Complaints received – summary

Eight complaints were made to the refinery in 2010, of which three were deemed to be attributable to refinery operations. The following is an extract from the Refinery Complaints Register and gives a summary of complaints reported and the company response.

The number of complaints received, and the number of which the reasons for the complaints originated in the refinery, are reduced from 2009. The causes leading to the three complaints are all odour related originated in the refinery waste water treatment plant. Corrective actions have been taken to eliminate these nuisance odours.

Environmental Complaints Register

1.

Date & Time: Saturday, January 2nd 17:00hrs
Source of Complaint: Resident of Ardnabourkey
Nature of complaint: Complained of a gas type odour in the vicinity of his house

Response:

The complaint was received by the Shift Supervisor who said that he would check the plant to establish if any odours were being generated. The BG proceeded to the WWTP to check for odours. He noted an odour in the vicinity of the equalisation basins. Gas checks were carried out in the area and nothing was found.

The complainant was telephoned by the Env Lead on Monday 4th and was assured that checks had been carried out in the plant and would be continued to be carried out to establish where the odour was coming from. The complainant said he had received the complaint from a neighbour and was passing it on the refinery as he had been asked to do by the HSE department. He said the odour was foul smelling. The complainant was asked to contact the environmental office immediately should the odour re occur.

Weather conditions: Wind was light North to North Easterly

Close out comment: Checks are

Wind direction at the time of the odour was not consistent with an odour being generated in the refinery getting carried to Ardnabourkey or Whitegate village.

It was not possible to definitively identify if this odour originated from the refinery.

Odour checks are being carried out on a daily basis to establish if on site odours are being carried offsite.

2.

Date & Time: Wednesday, February 3rd 16:30hrs
Source of Complaint: Resident of Whitegate Village
Nature of complaint: Complained of a gas type odour in the vicinity of her house

Response:

The complaint was received by the Shift Supervisor who said that he would check the

plant to establish if any odours were being generated. The BG proceeded to the WWTP to check for odours. He did not find odour in the area and noted that all the odour neutralising system was operating correctly. The SRU has shut down at the time for overhaul and it was thought the odour could have come from one of the vessel which was opened for inspection.

The complainant was telephoned by the Env Lead on Thursday the 4th and was assured that checks had been carried out in the plant and would be continued to be carried out to establish where the odour was coming from. The complainant said that the odour was there for a short period and then disappeared. The complainant was asked to contact the environmental office immediately should the odour re occur.

Weather conditions: Wind was light West to South Westerly

Close out comment: Checks are

Wind direction at the time of the odour was consistent with an odour being generated in the refinery getting carried to Whitegate village.

It was deemed that this odour originated from the refinery and the complaint was attributable.

Odour checks are being carried out on a daily basis to establish if on site odours are being carried offsite.

3.

Date & Time: Friday 30th April at 13:00hrs

Source of Complaint: Resident of Whitegate Village, Mosestown.

Nature of complaint: Complained of a gas type odour in the vicinity of her house

Response:

The complaint was received by John McCarthy who said that he would check with operations to establish if any odours were being generated. The BG proceeded to the WWTP to check for odours. Localised odour was present but was not thought to be causing odour outside the site.

The complainant was visited by the Env Lead and HSE Lead at 14:30 and was assured that checks had been carried out in the plant and would be continued to be carried out to establish where the odour was coming from. The complainant said that the odour was there for a short period and then disappeared. There was no odour present at the time of the visit. The complainant was asked to contact the environmental office immediately should the odour re occur.

Weather conditions: Wind was moderate West to South Westerly

Close out comment:

Wind direction at the time of the odour was consistent with an odour generated in the refinery getting carried to Whitegate village.

However all checks in the vicinity of the site were negative at the time of checking.

It was therefore unclear where this odour originated from. The complaint was deemed to be non-attributable.

Odour checks are being carried out on a daily basis to establish if on site odours are being carried offsite.

4.

Date & Time: Saturday, 29th May 2010 13:00 hrs
Source of Complaint: Resident of Whitegate Village
Nature of complaint: Complained of a gas type odour in the vicinity of his house

Response:

The complaint was received by the Shift Supervisor who said that he would check the plant to establish if any odours were being generated. He determined that agitation, during recovery, of an oily-water sludge on the inlet side of SW-1 was causing a H₂S type odour.

The complainant was visited by the Environment Lead on Monday 31st May 2010 and assurance was given that ever effort was been made to ensure no nuisance odours would be generated on site. The complainant was informed of site / boundary checks and procedures being undertaken by operations department to monitor for, and eliminate, any nuisance odours

Weather conditions: Wind was light and from the west

Close out comment:

Wind direction at time of complaint had been consistent with the nuisance coming from the pond area. This, and the response from the shift superintendent, attribute the nuisance as having originated in the refinery

Odour checks are being carried out on a daily basis to establish if on site odours are being carried offsite.

5.

Date & Time: Wednesday 2nd June 2010 @ 01:10 hrs.
Source of Complaint: Resident of Whitegate Village
Nature of complaint: Complained of a bad smell in the vicinity of her house

Response:

The complaint was received by the Shift Supervisor (EM) who said that he would check the refinery plants and boundaries to determine if a source point for the mal odour could be identified

The SS informed the environmental lead that site and Whitegate village checks, following the complaint, did not reveal any odours. Mr. Tom Mc Carthy of WYG conducted an odour survey between 11:00 and 13:30 hours on Wed. 2/06/2010. He reported a faint odour in the vicinity of the complainants house but concluded that this was not originating from the refinery. The complainant was visited by the Environment Lead & Mr. Tom McCarthy on Wed. afternoon (2/06/10). Assurance was given that ever effort was been made to ensure no nuisance odours would be generated on site. The complainant was again informed of site / boundary checks and procedures being undertaken by operations department to monitor for, and eliminate, any nuisance odours

Weather conditions: Wind was light and from the west

Close out comment:

Wind directions (northerly) at time of complaint and during WYG's odour survey were not consistent with the nuisance coming from the refinery. This, and the response from the shift superintendent, do not attribute the nuisance as having originated in the refinery

Odour checks are being carried out on a daily basis to establish if on site odours are being carried offsite.

6.

Date & Time: Sunday 20th June 2010 @ 11:10 hrs.
Source of Complaint: Resident of Whitegate Village
Nature of complaint: Complained of a dirty foam with an oily smell on the surface of the water in Whitegate Bay.

Response:

The complaint was received by the Main Control Room at 11:15 and was reported to the shift superintendent. The SS and the "on weekend duty" operations manager checked the refinery normal to harbour discharges and above water pipelines and were satisfied that no abnormal refinery operations had occurred. They then inspected and photographed the foam in the bay and reported that there was no "oil type" odour. However a very faint chemical smell was evident.

On Monday 21/06/2010 the environmental lead spoke to;

- Refinery operations manager.
- Refinery jetty operating staff
- The environmental contact at the ESB Aghada generating station.

He was informed that the ESB had also received a complaint from the Whitegate resident and that they had operational difficulties with there cooling water discharges during the weekend.

ff

Weather / tidal conditions: Wind was light and from the south west. Tide was incoming with high water at 12:37.

Close out comment:

The env lead is satisfied that the foam witnessed in Whitegate Bay had no hydrocarbon content and did not originate from the refinery.

Photographs of the offending foam are located in the HSE/Whitegate folder on the "s" drive.

7.

Date & Time: Friday 5th Nov 2010 & 1643 hrs.
Source of Complaint: Resident of Whitegate Village
Nature of complaint: Complained of a gas type odour in the area of his residence (Moses Town Drive – Whitegate Village)

Response:

The complaint was received by telephone by the HSE Lead (John McCarthy) 16:43 and was reported to the shift superintendent and process superintendent. The SS, the blending gauger and the process superintendent checked the refinery boundaries, the WWT area, the GZ & SRU areas and Whitegate Village. No gas type odours were noticed. However, the process superintendent reported a "seaweed" type odour at the bay wall in Whitegate village. A local hydrocarbon odour caused by a leaking gland on the

GZ bottoms pump was also reported.

At 17:15 hrs the HSE Lead visited the complainant and reassured him that all efforts were being taken to locate a nuisance odour source within the refinery. The complainant stated that there were no odours evident now (17:15) but there had been a smell at the time he telephoned in the complaint.

The Env. Lead visited 2 residents of Whitegate Village on Thursday 11th November to enquire whether they had noticed any nuisance odours in the recent past.

One resident did respond that she, on occasions, has blamed the refinery for unpleasant odours when the nuisance is actually coming from the bay, especially when the tide is low and winds are from the W or SW.

Weather / tidal conditions: Wind was very light / calm and from the south west. Tide was fully in with high water at 16:30 hrs.

Close out comment:

The env lead is satisfied that the refinery was not the source of mal odours as specified by the complainant.

8.

Date & Time: Thurs 9th Dec. 2010 & 09:00 hrs.

Source of Complaint: Resident of Thomas Davis Terrace

Nature of complaint: Complained of a gas type odour in the area of his residence

Response:

The complaint was received by telephone by the ENV Lead (John O' Keeffe) at 09:00 who then reported it to the shift superintendant and process superintendant. It was also stated at the daily operations meeting (09:15) that they were odours noticeable in the main car park. At 09:30 the ENV lead noticed a strong odour in the area of the equalisation basins at the wastewater treatment plants. It was also evident that the odour abatement system at the eq. basins was out of service due to its water delivery pipes being frozen.

As a result of the odour the rate of treatment of spent caustic was reduced.

The Env. Lead visited the complainant's residence at 10:30 hrs but got no response. He then telephoned the resident who stated that at this time there was no odour. He agreed to meet with the Env. Lead at 09:30 on Fri. 10/12/2010.

At 22:20 hrs. the complainant left a message on the Env. Lead's phone – saying that the same odour had returned.

On Friday morning a telephone advisory was received from a resident of Whitegate Village that there had been gas type odours in the area on the previous day. Operations dept. then shut down the spent caustic treatment facilities

The resident of Thomas Davis Terrace was visited by the Env. Lead at 09:30 and informed him that the odour was a result of the cold weather icing the pipework of the odour abatement system and that all efforts were been taken to rectify this.

Weather / tidal conditions: Wind was very light / calm and from the North on Thurs & Fri . 9-10/12/2010 .

Close out comment:

The env lead is satisfied that the refinery was the source of mal odours as specified by the complainant

Section 16 Conclusion and Outlook

This is the eleventh Annual Environmental Report prepared by Whitegate Refinery for submission to the EPA in conformance with Condition 2.9 of the company's IPPC Licence, No P0266-01.

This report provides a summary of environmental performance at the refinery site. This report together with past and future AERs provides a useful means of monitoring progress of the site's ongoing environmental performance and management of environmental issues.