Annual Environmental Report *2010*

Honeywell International Technologies Limited
ANNUAL ENVIRONMENTAL REPORT (AER)
to the Environmental Protection Agency (EPA)
March 2011

Integrated Pollution Control Licence (IPC) PO525-01

Front Page Summary

Honeywell International Technologies Limited has drafted the Annual Environmental Report (AER) in accordance with Condition 2 and Schedule 5 of PO525-01 and Environmental Protection Agency (EPA) Guidance Notes for Annual Environmental Reports.

Honeywell International Technologies Limited is committed to maintaining the highest Health, Safety & Environmental (HSE) standards. In 2010, the site continued to develop and improve the environmental management systems and reduce the environmental footprint of the Waterford Operation with the main environmental objectives focusing on the resolution of air monitoring issues associated with the site and the creation and development of an energy management system based on EN 16001.

Two surveillance audits relating to ISO 14001 & OHSAS 18001 were conducted by EQA in 2010. One major problem, two observations and five minor problems were noted during these audits. Serveral energy conseration projects and opportunities were identified within the plant to assist with savings on the average 1.5 million euro energy spend. These projects were identified as part of the company's attempt to align EN 16001 with ISO 14001 and OHSAS 18001.

There was one site inspection by the EPA in March 2010. This was to ensure that a comprehensive Recci visit was carried out by Catalyst Environmental and involved a comprehensive tour of the production and roof areas, and included all aspects related to the Compressor Wheel (CW) and Turbine Wheel (TW) processes, and the stack emissions arising from the various oven and afterburner operations. A number of EPA visits focused around air monitoring programmes and subsequent reports.

The expression of interest (EOI) form that was submitted as part of the Cleaner Greener Production Programme (CGPP) in 2008 was recommended for funding, subject to successful resolution of any outstanding technical and financial issues. The proposed CGPP project submitted by Honeywell aims to eliminate the need and use of polystyrene cores used in the manufacture of aluminum compressor wheels through innovative engineering solutions. Where successful, the new process will deliver smaller moulds requiring less quantity of raw materials. Fewer materials leads to a reduction in oven cycle time thus reducing a natural energy source and finally a reduction in the generation of the current hazardous waste stream. Honeywell remained committed to meeting the objectives and targets as outlined in the EOI submission. The project continued to meet requirements throughout 2010.

The site waste management contract was awarded to Veolia Environmental in Q3 2010 and resulted in significant cost savings and improved waste disposal methods due to the transfer of a large scale waste stream to a recovery option nationally.

A key focus for 2010 was meeting the increase in customer demands for the Single Sequential Turbo (SST) wheel. The site focused on issues concerning customer/internal scrap and building modifications to allow for the transfer of the handmould process, maintenance workshop and hazardous waste store into the Single Sequential Turbo (SST) area. The transfer commenced with the introduction of a drying oven and the the addition of trade effluent from the process to the Sludge Dewatering Plant (SDP).

Following the submission of a licence review application in July 2008 confusion arose regarding the corporate entity that is named on the face of the existing IPC licence (Reg. Ref. PO525-01) and the applicant for the licence review (Reg. Ref. PO525-02). Honeywell International Technologies Limited (Company No. 63614) is the entity named on the face of the existing licence. That is the entity to which the original IPC licence (Reg. Ref. PO525-01) was granted. Honeywell Transportation Ireland Limited (Company No. 87753) is the applicant for the licence review. It is a wholly owned subsidiary of Honeywell International Technologies Limited (Company No. 63614). The directors and secretary are the same for both companies. Subsequently the licence application was withdrawn in May 2010 and the licensee was requested to submit a licence transfer request. As of the 31st December 2010, this request was being revewed by the Agency.

For the purpose of this report and following a request from the Agency, Honeywell will endeavour to use the company name Honeywell International Technologies Limited in all future correspondence until further notified by the Agency.

Honeywell International Technologies ***commitment to continuous improvement and reduction of the sites environmental footprint is a core element of the corporate and site Environmental Management program (EMP)***

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1. INTRODUCTION

1.1. Facility Details

Name:	Honeywell International Technologies Limited
Location:	Unit 411, IDA Industrial Estate, Cork Road, Waterford.
Licence No:	PO525-01
IPC Class:	3.4
IPC Class:	3.4.2
Activity:	The processing of non-ferrous metals, their compounds or other alloys by thermal means in installations with a batch capacity exceeding 0.5 tonnes.
Site Contact:	Mr. Cecil Black HSE Manager Tel.: 051- 301488 Email: Cecil.Black@honeywell.com
	Ms. Amy Fahey HSE Coordinator Tel: 051 301316 Email: Amy.Fahey@Honeywell.com

1.2. Company Description

Honeywell International Technologies Limited formerly known as Honeywell Transportation Systems and Garret Ireland (Allied Signal Ireland Ltd.) occupied the first factory on the present site in 1978. The original factory was built for the Industrial Development Authority (IDA). Prior to the construction of the factory, the site was undeveloped. The site is located towards the western end of the Waterford Industrial Estate. The Facility area occupies 11,000 M^2 on 3.5 hectares

In 1980, a fire occurred which forced the plant to shutdown. A new building was constructed and the plant reopened in 1982 and was expanded in size in 1986. In the 1990's, the site was further developed to include new canteen facilities, extended casting capability and a software development centre.

This facility is engaged in the manufacture of Compressor Wheels (CW), Turbine Wheels (TW) and Single Sequential Turbo Wheels (SST) for the Garret range of turbo-chargers for internal combustion engines. Normal operations are carried out on a three (3)-shift basis for five days per week. At year-end of December 2010, the plant employed 471 personnel and worked 237 days. An increase in SST wheel demand resulted in the introduction of a four shift cycle for 15 weeks and numerous process changes including equipment and building modifications and improvements.

The site maintains a demonstrated commitment to quality, employee development and health, safety & environmental management systems.

Honeywell International Technologies Limited is accredited to and has been awarded the following internationally recognized accreditations

- ISO 14001 – May 2006
- OHSAS 18001 – May 2006

Examples of environmental communication programmes include (see appendix 1):

- ISO 14001 Awareness
- Energy awareness – EN16001
- PCB inventory awareness
- Gypsum plaster waste and cost savings
- REACH awareness

Spill response training programmes were also carried out in 2010 and a spill containment team was identified for site emergencies should they arise.

1.3. Product Range

- **COMPRESSOR WHEEL (CW) MANUFACTURING**

The activity involves the manufacture of aluminium compressor wheels and is covered under IPCL PO525-01 by Class 3.4
In 2010 - 6,558,589 Compressor wheels were made in the Waterford Foundry

- **Compressor Wheel Machining (CWM)**

This activity involves the machining of compressor wheel castings into finished compressor wheels ready for assembly into Turbochargers.
In 2010 – 4,486,687 compressor wheels were machined – which represents 86% of the volume of cast compressor wheels are machined on site.

- **TURBINE WHEEL (TW) MANUFACTURING**

This activity involves the casting of nickel steel alloy turbine wheels.
In 2010 – 3,363,965 turbine wheels were produced.

- **Single Sequential Turbo (SST) Manufacturing**

This activity involves the casting of single sequential turbo wheels, a new casting type specifically designed for the American market. In 2010 – 130,230 wheels were produced.

1.4. Sustainable Opportunity Policy: Honeywell's Commitment to Health, Safety and the Environment

Honeywell

Sustainable Opportunity Policy
Honeywell's Commitment to Health, Safety and the Environment

By integrating health, safety and environmental considerations into all aspects of our business, we protect our employees, our communities and the environment, achieve sustainable growth and accelerated productivity, drive compliance with all applicable regulations and develop technologies that expand the sustainable capacity of our world. Our health, safety and environmental management systems reflect our values and help us meet our business objectives.

- We protect the safety and health of our employees, and minimize the environmental footprint of our operations through efforts to prevent illness, injury and pollution.
- We actively promote and develop opportunities for expanding sustainable capacity by increasing fuel efficiency, improving security and safety, and reducing emissions of harmful pollutants.
- We are committed to compliance with all of our health, safety, environmental and legal requirements everywhere we operate.
- Our commitment to health, safety and the environment is an integral aspect of our design of products, processes and services, and of the lifecycle management of our products.
- Our management systems apply a global standard that provides protection of both human health and the environment during normal and emergency situations.
- We identify, control and endeavor to reduce emissions, waste and inefficient use of resources and energy.
- We are open with stakeholders and work within our communities to advance laws, regulation and practices that safeguard the public.
- We abide by the company's own strict standards in cases where local laws are less stringent.
- Our senior leadership and individual employees are accountable for their role in meeting our commitments.
- We measure and periodically review our progress and strive for continuous improvement.

These are our commitments to health, safety, and the environment, and to creating Sustainable Opportunity everywhere we operate.

Dave Cote

Michael

Dave Cote
Chairman and CEO
01/01/2009

1.5. Honeywell International Technologies Limited: Environmental Policy

Honeywell

Health, Safety & Environmental Policy

Honeywell Transportation Ireland Limited manufactures and machines nickel steel alloy turbine wheels and aluminium compressor wheels at our foundry operation in Waterford for the automotive industry worldwide. We embrace the principles and standards of Honeywell's "Commitment to Health, Safety and Environment" and endeavor to implement this policy for our site operations and to work towards a process of continual improvement.

Honeywell Transportation Ireland Limited is committed to:

- Securing the safety of all by preventing accidents, incidents and ill health by hazard identification, risk assessment and implementation of controls.
- Setting up systems to ensure Safe Place, Safe Plant, Safe Procedures and Safe People.
- Continual Improvement of our HS&E performance by setting challenging objectives and by conducting site inspections, audits and accident & incident analysis.
- Monitoring of progress and reviewing of HSE performance on a regular basis.
- Pollution prevention and minimising the impacts of our activities through annual waste minimization activities.
- At a minimum, compliance with all of our health, safety and environmental legal duties to employees, contractors and members of the general public.
- Actively encouraging a positive HS&E culture through leadership and employee involvement, consultation and communication.

This policy will be reviewed annually in the light of changing circumstances in order to ensure its continued relevance to all our activities.

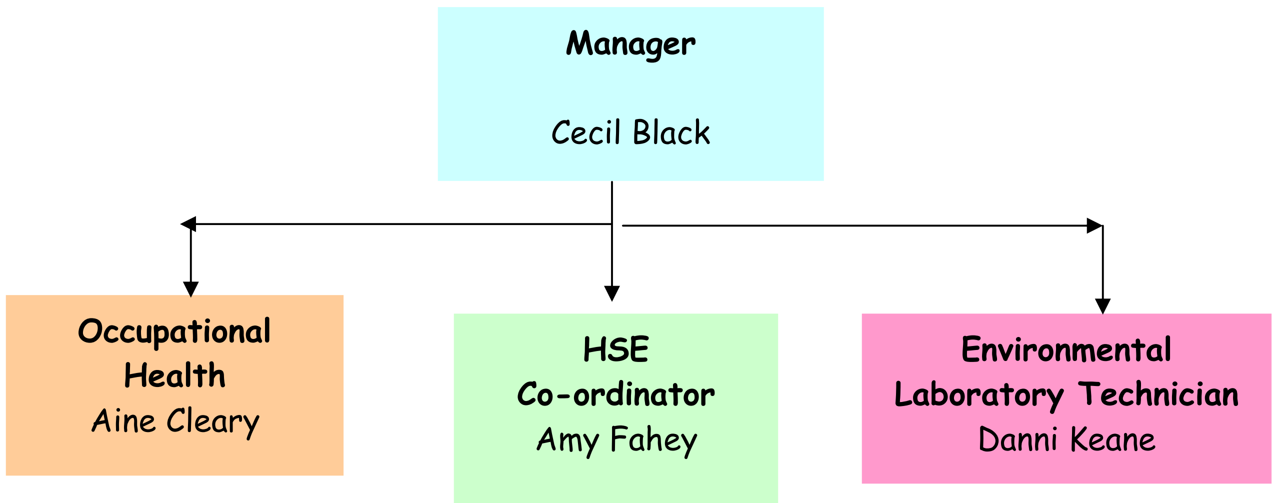
Signed: - Michael Morrissey
Plant Manager
Honeywell Transportation Ireland Limited

Dated: - 29/7/2010

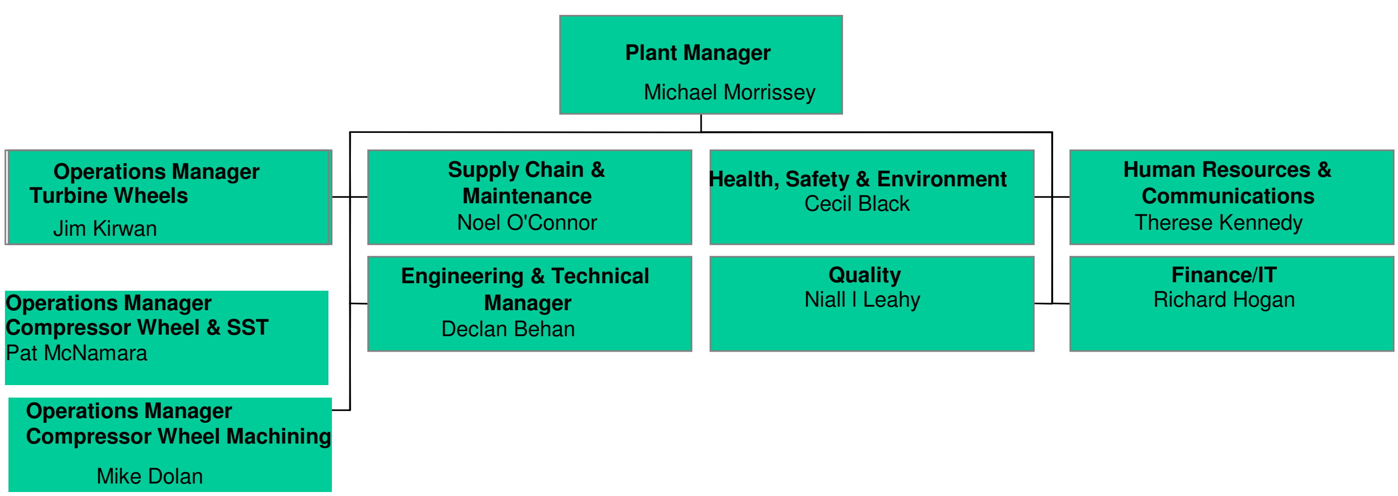
Date: 29.09.10 HTTW-G-HSE-G-002 Rev 6

1.6. Management Structures

Health, Safety, Environmental & Remediation



Waterford Leadership Organisation Chart



2. SUMMARY INFORMATION
2.1. Self-Monitoring Data
2.1.1. Emissions to Sewer

Emission Point Reference No.: SE1

All 2010 calculations made using the average daily flow rate of SE1: 332,987 litres per day. The average daily rate has been calculated based on a flow rate that is recorded every five minutes and records in litres per second flow rate each time.

Note: pH average value and temperature average value calculations were based on internal daily laboratory results.

Note: Duration of emissions (hours) is based on 339 days X 24 hours = 8136

Note: The number of days was calculated based on the number of days the sampling station collected a sample.

Table 2-1 Summary Table f or Emissions to Sewer

Parameter	Emissions Limits	Mass Emissions Previous Year	Average Mass Emissions Present Year MG/L	Monitoring Frequency	% Compliance Present Year
Flow	700m³/day	1.42	4.86	Continuous	100%
Temperature	43ºC	19.78 ºC	15.29	Continuous	100%
Chemical Oxygen Demand	1000mg/l	517.22	591.82	Daily Result	94.40%
pH	6-9	7.5	7.34	Daily Result	97.94%
Biochemical Oxygen Demand	400mg/l	284.42	370.16	Monthly	75%
Suspended Solids	600mg/l	93.22	221.29	Daily Result	97.64%
Sulphates (as SO_4)	1500mg/l	1685.65	1629.7	Daily	49.01%
Fluorides	3.3mg/l	0.38	0.58	Monthly	100%
Nitrates (as N)	4.2mg/l	1.745	1.73	Monthly	100%
Ammonia (as N)	30mg/l	<0.1	0.15	Weekly	100%
Total Heavy Metals	1.0mg/l	0.10	0.33	Quarterly	100%
Detergents (as MBAS)	30mg/l	8.13	5.03	Quarterly	100%
Oils, fats & greases	100mg/l	27.25	42.3	Quarterly	100%

Table: 2-2 Summary Emissions to Sewer Monitoring Table

	2010	Limits *	Average Mass Emissions mg/l	Average Mass Emissions kg/l	Average Mass Emissions Amount sent in kg/l multiplied by 332,987 L for 2010	Average Mass Emission Limits Limits in kg/l multiplied by 332,987 L	Duration of Emissions Average mass emission (kg) * duration of emission (hours – 8136)	Emission Limits Limit value (kg) * duration of emission (hours -8136)
Daily / Weekly / Quarterly / Monthly								
Continuous	Suspended Solids	600	221.29	0.000221	73.59	199.79	1.80	4.88
	BOD	400	370.16	0.000370	123.21	133.20	3.01	3.25
	Ammonia (as N)	30	0.15	0.0000002	0.07	9.99	0.002	0.24
	Fluoride	3.3	0.58	0.0000006	0.20	10.99	0.005	0.03
	Sulphate	1500	1629.7	0.001630	542.67	499.48	13.26	12.20
	Nitrate (as NO_3)	4.2	1.73	0.000002	0.67	1.40	0.02	0.03
	Oils, Fats & Grease	100	42.3	0.000042	14.10	33.30	0.34	0.81
	COD	1000	591.82	0.000591	196.80	332.99	4.81	8.14
	Heavy metals	1	0.33	0.0000003	0.10	0.33	0.003	0.008
	Detergents (MBAS)	30	5.03	0.000005	1.66	9.99	0.04	0.24
			Average value					
	Flow	47	4.86					
	Temperature	43 ºC	15.29					
	pH	6-9	7.34					

Note: All information used in the creation of the above table has been abstracted from external and internal monitoring results. External monitoring is carried out by TE Laboratories, Tullow Industrial Estate, Tullow, Co. Carlow.

The main sources of waste water from the Honeywell International Technologies Ireland site are:

- Trade effluent from the compressor wheel and turbine wheel business units (zyglo)
- Trade effluent from the Sludge dewatering plant (Alcast plaster particles, sedifloc)
- Trade effluent from the dip room (Rinse water)
- Trade effluent from the Single Sequential Turbo (SST) area (Automated Pouring Filling Cell (APFC)
- Sanitary (canteen, toilets, showers).

The sanitary waste water is discharged via underground foul lines. All other waste water is discharged via separate underground trade effluent lines. All waste water is discharged from Honeywell International Technologies Limited to the IDA's sewer and is currently being accepted into Waterford City Council Waste Water Treatment Plant.

All non compliances were reported to the EPA in accordance with condition 12 of PO525-01. Copies of all notifications were sent to Waterford City Council in order to keep all interested parties up to date on site issues. Table 2.3 briefly outlines non compliances and corrective actions for 2010.

The high COD & Suspended Solid results associated with Q4 2010 were attributed to the cold weather and the impacts on the SDP. A cold weather plant shut down plan has since been implemented as a caution measure where cold weather is anticipated.

The penetrant material used as part of the site inspection process has been identified as a major contributor to the toxic non compliances. Arrangements are in place to identify a suitable alternative that meets environmental and turbo requirements.

Substances of Very High Concern (SVHC) as listed under the REACH regulations are not contained in the site's trade effluent.

Following numerous attempts to extend the emission limit values associated with our trade effluent, Honeywell International Technologies lImited has been requested to confirm there is No impact of the site's trade effluent on the Waterford Waste Water Treatment Plant (WWWTP). As of from 31.12.10, obtaining this information from WWWTP has proven difficult due to a dispute between Waterford Corporation and the contractor who designed and built WWWTP.

CCTV inspections were carried out on trade effluent lines in 2010. A number of minor defects were noted and repair work carried out. Repair work predominately focused on the trade effluent line running from the SST area to SE1 (Final discharge location).

Table 2.3 Summary of Trade Effluent Non Compliances 2010

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
06.01.10	Trade effluent non compliance: 1. Toxicity	Remaining residue in pipe lines following washed down drains as part of new year start up	Ensure all lines are fully cleaned at every production holiday period	Local Authority EPA	**Closed**
26.01.10	Trade effluent non compliance: 1. Toxicity	Unknown	Review and identify corrective action	Local Authority EPA	**Outstanding**
30.03.10	Trade effluent non compliances: 1. Sulphate	Sulphates contributed by alcast plaster	None – under investigation	Local Authority EPA	**Outstanding**
14.04.10	Trade effluent non compliance: 1. Sulphate	APFC going directly to clarifier	Connect APFC to SDP	Local Authority EPA	**Closed**
28.04.10	Trade effluent non compliance: 1. Sulphate	APFC going directly to clarifier	Connect APFC to SDP	Local Authority EPA	**Closed**

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
15.06.10	Trade effluent non compliance: 1. Sulphate 2. COD	Inadequate location of piping directing flow into feed tank Inadequate PM's Insufficient BW tank cleaning Poor polymer batch from supplier	Redirect piping Review PM's Implement sufficient cleaning Review polymer	Local Authority EPA	**Closed**
18.06.10-10.07.10	Trade effluent non compliance: 1. Sulphate	Possible inadequate cleaning of tanks due to inappropriate access.	Install new hatch	Local Authority EPA	**Closed**
24.08.10	Trade effluent non compliance: 1. Sulphate	Problem with polymer dosing system Zyglo entered system causing foaming and interference to sensitive sensors Potential impact of high conductivity in DI water system	Implement daily checklist system in SDP Implement quick escalation process in SDP for all issues Resolve DI water issue	Local Authority EPA	**Closed**

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
08.09.10	Trade effluent non complainces: 1. Ph 2. Sulphates	Suspect increase sulphates arising from SST Probe at SE1 removed from its location	AWN reviewing impact of SST	Local Authority EPA	Outstanding
28.09.10	Trade effluent non complainces: 1. Sulphates 2. COD	Sulphates contributed by alcast plaster No cause given for COD	Extend licence parameters in conjunction with local authorities	Local Authority EPA	Outstanding
29.09.10 - 14.10.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	Outstanding
12.10.11	Trade effluent non compliance: 1. Toxicity	Possibly zyglo	1. Undertake review of SDS 2. Test separate waste streams 3. Talk to suppliers regarding formulations	Local Authority EPA	Outstanding

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
15.10.10 16.10.10 17.10.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
18.10.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
19.10.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
20.10.10	Trade effluent non compliance: 1.Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
27.10.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
01.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
02.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
04.11.10	Trade effluent non compliance: 2. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
05.11.10 06.11.10 07.11.10	Trade effluent non compliance: 1.Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
08.11.10	Trade effluent non compliance: 1.Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
09.11.10	Trade effluent non compliance: 1.Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
10.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
11.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
12.11.10 14.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
16.11.10 17.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
18.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
19.11.10	Trade effluent non compliance: `1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
22.11.10 23.11.10 24.11.10	Trade effluent non compliances: 1. Sulphates 2. COD	Sulphates contributed by alcast plaster No root cause given for COD	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
25.11.10	Trade effluent non compliance: 1. Sulphate	Sulphates contributed by alcast plaster	Extend licence parameters in conjunction with local authorities	Local Authority EPA	**Outstanding**
29.11.10	Trade effluent non compliances: 1. COD 2. Sulphates 3. Suspended Solids	Impact of cold weather on Sludge Dewatering Plant	Implement cold weather plan in conjunction with Veolia & maintenance at weekends	Local Authority EPA	**Closed** **Outstanding for sulphates**

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
30.11.10 01.12.10 02.12.10	Trade effluent non compliances: 1. COD 2. Sulphates 3. Suspended Solids	Impact of cold weather on Sludge Dewatering Plant	Implement cold weather plan in conjunction with Veolia & maintenance at weekends	Local Authority EPA	**Closed** **Outstanding for sulphates**

2.1.2. Summary of Emissions to Surface Waters

Non process water is discharged via SW1, SW2 & SW3 in accordance with licence conditions. Non process water consists of storm water run off from roofs and car parks. Monitoring of all surface water points occurs in accordance with Condition 9 and Schedule 4 of IPC PO525-01. TelLab surface water monitoring results are presented in appendix 2.

Honeywell International Technologies Limited has submitted numerous requests to the Agency to remove the requirement to include a meter at SW3 for the following reasons.

- There was No flow through SW 2 & SW 3 in 2009 and as a result No testing has occurred,
- The absence of a flow rate in this drain also results in the drying up and failure of monitoring equipment and additional costs are being incurred for maintenance and repair.

SW2 is located to the front of the building in car park 1. The absence of a constant flow here results in the absence of sampling and subsequent monitoring. Honeywell International Technologies Limited has requested that SW2 is also removed as a monitoring requirement within our license.

The incident regarding surface water 3 has previously been brought to the attention of the Agency in letters dated 15th December 2005, 15th May 2009 and 27th May 2010. SW3 is located at the rear of the building in car park 2.

Table 2.4 Summary of Surface Water Non Compliances 2010

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
31.03.10	Surface water contamination	McBreen accidentally disposed 1000l alcast plaster contaminated sludge into a SW drain	Jet lines and remove 40kg of sand and silt washings (no contaminants & disposed at Greenstar) Colour code all drains on site	EPA	**Closed**
12.05.10	Surface water contamination	Probe not replaced following calibration at SW3 due to repeated failures and costs associated with continual repair arising from absence of flow	Request submitted to remove requirement from licence	EPA	**Outstanding** (No response received by the Agency)

Note: Weekly visual inspections of surface water points are completed by security and also by the laboratory technician in line with Schedule 4 of PO525-01.

2.1.3. Summary Atmospheric Emissions

Numerous air monitoring programmes and site meetings occurred in 2010 in order to assess total Volatile Organic Compounds (VOCs) (as C) emissions against the licence emission limit value and to determine the composition of the measured VOC concentrations. City Analysts carried out air monitoring on behalf of Honeywell International Technologies Limited while Catalyst Environmental carried out air monitoring on behalf of the EPA.

Two EPA inspectors visited the site on the 02nd March 2010 to ensure that a comprehensive Recci visit was carried out by Catalyst Environmental. The involved a comprehensive tour of the production and roof area, and included all aspects related to the Compressor Wheel and Turbine Wheel processes, and the stack emissions arising from the various oven and afterburner operations.

Air Monitoring Programme No. 1: City Analysts on site to carry out air monitoring on oven A2-13 (oven 5) on the 21.01.10. (City analysts were requested to carry out an emissions monitoring survey on one stack at the turbine wheel (TW) business unit. The survey was carried out over one day. Emission points A2-13 was monitored on the 21st January for Total Organic Carbon (TOC) and Combustion Gases. The results show that the emissions from stack A2-13 are below the limits stated in IPPC Licence No:-P0525-01 for NO_X Concentration and TOC Concentration.

Table 2.5: City Analysts Air Monitoring Summary Emissions

Date	Oven	Sample Method	Afterburners	Total VOC mg/m3	Methane mg/m3	NMVOC mg/m3	H2O	Oxygen
21.1.10	A2-13		N/A	11	-	-	-	-

Air Monitoring Programme No. 2: Catalyst Envionmental commenced with the setting up of monitoring equipment on Sunday 28th March 2010 and Flame Ionization Detector (FID) monitoring of ovens on Monday 29th March 2010. The monitoring locations included Oven 2 (A2-2) and 10 (A2-6) over four days with the afterburner on. Catalyst Environmental repeated the monitoring programme the following week (commencing Monday April 12th) on Oven 1 (A2-1) and 9 (A2-5) but this time with the afterburner turned off. This monitoring programme focused on simultaneous monitoring of VOC emissios from ovens. A member of OEE visited the site on the 09th, 13th and 14th April to observe the polystyrene being added to the blocks and the blocks being loaded into the oven, or alternatively, see the blocks coming out of the oven. City Analysts also carried out back to back monitoring with Catalyst Environmental.

City Analyst report includes a summary of FID monitoring on the four main ovens carried out on the 28-29th March with the afterburner ON and from the 13-14 April with the afterburner OFF. Overall, some further investigation was requested by the EPA to try to determine the source of the higger VOC emissions.

Catalyst monotiring indicated very significant VOC emissions at times. The only noteworthy result is that methane may be a significant emission at A2-6, but further investigation was required to confirm this.

Table 2.6: City Analysts Air Monitoring Summary Emissions

Date	Oven	Sample Method	Afterburners	Total VOC mg/m3	Methane mg/m3	NMVOC mg/m3	H2O	Oxygen
30.3.10	A2-1		ON	2.8			1.07	18.04
29.3.10	A2-2		ON	4.75			6.51	17.11
30.3.10	A2-5		ON	27			6.06	16.32
29.3.10	A2-6		ON	100			6.19	16.92
14.4.10	A2-1		OFF	36				19.40
13.4.10	A2-2		OFF	26				20.1
14.4.10	A2-5	FTIR	OFF	185	131	53	2.2	19.4
13.4.10	A2-6	FTIR	OFF	136	85	51	3.1	19.9
27.4.10	A2-5	FTIR	ON	70	53	17	6.0	16.3
27.4.10	A2-6	FTIR	ON	74	55	19	6.2	16.9
28.4.10	A2-1	FTIR	ON	5.0	2.3	2.6	6.8	18.1
28.4.10	A2-2	FTIR	ON	8.1	5.8	2.3	6.5	17.1

Air Monitoring Programme No. 3: A number of samples were also taken onto thermal desorption tubes containing
Tenax and Spherocarb, and then subsequently analyzed in the laboratory. The samples were thermally desorbed using automated instrumentation and analysed by Gas Chromatograph Mass Spectrometry, (GC-MS). However, due to an instrument malfunction on the thermal desorption system, all of the samples were desorbed without any data collection, hence the duplicate charcoal tubes were analysed instead. Honeywell therefore deemed this an ineffective measurement method.

A request was submitted by Honeywell to replace the current licence term volatile organic compounds (VOC) with the term non methane VOC (NMVOC), to increase the NMVOC licence limit to 20 to 50 mg/m3 in line with Best Available Technology (BAT) and a proposal to switch off the afterburners in order to reduce fuel consumption and reduce Green House Gas (GHG) emissions from the site. The Agency advised this could be considered under the licence review process which was in place at the time. This licence review has subsequently been revoked.

Air Monitoring Programme No. 4: City Anlaysts carried out air monitoring on A2-3 (Oven 3) and A2-4 (Oven 4) on the 07th and 08th September 2010 to determine VOC concentrations and to investigate methane combustion.

Table 2.7: City Analysts Air Monitoring Summary Emissions

Date	Oven	Sample Method	Afterburners	Total VOC mg/m3	Methane mg/m3	NMVOC mg/m3	H2O	Oxygen
7.9.10	A2 - 4	FTIR	ON	49	25	24	3.4	17.32
8.9.10	A2-3	FTIR	ON	90	48	42	2.9	17.78

Air Monitoring Programme No. 5: City Analyst and Catalyst Environmental carried out air monitoring on November 4th & 5th 2010. Oven A2-5 (oven 9) was monitored using an FTIR gasmet analyser. On the 1st day the afterburner was off and the next day the afterburner was on. The Data collected by the FTIR analyser has been tabulated as Total VOC's (Volatile Organic Compounds) as Carbon, NMVOC's (Non Methane Volatile Organic Compounds) as Carbon and Methane as Carbon. Comparing the overall average values for the total VOC's, the methane and the NMVOC's during both processes, the methane concentration is almost the same when afterburners are on or off, the NMVOC's and VOC's concentration are approximately 50% higher when the afterburners are off compared to when the afterburners are on. Finally, the monitoring by FTIR has shown, at this time, that oven A2-5 can't meet the emission limit value of 20mg/m3 at the reference conditions for total VOC's with the afterburner on or off. This monitoring programme subsequently triggered a burner upgrade programme to align oven A2-5 (Oven 9) and A2-6 (Oven 10) with other process burners. The licensee upgraded these emission points from a gas burner rating of 117 BTU to 170 BTU to reduce the need to operate the ovens with a rich fuel mix.

Table 2.8: City Analysts Air Monitoring Summary Emissions

Date	Oven	Sample Method	Afterburners	Total VOC mg/m3	Methane mg/m3	NMVOC mg/m3	H2O	Oxygen
7.9.10	A2 - 4	FTIR	OFF	185	50	135	3.8	19.26
8.9.10	A2-3	FTIR	ON	102	47	54	4.7	18.82

The FIRT monitoring carried out by City Analysts indicated that methane is one of the dominant VOC constituents. However the VOC data viaried a lot and a pattern is not evident.

Catalyst commenced monitoring on the 02.11.10 on A2-2 & A2-5, FID & FTIR monitoring to trend VOC emissions over the process cycle and to verify whether methane is the dominant VOC onstituent with the afterburner on and off. This monitoring was carried out with the afterburners on and off during this period.

Honeywell also arranged for 1-2 polystyrene core gypsum blocks to be heated in an oven at 280 degrees over a 9-10 hour cycle under laboratory considitons in order to replicate the process at Honeywell. The emissions were monitored using FID & FTIR. The purpose was to determine the chemical composition of the emitted flue gas especially the concentration of volatile organic compounds. The results indicated that no methane was detected in the screening analysis. The main emitted compound has not been identified exactly. It is a high volatile compound and can be expected as a diphenylalkene.

All air monitoring reports have been included in appendix 3.

2.2. Table 2.9 Summary Air emission non compliances 2010

Date	Description	Cause	Corrective action	Regulatory authority informed	Status
04.01.10 05.01.10	Burn out cycle of CW Oven 6 (A2-6)	Afterburner failed to activate due to faulty timer relay switch	Replace faulty timer relay switch	EPA	**Closed**
28.01.10	CW Oven 4 burn out cycle issue: Afterburner failure during normal burn out process	Timer relay switch in main control panel that activates afterburner cycle start failed	Replace switch	EPA	**Closed**
14.06.10	CW oven 10 (A2-6)	Programme did not abort oven cycle and afterburner did not come on	Install PLC self checking programme to prevent a repeat occurrence.	EPA	**Closed**

2.1.4 Waste Management

Honeywell International Technologies Limited retained Indaver Ireland to operate all on-site waste management, including waste segregation and material handling until 4TH September 2011 when the contract was awarded to Veolia Environmental Services. There was a three month change over period and no issues arose. As part of this contractural change, Honeywell have received approval to use Veolia Environmental Services, Fermoy, Co. Cork and Veolia Environmental based at Ellesemere Port, Liverpool, England. Requests have also been submitted for the approval of Southcoast logistics and Fast shipping as transport couriers. As of the 31.12.10, this request was being processed by the Agency.

Table 2.10 Summary Information on Waste 2010

Company Name	Honeywell International Technologies Limited					
IPC Register Number	PO525-01					
Industrial Sector NACE Code	D	J	2	7	5	4
Reporting Period	January 2010 to December 2010					
Number of Employees (reporting period)	471					
Total tonnage of Waste Produced	3,964.62					
Hazardous	982.93					
Non-Hazardous	2,981.69					
Recycled waste	1,717.32					
Recovered Waste	115.48					

Note: The recycled waste and recovered waste figures have already been included in the hazardous and non hazardous waste figures.

Full waste segregation takes place in the canteen through the use of multi bins. Wastes are divided into the following:

- Hard plastics bins (Plastic mineral bottles, empty sandwich containers),
- Organic waste bins (Scrap food, paper napkins, banana skins, etc),
- Aluminium can bins and,
- General waste bins (polystyrene cups, crisp bags, and tinfoil).

Table 2.11 Wastes segregated and recycled throughout the business units include:

Waste Item	Compressor Wheel (CW)	Turbine Wheel (TW)	Machine Cell (CWM)	Single Sequential Turbo (SST)
Paper	√	√	√	√
Cardboard	√	√	√	√
Waste Electronic & Electrical	√	√	√	√
Aluminium Cans	√	√	√	√
Old mobile phone collection	√	√	√	√
Plastic	-	√	-	
Waste Batteries	√	√	√	√
Fluorescent light tubes	√	√	√	√
Alcast Plaster	√	-	-	√
Waste chemical containers/packaging	√	√	√	√
Aluminum/Dross skimmings	√	-	-	√
Swarf	√	-	√	√

Honeywell International Technologies Limited commenced trials in Q1 2010 which involved the movement of alcast plaster waste to Lagan Cement Limited, Killaskillen, Kinnegad, Co. Westmeath. This was agreed in advance with the Agency and has resulted in alcast plaster being re-used as an alternative raw material which is considered a receovery/reuse operation. 1464.44 tonnes were been sent to Lagan in 2010.

New waste streams approved by the Agency include:

- PX-20 White marker (EWC code 08 03 12)
- Emptry spray can container for developer D100 (EWC Code 16 05 04)
- Empty spray can container for developer D-90 (EWC Code 16 05 04)
- Empty tub container for Developer D-90G (EWC code 16 05 07)
- Losma filter cloths which is used filter Hocut 3380 (EWC code 15 02 02)

Table 2.12 Summary Table for Wastes Generated 2010

Waste	2006	2007	2008	2009	2010
Total quantity of waste produced in calendar year (Tonnes)	5,871.52	6,980.612	5,570.31	3341.58	3,964.62
total quantity of waste disposed of on-site	0	0	0	0	0
total quantity of waste disposed of off-site	2,289.46	706	665.79	3001.14	**2,243.27**
total quantity of waste recovered on-site	0	0	0	0	0
total quantity of waste recovered off-site	3,582.06	6,274.612	4904.52	340.44	
	2006	**2007**	**2008**	**2009**	**2010**
Quantity of non-hazardous waste produced in calendar year (tonnes)	5,695.20	5,056.62	618.39	2530.19	2,981.69
quantity of non-hazardous waste disposed of on-site	0	0	0	0	0
quantity of non-hazardous waste disposed of off-site	2,113.14	538.71	478.84	2179.91	1,288.73
quantity of non-hazardous waste recovered on-site	0	0	0	0	0
quantity of non-hazardous waste recovered off-site	3,582.06	4,517.91	139.55	350.28	1,692.96
	2006	**2007**	**2008**	**2009**	**2010**
Quantity of hazardous waste produced in calendar year (Tonnes)	176.32	1.923.99	4,951.92	811.29	982.96
quantity of hazardous waste disposed of on-site	0	0	0	0	0
quantity of hazardous waste disposed of off-site	176.32	167.291	71.85	631.87	958.82
quantity of hazardous waste recovered on-site	0	0	0	0	0
quantity of hazardous waste recovered off-site	0	1756.702	4,880.07	179 .42	24.14

Note: Where waste has been assigned a recovery and disposal code, the disposal code took preference for 2009 & 2010 figures.

Note: The term ‘recovered’ in the table 2.12 refers to recovered and recycled waste items.

Table 2.13 Waste Summary Data 2010

Information on each waste stream							
European Waste Catalogue Code	**Hazardous (Yes/No)**	**Description of Waste**	**Quantity (t/year)**	**Disposal/ Recovery Code**	**Location of Disposal/ Recovery**	**Name of Waste Disposal Recovery Contractor**	**Contract company**
10 10 08	No	Gypsum	**1069.3**	D9	Billfinger	Billfinger Berger , Hamburg, Germany	Indaver
19 12 12	No	Gypsum	1464.44	R5	Lagan Cement	Lagan Cement, Lagan Cement, Westmeath, Ireland.	Veolia
10 10 07	Yes	Turbine wheel ceramic waste including crucibles	695.46	D1	Buhck Gmbh & Co	Buhck Gmbh & Co Rappenberg, 21502 Wiershop, Germany	Indaver
10 10 07	Yes	Turbine wheel ceramic waste including crucibles	206.02	D1	Buhck Gmbh & Co	Buhck Gmbh & Co Rappenberg, 21502 Wiershop, Germany	Veolia

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
10 03 16	No	Aluminum ferrous	35.38	R4	Hegarty Metals	Hegarty Metals, Ballysimon Rd Limerick, Co. Limerick	Indaver
10 03 16	No	Aluminum swarf	0.929	R4	Hegarty Metals	Hegarty Metals, Ballysimon Rd Limerick, Co. Limerick	Veolia
10 03 16	No	Aluminum risers and runners	18.29	R4	Mil-Ver Metals Co Limited	Mil-Ver Metals Co Limited Coronel Avenue, Rowleys Green Industrial Estate, Conventry, West Midlands	Veolia

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
16 02 14	Yes	Waste Electrical & Electronic Equipment	0.92	R4	KMK Metals	KMK metalsCappincur Industrial Estate, Daingean Road, Tullamore, Co Offaly	Veolia
20 01 35	Yes	Mixed WEEE	0.2	R4	Immark Ireland Ltd	Imark Ireland, Site No 14A1, Greenogue Business Park Rathcoole, Dublin	Indaver
20 03 01	No	General Mixed Waste	219.43	D1	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Indaver
20 01 08	No	Composting Organic waste	67.72	R10	Vieola	Vieola Environmental Services, Six Cross Roads, Waterford.	Veolia
20 01 08	No	Compost	14.64	R10	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Indaver

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
20 01 38	No	Timber Pallets	10.06	R10	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Indvaer
20 01 38	No	Timber/Wood Pallets	4.5	R10	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Veolia
20 01 38	No	Timber Pallets	10.06	R10	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Indaver
15.01.01	No	Paper waste	8.5	R10	Rehab Recycling	Rehab Recycling, Monaghan Road, Cork	Honeywell
20 01 10	No	Mixed packaging	31.46	R3	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Veolia

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
20 01 01	No	Cardboard/Mixed paper	16.46	R3	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Indaver
18 01 03	Yes	Medical Waste	0.001	D9	SRCL	SRCL, Beech Wood Road, Dublin	Indaver
18 01 03	Yes	Medical waste/sharps	0.006	D9	Ecosafe	Ecosafe, Dublin, Ireland	Indaver
20 01 21	Yes	Fluorescent tubes	0.109	R5	Irish Lamps	Irish Lamps, Woodstock Industrial Estate, Kilkenny Road, Athy, Co. Kildate	Indaver
16 03 05	Yes	Packed waste	22.16	R2	Veolia Environmental Services (VES)	Veolia Environmental Services (VES), Corrin, Fermoy, Co. Cork	vEOLIA

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
16 03 05	Yes	Hocut 3380 & Sedifloc 1030	41.51	D10	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
07 05 13	Yes	Packed waste	0.01	D10	Veolia Environmental Services (VES)	Veolia Environmental Services (VES), Corrin, Fermoy, Co. Cork	Veolia
13 02 05	Yes	Grease	0.01	D10	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
13 08 99	Yes	Mixed oils	0.202	D9	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
15 05 02	Yes	Maintennace oils/penetrant aqua chek wb 100/HOCUT 3380 spill pads, filters contaminated with plaster, mixed hazardous waste, papers and aprons contaminated with Tacobond.	8.172	D10	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
15 02 02	Yes	Packed waste	1.83	D10	Sava Incinerator	Ostertweute 1 - 25541 Brunsbüttel Germany	Veolia
16 05 04	Yes	Aerosols	0.032	D10	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
16 05 04	Yes	Ardox	0.024	D10	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
16 05 07	Yes	RTV 630A, Crystaline silica container, RTV 615A, Aluminum flux	0.224	r13/d15	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
16 05 08	Yes	Ardox 9200, Hocut 3380, antifoam, lab smalls, water/oil/virosol	4.282	D15	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
16 05 08	Yes	Packed Waste	0.035	D10	Veolia Environmental Services (VES)	Veolia Environmental Services (VES), Corrin, Fermoy, Co. Cork	Veolia

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
08 01 11	Yes	Empty paint cans	0.075	D10	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
14 06 03	Yes	APS 15100 & 15191	0.058	D10	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
07 07 04	Yes	Penetrant aqua chek WB 100	0.864	D10/D13	ATM (Afvalstoffen Terminal Moerdijk BV)	ATM (Afvalstoffen Terminal Moerdijk BV), Westring 360, 44579 Castrop-Rauxel	Indaver

Information on each waste stream							
European Waste Catalogue Code	Hazardous (Yes/No)	Description of Waste	Quantity (t/year)	Disposal/ Recovery Code	Location of Disposal/ Recovery	Name of Waste Disposal Recovery Contractor	Contract company
15 01 10	Yes	APS empty containers	0.75	R4	AVG Abfall Verwertungs Gesellschaft mbh	AVG Abfall Verwertungs Gesellschaft mbh, Borsigstr, 2, D22113 Hamburg, Germany	Indaver
17 01 07	No	C&D waste	10.52	R12/R5	Greenstar Environmental Services Ltd (Waterford)	Greenstar, Carrignard, Six Cross Roads, Business Park, Waterford	Indaver
15 01 10	Yes	Empty containers	0.01	D10	Veolia Environmental Services (VES)	Veolia Environmental Services (VES), Corrin, Fermoy, Co. Cork	Veolia

Note: Table 2.16 reflects the Honeywell approved list of waste acceptance sites used by Indaver Ireland and Veolia Environmental. Not all waste acceptance sites used by Indaver Ireland are being used by Veolia Environmental.

2.2 Summary of Agency Monitoring and Enforcement 2010

2.2.1 EPA/Honeywell International Technologies Limited Correspondence 2010

In 2010 – there were a number of communications to and from the EPA with respect to Licence Register number PO525-01, these are summarised below.

Table 2-14 EPA Communication / Enforcement Information 2010

Date Sent / Date on Letter R'vd	EPA Reference No.	Description of Communication	Reply Date Honeywell / EPA	HTT/EPA Response
6.1.10	letter to michelle purcell	Afterburner falure oven 10		
06.01.10	email to colman concannon	request to join EPA proficiency scheme		
06.01.10	letter from EOA office of cllimate, licensing and resource use	acknowledge receipt of information on the 24.12.09		
08.01.10	phonecall from Frank	request to review issue concerning legal entity and resubmit request for additional information		
11.01.10	letter from michelle purcell	request for information regarding capacity details for proposed amendments to bunds	14.01.10	response with information on capacity
11.01.10	phonecall from david shannan	request for meeting with Amy Fahey concerning afterburners		
12.01.10	phonecall to colman concannon	identified email address as incorrect, email to be sent again		
12.01.10	email to colman concannon	request to join EPA proficiency scheme		
12.01.10	email from Colman Concannon	request for a list of parameters currently tested for in lab	12.01.10	Honeywell responsed via email
12.01.10	email to michelle purcell	requesting approval to complete toxicity & respirometry testing	14.01.10	Request from Michelle purcell to send in hard copy of request

14.01.10	letter to michelle purcell	requesting approval to complete toxicity & respirometry testing	26.01.10	letter from eimear o keefe approving respirometry and toxicity testing
15.01.10	on site meeting	meeting with David Shannan & Brendan Kisane with Amy Fahey & Danielle Conaghan		
19.01.10	letter to michelle purcell	REQUESTING APPROVAL TO SEND THREE ADDITIONAL LOADS TO LAGAN CEMENT	04.02.10	letter from eimear o keefe approving trial
21.01.10	letter from Rebecca Hadrill	results of sample taken on site on the 26.11.09		
25.01.10	fax and phonecall to Michelle purcell	Non compliance for sulphates & request for repsonse to letter regarding toxicity sent on the 14.01.10		
25.01.10	phonecall from emer o keefe	approval for toxicity & respirometry testing.		
28.1.10	letter to Eimer O keeffe	Afterburner no 4 failure		
01.02.10	email from Colman Concannon	commencement of epa proficiency scheme		
02.02.10	email from Colman Concannon	ISOTC Notification report: Once per working day		
03.02.10	phone message from Colman Concannon	Request for site full address	04.02.10	Emailed full address to Colman
03.02.10	email from eimear o keefe	established deadline for information regarding thermal output - 12.02.10	04.02.10	agreement to have submitted by 12.02.10
05.02.10	letter to eimear o keefe	request for approval of 2009 & 2010 EMP		
08.02.10	letter to eimear o keefe	request approval for waste stream - white marker	16.02.10	letter from Eimear O'Keefe requesting further information regarding waste stream
17.02.10	letter to eimear o keefe	update of trial regarding alcast plaster and request for information required to include this as a new waste acceptance area	24.02.10	response with information regarding waste
15.02.10	email to eimear o keefe	themal input capacity	15.02.10	email from eimear o keefe accepting information

22.02.10	letter from EPA	Rquest to submit written confirmation that the name of the correct company will be used in all future correspondence	26.02.10	response to letter
22.2.10	Letter to Elizabeth Lacey	Explanation re name change from Arthur Cox re IPC license		
24.02.10	samples to lab	as part of EPA proficiency scheme	25.02.10	Informed Colman Concannon that sample leaked, another sample to be sent
24.02.10	Letter from EPA	Request for information regarding bunding	01.03.10	response to letter
01.03.10	letter from EPA	acknowledge receipt of information on the 24.02.10		
25.02.10	letter from EPA	Request for information regarding gypsum waste stream and Lagan		
23.02.10	email from Colman Concannon	reminder about samples arriving at site		
26.02.10	email from Colman Concannon	information regarding colbalt error in sampling		
01.03.10	email from Colman Concannon	excel file for reporting results	05.03.10	emailed results to colman concannon
01.03.10	email from Colman Concannon	information on lab number		
03.03.10	fax and phonecall to Eimear O'Keefe	toxicity non compliance		
01.03.10	letter from epa	approval for new waste items		
05.03.10	email from Colman Concannon	intercalibration return		
05.03.10	Email sent to Tony Dolan	Email outlining proposed monitoring programme	05.03.10	Email Tony Dolan formal inspection report plus acceptance of email sent earlier.
09.03.10	visit from eimear o keefe	review surface water drains following incident report in industrial estate		
09.03.10	letter from EPA	SITE INSPECTION REPORT REGARDING AIR MONITORING		
10.03.10	letter from EPA	SITE INSPECTION REPORT REGARDING AIR		

		MONITORING		
112.3.10	Email from Tony Dolan	Looking to alter monitoring program from Monday Tuesday to Tuesday Wednesday		
19.03.10	letter from agency	advising agency cannot proceed with licence due to name issue		
22.03.10	visit from eugene hally	sample taken from SE1		
23.03.10	letter from epa	withdrawal of licence application		
23.03.10	phonecall to yvonne furlong	query regarding above letter		
25.03.10	letter from epa	air report amendment		
28.03.10	message from eimear o keefe	information required as part of request to use Lagan	29.03.10	responded to message, left message for eimear
28.03.10	leter from EPA			
28.03.10	VISIT FROM EPA CONTRACTORS	Air monitoring		
29.03.10	VISIT FROM TONY DOLAN	Air monitoring		
30.03.10	FAX TO EPA	SULPHATE NON COMPLIANCES		
31.03.10	fax to EPA	Surface water non compliance		
31.03.10	email to eimear o keefe	late submission of AER		
01.04.10	letter from agency	requesting confirmation to withdraw licence		
01.04.10	LETTER FROM EPA	PCB CONTAMINATED EQUIPMENT	08.06.10	response to query
07.04.10	email to aer returns	unable to submit report due to invalid data in some fields	07.04.10	response to query
07.04.10	submission of pdf version of aer	submission of pdf version of aer		
07.04.10	documents deliveried by courier	aer		
07.04.10	fax from epa	request to confirm withdrawal of licence application		
08.04.10	email from Colman Concannon	draft results		

08.04.10	submission of e-prtr	submission of e-prtr	08.04.10	acceptance return mail
08.04.10	Letter from Agency	decision regarding use of Lagan Cement		
08.04.10	letter from Agency	request to confirm withdrawal of licence application		
08.04.10	letter from Agency	letter from Agency regarding air report amendments		
08.04.10	letter from Agency	approval to amend feed tank bund and sludge dewatering bund		
08.04.10	letter and fax to Agency	request approval for waste stream - losma white marker		
08.04.10	email to agency	update on cleaning of surface water drain		
08/09.04.10	EPA on site	Air monitoring		
13.04.10	letter from EPA	approval to use losma paper		
09.04.10	letter from EPA	SITE INSPECTION REPORT REGARDING AIR MONITORING ON 09.04.10		
01.04.10	letter to EPA	Changes in SST 2		
14.04.10	LETTER TO EPA	CHANGES IN SST 3		
20.04.10	email from Colman Concannon	Attached final report for round 85		
21.04.10	email from Colman Concannon	a reminder that samples will arrive at your lab today April 21		
27.04.10	FAX TO EPA	sulphate non compliances (rang and left message with receptionist who said fax had arrived, requested it be sent for Eimears attention)		
27.04.10	email from E-PRTR	File open for amendment if requested to do so by EPA		
01.04.10	LETTER FROM AGENCY	Confirmation of licence withdrawn		
06.04.10	letter from EPA	Reconnaissance report attached		
07.04.10	letter from EPA	Site inspection report from a site inspection carried out on 14.04.10		
23.04.10	email from Colman Concannon	the template attached for round 86		

17.5.10	Letter to EPA	Withdrawal of licence application (Frank Clinton)	27.05.10	records noted to reflect that our IPC licence has been wirthdrawn
20-May	letter from EPA	INSPECTION REPORT		
25.05.10	letter to EPA	Update of site issues		
27.05.10	fax to epa	sulphate non compliance		
27.05.10	fax to epa	sw3 non compliance		
08.06.10	letter to EPA	Notification of new laboratory technician		
08.06.10	email to colman concannon	results from last round of samples		
08.06.10	Letter from EPA			
09.06.10	Letter from EPA			
15.06.10	email from Colman Concannon	new documents available on DIN livelink server		
15.06.10	fax to EPA	AFTERBURNER NON COMPLIANCE OVEN 10		
15.06.10	letter from epa			
15.06.10	fax to epa	sulphate non compliance	01.07.10	update of corrective actions issued during last sulphate non complaince
15.06.10	letter to EPA	Ground water results		
15.06.10	letter to EPA	NOTIFICATION OF WASTE MANAGEMENT VENDOR CHANGE		
16.06.10	letter from EPA	RESULTS FROM SE1 SAMPLE		
16.06.10	LETTER TO EPA	AIR MONTIORING RESULTS 2010		
17.06.10	email to epa	afterburner non compliance oupdate		
22.06.10	letter to epa	air emissions compliance		
23.06.10	letter from epa	request to complete and submit risk based methodology for determining enforcement category	16.07.10	submission of report via email
23.06.10	email from Colman Concannon	draft results from second round of testing		
24.06.10	email to eimear o keefe	request for approval of bund testing		
24.05.10	EMAIL TO RBME	query over protected cells in excell file		
29.06.10	email from Colman Concannon	results from last round of samples		

29.06.10	email from Colman Concannon	reminder about samples arriving at site		
02.07.10	email to EPA	CONDITION 11.2 recording interference from server upgrade		
02.07.10	letter from EPA	Review of Tedlar bags and tube samples		
02.07.10	letter from EPA	Request for information in relation to air monitoring		
08.07.10	letter from EPA	Approval to carry out bund testing		
12.07.10	Letter to T Dolan	Summary of Air monitoring report march April 2010		
14.07.10	LETTER TO EPA	SUPLHATE NON COMPLAINCES		
14.07.10	email to epa	results of intercalibration testing		
14.07.10	email from epa	response to correspondence above concerning acceptance of information		
16.07.10	email from epa	rbme report accepted		
16.07.10	email from epa	acknowledgement of receipt of completed rbme methodology for 2010		
19.07.10	email from epa	request from eimear to forward information to cecil		
22.07.10	visit from EPA	on site testing of trade effluent		
29.7.10	Letter to E O keefe	Formal request to agency for license review meeting		
06.08.10	voice mail from eimear o keefe	Becci Cantrell is new inspector as Eimear is going on leave		
09.08.10	meeting in EPA HQ	Cecil Black - review of air monitoring report		
20.07.10	email from Colman Concannon	request for outstanding PO's & notification of next round of sampling	19.08.10	alert to Colman that Honeywell were on shut down and No sampling was carried out
05.08.10	email from Colman Concannon	draft register		
24.08.10	fax to magnus (becci out of office) (rang magnus to collect fax)	sulphate non compliances		
16.8.10	Letter from becci Cantrell	minutes of recent metting held in agency offcie re air monitoring		

26.8.10	email Tony Dolan	Additional comments re styrene monitoring request by Eurofin		
30.08.10	letter to Becci Cantrell	letter to EPA to confirm monitoring for week commencing 6th September afterburners off.		
26.08.10	email from epa	draft results P87		
01.09.10	letter from epa	request for information		
01.09.10	letter from epa	meeting records		
07.09.10	EMAIL FROM EPA	ROUND 87 RESULTS		
07.09.10	email from epa	ROUND 87 DOC CORRECTION		
08.09.10	fax to epa	sulphate and ph non compliances		
08.09.10	email from epa	sample track and trace		
14.09.10	letter to EPA	Request to carry out monthly reporting of sulphate non compliances		
15.09.10	letter to EPA	Update on non compliance reported on 08.09.10		
16.09.10	email from Colman Concannon	R88 LAB		
17.09.10	letter to epa	Second update on non compliance reported on 08.09.10		
21.09.10	letter to epa	submission of ELRA	21.09.10	acceptance return mail
27.09.10	PHONECALL FROM EPA	query relating to SST and requirement to apply for a technical amendment		
28.09.10	fax to epa	sulphate and COD non compliance	06.10.10	update on non compliance provided to the Agency
05.10.10	phonecall from Magnus	query relating to SST and requirement to apply for a technical amendment		
06.10.10	Letter to EPA	UPDATE OF cod NON COMPLIANCE		
06.10.10	letter from EPA	Results of trade effluent sample taken on the 22.07.10		
6.10.10	Letter from EPA	Becci Cantrell letter requesting air monitoring in November	8.10.10	Email to Tony Dolan/Becci Cantrell for review discussion of monitoring
12.10.10	Email from EPA	Tony Dolan confiming discussion held same day re forth coming monitoring to comm Nov 1		
12.10.10	letter from EPA	Advise that change of name can only be considered through a licence transfer.		
12.10.10	letter from EPA	Re: air monitoring		

12.10.10	letter from EPA	Re: advise that daily reporting of sulphates must continue and communications required regarding meeting with AWN and local authority regarding trade effluent	15.10.10	Notification of non compliances and update on meeting with LA
12.10.10	letter from EPA	Notification of non compliance and request for further information regarding non compliances and new sst process	15.10.10	update of non compliances and sst process
12.10.10	letter from EPA	RESULTS OF ANALYSIS TAKEN FROM SE1 ON THE 22.07.10	15.10.10	Acknowledgement of report
15.10.10	letter to EPA	Notification of TFS document associated with TW waste and holding of waste on site		
18.10.10	fax to EPA	Non compliance for sulphates		
19.10.10	fax to EPA	Non compliance for sulphates		
20.10.10	fax to EPA	Non compliance for sulphates		
21.10.10	Email to Becci cantrell	update on meeting between LA's and AWN concerning sulphates		
21.10.10	fax to EPA	Non compliance for sulphates		
26.10.10	email to EPA	Honeywell air monitoring arrangements		
01.11.10	email to EPA	update on sulphate issue and meeting with local authority		
02.11.10	fax to EPA	Sulphate non compliance		
03.11.10	fax to EPA	Sulphate non compliance		
04.11.10	fax to EPA	Sulphate non compliance		
05.11.10	fax to EPA	Sulphate non compliance		
05.11.10	Letter to EPA	SST capacity increase 4		
05.11.10	Letter to EPA	BUND testing failure		
05.11.10	Fax to EPA	TOXICITY TESTING NON COMPLIANCE		
09.11.10	fax to EPA	Sulphate non compliance		
09.11.10	fax to EPA	Sulphate non compliance		
09.11.10	letter to EPA	Change of name application		
10.11.10	email from Colman Concannon	re. Calibration scheme		
10.11.10	FAX TO EPA	SULPHATE NON COMPLIANCE		
11.10.11	visit from EPA	Trade effluent sample taken at 12:30		
11.11.10	fax to EPA	Sulphate non compliance		

12.11.10	letter from EPA	Acknowledgement of application to transfer IPC licence name		
12.11.10	fax to EPA	Sulphate non compliance		
15.11.10	fax to EPA	Sulphate non compliance		
17.11.10	fax to EPA	Sulphate non compliance		
15.11.10	letter to EPA	SST extension update as previously requested		
18.11.10	fax to EPA	Sulphate non compliance		
19.11.10	fax to EPA	Sulphate non compliance		
22.11.10	fax to EPA	Sulphate non compliance		
22.11.10	email to colman concannon	intercalibration results		
25.11.10	fax to EPA	Sulphate non compliance		
26.11.10	fax to EPA	Sulphate & COD non compliance		
27.11.10	Email to Becci cantrell	request for response to recent letters concerning SST		
30.11.10	fax to EPA	Sulphate & COD & suspended solid non compliance		
01.12.10	email to EPA	update of non compliance mentioned above		
02.12.10	Letter to EPA	New waste management disposal sites		
03.12.10	Fax to EPA	Trade effluent non compliances		
04.12.10	Email to Tony Dolan x 2	Recent monitoring result analysis Update		
10.12.10	fax to EPA	TRADE EFFLUENT NON COMPLIANCES		
13.12.10	FAX TO EPA	TRADE EFFLUENT NON COMPLIANCES		
13.12.10	letter to epa	request for response to recentletters concerning sst		
14.12.10	Email Tony Dolan	Copy of both Eurofins and City Analyst Air November monitoring reports		
22.12.10	letter to Becci Cantrell	notification that bund testing will not take place		
22.12.10	EMAIL FROM EPA	Minimum standards for air emissions monitoring at IPC and waste sites		
16.12.10	letter from EPA	Notification of non compliance	22.10.12	review of the Incident Notification reports received in october and november
22.12.10	letter to EPA	Notfification regarding new chemstore unit and attenuation tank		
23.12.10	FAX TO EPA	SULPHATE NON COMPLIANCES		

2.2.2 EPA visits

2.2.2.1 **EPA Visits/Audits:** There were No unplanned EPA visits in 2010 however the site did receive a number of visits to review and oversee air monitoring programmes and to review subsequent reports.

2.2.2.2 **Monitoring Visits:** There were six monitoring visits conducted by the Agency during 2010. Three related to air monitoring and are also briefly referenced in secion 2.1.3. The remaining three involved sampling of trade effluent from SE1.

Table 2-15 Trade Effluent Analysis: EPA monitoring results

Limit Parameter	Emissions Limits	22.03.10 EPA Laboratory Result	22.07.10 EPA Laboratory Result
Suspended Solids mg/l	600	40	54
pH	6 - 9	8	7.8
BOD mg/l	400	400	130
Ammonia (as N) mg/l	30	0.3	No reading
Fluoride mg/l	3.3	0.06	0.99
Sulphate mg/l	1500	550	**3200**
Nitrate (as NO3)	4.2	NA	0.003
Oils, Fats & Grease mg/l	100	NA	Not Analysed
COD mg/l	1000	1164	330
Heavy metals mg/l	1	<1	<1
Detergents (MBAS)	30	Not Analysed	Not Analysed
Flow (L/sec)	< 47	Not Measured	Not Measured
Temperature	43	15.8	19.6

Note: Total Heavy Metals analysis includes nickel, zinc, copper, chromium and cadmium.
Note: See appendix 12 & 13 for toxicity and respirometry report as requested by the EPA as part of effluent analysis programme 2010.

Table 2.16: EPA air monitoring summary results March 2010

Date	Oven	Sample Method	Afterburners	Total VOC mg/m3	H2O	Oxygen
30.3.10	A2-1	FID	ON	8.3	6.2	20.1
29.3.10	A2-2	FID	ON	9.9	6.6	20.1
30.3.10	A2-5	FID	ON	37.2	7.2	18.4
29.3.10	A2-6	FID	ON	56.9	7.3	18.4

Table 2.17: EPA air monitoring summary results April 2010

Date	Oven	Sample Method	Afterburners	Total VOC mg/m3	H2O	Oxygen
14.4.10	A2-1	FID	OFF	56.9	6.6	19.7
13.4.10	A2-2	FID	OFF	131.9	6.7	19.9
14.4.10	A2-5	FID	OFF	1487.0	7.1	19.8
13.4.10	A2-6	FID	OFF	849.0	7.0	19.7

Table 2.18: EPA air monitoring summary results November 2010

Date	Oven	Sample Method	Afterburners	Total VOC mg/m3	Methane	Acetaldehyde	Formaldehyde	Styrene	Oxygen
2.11.10	A2-2	FTIR	ON	9.2	7.8	0.9	3.4	3.3	19.4
3.11.10	A2-2	FTIR	OFF	195.8	15.8	30.8	32.1	155.6	20.3
4.11.10	A2-5	FTIR	OFF	196.7	102.4	16.6	29.0	96.2	19.0
5.11.10	A2-5	FTIR	ON	74.5	70.0	0.7	9.3	9.5	19.7

2.2.3 Energy and Water Consumption 2010

2.2.3.1 The following outlines the main projects relating to energy savings within the plant during 2010 which is expected to result in approximately 750,000kWh saving per annum:

2.2.3.1.1 On the 09th April 2008, Honeywell submitted an expression of interest (EOI) form required for acceptance into the Cleaner Greener Production Programme (CGPP). A full application based on the accepted EOI was submitted following acceptance for further consideration. On the 02nd December 2008, the EPA notified Honeywell that the application had been shortlisted and recommended for funding, subject to successful resolution of any outstanding technical and financial issues. The proposed CGPP project submitted by Honeywell aims to eliminate the need and use of polystyrene cores used in the manufacture of aluminum compressor wheels through innovative engineering solutions. Where successful, the new process will deliver smaller moulds requiring less quantity of raw materials. Fewer materials leads to a reduction in oven cycle time thus reducing a natural energy source and finally a reduction in the generation of the current hazardous waste stream. Two technical project reports were submitted to the Environmental Protection Agency in 2009. The site remains committed to the project. A 35% advance payment of the budgeted total project cost has been assigned to Honeywell International Technologies by the Department of the Environment, Heritage and Local Government through the Environmental Research Sub Programme of the National Development Plan 2007 – 2013. In 2010 some technology breakthroughs were made with the project in that a successful method was developed to manufacture the plaster moulds without the need for the polystyrene core. The focus now is to develop a successful method of pouring metal into these plaster moulds to manufacture compressor wheel casting to the same quality as the existing process. Also in 2010 there were Technical and Financial reports submitting to the EPA for which approval was received.

2.2.3.1.2 Through the use of Cimplicity (internal monitoring system) daily usage is monitored against productivity in order for the business to maximize and utilize gas usage versus moulds poured.

2.2.3.1.3 Motion and light sensors were installed in all offices and main corridors

2.2.3.1.4 External light sensors system were upgraded

2.2.3.1.5 Plant boiler system was upgraded

2.2.3.1.6 Radiator temperature controllers were incorporated

2.2.3.1.7 Designed and implemented EN 16001 (The system was at stage one implementation on the 31.12.10)

2.2.3.2 The following outlines the main projects relating to water savings within the plant during 2010.

2.2.3.2.1 Upgraded leaking chill water valves

2.2.3.2.2 Intalled urinal flushing process for all employee toilets (expected saving of 1,000 litres/annum)

2.2.3.2.3 Repaired leaking ground water well line

Table 2-19 Energy Consumption

Energy Consumption			***January 2010– December 2010***	
Source	**Quantity**	**Units**	**Reporting Period**	**Main Consumption Sources**
Electricity	**15,397,924**	KWh	Jan – Dec 2010	CW Melting Pots CW Heat Treat TW VIP Industion Units CW Scrap Pots Compressed Air
Natural Gas	**33,797,712**	KWh	Jan – Dec 2010	CW Afterburners CW Ovens TW Aircast Ovens TW Plenums

Table 2-20 Water Consumption

Water Consumption			***January 2010 – December 2010***	
Source	***Quantity***	**Units**	***Reporting Period***	***Main Consumption Sources***
Municipal Supply	25591.37	M3	January to December 2010	CW Blockwasher facility; CW Blockmould process CW & TW Zyglo Wash Toilets/Showers/Sinks Canteen Dip Room Plastic Injection
On-Site Ground Water Abstraction **Well 1** **Well 2**	 19353.67 42419.75	M3	January to December 2010	Supplementary to the process reservoir tank
Total water consumption	87364.79	M3	January to December 2010	Plant wide

Note: Based on the data obtained to date for 2010, the daily averages are as follows:

- **Well 1:** 52,673 litres
- **Well 2:** 116,205 litres

Note: See appendix 4 for groundwater monitoring results carried out in accordance with Schedule 4(ii) Groundwater and Schedule 4 (i) of IPC PO525-01. VOC levels indicated in the report do not reflect chemical usage or site activities at present or in the past.

2.2.4 Environmental Incidents and Complaints 2010

Table 2.21 Environmental Incidents 2010

Environmental Complaints January-December 2010					
	Incident	**Cause**	**Corrective action**	**Reported Agencies**	**Miscellaneous complaints**
1	Bund Testing failure in the feed tank and sludge dewatering plant bunds	Structural issues following construction work on bund areas	Review and correct any defects.	EPA	The structural issues could not be addressed immediately after the bund integrity test due to the freezing weather conditions.

Note: A copy of all bund integrity reports has been included in appendix 9.
Note: All structural work for the feed tank and sludge dewatering plant bunds has been scheduled for the 23rd, 24th & 25th April 2011.
Note: All other environmental incidents have been detailed in this report under various headings.

- Releases to Atmophere have been included in table 2.12
- Non compliances for emissions to sewer have been included in table 2.3
- Surface water contamination incidents have been included in table 2.4

There were no environmental complaints reported or recorded for reporting period from January to December 2010.

Table 2.22 Environmental Complaints 2010

Environmental Complaints January-December 2010					
Ref.	**Odour-related complaints**	**Noise related complaints**	**Water related complaints**	**Procedural complains**	**Miscellaneous complaints**
N/A	**0**	**0**	**0**	**0**	**0**

2.2.5 Environmental Expenditure 2010

Table 2-23 Expenditure Costs 2010

Spending on Environmental Protection January- December 2010		
Area/Project/Task	**Purpose**	**Cost/Spending**
EPA Fees	IPC Charges	€20,073.44
External Services	McBreen Environmental	€68,144
	Chemstore	€53,656.
	Rehab Enterprises	€4,534.91
	Best Chemicals	€55,421.36
	TE Laboratories	€10,230.96
	Enterprise Environmental	€2,270
	Water Technology	€47,064.79
	City Analysts	€34,150
	Hickey Fabrication Services	€12,269.76
	Horizon Environmental	€8,800
	Enterprise Ireland	€2,300
	Malone O' Regan	€16,700
	Kalen Technologies	€36,798
	Tritschler & Tritschler	€22,890
	AWN Consulting	€6.367
Management system auditing fees	EQA	€5,700
	Certification Europe	€4,215
Waste Management Costs	Indaver Waste Management	€726.334.16
	Veolia Environmental Services	€59,052
TOTAL SPEND 2010		**€1,196,971.38**

3. ENVIRONMENTAL MANAGEMENT

3.1. Register of Aspects

The Honeywell International Technologies Limited EMP is certified to the ISO 14001 management standard since May 2006. EQA (European Quality Assurance Ltd) carried out both surveillance audits in 2010 ensuring the standard is being adhered to. A detailed review of all identified environmental aspects and impacts was also carried out. This allows for the categorization of all the aspects for the site. The 2011 EMP is based on the 2010 end of year review. A procedure has been put in place to standardize this review and ensure it is performed on an annual basis.

Table 3-1 Section B Summary of Significance Ratings 2010

No.	Environmental Aspect	Frequency of Occurrence F	Likelihood of Control Loss L	Severity of Consequences S = Sum of Criteria i - vi						S	Significance Rating C C = F x L x S
				i	ii	iii	iv	v	vi		
1	Emissions to Sewer	**10**	**10**	5	2	3	5	2	3	**20**	**2000**
2	Energy & Resource Usage	**10**	**8**	3	1	4	5	5	3	**21**	**1680**
3	Hazardous Materials	**10**	**7**	3	2	3	5	5	3	**21**	**1470**
4	Hazardous Waste	**10**	**5**	3	5	4	6	4	6	**25**	**1400**
5	Supply Side Activities	**10**	**7**	2	2	4	4	5	1	**18**	**1260**
6	Emissions to Atmosphere	**10**	**5**	3	2	2	4	4	4	**19**	**1250**
7	Contractors	**10**	**6**	4	3	3	4	3	2	**19**	**1140**
8	Emissions to surface waters	**8**	**7**	4	3	3	4	2	3	**19**	**1064**
9	Non Hazardous Waste	**10**	**4**	3	3	4	5	5	2	**22**	**880**
10	Groundwater and municipal water supply	**10**	**5**	2	1	2	5	2	2	**14**	**700**
11	Transport	**10**	**4**	1	1	3	4	3	3	**15**	**600**
12	Visual Impact	**10**	**4**	3	1	1	4	3	3	**15**	**600**
13	Environmental Noise	**10**	**4**	3	2	2	4	1	1	**13**	**520**
14	Ecosystems	**8**	**3**	4	2	2	3	1	2	**14**	**336**
15	Emissions to Ground	**2**	**3**	4	1	1	4	1	2	**13**	**78**

In accordance with the IPC Licence requirements, Honeywell International Technologies Limited carried out a review of the above sections and identified utilizing the aspects and impacts evaluation under the ISO14001 system projects where necessary. These projects have been identified and incorporated into the environmental management plan. The 2010 Register of Aspects has been included in Appendix 7. Appendix 8 includes the 2010 annual review meeting slides. Further information relating to the annual review meeting can be obtained from the HSE department on request.

3.2. Environmental Management Program 2010 Report

3.2.1. The 2010 **EMP** and Action status is detailed in appendix 5.
3.2.2. The 2011 **EMP** has been included in appendix 6.

3.3. Training

All employees are trained regularly on spill response, ISO 14001, IPC license and waste segregation. Special teams are trained on chemical handling, hazardous waste handling and spill containment. All records are maintained on site. 117.69 hours were assigned to environmental training and awareness in 2010. These accounts for 12% of all HSE training plant wide and includes waste handling training, ISO 14001 & spill response.

3.4. Fire and Loss Prevention

Fire and loss prevention reports are carried out on an annual basis by Corporate Global Risk Consultants (GRC's). The main objective of the report is to ensure compliance with all Honeywell standards in terms of fire prevention which includes site fire safety practices, chemical and hazardous waste storage procedures and fire prevention services/processes in place. In 2010, the audit report identified corrective actions relating to enhancing transformer oil analysis to include furanic testing and upgrading factory roof.

4. OTHER REPORTS

4.1. Bund Testing

Six hour bund testing was carried out during Q4 2010 in accordance with Condition 9.4 of IPC PO525-01. This testing included the newly renovated feed tank and sludge dewatering tank bund areas. Structural issues were identified and No test reports were issued. The bund integrity tests were carried out by Chemstore (Limerick). Chemstore commenced with visual testing before filling bunds with water.

4.2. Methodology for determining enforcement category of licences

In accordance with the annual requirement to complete the OEE's Methodology for Determining Enforcement Category of Licences, Honeywell completed its 2009 assessment and submitted to the EPA as required on the 16th July 2010. Honeywell International Technologies Limited assigned an enforcement category of PA-3. Subsequent EPA notification identified the site enformcenet category as P-A2. Please reference appendix 10 for a copy of the assessment.

4.3. E-PRTR

Please find attached copies of all excel sheets from the E-PRTR in Appendix 10.

4.4. Polychlorinated Biphenyls (PCB) Inventory

The Agency confirmed that Honeywell has been removed from the national PCB inventory and is No longer considered a PCB holding as defined by the Waste Management (Hazardous Waste) Regulations, 1998, S.I No. 163 of 1998.

4.5. Registration, Evaluation, Authorisation of Chemicals (REACH) compliance

Numerous reviews have occurred on site in relation to the list of substances identified as Substances of Very High Concern (SVHC) under the REACH regulations. One SVHC, refractory ceramic fibres (RCF) has been listed as a SVHC and is considered a carcinogen category two substance. This substance forms part of the TW ceramic mould and is supplied by an European Manufacturer who is fully committed to meeting its legal obligations and who has pre-registered substances including the RCF as required. Honeywell International Technologies Limited in conjunction with the manufacturer is working to find a substitute.

4.6. Pipeline Integrity

Industrial CCTV drain surveys were carried out on process lines in Q1/Q2 2010. One concrete drain line running from the old handmould area (now known as the SST area) had multiple defects and was subsequently repaired.

Industrial CCTV drain surveys were carried out on foul lines in Q2 2010. No significant deviations were noted.

Copies of all reports and CCTV information can be obtained from the HSE department on request.

4.7. Annual Management Review 2010

A full review of the environmental management system was carried out in Q1 2011 in conjunction with a review of the safety management system. This review was presented by the HSE manager to the senior management team. A copy of the review presentation has been included in Appendix 8.

Honeywell

Transportation Ireland Limited

SEPTEMBER HSE COMMUNICATIONS

ISO 14001 & OHSAS 18001 AUDIT

Audit Process:
At present, the site is accredited to ISO 14001 (International Standard for the environment) & OHSAS 18001 (International standard for occupational health and safety). Each year, the site undergoes two audits over a two day period to evaluate compliance with both standards. **The next audit is expected to occur on the 28th and 29th September** 2010. Auditors frequently speak with employees during the audit process. Typical questions and answers are outlined below. Please take note!

What is ISO 14001? An **international environmental management system standard**; is a tool that enables an organisation to keep aware of the interaction that its products and activities have on the environment, and to improve its performance.

What is OHSAS 18001? An **international occupational health and safety management system specification** aimed at minimising risk to employees

Both systems are based on the **Plan, Do Check, Act methodology**.

- **Plan:** establish the objectives and processes necessary to deliver results in accordance with the organization's
environmental policy.
- **Do:** implement the processes.
- **Check:** monitor and measure processes against environmental policy, objectives, targets, legal and other
requirements, and report the results.
- **Act:** take actions to continually improve performance of the environmental management system.

Benefits of ISO 14001 & OHSAS 18001:
- Establish a **management system** to eliminate or minimise risk to employees and the environment.
- Implement, maintain and **continually improve** our l management system
- Seek **certification/registration** of our management system by an external organisation

Typical Auditor Questions and Answers

Q. What is ISO 14001?
A. ISO 14001 is an **international environmental management system standard.**

Q. What is OHSAS 18001?
A. ISO 18001 is an **international occupational health and safety management system standard;**

Q. Are you aware of the company HS&E Policy?
A. Yes, the HS&E Policy is displayed in Reception and on the HS&E Notice board; it outlines the company's commitment to managing HS&E matters.

Q. Where would you find HS&E Policies / Procedures / Forms?
A. Copies can also be obtained from **supervisors or a HS&E member.** Copies can also be obtained electronically via the QA document control system.

Q. **Have did you hear about ISO 14001 & OHSAS 18001?**
A. Postings have been placed on notice boards and communications have been received from PLM's.

Q. What are the main environmental aspects associated with the company?
A. **Emissions to sewer** (sulphates arising from the use of alcast plaster), Energy (high usage), Hazardous waste (e.g. TW ceramic waste) generation, non-hazardous waste generation (e.g. gypsum plaster)

Q. If a spillage occurred in the area, how would it be cleaned up?
A. The spillage would be cleaned up using socks and pads in the spill kits and the contaminated items would be placed in the Hazardous Waste wheely bin. Large scale spills would be handled by the spill response team members.

Q. If a spillage occurred, at what stage would you notify the HS&E Dept?
A. If the spillage exceeded 50 L, if a spillage occurred in the back yard area or if a spillage poured to drain or soil area.

Q. What form of waste segregation exists in the Business Units?

A. **CW:** Plaster bags, cardboard & soft plastics, Al risers, dross and filters, cardboard, hazardous waste chemicals

MC: Al swarf, domino ink containers, cardboard & soft plastics, hazardous waste chemicals, aluminium cans

TW: Cardboard & soft plastics, Allsop packaging, Thermal Ceramics packaging, aluminium cans, hazardous waste chemicals

Q. What are HS&E Management Programmes?

A. These programmes **outline company objectives and targets for HS&E improvements**.

Q. How would an employee bring a HSE issue to the attention of their supervisor / HS&E Dept.?

A. Using the **Hazard Alert Notification Form**; this is used to record internal safety and environmental hazards. Employees can also report issues directly to site managers, supervisors, HSE representatives or the HSE department.

Q. What procedure is followed when purchasing a new chemical?

A. All chemicals must be approved by the HSE department prior to introduction of the chemical on site. Safety Data Sheets (SDS) must be obtained.

Q. Where can SDS's be found?

A. PLM's office, security, HSE Department

R. What liquids can be discharged to surface water drains?

A. **No liquids other that rain water** can be discharged to surface water drains. All surface water drains are colour coded blue.

Q. How are you informed / kept up to date of any HS&E information?

A. HSE Postings, HSE communications, HSE alerts, Turbo Topics, updates from PLM's/Management.

Honeywell

Transportation Ireland Limited

OCTOBER HSE COMMUNICATIONS

ENERGY AWARENESS

EN 16001 Energy Management Systems
The standard specifies the requirements for an environmental management system to enable an organization to develop and implement an energy policy, identify significant areas of energy consumption and target energy reductions.

Why EN 16001?

- **Reduce costs**
  Reduce energy costs via a structured approach to identifying, measuring and managing energy consumption.
- **Improve business performance**
  Drive greater productivity by identifying technical point solutions and affecting behavioural change to reduce energy consumption.
- **Engage top management**
  Position energy management as a key business issue.
- **Comply with legislation**
  Meet current or future mandatory energy efficiency targets and/or the requirements of emission reduction legislation.
- **Formalise energy policy and objectives**
  Create respect for the energy management policy and embed energy efficient thinking in the organization.
- **Integrate your management systems**
  Align the environmental management system with existing management systems for incremental benefit.
- **Secure energy supply**
  Understand energy risk exposure and identify areas of the organization at greatest risk.
- **Drive innovation**
  Develop opportunities for new products and services in the low-carbon economy of the future.

Honeywell

Transportation Ireland Limited

OCTOBER HSE COMMUNICATIONS

ENERGY AWARENESS

EN 16001 & Honeywell Waterford

Honeywell are currently in the process of aligning EN 16001 with the international HSE standards ISO 14001 & OHSAS 18001. A third party gap analysis is scheduled for December 2010 with full certification expected in March 2010.

Jim Doyle is currently focusing on energy conservation projects and opportunities within the plant to assist with savings on the average annual 1.5 million spend on energy.

The first project will focus on the introduction of motion sensor lighting in the main corridors, canteen and toilet areas. More updates on projects will follow as new projects are identified and implemented.

Energy Saving Tips in Work

Computers/printers, etc:

- **Enable the monitor power management function on office computers**, which automatically puts monitors to sleep when not in use, 'wakes' them with a touch of the mouse or keyboard.
- When shutting down your computer at the end of every day, **ensure that both the screen and drive are powered off.**
- **Turn off printers, copiers & fax machines at the end of the day and on weekends**.

Air Conditioning:

- **Ensure that areas in front of vents are clear of office furniture**, file cabinets, stacks of paper, etc. As much as 25% more energy is required to distribute air if vents are blocked.
- When your office is going to be unoccupied for long periods of time (i.e. holidays, weekends), **adjust your thermostat to avoid conditioning unoccupied spaces.** Lower the temperature a few degrees in the winter, and increase it during the summer – once your back in the offices, adjust it to the normal range.

Honeywell

Transportation Ireland Limited

OCTOBER HSE COMMUNICATIONS

EPA Polychlorinated biphenyls (PCB) Inventory

This communications has been created to inform all employees that Honeywell Transportation Ireland Limited has been removed from the national PCB inventory and is no longer considered a PCB holding as defined by the Waste Management (Hazardous Waste) Regulations 1998, S.I. No. 163 of 1998.

Should any in scope equipment subsequently be identified, Honeywell Transportation Ireland Limited is obliged to notify the Environmental Protection Agency and take the following actions:

- Access the equipment to determine PCB status via testing or from manufacturer's information; and
- Decommission or decontaminate the equipment where the PCB few status cannot be verified.

What are PCB's?

Polychlorinated biphenyls are a class of organic compounds which are widely used in many applications especially as dielectric fluids in transformers, capacitors, and coolants.

PCB's are very stable compounds and do not degrade readily. They have a high environmental toxic impact and their destruction by chemical, thermal, and biochemical processes is extremely difficult, and presents the risk of generating extremely toxic dibenzodioxins and dibenzofurans through partial oxidation.

OCTOBER HSE COMMUNICATIONS

GYPSUM WASTE & COST SAVINGS

Veolia Environmental have identified an alternative waste acceptance site for Honeywell gypsum waste. This includes waste arising from the CW Knock Out area and the Sludge Dewatering Plant (Blockwasher & SST).

The gypsum waste stream is now being sent to Lagan Cement Limited, Kinnegad, Co. Meath. The material will be used in Lagan as an alternative raw material and is considered a recovery/reuse operation.

In previous years, Honeywell disposed gypsum waste in Germany at an increased cost to the company. 1913.94 tonnes of gypsum waste was disposed over seas in 2009 & 3559.47 tonnes in 2008.

Waste acceptance costs are lower at Lagan when considered to the disposal site in Germany. There are also reduced transport costs. As a result, it is expected that Honeywell will save 100,000 euro per annum as a result of utilising Lagan Cement.

All gypsum waste is visually inspected prior to acceptance at Lagan Cement. Waste loads containing large metal pieces or large quantities of small metal pieces will not be accepted at the site. Subsequently, Honeywell will have to revert back to the more costly and less environmentally friendly option in Germany.

Under no circumstances should metal be disposed:

- via the Knock Out conveyor
- directly into the dry plaster skip
- into the mixed plaster skip in the back yard
- in the sludge skips in the Sludge Dewatering Plant

Honeywell

Transportation Ireland Limited

HSE posting

REACH enforcement campaign

The Health and Safety Authority is participating in an EU project to assess compliance with the REACH restriction on polycyclic aromatic hydrocarbons (PAHs) in the extender oils of tyres. It is one of a number of EU coordinated enforcement projects which contribute towards ensuring harmonisation of REACH enforcement in Member States. The project will also contribute towards raising awareness throughout industry regarding REACH provisions.

The restriction on the placing on the market and use of PAHs in the extender oils of tyres came into force on 1st January 2010. Tyres, and treads for retreading, manufactured after this date are banned from being placed on the market if they contain extender oils containing PAH concentrations above certain limits.

Traditionally, tyres have been produced worldwide using extender oils that may contain various quantities of PAHs, which are in fact not added intentionally. They are present because the oils used in the manufacturing process happen to contain them. PAHs are a group of over 100 organic chemical substances of poly-aromatic structure that occur naturally in petroleum oil and coal. They are toxic, and several have been classified as carcinogens. They are also persistent organic pollutants (POPs) and can accumulate in plants and animals. In order to provide a high level of protection to human health and the environment and to contribute to the reduction of total annual emissions of PAHs, the European Commission considered it necessary to restrict the placing on the market and use of PAH-rich extender oils for the production of tyres. Suitable alternatives have been identified, so safety is not compromised by compliant oils and tyres.

The first stage of the enforcement campaign involved the HSA contacting the relevant stakeholders in the tyre industry, i.e. companies involved in the supply of tyres to the European (mainly Irish) market, which include importers, wholesalers and distributors, to request specific information in relation to the tyres purchased for supply. Relevant companies have received guidance on how to achieve and maintain compliance with the restriction, which includes maintaining regular, ongoing contact with the tyre manufacturers/suppliers, and keeping accurate and up-to-date records of all steps taken to establish compliance. Depending on the responses received, a selection of companies will be subject to site visits and enforcement action as required.

REACH enforcement campaign and Honeywell (Waterford) Honeywell is currently working with suppliers/manufacturers to identify alternative substances which have been identified as a restricted substance under the REACH regulations. At present, the following chemicals have been affected:

1. Ecoref 1260 (TW Crucible) – contains refractory ceramic fibres
2. Kalminex XP (TW) – contains colophony
3. Sticktite T (TW) - contains colophony

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 10.11.2010
Date Received: 11.11.2010
Date Analysis Commenced: 11.11.2010
Our Ref: WS-28446
Certificate No: L/10/2387

	Sample ID	**SW1**
Determinand	**Lab ID**	**92273**
Cadmium#	**	<0.03
Chromium#	**	<0.05
COD	n/a	15
Copper#	**	<0.05
Nickel#	**	<0.10
Sulphate	**	34
Zinc#	**	0.05

Results expressed as mg/l (ppm)
unless stated otherwise

#: Analysis of metals are performed on the filtered sample.

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 13.05.2010
Date Received: 13.05.2010
Date Analysis Commenced:13.05.2010
Our Ref: WS-27125
Certificate No: L/10/1043

	Sample ID	**SW-1**
Determinand	**Lab ID**	**88419**
COD	n/a	69
Cadmium#	**	<0.03
Chromium#	**	<0.05
Copper #	**	<0.05
Nickel#	**	<0.10
Zinc#	**	0.62

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

#: Analysis of metals are performed on the filtered sample.

Exceedances are highlighted in bold.
MAC = Maximum Admissable Concentration.
MRC = Minimum Required Concentration.

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 17.02.2010
Date Received: 17.02.2010
Date Analysis Commenced:17.02.2010
Our Ref: WS-26515
Certificate No: L/10/0406

	Sample ID	**Cooking water supply**
Determinand	**Lab ID**	**86591**
Total Coliforms(cfu/100ml)	n/a	0
Faecal Coliforms (cfu/100ml)	n/a	0

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests

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This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

TelLab

ANALYSIS OF SLUDGE SAMPLE.

Date Sampled: 17.02.2010
Date Received: 17.02.2010
Date Analysis Commenced: 17.02.2010
Our Ref: WS-26515
Certificate No: L/10/0406

	Sample ID	**Sludge**
Determinand	**Lab ID**	**86592**
Moisture (%)	n/a	48.9

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests   ++ = Subcontracted Tests   n/a = Non-INAB Accredited Tests

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 16.02.2010
Date Received: 17.02.2010
Date Analysis Commenced: 17.02.2010
Our Ref: WS-26515
Certificate No: L/10/0406

	Sample ID	**SE-1**
Determinand	**Lab ID**	**86593**
Ammonia as NH4	n/a	<0.1
COD	n/a	692
Suspended Solids	n/a	31

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 17.02.2010
Date Received: 17.02.2010
Date Analysis Commenced: 17.02.2010
Our Ref: WS-26515
Certificate No: L/10/0406

Determinand	Sample ID / Lab ID	SW-1 / 86594
COD	n/a	32
Cadmium #	**	<0.03
Nickel #	**	<0.10
Zinc #	**	0.19
Chromium #	**	<0.05
Copper #	**	<0.05
Sulphate #	**	32

Analysis of metals are performed on the filtered sample

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests

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This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

Results expressed as mg/l (ppm)
unless stated otherwise

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 17.08.2010
Date Received: 19.08.2010
Date Analysis Commenced: 19.08.2010
Our Ref: WS-27802
Certificate No: L/10/1735

	Sample ID	**SE-1**
Determinand	**Lab ID**	**90471**
COD	n/a	408
Ammonia as NH_4	n/a	<0.1
Oils Fats & Greases	n/a	57
Suspended Solids	n/a	35

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredit

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Lab

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 18.08.2010
Date Received: 19.08.2010
Date Analysis Commenced: 19.08.2010
Our Ref: WS-27802
Certificate No: L/10/1735

	Sample ID	**SW-1**
Determinand	**Lab ID**	**90472**
COD	n/a	75
Sulphate	**	131
Cadmium#	**	<0.03
Chromium#	**	<0.05
Copper #	**	<0.05
Nickel#	**	<0.10
Zinc#	**	0.15

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests   ++ = Subcontracted Tests   n/a = Non-INAB Accredited Tests

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

#: Analysis of metals are performed on the filtered sample.

Exceedances are highlighted in bold.
MAC = Maximum Admissable Concentration.
MRC = Minimum Required Concentration.

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 17.08.2010
Date Received: 19.08.2010
Date Analysis Commenced: 19.08.2010
Our Ref: WS-27802
Certificate No: L/10/1735

Determinand	Sample ID Lab ID	SE-1 90471
COD	n/a	408
Ammonia as NH_4	n/a	<0.1
Oils Fats & Greases	n/a	57
Suspended Solids	n/a	35

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredit

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UKAS TESTING 4279

EPA AIR EMISSIONS COMPLIANCE MONITORING EMISSIONS REPORT

(Prepared on behalf of the EPA by Catalyst Environmental - EPA Contract No. OEE-09-01)

Unit 1C, Langlands Square, Langlands Business Park, East Kilbride, G75 0YY
T: 0800 328 1821
E: barry.grant@cat-env.com
Your Catalyst Contact: Barry Grant (07826 916 683)

Stack Emissions Testing Report Commissioned by
Irish Environmental Protection Agency

Installation Name & Address
Honeywell International Technologies Ltd
Unit 411
Industrial Estate
Cork Road
Waterford
Ireland

IPPC Licence: P0525-01

Dates of the Monitoring Campaign
March / April 2010

Job Reference Number
P0525-01PAR10-01

Report Written by
Brett Philip Team Leader MCERTS Level 2 MM 06 718 TE1 TE2 TE3 TE4

Report Approved by
Barry Grant Regional Manager MCERTS Level 2 MM 03 200 TE1 TE2 TE3 TE4

Report Date
18th May 2010

Version
Version 2

Signature of Report Approver
B Grant

CONTENTS

Opinions and interpretations expressed herein are outside the scope of Catalyst Environmental Ltd's UKAS accreditation.

This version of the test report supersedes the previous version of the test report. Please destroy all previous versions to ensure no confusion arises from having multiple test reports in existence.

Executive Summary

MONITORING OBJECTIVES

Honeywell International Technologies Ltd, Waterford

Introduction

Catalyst Environmental carried out air emissions monitoring on behalf of the EPA for volatile organic carbon (VOC) at Honeywell International Technologies over two monitoring periods from 29-30/03/10, and from 13-14/04/10. This monitoring was carried out on the licensed emission points A2-1, A2-2, A2-5, and A2-6 with the Afterburners ON during the March campaign, and at the same emission points with afterburners OFF during the April campaign. These monitoring locations are at the stack emission points arising from compressor wheel ovens 1, 2, 9, and 10 respectively. The afterburners are designed to burn off any pollutant emissions that may arise at various stages of the process cycle.

The first step of the production process is the insertion of a polystyrene core into the frame containing the rubber compressor wheel mould. The frame is then filled with wet gypsum. After the gypsum is poured in and begins to harden, the compressor wheel mould is then tapped & removed, and then the wet gypsum block mould containing the polystyrene core is put into the oven for the 9-10 hour process cycle. Initially the oven temp is down at around 130^{o}C but it gradually heats up to the design temp of 270^{o}C. The afterburner is programmed to kick in about 4 hours into the cycle, and it then runs at 870^{o}C for the remaining 4-5 hours of the process cycle. The burn out of the polystyrene layer would occur after around 4 hours, so this is the point where a spike in the VOC emissions may arise.

The main monitoring was performed using a SICK MAIHAK 3006 flame ionisation detection unit (FID). The FID units are subject to full annual system checks each year. The annual system checks include linerity, zero drift, span drift. Both FID were found to be operting well within the given tolerances during the last system check which were undertaken in Jan 2010 (CAT 8.3) and March 2010 (CAT 8.8). The FID unit is also calibrated and the sample lines checked for integrity prior to every sample on site. The FID unit was allowed to reach its working temperature and stabilise before it was calibrated. The calibration was performed to ensure that the analyser was reading accurately. It was calibrated at zero using a traceable zero gas and was calibrated also at 80 ppm (128.5 mgC/m^3) and 800ppm (1285 mgC/m^3) using propane as the traceable calibration gas. The calibration results are available in Appendix 2. The zero & span gases were introduced into the analyser through the calibration port and each of the steps involved in the calibration were performed in accordance with section 6.2 (Adjustments and Checks) of the CEN standards EN 13526. The FID calibrations were performed each day before and after the production cycle, and the calibration results indicate that the FID was performing to an acceptable standard, as the results were well within the allowable span drift.

Honeywell are required to comply with the conditions of their IPPC licence P0525-01. In this licence, emission limit values have been set for a range of pollutant species including VOC. Section 3.1.2 (v) of Honeywell Transportations' IPPC licence states that no thirty-minute mean monitoring value shall exceed the emission limit value. The licence requires that data be corrected to a reference oxygen level of 17% and reported as a dry gas, meaning the result has been corrected for any moisture that may be present. The emission limit value, which is based on corrected VOC data and set in the company's IPPC licence at emission point A2-1 - A2-8, is 20mgC/m^3.

Catalyst monitored VOC on emission points A2-2, and A2-6 from 06.00 am to 14.40 pm on 29-03-10, with the Afterburner ON, and a similar format was followed for monitoring at A2-1, and A2-5 on the 30-03-10. In line with licence requirements, this data has been presented as corrected 30 minute averaged results in the appendices. The continuous data was separated into discreet 30 minute periods and the data within each of these 30 minute periods was averaged to give the mean VOC concentration in that period. A similar format of monitoring at the four emission points over two days was repeated during the second VOC monitoring campaign carried out on the 13-14/03/10 but this time with the afterburners OFF.

Executive Summary

MONITORING DATE(S) & TIMES

Honeywell International Technologies Ltd, Waterford

Emission Point	Sampling Date(s)	Sampling Times	Duration (mins)
A2-1 Afterburner ON	30/03/2010	07:26 - 14:35	429
A2-1 Afterburner OFF	14/04/2010	06:00 - 14:00	480
A2-2 Afterburner ON	29/03/2010	06:35 - 15:00	505
A2-2 Afterburner OFF	13/04/2010	05:45 - 14:10	505
A2-5 Afterburner ON	30/03/2010	06:53 - 14:03	430
A2-5 Afterburner OFF	14/04/2010	06:00 - 13:09	429
A2-6 Afterburner ON	29/03/2010	05:49 - 13:49	480
A2-6 Afterburner OFF	13/04/2010	05:45 - 13:35	470

SUMMARY OF RESULTS

Emission Point	A2-1 (ON)	A2-1 (OFF)	A2-2 (ON)	A2-2 (OFF)	A2-5 (ON)	A2-5 (OFF)	A2-6 (ON)	A2-6 (OFF)
Time (mins)	VOC (mgC/m3)							
0 - 30	12.0	12.4	12.4	44.5	48.2	1855.5	62.3	270.2
30 - 60	12.4	11.9	10.8	23.3	44.8	2045.9	70.6	164.7
60 - 90	12.4	14.7	9.6	15.3	46.9	-	96.5	96.3
90 - 120	11.4	11.9	12.0	17.3	39.3	-	79.4	94.1
120 - 150	6.7	6.9	14.2	22.8	36.6	-	73.2	-
150 - 180	6.9	8.5	15.6	27.4	37.8	-	81.2	-
180 - 210	6.8	8.3	15.4	38.1	45.3	-	77.9	121.0
210 - 240	6.6	10.4	16.1	94.6	45.8	1207.2	77.9	84.4
240 - 270	6.7	11.6	8.6	205.0	32.5	1271.8	51.0	528.7
270 - 300	6.6	9.5	6.7	387.7	35.0	1325.4	47.0	714.5
300 - 330	6.6	12.7	6.5	387.1	31.6	1439.0	53.8	1272.7
330 - 360	6.6	31.1	6.9	297.8	31.1	1586.6	33.8	1669.4
360 - 390	6.8	87.9	6.6	251.2	27.4	1289.9	27.4	2207.1
390 - 420	6.8	184.0	7.2	166.9	27.8	1367.7	27.0	2017.2
420 - 450	10.0	250.7	6.6	107.3	27.0		26.3	1549.3
450 - 480		238.4	6.7	79.4			24.7	1098.3
480 - 510			6.8	63.6				
ELV	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Mean	8.3	56.9	9.9	131.9	37.1	1487.7	56.9	849.1

Refer to appendices for detailed information and data profiles.

Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

UKAS TESTING 4279

MCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Executive Summary

MONITORING & ANALYTICAL METHODS

Honeywell International Technologies Ltd, Waterford

	Monitoring				Analysis					
Parameter	**Standard**	**Technical Procedure**	**UKAS Testing**	**UKAS Number**	**Analytical Procedure**	**Analytical Technique**	**UKAS Analysis**	**UKAS Number**	**MCERTS Testing**	**LOD (Average)**
Water Vapour	BS EN 14790	CAT-TP-05	Yes	4279	CAT-TP-05	Gravimetric	Yes	4279	Yes	0.1 % v/v
Total VOCs (as Carbon)	BS EN 13526	CAT-TP-20	Yes	4279	Flame Ionisation Detection by Sick 3006 FID				Yes	0.11 mg/m³
Oxygen	BS EN 14789	CAT-TP-21	Yes	4279	Dry Zirconia Cell by Horiba PG-250				Yes	0.04 %
Velocity & Vol. Flow Rate	BS EN 13284-1	CAT-TP-04	Yes	4279	Pitot Tube and Thermocouple				Yes	N/A

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
All	All	There are no deviations associated with the sampling employed.

Executive Summary

PLANT PHOTOS

A2-1

A2-1 & A2-2

A2-5 & A2-6

A2-6

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

Team Leader	Name	Brett Philip
	MCERTS Accreditation	MCERTS Level 2
	MCERTS Number	MM 06 718
	Technical Endorsements	TE1 TE2 TE3 TE4

Team Leader	Name	Robert Hester
	MCERTS Accreditation	MCERTS Level 2
	MCERTS Number	MM 06 766
	Technical Endorsements	TE1 TE2 TE3 TE4

Trainee	Name	David Guy
	MCERTS Accreditation	MCERTS Trainee
	MCERTS Number	MM 09 1044
	Technical Endorsements	None

LIST OF EQUIPMENT

Extractive Sampling	
Equipment Type	**Equipment I.D.**
Control Box DGM	CAT 7.2
Box Thermocouples	CAT 3.7
Umbilical	-
Oven Box	-
Probe	-
S-Pitot (1)	CAT 21S.6
S-Pitot (2)	-
L-Pitot	-
500g Check Weight	CAT 17.2
1Kg Check Weight	CAT 17.2
Last Impinger Arm	-
Callipers	-
Small DGM	-
Laboratory Balance	-
Tape Measure	CAT 16.5

Instrumental Analysers	
Equipment Type	**Equipment I.D.**
Horiba PG-250 Analyser	CAT 9.4
JCT JCC P-1 Cooler	CAT 4.43
5m FT-IR	-
5m FT-IR Sampling System	-
SICK MAHAIK 3006 FID	CAT 8.3 / 8.8
Heated Head Filter	CAT 12.9 / 12.31
Mass Flow Controller (1)	CAT 6.9 / 6.10
Mass Flow Controller (2)	CAT 6.21 / 6.22
Mass Flow Controller (3)	CAT 6.17 / 6.18

Span Gas Reference No	CYL 1.0027
Span Gas Expiry Date	04/06/2012
Gas Concentration (ppm)	78.9
Span Gas MU (%)	2

Span Gas Reference No	CYL 1.0009
Span Gas Expiry Date	03/02/2012
Gas Concentration (ppm)	804.9
Span Gas MU (%)	2

Miscellaneous Items	
Equipment Type	**Equipment I.D.**
Digital Manometer (1)	CAT 2.2
Digital Manometer (2)	-
Digital Temperature Meter	CAT 3.5
Stopwatch	CAT 14.2
Barometer	CAT 3.2
Stack Thermocouple (1)	CAT 4.12
Stack Thermocouple (2)	-
1m Heated Line (1)	-
1m Heated Line (2)	-
1m Heated Line (3)	-
5m Heated Line (1)	CAT 20.18
15m Heated Line (1)	CAT 20.5
15m Heated Line (2)	-
20m Heated Line (1)	CAT 20.26

SICK MAHAIK 3006 FID	CAT 8.3
Last system check	24/01/2010
SICK MAHAIK 3006 FID	CAT 8.8
Last system check	25/03/2010

APPENDIX 2

TOTAL VOCs (as CARBON): RESULTS SUMMARY

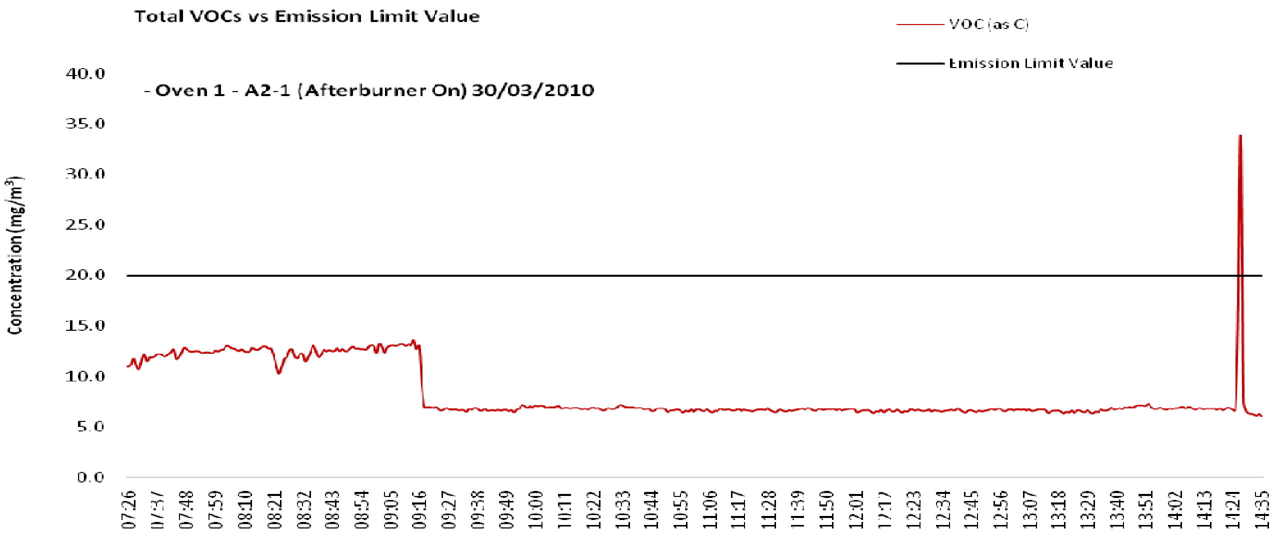
Honeywell International Technologies Ltd, Waterford

A2-1 (Afterburner ON)

30 minute averages

Sample Time (mins)	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	12.0			
30 - 60	OFF	12.4	12.2		
60 - 90	OFF	12.4			
90 - 120	OFF	11.4			
120 - 150	ON	6.7			
150 - 180	ON	6.9			
180 - 210	ON	6.8			
210 - 240	ON	6.6			
240 - 270	ON	6.7	4.9		
270 - 300	ON	6.6			
300 - 330	ON	6.6			
330 - 360	ON	6.6			
360 - 390	ON	6.8	1.5	14.8	
390 - 420	ON	6.8			
420 - 450	ON	10.0			
Emission Limit		**20**			
Average over full cycle	-	8.3	6.2	14.8	20.1

Graphical Trend of Data



Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-1 (Afterburner ON)

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	07:26 - 14:35
Sampling Dates	-	30/03/2010
Instrument Range	ppm	100
Span Gas Value	ppm	78.9

Quality Assurance

	Zero Drift	Units	Run 1
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.07
CAL 1	Zero Down Sampling Line (Post)	ppm	0.17
CAL 1	Zero Drift	ppm	0.10
CAL 2	Zero Down Sampling Line (Pre)	ppm	
CAL 2	Zero Down Sampling Line (Post)	ppm	
CAL 2	Zero Drift	ppm	
CAL 3	Zero Down Sampling Line (Pre)	ppm	
CAL 3	Zero Down Sampling Line (Post)	ppm	
CAL 3	Zero Drift	ppm	
	Allowable Zero Drift	± ppm	0.62
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span Down Sampling Line (Pre)	ppm	79.00
CAL 1	Span Down Sampling Line (Post)	ppm	78.40
CAL 1	Span Drift	ppm	-0.60
CAL 2	Span Down Sampling Line (Pre)	ppm	
CAL 2	Span Down Sampling Line (Post)	ppm	
CAL 2	Span Drift	ppm	
CAL 3	Span Down Sampling Line (Pre)	ppm	
CAL 3	Span Down Sampling Line (Post)	ppm	
CAL 3	Span Drift	ppm	
	Allowable Span Drift	± ppm	0.62
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Weather / Ambient Conditions	-	Wet / Outside

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1
There are no deviations associated with the sampling employed.	x

APPENDIX 2

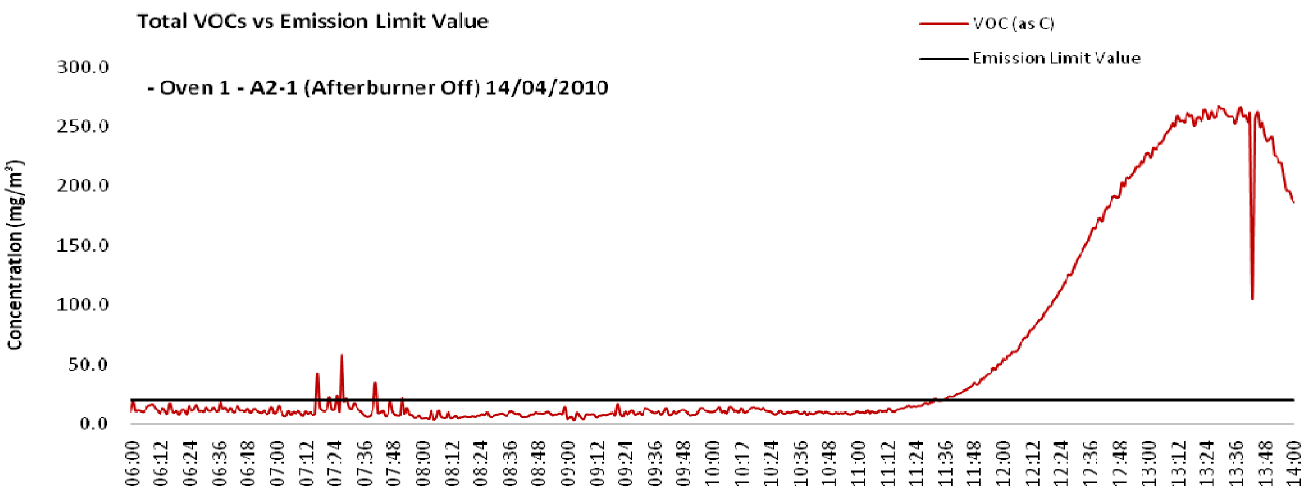
Honeywell International Technologies Ltd, Waterford

A2-1 (Afterburner OFF)

30 minute averages

Sample Time (mins)	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	12.4			
30 - 60	OFF	11.9	13.3		
60 - 90	OFF	14.7			
90 - 120	OFF	11.9			
120 - 150	OFF	6.9			
150 - 180	OFF	8.5			
180 - 210	OFF	8.3			
210 - 240	OFF	10.4			
240 - 270	OFF	11.6	5.4		
270 - 300	OFF	9.5			
300 - 330	OFF	12.7			
330 - 360	OFF	31.1			
360 - 390	OFF	87.9	1.1	12.4	
390 - 420	OFF	184.0			
420 - 450	OFF	250.7			
450 - 480	OFF	238.4			
Emission Limit		**20**			
Average over full cycle	-	56.9	6.6	12.4	19.7

Graphical Trend of Data



Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

UKAS TESTING 4279

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-1 (Afterburner OFF)

Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	06:00 - 14:00	
Sampling Dates	-	14/04/2010	
Instrument Range	ppm	100	
Span Gas Value	ppm	78.9	

Quality Assurance

	Zero Drift	Units	Run 1	
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.05	
	Zero Down Sampling Line (Post)	ppm	0.17	
	Zero Drift	ppm	0.12	
CAL 2	Zero Down Sampling Line (Pre)	ppm		
	Zero Down Sampling Line (Post)	ppm		
	Zero Drift	ppm		
CAL 3	Zero Down Sampling Line (Pre)	ppm		
	Zero Down Sampling Line (Post)	ppm		
	Zero Drift	ppm		
	Allowable Zero Drift	± ppm	0.62	
	Zero Drift Acceptable	-	Yes	

	Span Drift	Units	Run 1	
CAL 1	Span Down Sampling Line (Pre)	ppm	79.00	
	Span Down Sampling Line (Post)	ppm	78.40	
	Span Drift	ppm	-0.60	
CAL 2	Span Down Sampling Line (Pre)	ppm		
	Span Down Sampling Line (Post)	ppm		
	Span Drift	ppm		
CAL 3	Span Down Sampling Line (Pre)	ppm		
	Span Down Sampling Line (Post)	ppm		
	Span Drift	ppm		
	Allowable Span Drift	± ppm	0.62	
	Span Drift Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Weather / Ambient Conditions	-	Dry / Outside	

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

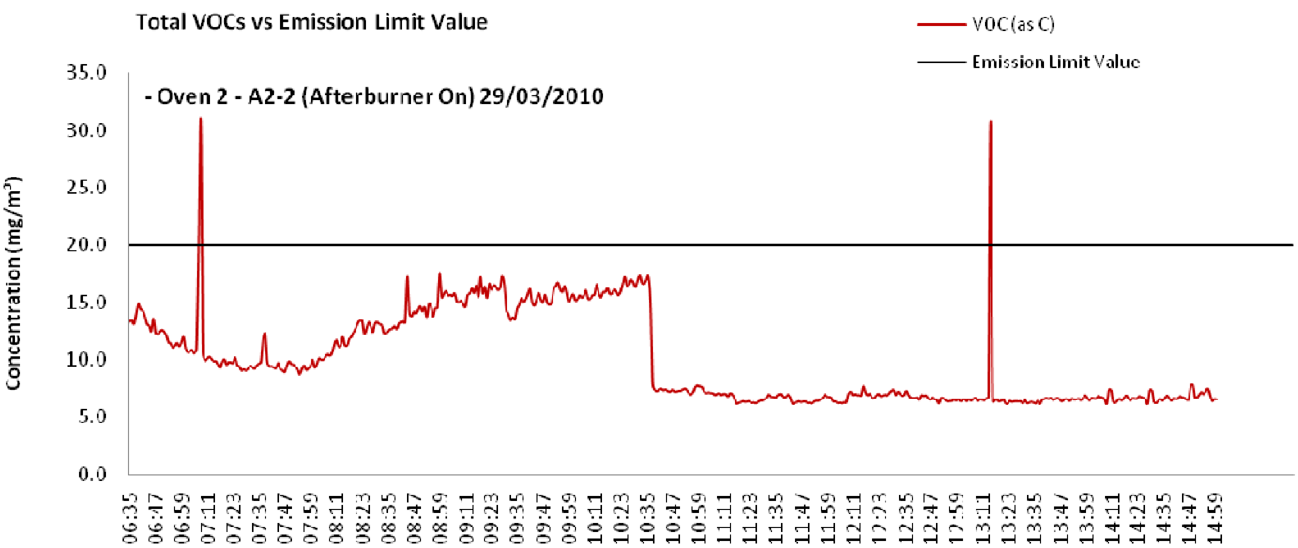
Honeywell International Technologies Ltd, Waterford

A2-2 (Afterburner ON)

30 minute averages

Sample Time (mins)	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	12.4			
30 - 60	OFF	10.8	15.8		
60 - 90	OFF	9.6			
90 - 120	OFF	12.0			
120 - 150	OFF	14.2			
150 - 180	OFF	15.6			
180 - 210	OFF	15.4			
210 - 240	OFF	16.1			
240 - 270	ON	8.6			
270 - 300	ON	6.7			
300 - 330	ON	6.5		14.5	
330 - 360	ON	6.9	2.6		
360 - 390	ON	6.6			
390 - 420	ON	7.2			
420 - 450	ON	6.6			
450 - 480	ON	6.7			
480 - 510	ON	6.8	1.3		
Emission Limit		**20**			
Average over full cycle	-	9.9	6.6	14.5	20.1

Graphical Trend of Data



Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-2 (Afterburner ON)

Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	06:35 - 15:00	
Sampling Dates	-	29/03/2010	
Instrument Range	ppm	100	
Span Gas Value	ppm	78.9	

Quality Assurance

	Zero Drift	Units	Run 1	
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.08	
CAL 1	Zero Down Sampling Line (Post)	ppm	0.14	
CAL 1	Zero Drift	ppm	0.06	
CAL 2	Zero Down Sampling Line (Pre)	ppm		
CAL 2	Zero Down Sampling Line (Post)	ppm		
CAL 2	Zero Drift	ppm		
CAL 3	Zero Down Sampling Line (Pre)	ppm		
CAL 3	Zero Down Sampling Line (Post)	ppm		
CAL 3	Zero Drift	ppm		
	Allowable Zero Drift	± ppm	0.62	
	Zero Drift Acceptable	-	Yes	

	Span Drift	Units	Run 1	
CAL 1	Span Down Sampling Line (Pre)	ppm	79.20	
CAL 1	Span Down Sampling Line (Post)	ppm	78.60	
CAL 1	Span Drift	ppm	-0.60	
CAL 2	Span Down Sampling Line (Pre)	ppm		
CAL 2	Span Down Sampling Line (Post)	ppm		
CAL 2	Span Drift	ppm		
CAL 3	Span Down Sampling Line (Pre)	ppm		
CAL 3	Span Down Sampling Line (Post)	ppm		
CAL 3	Span Drift	ppm		
	Allowable Span Drift	± ppm	0.62	
	Span Drift Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Weather / Ambient Conditions	-	Wet / Outside	

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

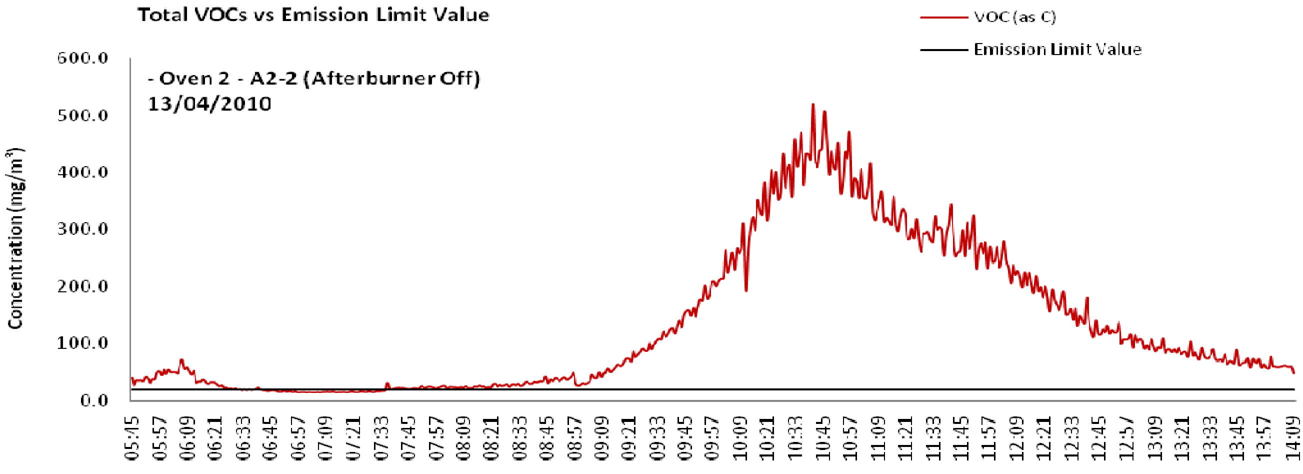
Honeywell International Technologies Ltd, Waterford

A2-2 (Afterburner OFF)

30 minute averages

Sample Time (mins)	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	44.5			
30 - 60	OFF	23.3	13.25		
60 - 90	OFF	15.3			
90 - 120	OFF	17.3			
120 - 150	OFF	22.8			
150 - 180	OFF	27.4			
180 - 210	OFF	38.1			
210 - 240	OFF	94.6	5.49	12.34	
240 - 270	OFF	205.0			
270 - 300	OFF	387.7			
300 - 330	OFF	387.1			
330 - 360	OFF	297.8			
360 - 390	OFF	251.2			
390 - 420	OFF	166.9			
420 - 450	OFF	107.3			
450 - 480	OFF	79.4			
480 - 510	OFF	63.6	1.23		
Emission Limit		**20**			
Average over full cycle	-	131.9	6.7	12.3	19.9

Graphical Trend of Data



Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-2 (Afterburner OFF)

Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	05:45 - 14:10	
Sampling Dates	-	13/04/2010	
Instrument Range	ppm	100	
Span Gas Value	ppm	78.9	

Quality Assurance

	Zero Drift	Units	Run 1	
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.08	
CAL 1	Zero Down Sampling Line (Post)	ppm	0.14	
CAL 1	Zero Drift	ppm	0.06	
CAL 2	Zero Down Sampling Line (Pre)	ppm		
CAL 2	Zero Down Sampling Line (Post)	ppm		
CAL 2	Zero Drift	ppm		
CAL 3	Zero Down Sampling Line (Pre)	ppm		
CAL 3	Zero Down Sampling Line (Post)	ppm		
CAL 3	Zero Drift	ppm		
	Allowable Zero Drift	± ppm	0.62	
	Zero Drift Acceptable	-	Yes	

	Span Drift	Units	Run 1	
CAL 1	Span Down Sampling Line (Pre)	ppm	79.20	
CAL 1	Span Down Sampling Line (Post)	ppm	78.60	
CAL 1	Span Drift	ppm	-0.60	
CAL 2	Span Down Sampling Line (Pre)	ppm		
CAL 2	Span Down Sampling Line (Post)	ppm		
CAL 2	Span Drift	ppm		
CAL 3	Span Down Sampling Line (Pre)	ppm		
CAL 3	Span Down Sampling Line (Post)	ppm		
CAL 3	Span Drift	ppm		
	Allowable Span Drift	± ppm	0.62	
	Span Drift Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Weather / Ambient Conditions	-	Dry / Outside	

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

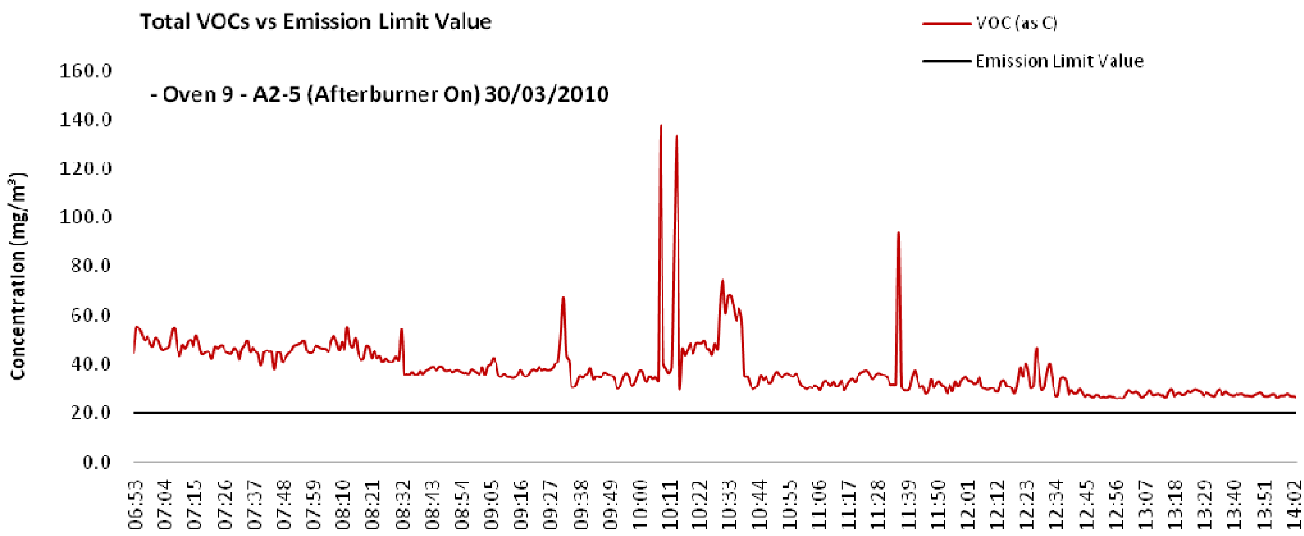
Honeywell International Technologies Ltd, Waterford

A2-5 (Afterburner ON)

30 minute averages

Sample Time (mins)	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	48.2			
30 - 60	OFF	44.8	14.9		
60 - 90	OFF	46.9			
90 - 120	ON	39.3			
120 - 150	ON	36.6			
150 - 180	ON	37.8	5.3	12.7	
180 - 210	ON	45.3			
210 - 240	ON	45.8			
240 - 270	ON	32.5			
270 - 300	ON	35.0			
300 - 330	ON	31.6			
330 - 360	ON	31.1			
360 - 390	ON	27.4	1.3		
390 - 420	ON	27.8			
420 - 450	ON	27.0			
Emission Limit		**20**			
Average over full cycle	-	37.1	7.2	12.7	18.4

Graphical Trend of Data



Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-5 (Afterburner ON)

Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	06:53 - 14:03	
Sampling Dates	-	30/03/2010	
Instrument Range	ppm	1000	
Span Gas Value	ppm	804.9	

Quality Assurance

	Zero Drift	Units	Run 1	
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.20	
CAL 1	Zero Down Sampling Line (Post)	ppm	0.60	
CAL 1	Zero Drift	ppm	0.40	
CAL 2	Zero Down Sampling Line (Pre)	ppm		
CAL 2	Zero Down Sampling Line (Post)	ppm		
CAL 2	Zero Drift	ppm		
CAL 3	Zero Down Sampling Line (Pre)	ppm		
CAL 3	Zero Down Sampling Line (Post)	ppm		
CAL 3	Zero Drift	ppm		
	Allowable Zero Drift	± ppm	0.62	
	Zero Drift Acceptable	-	Yes	

	Span Drift	Units	Run 1	
CAL 1	Span Down Sampling Line (Pre)	ppm	804.60	
CAL 1	Span Down Sampling Line (Post)	ppm	804.10	
CAL 1	Span Drift	ppm	-0.50	
CAL 2	Span Down Sampling Line (Pre)	ppm		
CAL 2	Span Down Sampling Line (Post)	ppm		
CAL 2	Span Drift	ppm		
CAL 3	Span Down Sampling Line (Pre)	ppm		
CAL 3	Span Down Sampling Line (Post)	ppm		
CAL 3	Span Drift	ppm		
	Allowable Span Drift	± ppm	0.62	
	Span Drift Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Weather / Ambient Conditions	-	Wet / Outside	

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

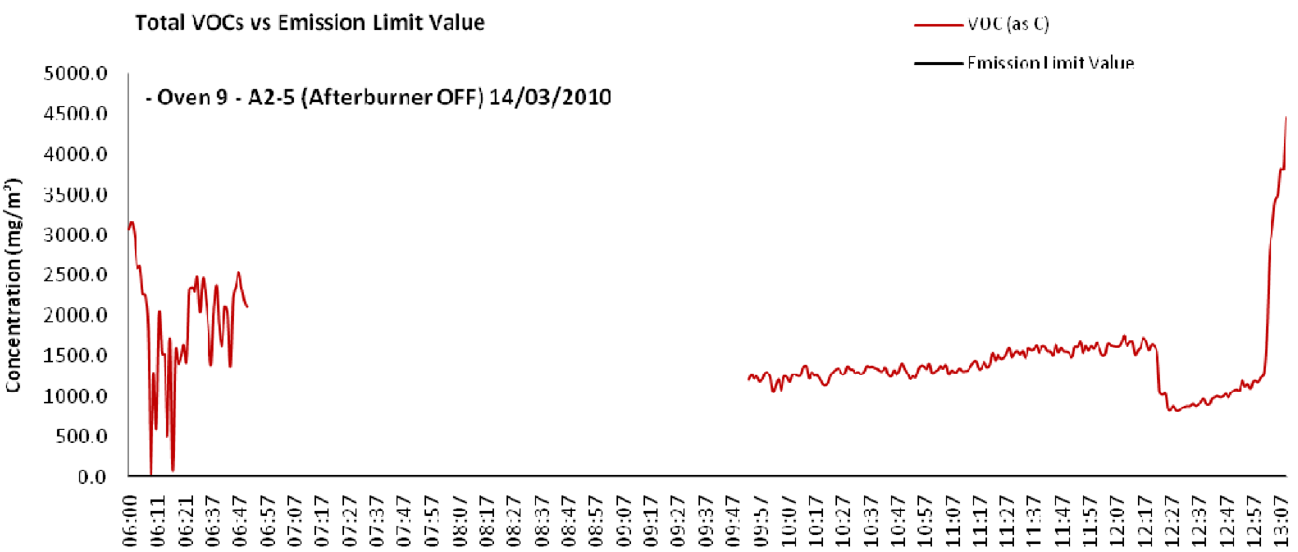
Honeywell International Technologies Ltd, Waterford

A2-5 (Afterburner OFF)

30 minute averages

Sample Time (mins)	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	1855.5	14.72		
30 - 60	OFF	2045.9			
60 - 90	OFF	-			
90 - 120	OFF	-			
120 - 150	OFF	-			
150 - 180	OFF	-			
180 - 210	OFF	-			
210 - 240	OFF	1207.2			
240 - 270	OFF	1271.8	5.30	11.00	
270 - 300	OFF	1325.4			
300 - 330	OFF	1439.0			
330 - 360	OFF	1586.6			
360 - 390	OFF	1289.9	1.31		
390 - 420	OFF	1367.7			
Emission Limit		**20**			
Average over full cycle	-	1487.7	7.1	11.0	19.8

Graphical Trend of Data



Note : Missing data is due to insufficient power being available and subsequent power failure.

Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

UKAS TESTING 4279

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-5 (Afterburner OFF)

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	06:00 - 13:09
Sampling Dates	-	14/04/2010
Instrument Range	ppm	1000
Span Gas Value	ppm	804.9

Quality Assurance

	Zero Drift	Units	Run 1
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.20
CAL 1	Zero Down Sampling Line (Post)	ppm	0.50
CAL 1	Zero Drift	ppm	0.40
CAL 2	Zero Down Sampling Line (Pre)	ppm	
CAL 2	Zero Down Sampling Line (Post)	ppm	
CAL 2	Zero Drift	ppm	
CAL 3	Zero Down Sampling Line (Pre)	ppm	
CAL 3	Zero Down Sampling Line (Post)	ppm	
CAL 3	Zero Drift	ppm	
	Allowable Zero Drift	± ppm	0.62
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span Down Sampling Line (Pre)	ppm	804.60
CAL 1	Span Down Sampling Line (Post)	ppm	804.40
CAL 1	Span Drift	ppm	-0.50
CAL 2	Span Down Sampling Line (Pre)	ppm	
CAL 2	Span Down Sampling Line (Post)	ppm	
CAL 2	Span Drift	ppm	
CAL 3	Span Down Sampling Line (Pre)	ppm	
CAL 3	Span Down Sampling Line (Post)	ppm	
CAL 3	Span Drift	ppm	
	Allowable Span Drift	± ppm	0.62
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Weather / Ambient Conditions	-	Dry / Outside

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1
There are no deviations associated with the sampling employed.	x

APPENDIX 2

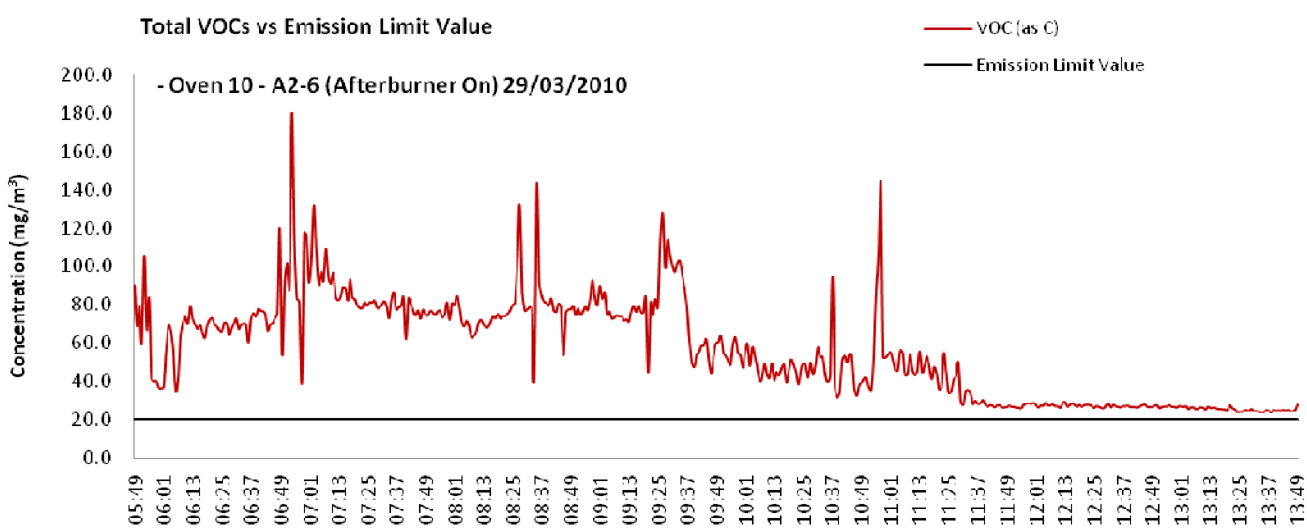
Honeywell International Technologies Ltd, Waterford

A2-6 (Afterburner ON)

30 minute averages

Sample Time	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	62.3			
30 - 60	OFF	70.6	14.8		
60 - 90	OFF	96.5			
90 - 120	OFF	79.4			
120 - 150	OFF	73.2			
150 - 180	OFF	81.2			
180 - 210	OFF	77.9			
210 - 240	OFF	77.9			
240 - 270	ON	51.0	5.9	12.6	
270 - 300	ON	47.0			
300 - 330	ON	53.8			
330 - 360	ON	33.8			
360 - 390	ON	27.4			
390 - 420	ON	27.0			
420 - 450	ON	26.3	1.2		
450 - 480	ON	24.7			
Emission Limit	-	**20**			
Average over full cycle	-	56.9	7.3	12.6	18.4

Graphical Trend of Data



Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

UKAS TESTING 4279 mCERTS

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-6 (Afterburner ON)

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	05:49 - 13:49
Sampling Dates	-	29/03/2010
Instrument Range	ppm	1000
Span Gas Value	ppm	804.9

Quality Assurance

	Zero Drift	Units	Run 1
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.10
	Zero Down Sampling Line (Post)	ppm	0.20
	Zero Drift	ppm	0.10
CAL 2	Zero Down Sampling Line (Pre)	ppm	
	Zero Down Sampling Line (Post)	ppm	
	Zero Drift	ppm	
CAL 3	Zero Down Sampling Line (Pre)	ppm	
	Zero Down Sampling Line (Post)	ppm	
	Zero Drift	ppm	
	Allowable Zero Drift	± ppm	0.62
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span Down Sampling Line (Pre)	ppm	804.50
	Span Down Sampling Line (Post)	ppm	804.30
	Span Drift	ppm	-0.20
CAL 2	Span Down Sampling Line (Pre)	ppm	
	Span Down Sampling Line (Post)	ppm	
	Span Drift	ppm	
CAL 3	Span Down Sampling Line (Pre)	ppm	
	Span Down Sampling Line (Post)	ppm	
	Span Drift	ppm	
	Allowable Span Drift	± ppm	0.62
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Weather / Ambient Conditions	-	Wet / Outside

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1
There are no deviations associated with the sampling employed.	x

APPENDIX 2

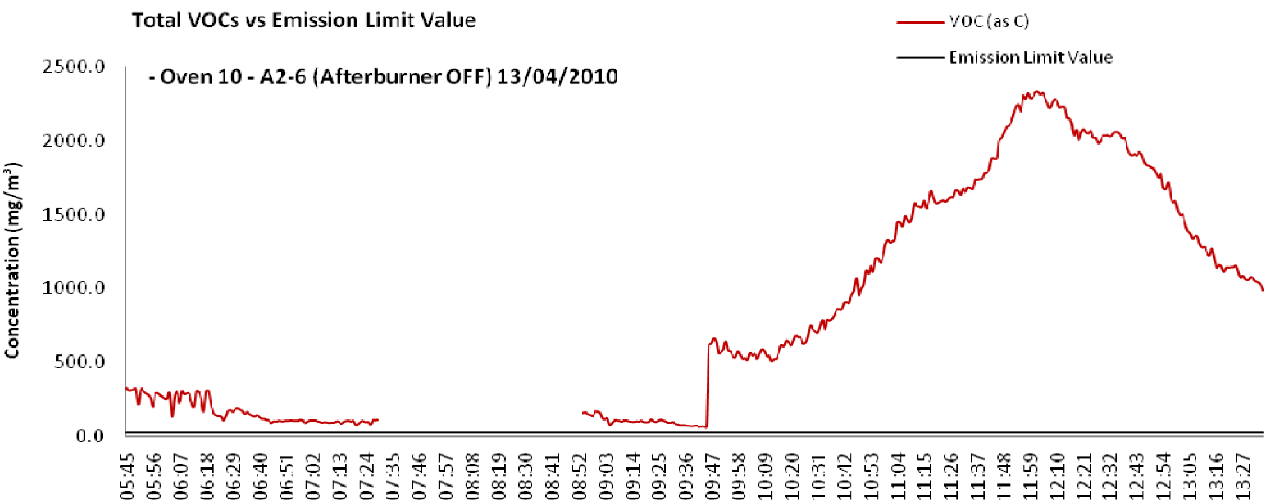
Honeywell International Technologies Ltd, Waterford

A2-6 (Afterburner OFF)

30 minute averages

Sample Time	Afterburner	VOC (mgC/m3)	Moisture (%)	Velocity (m/s)	Oxygen (%)
0 - 30	OFF	270.2			
30 - 60	OFF	164.7	14.8		
60 - 90	OFF	96.3			
90 - 120	OFF	94.1			
120 - 150	OFF	-			
150 - 180	OFF	-			
180 - 210	OFF	121.0	5.0	10.74	
210 - 240	OFF	84.4			
240 - 270	OFF	528.7			
270 - 300	OFF	714.5			
300 - 330	OFF	1272.7			
330 - 360	OFF	1669.4			
360 - 390	OFF	2207.1			
390 - 420	OFF	2017.2			
420 - 450	OFF	1549.3	1.1		
450 - 480	OFF	1098.3			
Emission Limit	-	**20**			
Average over full cycle	-	849.1	7.0	10.7	19.7

Graphical Trend of Data



Note : Missing data is due to insufficient power being available and subsequent power failure.

Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

The results above were corrected using real time oxygen values. The moisture value used to correct the results was the average value over the full cycle.

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

A2-6 (Afterburner OFF)

Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	05:45 - 13:35	
Sampling Dates	-	13/04/2010	
Instrument Range	ppm	1000	
Span Gas Value	ppm	804.9	

Quality Assurance

	Zero Drift	Units	Run 1	
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.10	
	Zero Down Sampling Line (Post)	ppm	0.20	
	Zero Drift	ppm	0.10	
CAL 2	Zero Down Sampling Line (Pre)	ppm		
	Zero Down Sampling Line (Post)	ppm		
	Zero Drift	ppm		
CAL 3	Zero Down Sampling Line (Pre)	ppm		
	Zero Down Sampling Line (Post)	ppm		
	Zero Drift	ppm		
	Allowable Zero Drift	± ppm	0.62	
	Zero Drift Acceptable	-	Yes	

	Span Drift	Units	Run 1	
CAL 1	Span Down Sampling Line (Pre)	ppm	806.00	
	Span Down Sampling Line (Post)	ppm	806.00	
	Span Drift	ppm	0.00	
CAL 2	Span Down Sampling Line (Pre)	ppm		
	Span Down Sampling Line (Post)	ppm		
	Span Drift	ppm		
CAL 3	Span Down Sampling Line (Pre)	ppm		
	Span Down Sampling Line (Post)	ppm		
	Span Drift	ppm		
	Allowable Span Drift	± ppm	0.62	
	Span Drift Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Weather / Ambient Conditions	-	Dry / Outside	

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

TOTAL VOCs (as CARBON): MEASUREMENT UNCERTAINTY CALCULATIONS (AT ELV)

	Value			
Measured Quantities	**Units**	**Run 1**	**Run 2**	**Run 3**
MCERTS Certified Range of Analyser	ppm	9.3		
Operational Range of Analyser	ppm	100.0		
Measured Reading	ppm	5.2		

	Individual Errors as Standard Uncertainties			
Measured Quantities	**Units**	**Run 1**	**Run 2**	**Run 3**
Nonlinearity	ppm	0.020		
Temperature Dependent Zero Drift	ppm	0.027		
Temperature Dependent Span Drift	ppm	0.027		
Cross-Sensitivity	ppm	0.286		
Leak	ppm	0.00		
Calibration Gas Uncertainty	ppm	0.07		
Mass Flow Controllers (dilution) Uncertainty	ppm	0.10		

Parameter	**Units**	**Run 1**	**Run 2**	**Run 3**
Combined uncertainty	ppm	0.32		
Expanded uncertainty (95% confidence)	ppm	0.62		
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.62		
Reported Uncertainty	ppm	0.62		
Expanded uncertainty (95% confidence)	%	5.0		
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	5.0		
Reported Uncertainty	%	5.0		

Unit 1C, Langlands Square, Langlands Business Park, East Kilbride, G75 0YY
E: barry.grant@cat-env.com
Your Catalyst Contact: Barry Grant (07826 916 683)

Stack Emissions Testing Report Commissioned by
Honeywell Transportation Ireland Ltd

Installation Name & Address
Honeywell International Technologies Ltd
Unit 11
Waterford Industrial Estate
Cork Road
Waterford
Ireland

IPC Licence: P0525-01

Stack Reference
A2-5 (Oven 9)

Dates of the Monitoring Campaign
4th - 5th November 2010

Job Reference Number
P0525-01PAR-02

Report Written by
Brett Philip Team Leader MCERTS Level 2 MM 06 718 TE1 TE2 TE3 TE4

Report Approved by
Barry Grant Regional Manager MCERTS Level 2 MM 03 200 TE1 TE2 TE3 TE4

Report Date
30th November 2010

Version
Version 2

Signature of Report Approver
B Grant

UKAS TESTING 4279

CONTENTS

Opinions and interpretations expressed herein are outside the scope of Catalyst Environmental Ltd's UKAS accreditation.

This version of the test report supersedes the previous version of the test report. Please destroy all previous versions to ensure no confusion arises from having multiple test reports in existence.

Executive Summary

MONITORING OBJECTIVES

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)
4th - 5th November 2010

Introduction

Catalyst Environmental carried out air emissions monitoring on behalf of the EPA for volatile organic carbon (VOC) using an FID, and for speciated VOC's (methane, formaldehyde, acetaldehyde, styrene) using an FTIR, at Honeywell International Technologies over the period from 02/11/10 to the 05/11/10. This monitoring was carried out on the licensed emission points A2-2, and A2-5 with both the Afterburners ON and with afterburners OFF during this period. These monitoring locations are at the stack emission points arising from compressor wheel ovens 2, and 9 respectively. This report sets out the VOC and FTIR monitoring data for emission point A2-5.

The first step of the production process is the insertion of a polystyrene core into the frame containing the rubber compressor wheel mould. The frame is then filled with wet gypsum. After the gypsum is poured in and begins to harden, the compressor wheel mould is then tapped & removed, and then the wet gypsum block mould containing the polystyrene core is put into the oven for the 9-10 hour process cycle. Initially the oven temp is down at around 130^oC but it gradually heats up to the design temp of 270^oC. The afterburner is programmed to kick in about 4 hours into the cycle, and it then runs at 870^oC for the remaining 4-5 hours of the process cycle. The burn out of the polystyrene layer would occur after around 4 hours, so this is the point where a spike in the VOC emissions may arise.

The VOC (as C) monitoring was performed using a SICK MAIHAK 3006 flame ionisation detection unit (FID). The FID units are subject to full annual system checks each year. The annual system checks include linearity, zero drift, span drift. The FID was found to be operating well within the given tolerances during the last system check which were undertaken in March 2010. The FID unit is also calibrated and the sample lines checked for integrity prior to every sample on site. The FID unit was allowed to reach its working temperature and stabilise before it was calibrated. The calibration was performed to ensure that the analyser was reading accurately. It was calibrated at zero using a traceable zero gas and was calibrated also at 80 ppm (128.5 mgC/m^3) and 800ppm (1285 mgC/m^3) using propane as the traceable calibration gas. The calibration results are available in Appendix 2. The zero & span gases were introduced into the analyser through the calibration port and each of the steps involved in the calibration were performed in accordance with section 6.2 (Adjustments and Checks) of the CEN standards EN 13526. The FID calibrations were performed each day before and after the production cycle, and the calibration results indicate that the FID was performing to an acceptable standard, as the results were well within the allowable span drift.

The speciated VOC monitoring was carried out a Gasmet DX4000 Fourier transfer infra red (FTIR) analyser. The FTIR is subject to a full water vapour calibration every 6 months. The FTIR was found to be operating well within the given tolerances during the last water vapour calibration which was undertaken in June 2010. The FTIR units are subject to full system checks include linearity, zero drift, span drift on site prior to every job. The analyser and sample lines are checked with a zero gas (N_2) and traceable reactive gas (400ppm SO_2) for integrity and sample loss prior to every sample on site. The on site systems checks are available in Appendix 2. The system checks were performed each day before the production cycle, and the results indicate that the FTIR was performing to an acceptable standard, as the results were well within permitted tolerances.

Honeywell are required to comply with the conditions of their IPPC licence P0525-01. In this licence, emission limit values have been set for a range of pollutant species including VOC. Section 3.1.2 (v) of Honeywell Transportations' IPPC licence states that no thirty-minute mean monitoring value shall exceed the emission limit value. The licence requires that data be corrected to a reference oxygen level of 17% and reported as a dry gas, meaning the result has been corrected for any moisture that may be present. The emission limit value, which is based on corrected VOC data and set in the company's IPPC licence at emission point A2-1 - A2-8, is 20mgC/m^3.

Catalyst monitored VOC on A2-5, from 00.48 to 09.26 on the 05-11-10 with the Afterburner ON, and from 06:11 to 14:50 with the Afterburner OFF on the 04-11-10. This constitutes a minimum of 480 minutes of continuous VOC monitoring data at emission point A2-5 that was monitored each day. In line with licence requirements, this data has been presented as corrected 30 minute averaged results in the executive summary. The continuous data was separated into discreet 30 minute periods and the data within each of these 30 minute periods was averaged to give the mean VOC concentration in that period.

Executive Summary

(Page 2 of 7)

MONITORING DATE(S) & TIMES

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)
4th - 5th November 2010

Parameter (Afterburner ON)		**Units**	**Concentration**		**Sampling Date(s)**	**Sampling Times**	**Duration (mins)**
Total VOCs (as Carbon)	Run 1	mg/m^3	74.5		05/11/2010	00:48 - 09:26	518
Methane	Run 1	mg/m^3	70.0		05/11/2010	00:48 - 09:26	518
Formaldehyde	Run 1	mg/m^3	9.3		05/11/2010	00:48 - 09:26	518
Acetaldehyde	Run 1	mg/m^3	0.7		05/11/2010	00:48 - 09:26	518
Styrene	Run 1	mg/m^3	9.5		05/11/2010	00:48 - 09:26	518
Water Vapour	Run 1	% v/v	7.6		05/11/2010	00:48 - 09:26	518
Oxygen		% v/v	**Dry**	19.7			
Parameter (Afterburner OFF)		**Units**	**Concentration**		**Sampling Date(s)**	**Sampling Times**	**Duration (mins)**
Total VOCs (as Carbon)	Run 2	mg/m^3	196.7		04/11/2010	06:11 - 14:50	517
Methane	Run 2	mg/m^3	102.4		04/11/2010	06:11 - 14:48	517
Formaldehyde	Run 2	mg/m^3	29.0		04/11/2010	06:11 - 14:48	517
Acetaldehyde	Run 2	mg/m^3	16.6		04/11/2010	06:11 - 14:48	517
Styrene	Run 2	mg/m^3	96.2		04/11/2010	06:11 - 14:48	517
Water Vapour	Run 2	% v/v	6.7		04/11/2010	06:11 - 14:48	517
Oxygen		% v/v	**Dry**	19.0			
Velocity & Volumetric Flow Rate	Run 1	Afterburner OFF			04/11/2010	06:15 - 06:30	

All results are expressed at the respective reference conditions.

NOTE: VOLUMETRIC FLOW RATE DATA TAKEN FROM THE PRELIMINARY VELOCITY TRAVERSE.

[1] Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 17% oxygen.

Executive Summary

(Page 3 of 7)

SUMMARY OF RESULTS

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)
4th - 5th November 2010

Emission Point	**Units**	**Total VOC (as C)**	**Total VOC (as C)**	**Methane**	**Acetaldehyde**	**Formaldehyde**	**Styrene**
Time (mins)	mg/m^3	**A2-5 (AF ON)**	**A2-5 (Afterburner OFF), mg/m^3**				
0 - 30		202.2	193.8	194.9	1.2	29.1	39.4
30 - 60		188.9	224.8	233.1	1.2	33.1	43.8
60 - 90		165.1	198.0	201.5	1.1	31.4	38.8
90 - 120		143.4	130.5	125.0	1.1	22.2	15.1
120 - 150		115.7	123.7	118.9	1.1	20.9	12.0
150 - 180		99.3	96.8	90.9	1.1	20.3	9.9
180 - 210		86.3	98.7	87.1	1.0	13.7	8.2
210 - 240		83.0	84.4	70.5	1.0	11.7	4.3
240 - 270		41.1	75.8	65.7	1.0	11.1	3.0
270 - 300		22.1	94.0	76.9	1.0	11.6	10.8
300 - 330		21.8	110.8	71.6	4.8	14.9	32.0
330 - 360		22.6	169.2	71.9	17.7	23.5	90.9
360 - 390		20.4	267.9	64.2	40.5	42.1	203.2
390 - 420		18.7	406.0	57.1	66.3	64.7	339.3
420 - 450		19.9	440.7	65.3	65.7	63.3	350.1
450 - 480		18.9	365.4	67.4	49.2	48.0	271.8
480 - 510		18.7	293.2	72.9	32.0	33.5	191.9
ELV		**20**	**20**	-	-	-	-
Mean		**74.5**	**196.7**	**102.4**	**16.6**	**29.0**	**96.2**

Refer to appendices for detailed information and data profiles.

Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

Executive Summary

(Page 5 of 7)

MONITORING & ANALYTICAL METHODS

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)
4th - 5th November 2010

Parameter	Monitoring				Analysis				MCERTS Testing	LOD (Average)
	Standard	Technical Procedure	UKAS Testing	Analysis Lab	Analytical Procedure	Analytical Technique	UKAS Analysis	Analysis Lab		
Total VOCs (as Carbon)	BS EN 13526	CAT-TP-20	Yes	CAT	Flame Ionisation Detection by Sick 3006 FID				Yes	0.11 mg/m³
Methane	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.04 mg/m³
Formaldehyde	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.07 mg/m³
Acetaldehyde	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.31 mg/m³
Styrene	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.56 mg/m³
Water Vapour	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.003 %
Oxygen	BS EN 14789	CAT-TP-22	Yes	CAT	Wet Zirconia Cell by Dittrich MF-010-O-LC [1]				Yes	0.09 %
Velocity & Vol. Flow Rate	BS EN 13284-1	CAT-TP-04	Yes	CAT	Pitot Tube and Thermocouple				Yes	N/A

[1] MCERTS accreditation on the Dittrich MF-010-O-LC relates to in-house verification against the requirements of BS EN 14789 & BS EN 14793.

ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
All	All	There are no deviations associated with the sampling employed.

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

Team Leader	Name	Brett Philip
	MCERTS Accreditation	MCERTS Level 2
	MCERTS Number	MM 06 718
	Technical Endorsements	TE1 TE2 TE3 TE4

Team Leader	Name	Barry Grant
	MCERTS Accreditation	MCERTS Level 2
	MCERTS Number	MM 03 200
	Technical Endorsements	TE1 TE2 TE3 TE4

Trainee	Name	John Glennon
	MCERTS Accreditation	MCERTS Trainee
	MCERTS Number	MM 10 1074
	Technical Endorsements	None

LIST OF EQUIPMENT

Extractive Sampling	
Equipment Type	**Equipment I.D.**
Control Box DGM	-
Box Thermocouples	-
Umbilical	-
Oven Box	-
Probe	-
S-Pitot (1)	CAT 21S.22
S-Pitot (2)	-
L-Pitot	-
500g Check Weight	-
1Kg Check Weight	-
Last Impinger Arm	-
Callipers	-
Small DGM	-
Laboratory Balance	-
Tape Measure	CAT 16.15

Instrumental Analysers	
Equipment Type	**Equipment I.D.**
Horiba PG-250	-
Servomex 4900	-
JCT JCC P-1 Cooler	-
5m FT-IR	CAT 19.3
5m FT-IR Sampling System	CAT 15.2
Bernath 3006 FID	CAT 8.10
Heated Head Filter	CAT 12.32
Mass Flow Controller (1)	CAT 6.9
Mass Flow Controller (2)	CAT 6.10
Mass View (1)	-
Mass View (2)	-
Easylogger EN-EL-12 Bit	CAT 11.14

Miscellaneous Items	
Equipment Type	**Equipment I.D.**
Digital Manometer (1)	CAT 2.2
Digital Manometer (2)	-
Digital Temperature Meter	CAT 3.5
Stopwatch	-
Barometer	CAT 13.2
Stack Thermocouple (1)	CAT 4.133
Stack Thermocouple (2)	-
1m Heated Line (1)	CAT 20.12
1m Heated Line (2)	CAT 20.13
1m Heated Line (3)	-
5m Heated Line (1)	-
15m Heated Line (1)	-
20m Heated Line (2)	CAT 20.26
20m Heated Line (1)	CAT 20.28

APPENDIX 2

METHANE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	69.99	102.36		86.18
Uncertainty	±mg/m³	4.56	6.49		5.52
Mass Emission	g/hr	111.4	162.9		137.1
Uncertainty	±g/hr	7.3	10.3		8.8

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002.5	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Instrument Specific	20, 50 , 100, 225, 500, 700, 1000 ppm

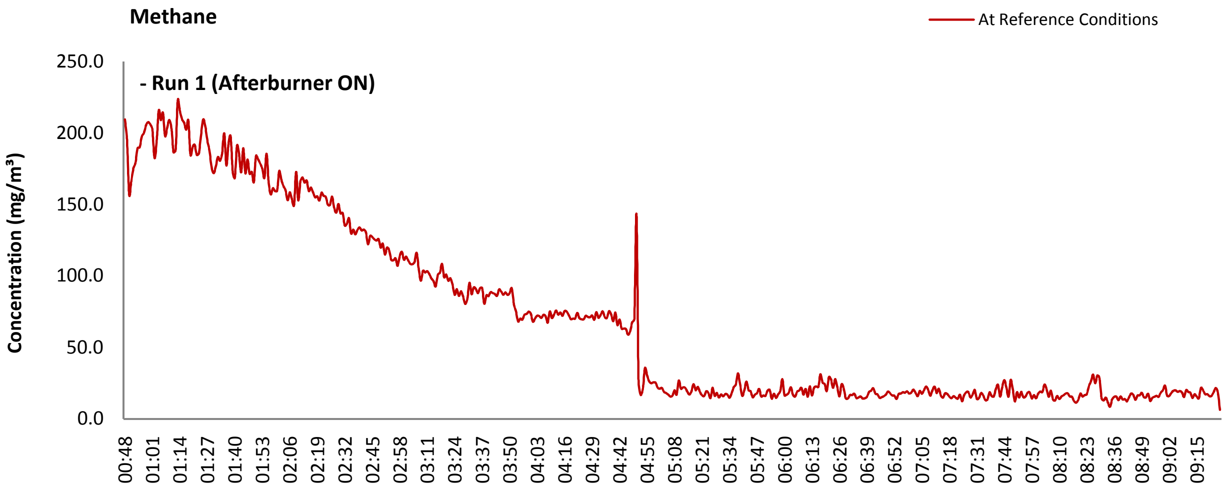
Reference Conditions

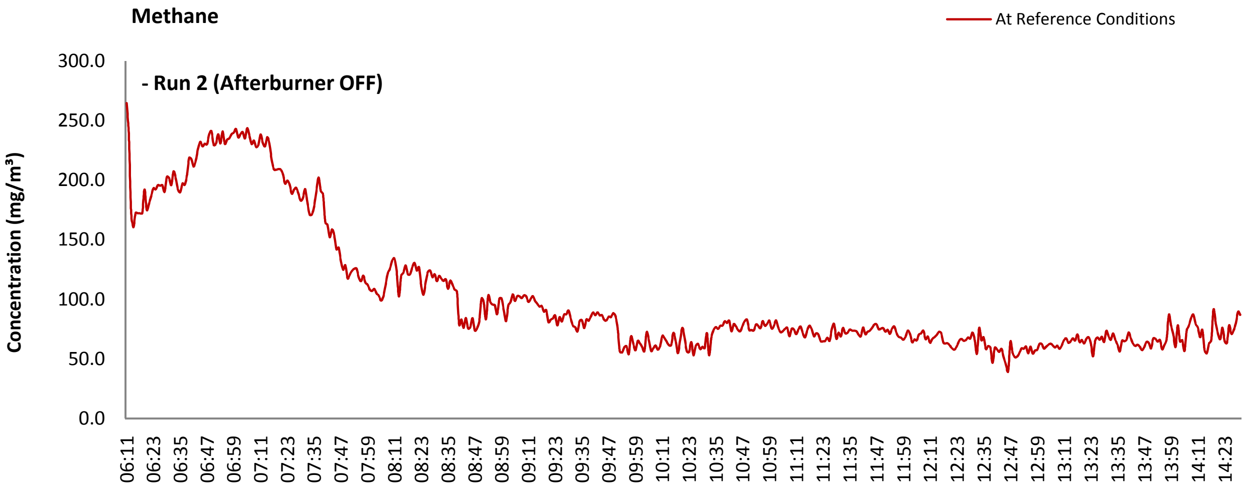
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

METHANE: DATA TREND

Graphical Trend of Data





APPENDIX 2

FORMALDEHYDE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	9.28	29.02		19.15
Uncertainty	±mg/m³	2.74	2.52		2.63
Mass Emission	g/hr	14.8	46.2		30.5
Uncertainty	±g/hr	4.4	4.0		4.2

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002.5	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Instrument Specific	24.9, 45.6 ppm

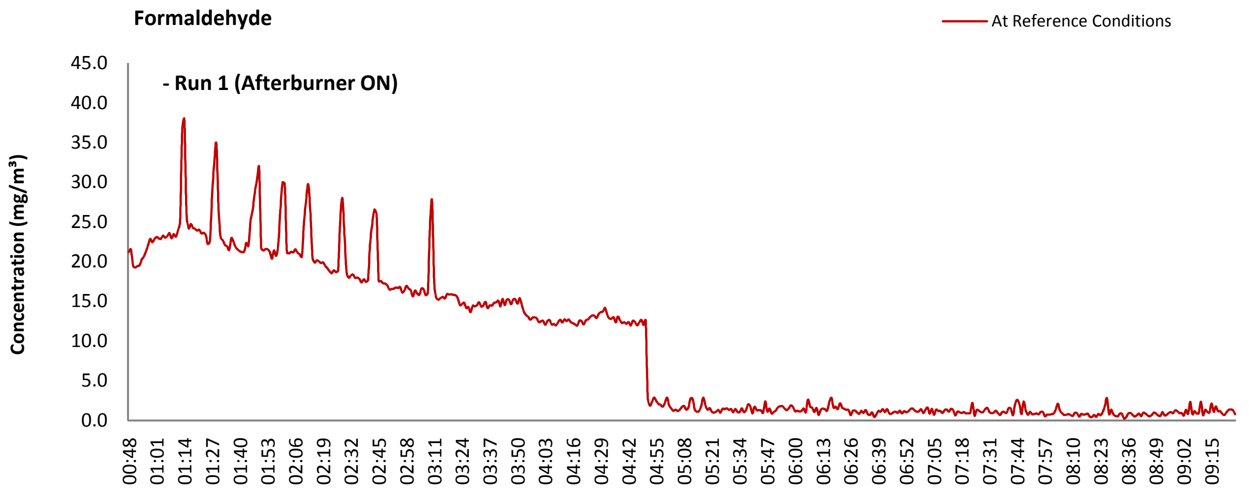
Reference Conditions

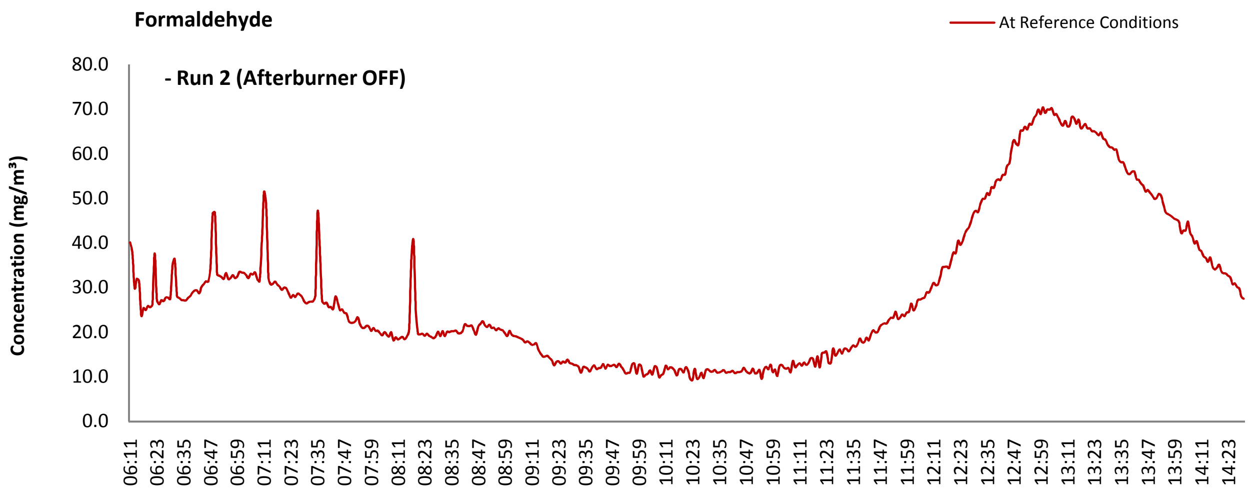
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

FORMALDEHYDE: DATA TREND

Graphical Trend of Data





APPENDIX 2

ACETALDEHYDE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	0.73	16.62		8.67
Uncertainty	±mg/m³	3.16	2.30		2.73
Mass Emission	g/hr	1.2	26.4		13.8
Uncertainty	±g/hr	5.0	3.7		4.3

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002.5	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Gasmet Library	20, 50, 200 ppm

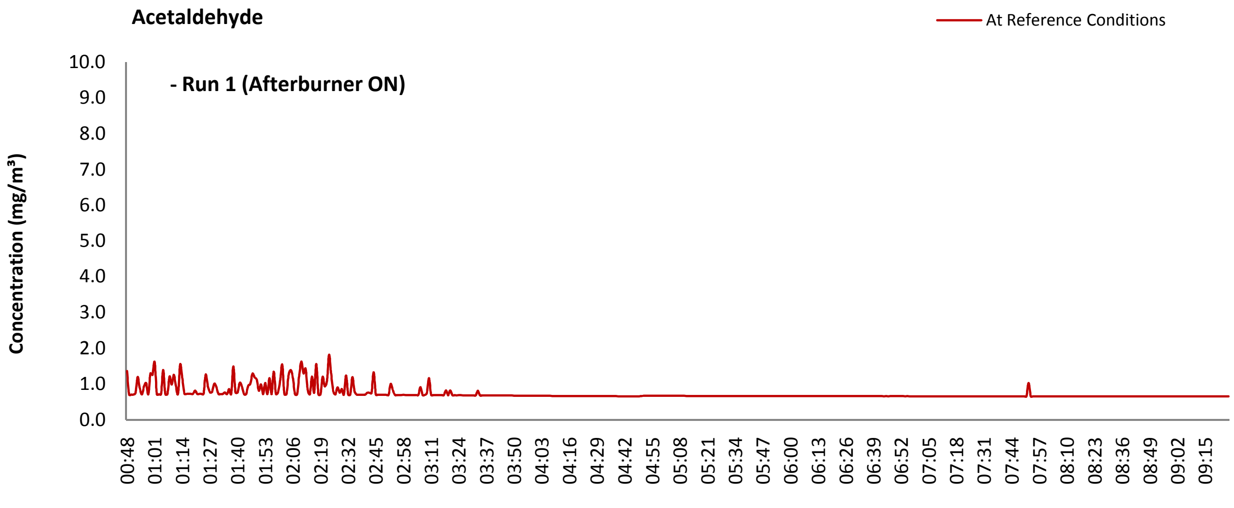
Reference Conditions

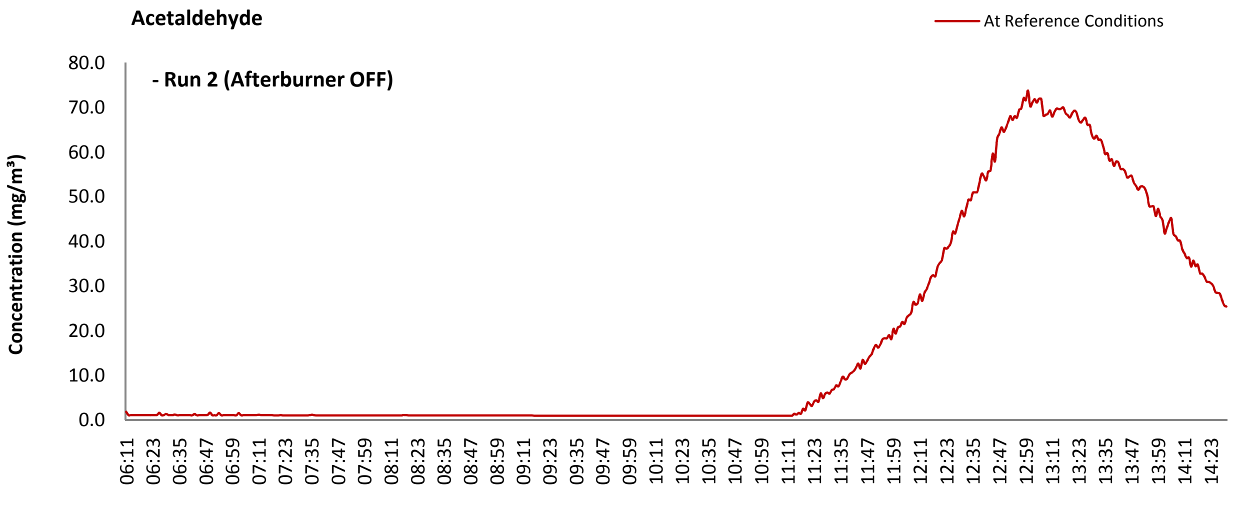
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

ACETALDEHYDE: DATA TREND

Graphical Trend of Data





APPENDIX 2

STYRENE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	9.46	96.15		52.81
Uncertainty	±mg/m³	7.49	7.76		7.63
Mass Emission	g/hr	15.1	153.0		84.0
Uncertainty	±g/hr	11.9	12.4		12.1

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002.5	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Gasmet Library	20, 50, 100 ppm

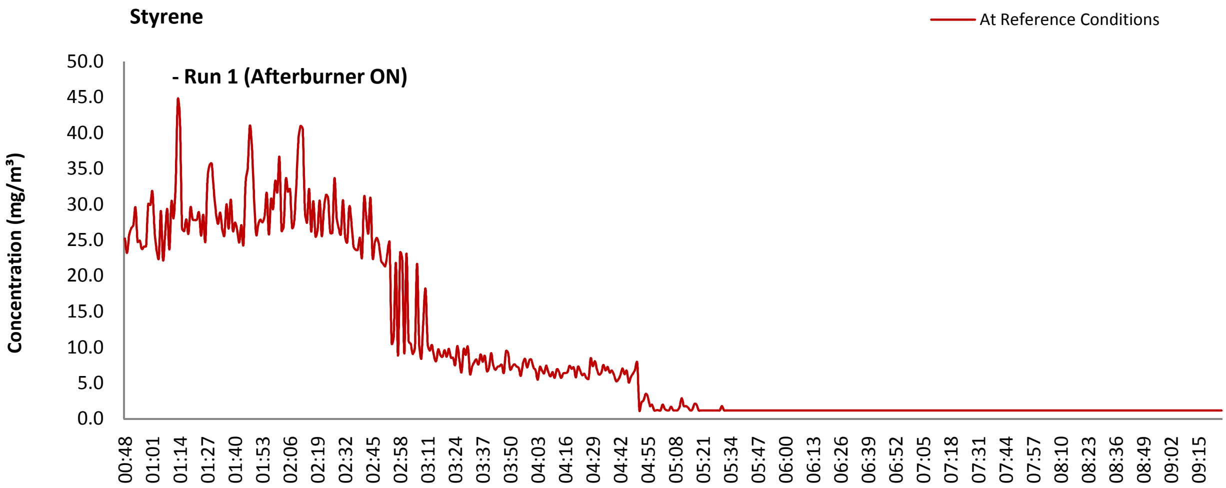
Reference Conditions

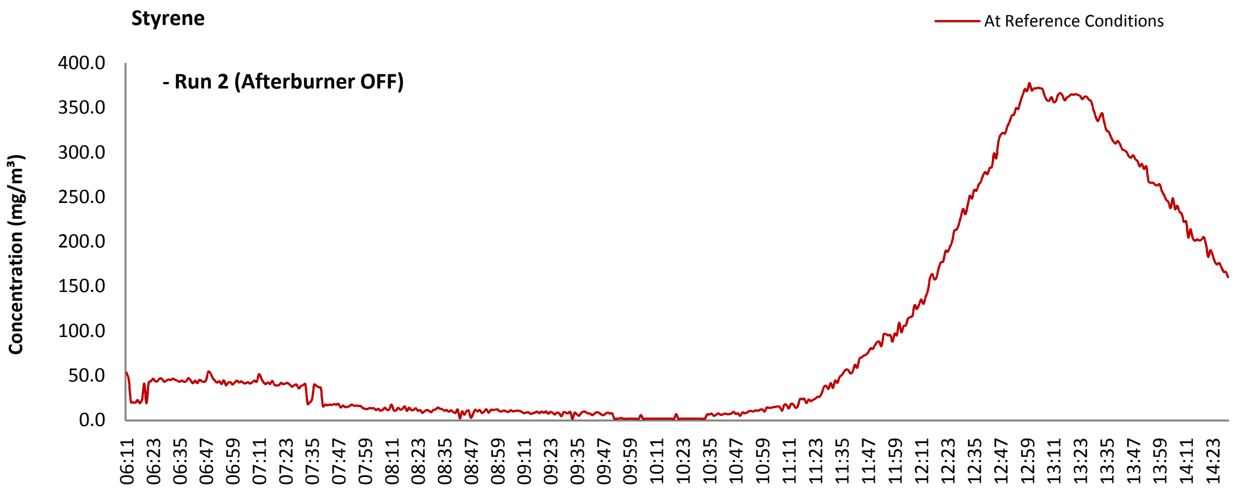
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

STYRENE: DATA TREND

Graphical Trend of Data





APPENDIX 2

FTIR SAMPLING DETAILS & QUALITY ASSURANCE

(PAGE 1 OF 2)

Sampling Details

Parameter	Units	AF ON	AF OFF	
Sampling Times	-	00:48 - 09:26	06:11 - 14:48	
Sampling Date	-	05/11/2010	04/11/2010	
CTS Gas Value	ppm	410.2	410.2	

Quality Assurance

	Zero Calibration Check (NEA)	Units	Run 1	Run 2	
CAL 1	Minimum Energy in Cell	AU	-0.0015	-0.0015	
	Maximum Energy in Cell	AU	0.0006	0.0006	
CAL 2	Minimum Energy in Cell	AU			
	Maximum Energy in Cell	AU			
CAL 3	Minimum Energy in Cell	AU			
	Maximum Energy in Cell	AU			
	Allowable Energy in Cell	± AU	0.0050	0.0050	
	Zero Calibration Check Acceptable	-	Yes	Yes	

	CTS Gas Check - Pre Test	Units	Run 1	Run 2	
CAL 1	CTS Gas Value	ppm	410.2	410.2	
	CTS Gas Reading on Analyser	ppm	395.0	395.0	
	Difference	ppm	-15.2	-15.2	
CAL 2	CTS Gas Value	ppm			
	CTS Gas Reading on Analyser	ppm			
	Difference	ppm			
CAL 3	CTS Gas Value	ppm			
	CTS Gas Reading on Analyser	ppm			
	Difference	ppm			
	Allowable Difference	± ppm	20.5	20.5	
	CTS Gas Acceptable	-	Yes	Yes	

	CTS Gas Check - Post Test	Units	Run 1	Run 2	
CAL 1	CTS Gas Value	ppm	410.2	410.2	
	CTS Gas Reading on Analyser	ppm	395.0	395.0	
	Difference	ppm	-15.2	-15.2	
CAL 2	CTS Gas Value	ppm			
	CTS Gas Reading on Analyser	ppm			
	Difference	ppm			
CAL 3	CTS Gas Value	ppm			
	CTS Gas Reading on Analyser	ppm			
	Difference	ppm			
	Allowable Difference	± ppm	20.5	20.5	
	CTS Gas Acceptable	-	Yes	Yes	

Test Conditions	Units	Run 1	Run 2	
Run Ambient Temperature Range	°C	5 - 7	5 - 7	

APPENDIX 2

FTIR SAMPLING DETAILS & QUALITY ASSURANCE

(PAGE 2 OF 2)

Line Position	Units	Test
Line Position Acceptable	-	Yes

Response Times	Units	Test
Response Time, T_{95}	s	30
Reverse Response Time, RT_{95}	s	30
Allowable Response Time	s	200
Response Time Acceptable	-	Yes

Detector Linearity	Units	Test
Average Zero Minimum	AU	-0.0001
CTS Gas Minimum	AU	-0.0026
Average Zero Maximum	AU	0.0001
CTS Gas Maximum	AU	-0.0022
Allowable Difference	± AU	0.0050
Detector Linearity Acceptable	-	Yes

Method Deviations

Nature of Deviation	Run Number		
(x = deviation applies to the associated run)	1	2	
There are no deviations associated with the sampling employed.	x	x	

APPENDIX 2

TOTAL VOCs (as CARBON): RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	74.49	196.68		135.59
Uncertainty	±mg/m³	3.69	9.74		6.71
Mass Emission	g/hr	118.5	313.0		215.7
Uncertainty	±g/hr	5.9	15.5		10.7

General Sampling Information

Parameter	Value	
Standard	BS EN 13526	
Technical Procedure	CAT-TP-20	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Span Gas Reference Number	CYL 1.0021	
Span Gas Expiry Date	-	
Span Gas Start Pressure (bar)	140	
Gas Cylinder Concentration (ppm)	80 / 800	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

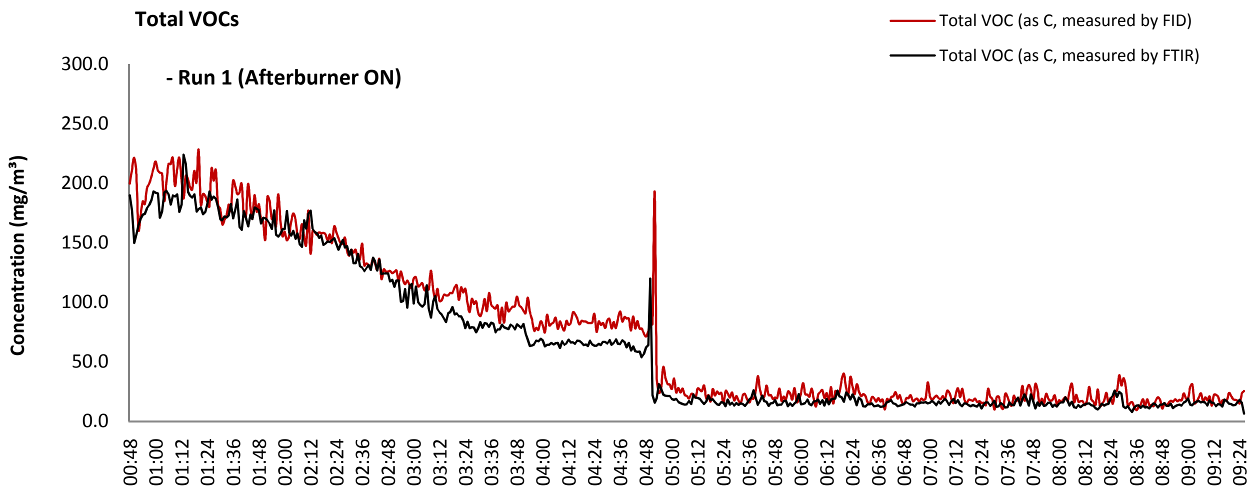
Reference Conditions

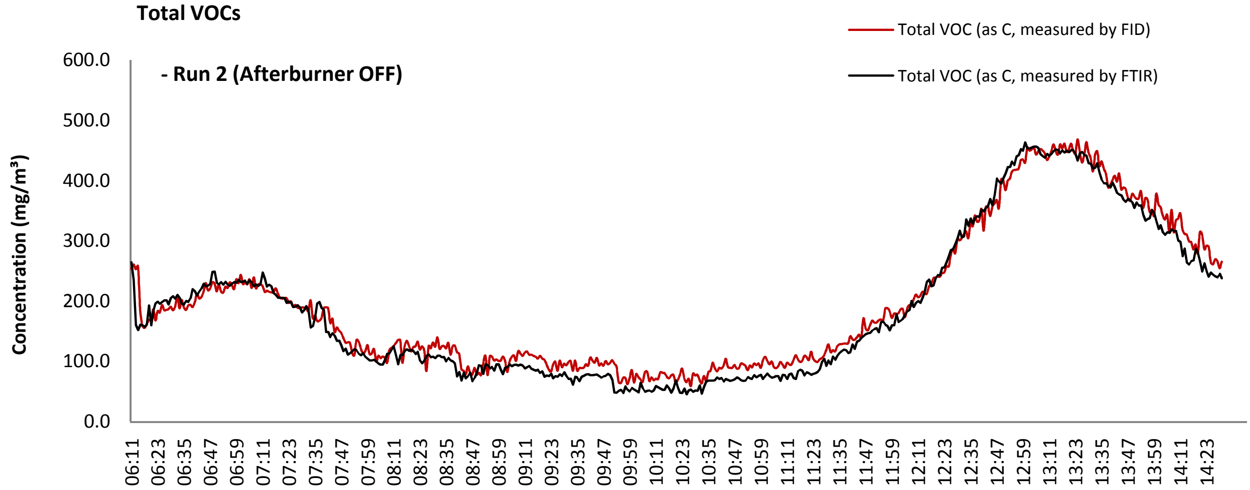
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

TOTAL VOCs (as CARBON): DATA TREND

Graphical Trend of Data





UKAS TESTING 4279 mCERTS Catalyst environmental

APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	AF ON	AF OFF	
Sampling Times	-	00:48 - 09:26	06:11 - 14:50	
Sampling Dates	-	04/11/2010	04/11/2010	
Instrument Range	ppm	1000	1000	
Span Gas Value	ppm	80.0	819.0	

Quality Assurance

	Zero Drift	Units	Run 1	Run 2	
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.00	0.00	
CAL 1	Zero Down Sampling Line (Post)	ppm	0.00	0.00	
CAL 1	Zero Drift	ppm	0.00	0.00	
CAL 2	Zero Down Sampling Line (Pre)	ppm			
CAL 2	Zero Down Sampling Line (Post)	ppm			
CAL 2	Zero Drift	ppm			
CAL 3	Zero Down Sampling Line (Pre)	ppm			
CAL 3	Zero Down Sampling Line (Post)	ppm			
CAL 3	Zero Drift	ppm			
	Allowable Zero Drift	± ppm	50.00	50.00	
	Zero Drift Acceptable	-	Yes	Yes	

	Span Drift	Units	Run 1	Run 2	
CAL 1	Span Down Sampling Line (Pre)	ppm	80.00	817.00	
CAL 1	Span Down Sampling Line (Post)	ppm	83.00	829.00	
CAL 1	Span Drift	ppm	3.00	12.00	
CAL 2	Span Down Sampling Line (Pre)	ppm			
CAL 2	Span Down Sampling Line (Post)	ppm			
CAL 2	Span Drift	ppm			
CAL 3	Span Down Sampling Line (Pre)	ppm			
CAL 3	Span Down Sampling Line (Post)	ppm			
CAL 3	Span Drift	ppm			
	Allowable Span Drift	± ppm	50.00	50.00	
	Span Drift Acceptable	-	Yes	Yes	

Test Conditions	Units	Run 1	Run 2	
Run Ambient Temperature Range	°C	5 - 7	5 - 7	

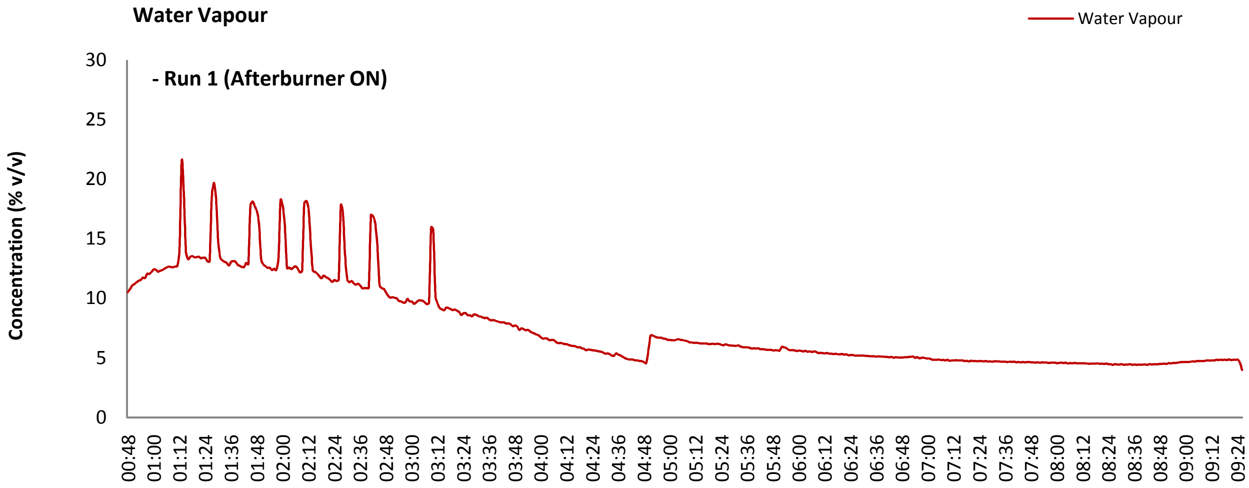
Method Deviations

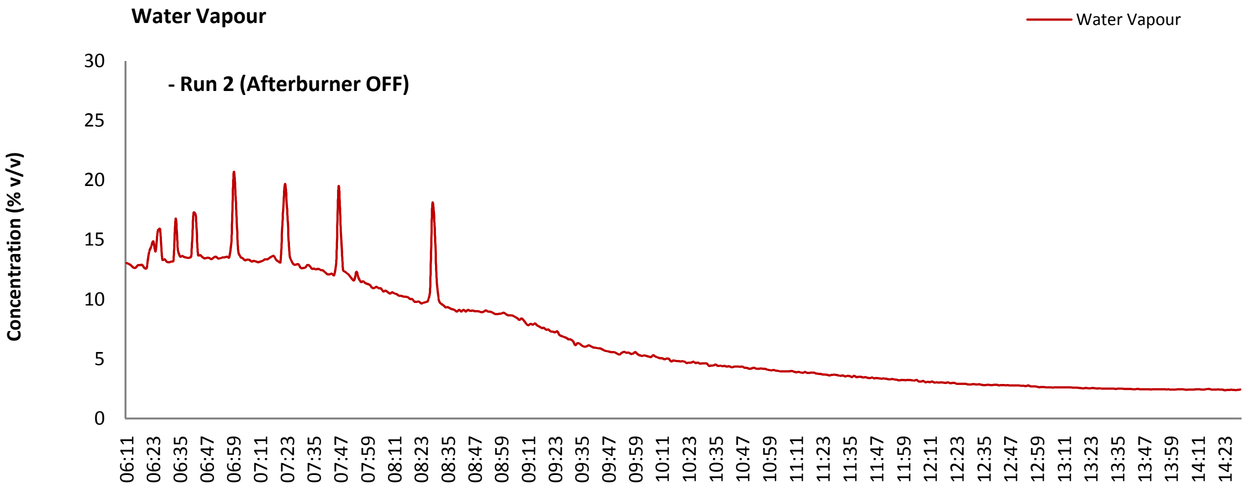
Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	Run Number 2	
There are no deviations associated with the sampling employed.	x	x	

APPENDIX 2

PERIPHERAL MEASUREMENTS: DATA TREND

Graphical Trend of Data





APPENDIX 3

PROCESS DETAILS

Honeywell International Technologies Ltd, Waterford
A2-5 (Oven 9)
4th - 5th November 2010

Standard Operating Conditions

Parameter	Value
Process Status	Typical operation
Capacity (of 100%) and Tonnes / Hour	N/A
Continuous or Batch Process	9 hour batch cycle
Feedstock (if applicable)	Gypsum (drying) & Polystyrene (216 blocks)
Abatement System	Afterburner
Abatement System Running Status	See Site Specific Operating Conditions
Fuel	Gas
Plume Appearance	None Visible

Site Specific Operating Conditions

Parameter	Status
Run 1	**Afterburner ON (at approx 4 hours into cycle)**
Run 2	**Afterburner OFF**

APPENDIX 4

SUITABILITY OF SAMPLING LOCATION

Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	0.65
Width	m	-
Area	m^2	0.33
Port Depth	cm	23
Orientation of Duct	-	Vertical
Sample Port Size	-	4" Flange

Location of Sampling Platform

General Platform Information	Value
Permanent / Temporary Platform	On Roof
Inside / Outside	Outside

Platform Details

EA Technical Guidance Note M1 / BS EN 15259 Platform Requirements	Value
Sufficient working area to manipulate probe and operate the measuring instruments	Yes
Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)	Yes
Platform has vertical base boards (approx. 0.25m high)	Yes
Platform has chains / self closing gates at top of ladders	N/A
There are no obstructions present which hamper insertion of sampling equipment	Yes
Safe Access Available	Yes
Easy Access Available	Yes

Sampling Location / Platform Improvement Recommendations

The sampling location meets all the requirements specified in EA Guidance Note M1 and BS EN 15259, and therefore there are no improvement recommendations.

BS EN 15259 Homogeneity Test Requirements

There is no requirement to perform a BS EN 15259 Homogeneity Test on this Stack.

Sampling Plane Validation Criteria (from EA Technical Guidance Document (Monitoring) M1)

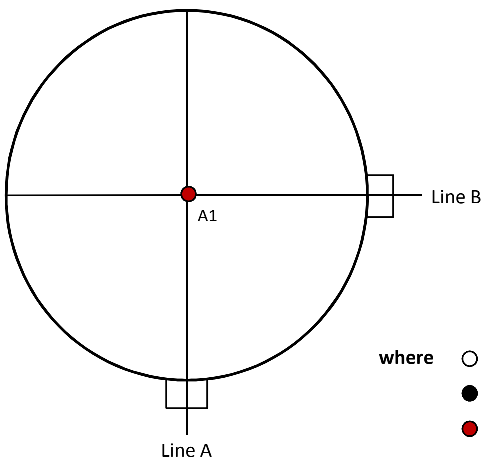
Criteria in M1	Units	Traverse 1		Required	Compliant
Lowest Differential Pressure	Pa	22.6		> 5 Pa	Yes
Mean Velocity	m/s	6.81		-	-
Lowest Gas Velocity	m/s	5.80		-	-
Highest Gas Velocity	m/s	8.93		-	-
Ratio of Above	: 1	1.54		< 3 : 1	Yes
Maximum Angle of Swirl	°	5		< 15°	Yes
No Local Negative Flow	-	Yes		-	Yes

APPENDIX 4

PLANT PHOTOS

Photo 1

SAMPLE POINTS



where ○ = isokinetic point sampled at

● = isokinetic point not sampled at

● = non-isokinetic / combustion gases sample point

APPENDIX 4

PRELIMINARY STACK SURVEY: CALCULATIONS

General Stack Details

Stack Details (from Traverse)	Units	Value
Stack Diameter / Depth, D	m	0.65
Stack Width, W	m	-
Stack Area, A	m²	0.33
Average Stack Gas Temperature, T_a	°C	256.0
Average Stack Gas Pressure	mmH_2O	5.3
Average Stack Static Pressure, P_{static}	kPa	-0.030
Average Barometric Pressure, P_b	kPa	100.3
Average Pitot Tube Calibration Coefficient, C_p	-	0.83

Stack Gas Composition & Molecular Weights

Component	Conc ppm	Conc Dry % v/v	Conc Wet % v/v	Volume Fraction r	Molar Mass M	Density kg/m³ p	Conc kg/m³ p_i
CO_2	-	1.00	0.93	0.0100	44.01	1.9635	0.01964
O_2	-	19.35	18.00	0.1935	32.00	1.4277	0.27626
N_2	-	79.65	74.07	0.7965	28.01	1.2498	0.99550
Moisture (H_2O)	-	-	7.00	0.0700	18.02	0.8037	0.05626

Where: p = M / 22.41

p_i = r x p

Calculation of Stack Gas Densities

Determinand	Units	Result
Dry Density (STP), P_{STD}	kg/m³	1.291
Wet Density (STP), P_{STW}	kg/m³	1.257
Dry Density (Actual), P_{Actual}	kg/m³	0.660
Average Wet Density (Actual), $P_{ActualW}$	kg/m³	0.924

Where: P_{STD} = sum of component concentrations, kg/m³ (not including water vapour)

P_{STW} = sum of all wet concentrations / 100 x density, kg/m³ (including water vapour)

$P_{Actual} = P_{STD} \times (T_{STP} / (P_{STP})) \times ((P_{static} + P_b) / T_a)$

$P_{ActualW}$ (at each sampling point) = $P_{STW} \times (T_s / P_s) \times (P_a / T_a)$

Calculation of Stack Gas Volumetric Flowrate, Q

Duct gas flow conditions	Units	Actual	REF [1]
Temperature	°C	256.0	0.0
Total Pressure	kPa	100.3	101.3
Moisture	%	7.14	0.00
Oxygen (Dry)	%	19.4	17.0

Gas Volumetric Flowrate (from Traverse)	Units	Result
Gas Volumetric Flowrate (Actual)	m³/hr	8132
Gas Volumetric Flowrate (STP, Wet)	m³/hr	4154
Gas Volumetric Flowrate (STP, Dry)	m³/hr	3857
Gas Volumetric Flowrate REF [1]	m³/hr	1591

APPENDIX 4

PRELIMINARY STACK SURVEY: VELOCITY TRAVERSE

(1 of 1)

Parameter	Units	Value
Date of Survey	-	04/11/2010
Time of Survey	-	06:15 - 06:30
Atmospheric Pressure	kPa	100.6
Stack Static Pressure	Pa	-13
Type of Pitot Used	-	S-Type Pitot
Are Water Droplets Present?	-	No

Parameter	Units	Value
Initial Pitot Leak Check	-	Pass
Final Pitot Leak Check	-	Pass
Orientation of Duct	-	Vertical
Pitot Tube, C_p	-	0.83
Number of Lines Available	-	2
Number of Lines Used	-	2

	Swirl Point (taken at the sampling points used during testing)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Angle of Swirl (°)	5																			

		Sampling Line A				Sampling Line B			
Traverse Point	Depth m	ΔP mmH_2O	Temp °C	Wet Density kg/m³	Velocity m/s	ΔP mmH_2O	Temp °C	Wet Density kg/m³	Velocity m/s
1	0.03	3.2	97.0	0.921	6.84	5.5	94.0	0.929	8.93
2	0.10	3.3	96.0	0.924	6.93	4.1	93.0	0.931	7.70
3	0.16	3.5	94.0	0.929	7.12	4.4	94.0	0.929	7.99
4	0.23	3.4	95.0	0.926	7.03	4.1	97.0	0.921	7.74
5	0.29	3.1	93.0	0.931	6.69	3.4	95.0	0.926	7.03
6	0.36	2.4	94.0	0.929	5.90	3.0	99.0	0.916	6.64
7	0.42	2.6	95.0	0.926	6.15	2.9	97.0	0.921	6.51
8	0.49	2.6	96.0	0.924	6.15	2.9	96.0	0.924	6.50
9	0.55	2.8	97.0	0.921	6.40	2.3	97.0	0.921	5.80
10	0.62	2.6	99.0	0.916	6.18	2.4	96.0	0.924	5.91
Mean		**3.0**	**95.6**	**0.925**	**6.54**	**3.5**	**95.8**	**0.924**	**7.07**

APPENDIX 5

METHANE: MEASUREMENT UNCERTAINTY CALCULATIONS

		Value		
Measured Quantities	**Units**	**AF ON**	**AF OFF**	
Measured Reading	ppm	29.6	66.6	

		Individual Errors as Standard Uncertainties		
Measured Quantities	**Units**	**Run 1**	**Run 2**	
Nonlinearity	ppm	0.2	0.2	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.3	0.8	
Accuracy of Analysis Function	ppm	0.9	1.9	
Calibration Gas Uncertainty	ppm	0.2	0.5	

Parameter	**Units**	**Run 1**	**Run 2**	
Combined uncertainty	ppm	1.0	2.2	
Expanded uncertainty (95% confidence)	ppm	1.9	4.2	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	1.9	4.2	
Reported Uncertainty	ppm	1.9	4.2	
Expanded uncertainty (95% confidence)	%	6.5	6.3	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	6.5	6.3	
Reported Uncertainty	%	6.5	6.3	

APPENDIX 5

FORMALDEHYDE: MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			
Measured Quantities	**Units**	**AF ON**	**AF OFF**	
Measured Reading	ppm	2.1	10.1	

	Individual Errors as Standard Uncertainties			
Measured Quantities	**Units**	**Run 1**	**Run 2**	
Nonlinearity	ppm	0.3	0.3	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.0	0.1	
Accuracy of Analysis Function	ppm	0.1	0.3	
Calibration Gas Uncertainty	ppm	0.0	0.1	

Parameter	**Units**	**Run 1**	**Run 2**	
Combined uncertainty	ppm	0.3	0.4	
Expanded uncertainty (95% confidence)	ppm	0.6	0.9	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.6	0.9	
Reported Uncertainty	ppm	0.6	0.9	
Expanded uncertainty (95% confidence)	%	29.5	8.7	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	29.5	8.7	
Reported Uncertainty	%	29.5	8.7	

APPENDIX 5

ACETALDEHYDE: MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			
Measured Quantities	**Units**	**AF ON**	**AF OFF**	
Measured Reading	ppm	0.1	3.9	

	Individual Errors as Standard Uncertainties			
Measured Quantities	**Units**	**Run 1**	**Run 2**	
Nonlinearity	ppm	0.2	0.2	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.0	0.0	
Accuracy of Analysis Function	ppm	0.0	0.1	
Calibration Gas Uncertainty	ppm	0.0	0.0	

Parameter	**Units**	**Run 1**	**Run 2**	
Combined uncertainty	ppm	0.2	0.3	
Expanded uncertainty (95% confidence)	ppm	0.5	0.5	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.5	0.5	
Reported Uncertainty	ppm	0.5	0.5	
Expanded uncertainty (95% confidence)	%	430.2	13.9	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	430.2	13.9	
Reported Uncertainty	%	430.2	13.9	

APPENDIX 5

STYRENE: MEASUREMENT UNCERTAINTY CALCULATIONS

Measured Quantities	Value			
	Units	AF ON	AF OFF	
Measured Reading	ppm	0.6	9.6	

Measured Quantities	Individual Errors as Standard Uncertainties			
	Units	Run 1	Run 2	
Nonlinearity	ppm	0.2	0.2	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.0	0.1	
Accuracy of Analysis Function	ppm	0.0	0.3	
Calibration Gas Uncertainty	ppm	0.0	0.1	

Parameter	Units	Run 1	Run 2	
Combined uncertainty	ppm	0.2	0.4	
Expanded uncertainty (95% confidence)	ppm	0.5	0.8	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.5	0.8	
Reported Uncertainty	ppm	0.5	0.8	
Expanded uncertainty (95% confidence)	%	79.2	8.1	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	79.2	8.1	
Reported Uncertainty	%	79.2	8.1	

APPENDIX 5

TOTAL VOCs (as CARBON): MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			
Measured Quantities	**Units**	**AF ON**	**AF OFF**	**Run 3**
MCERTS Certified Range of Analyser	ppm	9.3	9.3	
Operational Range of Analyser	ppm	1000.0	1000.0	
Measured Reading	ppm	21.5	37.0	

	Individual Errors as Standard Uncertainties			
Measured Quantities	**Units**	**Run 1**	**Run 2**	**Run 3**
Nonlinearity	ppm	0.013	0.013	
Temperature Dependent Zero Drift	ppm	0.027	0.027	
Temperature Dependent Span Drift	ppm	0.027	0.027	
Cross-Sensitivity	ppm	0.497	0.853	
Leak	ppm	0.00	0.05	
Calibration Gas Uncertainty	ppm	0.13	0.22	
Mass Flow Controllers (dilution) Uncertainty	ppm	0.18	0.30	

Parameter	**Units**	**Run 1**	**Run 2**	**Run 3**
Combined uncertainty	ppm	0.54	0.93	
Expanded uncertainty (95% confidence)	ppm	1.07	1.83	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	1.07	1.83	
Reported Uncertainty	ppm	1.07	1.83	
Expanded uncertainty (95% confidence)	%	5.0	5.0	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	5.0	5.0	
Reported Uncertainty	%	5.0	5.0	

Although measured concentrations greater than the MCERTS Certified range of the analyser (15 mg/m³) were recorded, Catalyst's Internal Annual Systems Checks cover the use of the analyser up to 16061 mg/m³.

Unit 1C, Langlands Square, Langlands Business Park, East Kilbride, G75 0YY
E: barry.grant@cat-env.com
Your Catalyst Contact: Barry Grant (07826 916 683)

Stack Emissions Testing Report Commissioned by
Honeywell Transportation Ireland Ltd

Installation Name & Address
Honeywell International Technologies Ltd
Unit 11
Waterford Industrial Estate
Cork Road
Waterford
Ireland

IPC Licence: P0525-01

Stack Reference
A2-2 (Oven 2)

Dates of the Monitoring Campaign
2nd - 3rd November 2010

Job Reference Number
P0525-01PAR-02

Report Written by
Brett Philip Team Leader MCERTS Level 2 MM 06 718 TE1 TE2 TE3 TE4

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Report Date
30th November 2010

Version
Version 3

Signature of Report Approver
B Grant

CONTENTS

Opinions and interpretations expressed herein are outside the scope of Catalyst Environmental Ltd's UKAS accreditation.

This version of the test report supersedes the previous version of the test report. Please destroy all previous versions to ensure no confusion arises from having multiple test reports in existence.

Executive Summary

(Page 1 of 7)

MONITORING OBJECTIVES

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)
2nd - 3rd November 2010

Introduction

Catalyst Environmental carried out air emissions monitoring on behalf of the EPA for volatile organic carbon (VOC) using an FID, and for speciated VOC's (methane, formaldehyde, acetaldehyde, styrene) using an FTIR, at Honeywell International Technologies over the period from 02/11/10 to the 05/11/10. This monitoring was carried out on the licensed emission points A2-2, and A2-5 with both the Afterburners ON and with afterburners OFF during this period. These monitoring locations are at the stack emission points arising from compressor wheel ovens 2, and 9 respectively. This report sets out the VOC and FTIR monitoring data for emission point A2-2.

The first step of the production process is the insertion of a polystyrene core into the frame containing the rubber compressor wheel mould. The frame is then filled with wet gypsum. After the gypsum is poured in and begins to harden, the compressor wheel mould is then tapped & removed, and then the wet gypsum block mould containing the polystyrene core is put into the oven for the 9-10 hour process cycle. Initially the oven temp is down at around 130^{o}C but it gradually heats up to the design temp of 270^{o}C. The afterburner is programmed to kick in about 4 hours into the cycle, and it then runs at 870^{o}C for the remaining 4-5 hours of the process cycle. The burn out of the polystyrene layer would occur after around 4 hours, so this is the point where a spike in the VOC emissions may arise.

The VOC (as C) monitoring was performed using a SICK MAIHAK 3006 flame ionisation detection unit (FID). The FID units are subject to full annual system checks each year. The annual system checks include linearity, zero drift, span drift. The FID was found to be operating well within the given tolerances during the last system check which were undertaken in March 2010. The FID unit is also calibrated and the sample lines checked for integrity prior to every sample on site. The FID unit was allowed to reach its working temperature and stabilise before it was calibrated. The calibration was performed to ensure that the analyser was reading accurately. It was calibrated at zero using a traceable zero gas and was calibrated also at 80 ppm (128.5 mgC/m^3) and 800ppm (1285 mgC/m^3) using propane as the traceable calibration gas. The calibration results are available in Appendix 2. The zero & span gases were introduced into the analyser through the calibration port and each of the steps involved in the calibration were performed in accordance with section 6.2 (Adjustments and Checks) of the CEN standards EN 13526. The FID calibrations were performed each day before and after the production cycle, and the calibration results indicate that the FID was performing to an acceptable standard, as the results were well within the allowable span drift.

The speciated VOC monitoring was carried out a Gasmet DX4000 Fourier transfer infra red (FTIR) analyser. The FTIR is subject to a full water vapour calibration every 6 months. The FTIR was found to be operating well within the given tolerances during the last water vapour calibration which was undertaken in June 2010. The FTIR units are subject to full system checks include linearity, zero drift, span drift on site prior to every job. The analyser and sample lines are checked with a zero gas (N_2) and traceable reactive gas (400ppm SO_2) for integrity and sample loss prior to every sample on site. The on site systems checks are available in Appendix 2. The system checks were performed each day before and after the production cycle, and the results indicate that the FTIR was performing to an acceptable standard, as the results were well within permitted tolerances.

Honeywell are required to comply with the conditions of their IPPC licence P0525-01. In this licence, emission limit values have been set for a range of pollutant species including VOC. Section 3.1.2 (v) of Honeywell Transportations' IPPC licence states that no thirty-minute mean monitoring value shall exceed the emission limit value. The licence requires that data be corrected to a reference oxygen level of 17% and reported as a dry gas, meaning the result has been corrected for any moisture that may be present. The emission limit value, which is based on corrected VOC data and set in the company's IPPC licence at emission point A2-1 - A2-8, is 20mgC/m^3.

Catalyst monitored VOC on A2-2, from 06.15 to 14.15 on the 02-11-10 with the Afterburner ON, and from 06:00 to 14:30 with the Afterburner OFF on the 03-11-10. This constitutes a minimum of 480 minutes of continuous VOC monitoring data at emission point A2-2 that was monitored each day. In line with licence requirements, this data has been presented as corrected 30 minute averaged results in the executive summary. The continuous data was separated into discreet 30 minute periods and the data within each of these 30 minute periods was averaged to give the mean VOC concentration in that period.

Executive Summary

(Page 2 of 7)

MONITORING DATE(S) & TIMES

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)
2nd - 3rd November 2010

Parameter (Afterburner ON)		Units	Concentration		Sampling Date(s)	Sampling Times	Duration (mins)
Total VOCs (as Carbon)	Run 1	mg/m³	9.2		02/11/2010	06:15 - 14:15	480
Methane	Run 1	mg/m³	7.8		02/11/2010	06:15 - 14:15	480
Formaldehyde	Run 1	mg/m³	3.4		02/11/2010	06:15 - 14:15	480
Acetaldehyde	Run 1	mg/m³	0.9		02/11/2010	06:15 - 14:15	480
Styrene	Run 1	mg/m³	3.3		02/11/2010	06:15 - 14:15	480
Water Vapour	Run 1	% v/v	7.3		02/11/2010	06:15 - 14:15	480
Oxygen		% v/v	**Dry**	19.4			
Parameter (Afterburner OFF)		**Units**	**Concentration**		**Sampling Date(s)**	**Sampling Times**	**Duration (mins)**
Total VOCs (as Carbon)	Run 2	mg/m³	195.8		03/11/2010	06:00 - 14:30	510
Methane	Run 2	mg/m³	15.8		03/11/2010	06:00 - 14:30	510
Formaldehyde	Run 2	mg/m³	32.1		03/11/2010	06:00 - 14:30	510
Acetaldehyde	Run 2	mg/m³	30.8		03/11/2010	06:00 - 14:30	510
Styrene	Run 2	mg/m³	155.6		03/11/2010	06:00 - 14:30	510
Water Vapour	Run 2	% v/v	2.4		03/11/2010	06:00 - 14:30	510
Oxygen		% v/v	**Dry**	20.3			
Velocity & Volumetric Flow Rate	Run 1	Afterburner OFF			02/11/2010	08:30 - 08:50	
Velocity & Volumetric Flow Rate	Run 2	Afterburner ON			02/11/2011	11:30 - 11:50	

All results are expressed at the respective reference conditions.

NOTE: VOLUMETRIC FLOW RATE DATA TAKEN FROM THE PRELIMINARY VELOCITY TRAVERSE.

[1] Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 17% oxygen.

Executive Summary

(Page 3 of 7)

SUMMARY OF RESULTS

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)
2nd - 3rd November 2010

Emission Point	Units	Total VOC (as C)	Total VOC (as C)	Methane	Acetaldehyde	Formaldehyde	Styrene
Time (mins)	mg/m³	**A2-2 (AF ON)**	**A2-2 (Afterburner OFF), mg/m³**				
0 - 30		16.6	30.3	24.8	1.8	5.0	3.3
30 - 60		12.6	26.5	19.8	1.8	14.5	3.3
60 - 90		11.7	28.9	20.0	1.9	22.9	3.3
90 - 120		13.2	33.3	19.3	2.3	17.8	4.3
120 - 150		12.8	80.0	20.0	13.1	21.4	49.0
150 - 180		12.2	218.1	20.1	45.5	45.6	183.0
180 - 210		14.4	420.9	14.0	86.1	78.1	372.6
210 - 240		11.4	542.6	11.9	102.1	90.3	472.3
240 - 270		4.9	558.9	11.1	97.1	84.1	481.2
270 - 300		7.0	480.9	10.7	75.9	65.2	394.9
300 - 330		8.0	332.7	11.8	47.9	43.9	270.4
330 - 360		6.0	204.1	13.4	25.7	24.8	159.0
360 - 390		5.0	136.5	15.2	12.6	13.2	96.9
390 - 420		4.3	78.4	14.1	3.3	7.0	50.5
420 - 450		4.0	61.6	14.9	2.1	5.8	38.8
450 - 480		4.0	54.6	14.4	2.8	4.4	37.0
480 - 510		3.9	44.9	13.5	2.2	2.8	26.0
ELV		**20**	**20**	-	-	-	-
Mean		**9.2**	**195.8**	**15.8**	**30.8**	**32.1**	**155.6**

Refer to appendices for detailed information and data profiles.

Reference Conditions are 273K, 101.3KPa, 17% oxygen dry gas.

Executive Summary

(Page 5 of 7)

MONITORING & ANALYTICAL METHODS

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)
2nd - 3rd November 2010

Parameter	Monitoring: Standard	Monitoring: Technical Procedure	Monitoring: UKAS Testing	Monitoring: Analysis Lab	Analysis: Analytical Procedure	Analysis: Analytical Technique	Analysis: UKAS Analysis	Analysis: Analysis Lab	MCERTS Testing	LOD (Average)
Total VOCs (as Carbon)	BS EN 13526	CAT-TP-20	Yes	CAT	Flame Ionisation Detection by Sick 3006 FID				Yes	0.11 mg/m³
Methane	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.04 mg/m³
Formaldehyde	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.07 mg/m³
Acetaldehyde	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.31 mg/m³
Styrene	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.56 mg/m³
Water Vapour	ASTM D6348-03	CAT-TP-22	Yes	CAT	FTIR by Gasmet Technologies Oy DX4000				Yes	0.003 %
Oxygen	BS EN 14789	CAT-TP-22	Yes	CAT	Wet Zirconia Cell by Dittrich MF-010-O-LC [1]				Yes	0.09 %
Velocity & Vol. Flow Rate	BS EN 13284-1	CAT-TP-04	Yes	CAT	Pitot Tube and Thermocouple				Yes	N/A

[1] MCERTS accreditation on the Dittrich MF-010-O-LC relates to in-house verification against the requirements of BS EN 14789 & BS EN 14793.

ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
All	All	There are no deviations associated with the sampling employed.

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

Team Leader	Name	Brett Philip
	MCERTS Accreditation	MCERTS Level 2
	MCERTS Number	MM 06 718
	Technical Endorsements	TE1 TE2 TE3 TE4

Team Leader	Name	Barry Grant
	MCERTS Accreditation	MCERTS Level 2
	MCERTS Number	MM 03 200
	Technical Endorsements	TE1 TE2 TE3 TE4

Trainee	Name	John Glennon
	MCERTS Accreditation	MCERTS Trainee
	MCERTS Number	MM 10 1074
	Technical Endorsements	None

LIST OF EQUIPMENT

Extractive Sampling

Equipment Type	Equipment I.D.
Control Box DGM	-
Box Thermocouples	-
Umbilical	-
Oven Box	-
Probe	-
S-Pitot (1)	CAT 21S.22
S-Pitot (2)	-
L-Pitot	-
500g Check Weight	-
1Kg Check Weight	-
Last Impinger Arm	-
Callipers	-
Small DGM	-
Laboratory Balance	-
Tape Measure	CAT 16.15

Instrumental Analysers

Equipment Type	Equipment I.D.
Horiba PG-250	-
Servomex 4900	-
JCT JCC P-1 Cooler	-
5m FT-IR	CAT 19.3
5m FT-IR Sampling System	CAT 15.2
Bernath 3006 FID	CAT 8.10
Heated Head Filter	CAT 12.32
Mass Flow Controller (1)	CAT 6.9
Mass Flow Controller (2)	CAT 6.10
Mass View (1)	-
Mass View (2)	-
Easylogger EN-EL-12 Bit	CAT 11.14

Miscellaneous Items

Equipment Type	Equipment I.D.
Digital Manometer (1)	CAT 2.2
Digital Manometer (2)	-
Digital Temperature Meter	CAT 3.5
Stopwatch	-
Barometer	CAT 13.2
Stack Thermocouple (1)	CAT 4.133
Stack Thermocouple (2)	-
1m Heated Line (1)	CAT 20.12
1m Heated Line (2)	CAT 20.13
1m Heated Line (3)	-
5m Heated Line (1)	-
15m Heated Line (1)	-
20m Heated Line (2)	CAT 20.26
20m Heated Line (1)	CAT 20.28

APPENDIX 2

METHANE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	7.80	15.81		11.80
Uncertainty	±mg/m³	1.03	2.31		1.67
Mass Emission	g/hr	13.6	27.5		20.5
Uncertainty	±g/hr	1.8	4.0		2.9

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Instrument Specific	20, 50 , 100, 225, 500, 700, 1000 ppm

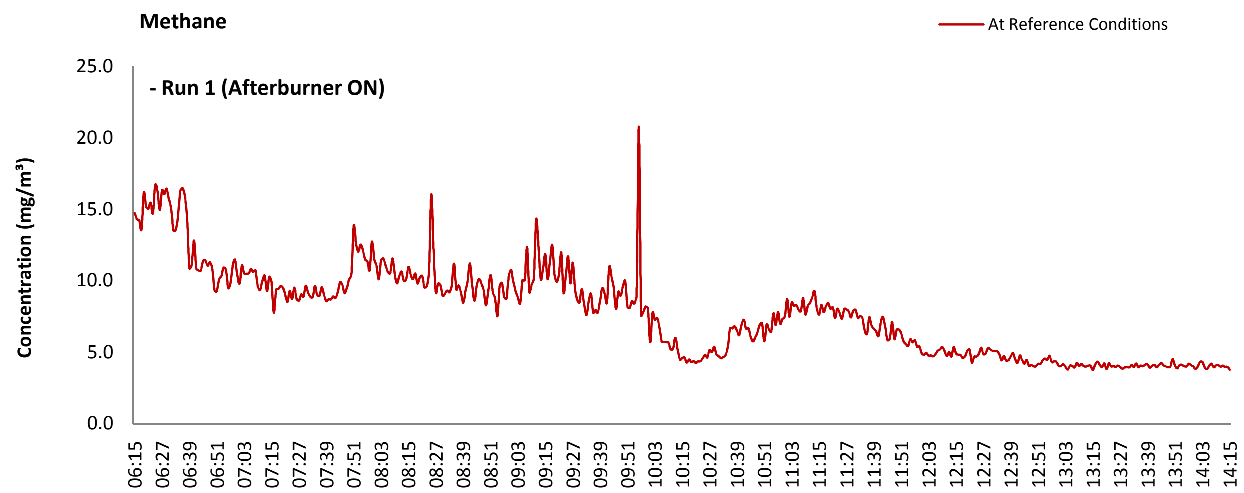
Reference Conditions

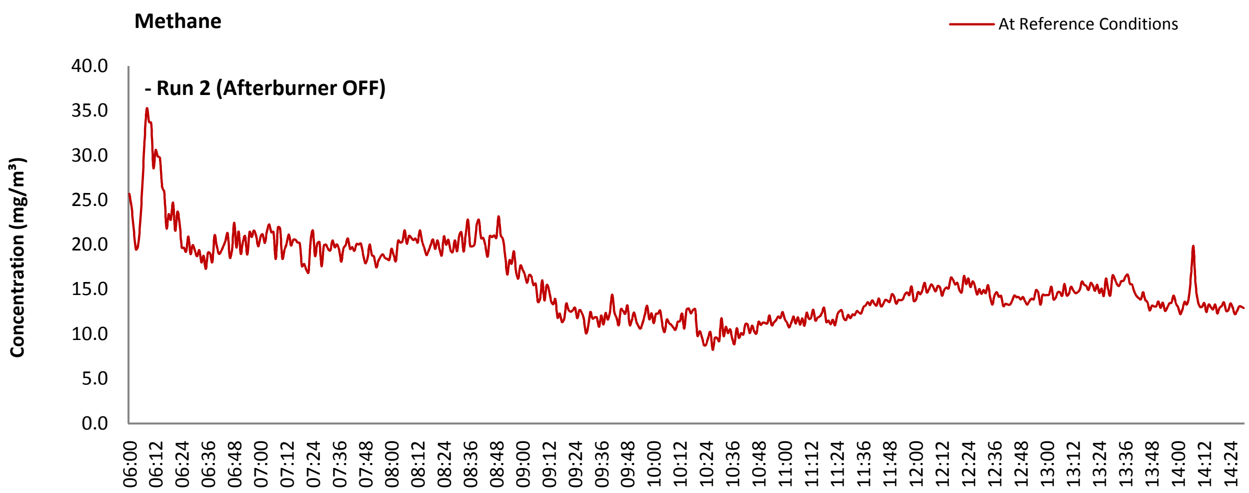
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

METHANE: DATA TREND

Graphical Trend of Data





APPENDIX 2

FORMALDEHYDE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m^3	3.44	32.12		17.78
Uncertainty	$\pm mg/m^3$	2.13	5.26		3.70
Mass Emission	g/hr	6.0	55.9		30.9
Uncertainty	±g/hr	3.7	9.2		6.4

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Instrument Specific	24.9, 45.6 ppm

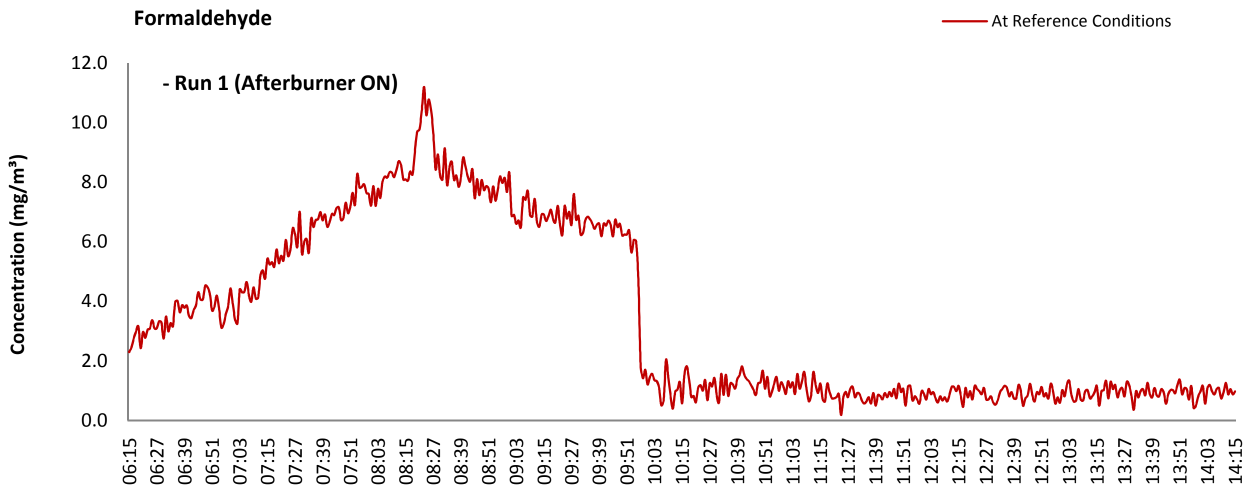
Reference Conditions

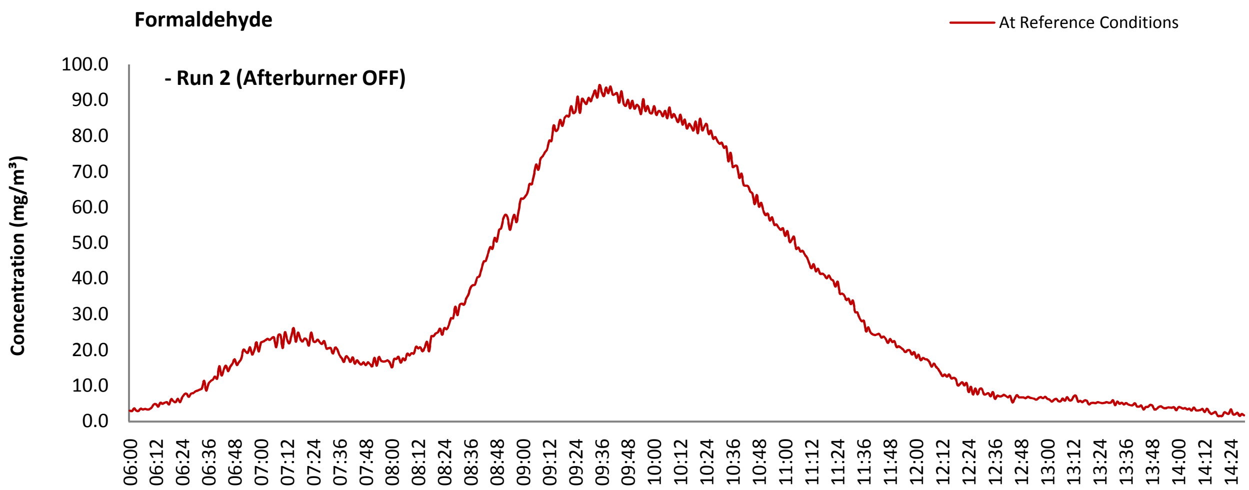
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

FORMALDEHYDE: DATA TREND

Graphical Trend of Data





APPENDIX 2

ACETALDEHYDE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	0.88	30.84		15.86
Uncertainty	±mg/m³	2.50	6.04		4.27
Mass Emission	g/hr	1.5	53.7		27.6
Uncertainty	±g/hr	4.4	10.5		7.4

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Gasmet Library	20, 50, 200 ppm

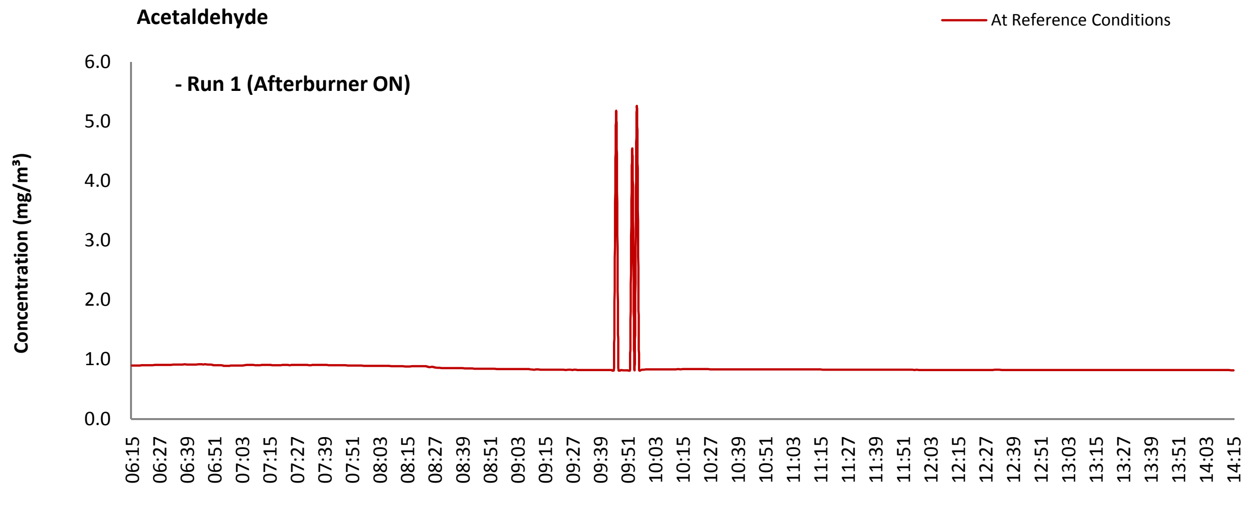
Reference Conditions

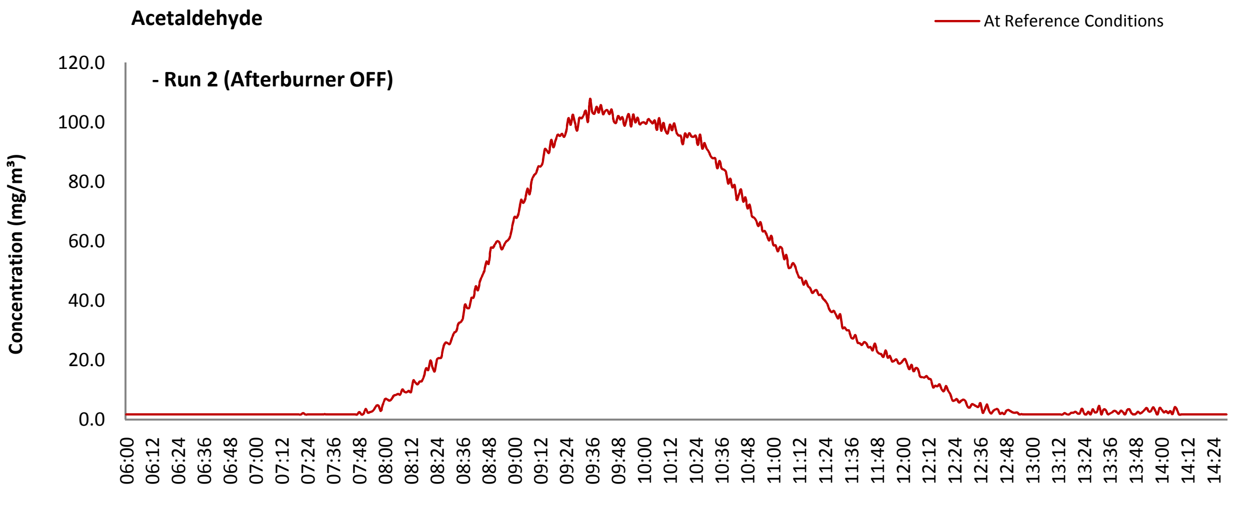
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

ACETALDEHYDE: DATA TREND

Graphical Trend of Data





APPENDIX 2

STYRENE: RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	3.26	155.55		79.40
Uncertainty	±mg/m³	5.92	16.71		11.32
Mass Emission	g/hr	5.7	270.8		138.2
Uncertainty	±g/hr	10.3	29.1		19.7

General Sampling Information

Parameter	Value	
Standard	ASTM D6348-03	
Technical Procedure	CAT-TP-22	
Sampling System Path Length (m)	5	
Sample Cell Temperature (°C)	180	
Sample Cell Pressure (mbar)	1002	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
CTS Gas Reference Number	CYL 3.0024	
CTS Gas Expiry Date	02/07/2012	
CTS Gas Start Pressure (bar)	150	
Gas Cylinder Concentration (ppm)	410.2	
CTS Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

References Used in Analytical Algorithm Application

Type of Reference	Concentration of References
Gasmet Library	20, 50, 100 ppm

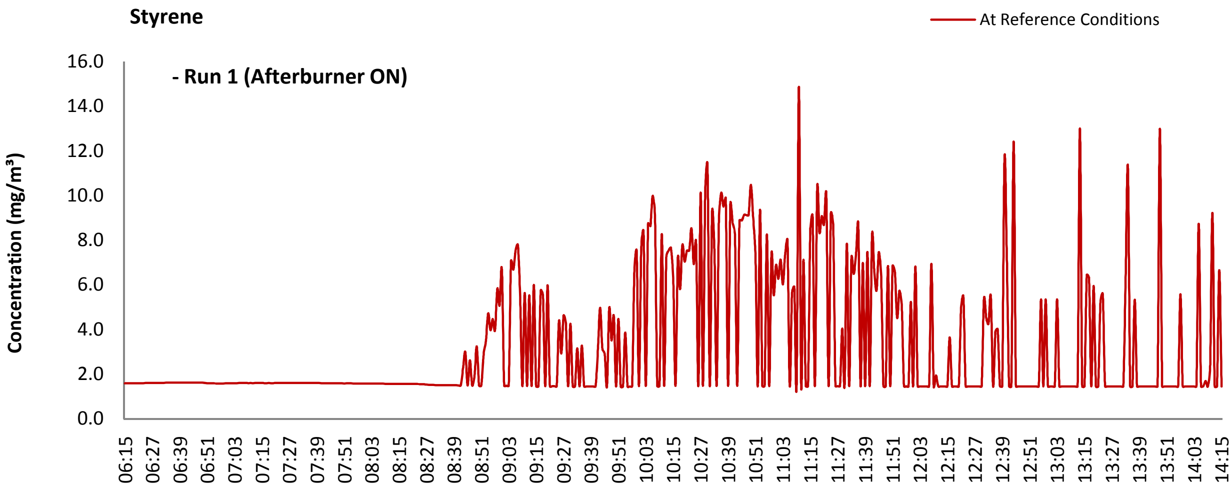
Reference Conditions

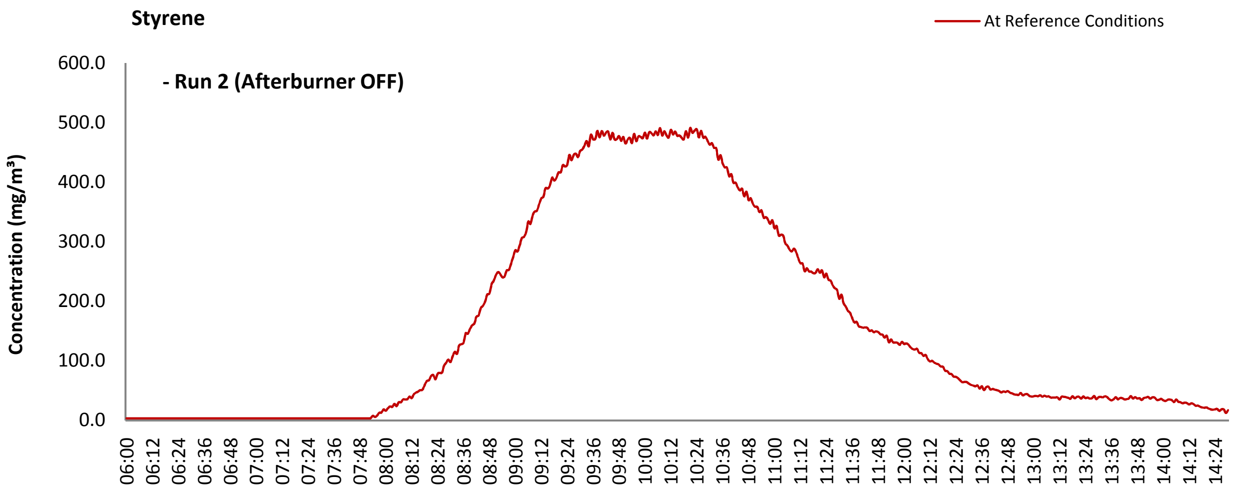
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

STYRENE: DATA TREND

Graphical Trend of Data





APPENDIX 2

FTIR SAMPLING DETAILS & QUALITY ASSURANCE

(PAGE 1 OF 2)

Sampling Details

Parameter	Units	AF ON	AF OFF	
Sampling Times	-	06:15 - 14:15	06:00 - 14:30	
Sampling Date	-	02/11/2010	03/11/2010	
CTS Gas Value	ppm	410.2	410.2	

Quality Assurance

	Zero Calibration Check (NEA)	Units	Run 1	Run 2	
CAL 1	Minimum Energy in Cell	AU	-0.0006	-0.0009	
CAL 1	Maximum Energy in Cell	AU	0.0004	0.0007	
CAL 2	Minimum Energy in Cell	AU			
CAL 2	Maximum Energy in Cell	AU			
CAL 3	Minimum Energy in Cell	AU			
CAL 3	Maximum Energy in Cell	AU			
	Allowable Energy in Cell	± AU	0.0050	0.0050	
	Zero Calibration Check Acceptable	-	Yes	Yes	

	CTS Gas Check - Pre Test	Units	Run 1	Run 2	
CAL 1	CTS Gas Value	ppm	410.2	412.5	
CAL 1	CTS Gas Reading on Analyser	ppm	391.0	396.0	
CAL 1	Difference	ppm	-19.2	-16.5	
CAL 2	CTS Gas Value	ppm			
CAL 2	CTS Gas Reading on Analyser	ppm			
CAL 2	Difference	ppm			
CAL 3	CTS Gas Value	ppm			
CAL 3	CTS Gas Reading on Analyser	ppm			
CAL 3	Difference	ppm			
	Allowable Difference	± ppm	20.5	20.6	
	CTS Gas Acceptable	-	Yes	Yes	

	CTS Gas Check - Post Test	Units	Run 1	Run 2	
CAL 1	CTS Gas Value	ppm	410.2	412.5	
CAL 1	CTS Gas Reading on Analyser	ppm	390.0	395.0	
CAL 1	Difference	ppm	-20.2	-17.5	
CAL 2	CTS Gas Value	ppm			
CAL 2	CTS Gas Reading on Analyser	ppm			
CAL 2	Difference	ppm			
CAL 3	CTS Gas Value	ppm			
CAL 3	CTS Gas Reading on Analyser	ppm			
CAL 3	Difference	ppm			
	Allowable Difference	± ppm	20.5	20.6	
	CTS Gas Acceptable	-	Yes	Yes	

Test Conditions	Units	Run 1	Run 2	
Run Ambient Temperature Range	°C	5 - 7	5 - 7	

APPENDIX 2

FTIR SAMPLING DETAILS & QUALITY ASSURANCE

(PAGE 2 OF 2)

Line Position	**Units**	**Test**
Line Position Acceptable	-	Yes

Response Times	**Units**	**Test**
Response Time, T_{95}	s	30
Reverse Response Time, RT_{95}	s	30
Allowable Response Time	s	200
Response Time Acceptable	-	Yes

Detector Linearity	**Units**	**Test**
Average Zero Minimum	AU	-0.0003
CTS Gas Minimum	AU	0.0044
Average Zero Maximum	AU	-0.0002
CTS Gas Maximum	AU	0.0043
Allowable Difference	± AU	0.0050
Detector Linearity Acceptable	-	Yes

Method Deviations

Nature of Deviation	**Run Number**		
(x = deviation applies to the associated run)	**1**	**2**	
There are no deviations associated with the sampling employed.	x	x	

APPENDIX 2

TOTAL VOCs (as CARBON): RESULTS SUMMARY

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)

Sample Runs

Parameter	Units	AF ON	AF OFF		Mean
Concentration	mg/m³	9.23	195.78		102.51
Uncertainty	±mg/m³	0.57	9.70		5.13
Mass Emission	g/hr	16.1	340.8		178.4
Uncertainty	±g/hr	1.0	16.9		8.9

General Sampling Information

Parameter	Value	
Standard	BS EN 13526	
Technical Procedure	CAT-TP-20	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Span Gas Reference Number	CYL 1.0021	
Span Gas Expiry Date	-	
Span Gas Start Pressure (bar)	140	
Gas Cylinder Concentration (ppm)	80 / 800	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

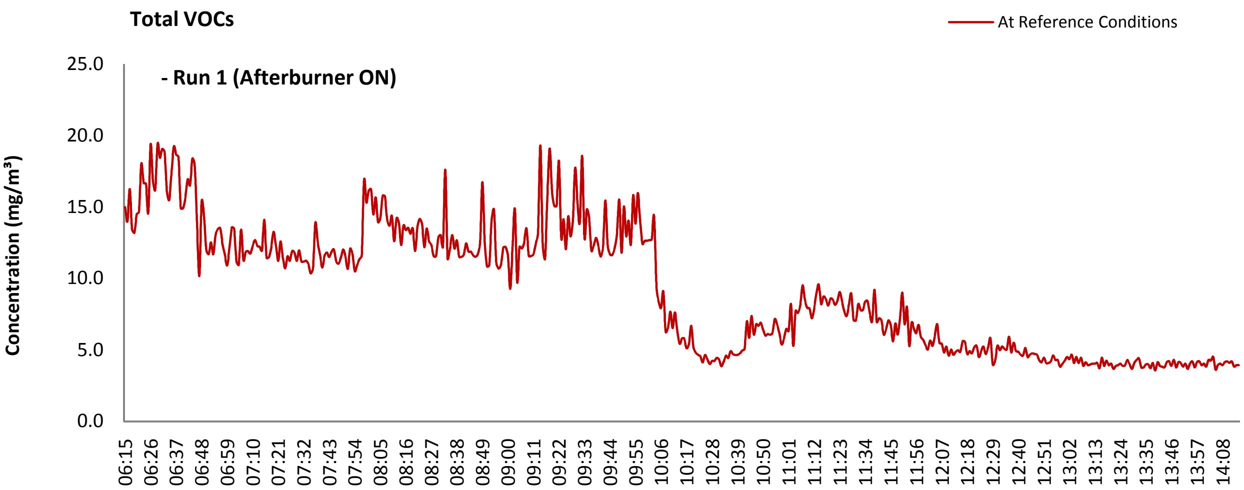
Reference Conditions

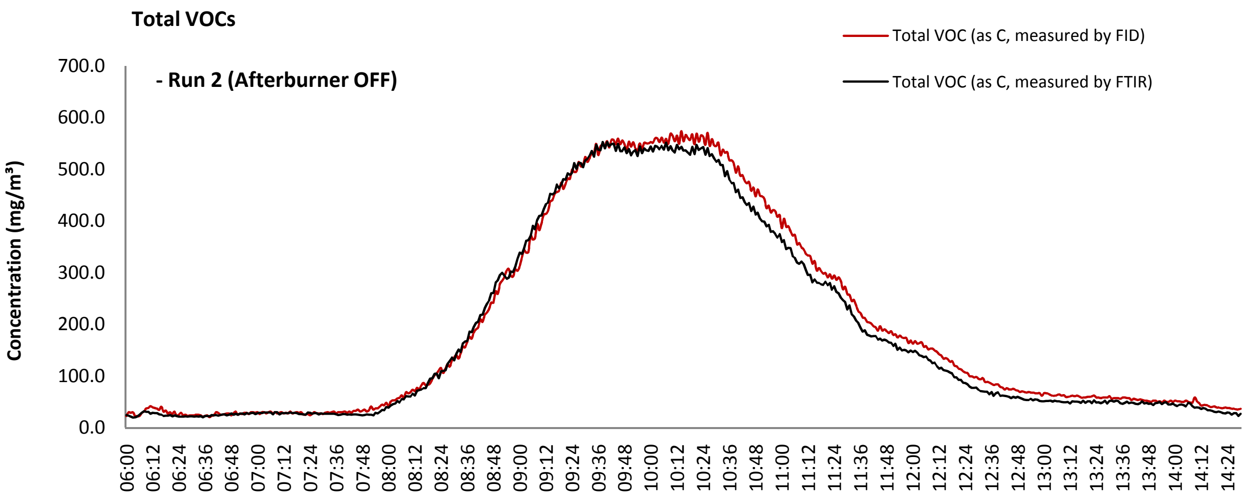
Reference Conditions are: 273K, 101.3kPa, dry gas, 17% oxygen.

APPENDIX 2

TOTAL VOCs (as CARBON): DATA TREND

Graphical Trend of Data





APPENDIX 2

TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	AF ON	AF OFF	
Sampling Times	-	06:15 - 14:15	06:00 - 14:30	
Sampling Dates	-	02/11/2010	03/11/2010	
Instrument Range	ppm	100	1000	
Span Gas Value	ppm	80.0	819.0	

Quality Assurance

	Zero Drift	Units	Run 1	Run 2	
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.10	0.20	
CAL 1	Zero Down Sampling Line (Post)	ppm	0.10	0.10	
CAL 1	Zero Drift	ppm	0.00	-0.10	
CAL 2	Zero Down Sampling Line (Pre)	ppm			
CAL 2	Zero Down Sampling Line (Post)	ppm			
CAL 2	Zero Drift	ppm			
CAL 3	Zero Down Sampling Line (Pre)	ppm			
CAL 3	Zero Down Sampling Line (Post)	ppm			
CAL 3	Zero Drift	ppm			
	Allowable Zero Drift	± ppm	5.00	50.00	
	Zero Drift Acceptable	-	Yes	Yes	

	Span Drift	Units	Run 1	Run 2	
CAL 1	Span Down Sampling Line (Pre)	ppm	80.20	818.00	
CAL 1	Span Down Sampling Line (Post)	ppm	79.20	793.00	
CAL 1	Span Drift	ppm	-1.00	-25.00	
CAL 2	Span Down Sampling Line (Pre)	ppm			
CAL 2	Span Down Sampling Line (Post)	ppm			
CAL 2	Span Drift	ppm			
CAL 3	Span Down Sampling Line (Pre)	ppm			
CAL 3	Span Down Sampling Line (Post)	ppm			
CAL 3	Span Drift	ppm			
	Allowable Span Drift	± ppm	5.00	50.00	
	Span Drift Acceptable	-	Yes	Yes	

Test Conditions	Units	Run 1	Run 2	
Run Ambient Temperature Range	°C	5 - 7	5 - 7	

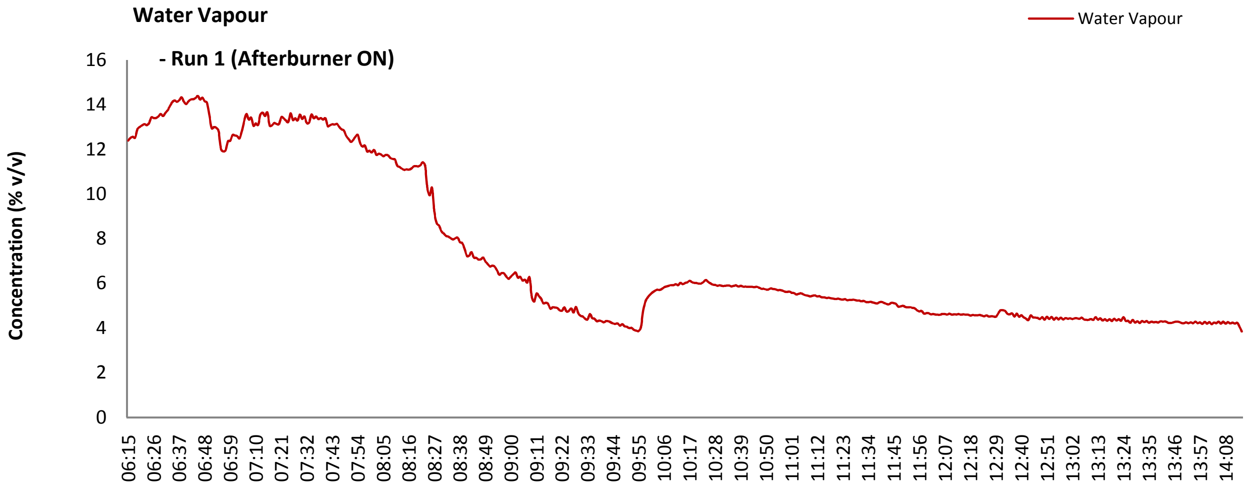
Method Deviations

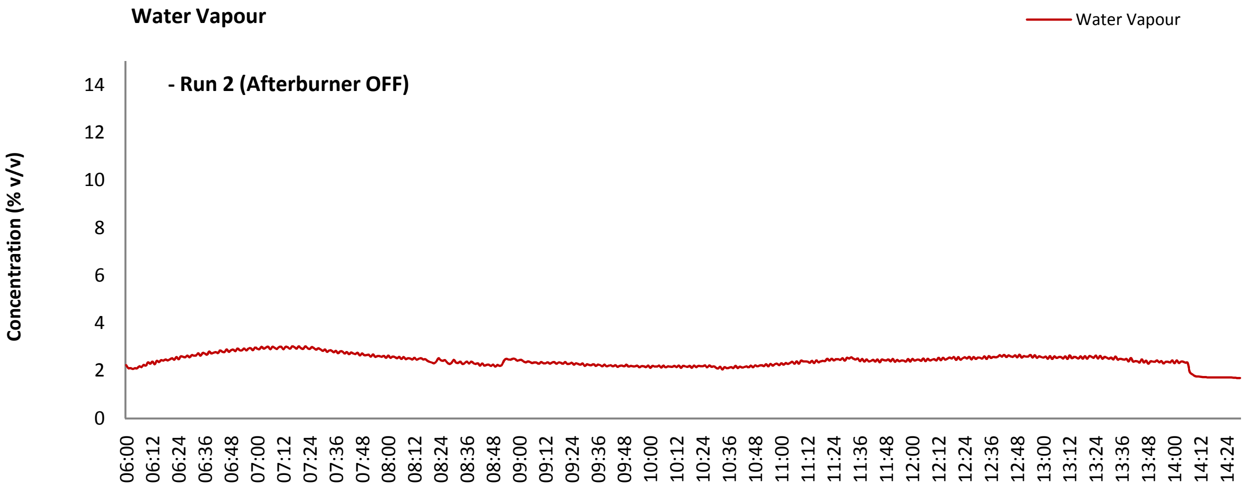
Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	2	
There are no deviations associated with the sampling employed.	x	x	

APPENDIX 2

PERIPHERAL MEASUREMENTS: DATA TREND

Graphical Trend of Data





APPENDIX 3

PROCESS DETAILS

Honeywell International Technologies Ltd, Waterford
A2-2 (Oven 2)
2nd - 3rd November 2010

Standard Operating Conditions

Parameter	Value
Process Status	Typical operation
Capacity (of 100%) and Tonnes / Hour	N/A
Continuous or Batch Process	9 hour batch cycle
Feedstock (if applicable)	Gypsum (drying) & Polystyrene (216 blocks)
Abatement System	Afterburner
Abatement System Running Status	See Site Specific Operating Conditions
Fuel	Gas
Plume Appearance	None Visible

Site Specific Operating Conditions

Parameter	Status
Run 1	**Afterburner ON (at approx 4 hours into cycle)**
Run 2	**Afterburner OFF**

APPENDIX 4

SUITABILITY OF SAMPLING LOCATION

Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	0.65
Width	m	-
Area	m²	0.33
Port Depth	cm	23
Orientation of Duct	-	Vertical
Sample Port Size	-	4" Flange

Location of Sampling Platform

General Platform Information	Value
Permanent / Temporary Platform	On Roof
Inside / Outside	Outside

Platform Details

EA Technical Guidance Note M1 / BS EN 15259 Platform Requirements	Value
Sufficient working area to manipulate probe and operate the measuring instruments	Yes
Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)	Yes
Platform has vertical base boards (approx. 0.25m high)	Yes
Platform has chains / self closing gates at top of ladders	N/A
There are no obstructions present which hamper insertion of sampling equipment	Yes
Safe Access Available	Yes
Easy Access Available	Yes

Sampling Location / Platform Improvement Recommendations

The sampling location meets all the requirements specified in EA Guidance Note M1 and BS EN 15259, and therefore there are no improvement recommendations.

BS EN 15259 Homogeneity Test Requirements

There is no requirement to perform a BS EN 15259 Homogeneity Test on this Stack.

Sampling Plane Validation Criteria (from EA Technical Guidance Document (Monitoring) M1)

Criteria in M1	Units	Traverse 1	Traverse 2		Required	Compliant
Lowest Differential Pressure	Pa	17.7	50.0		> 5 Pa	Yes
Mean Velocity	m/s	6.97	14.16		-	-
Lowest Gas Velocity	m/s	5.25	11.97		-	-
Highest Gas Velocity	m/s	8.35	16.28		-	-
Ratio of Above	: 1	1.59	1.36		< 3 : 1	Yes
Maximum Angle of Swirl	°	5			< 15°	Yes
No Local Negative Flow	-	Yes	Yes		-	Yes

APPENDIX 4

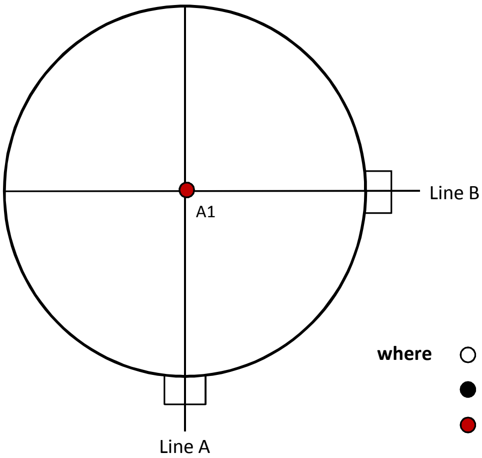
PLANT PHOTOS

Photo 1

Photo 2

Photo 3

SAMPLE POINTS



where ○ = isokinetic point sampled at

● = isokinetic point not sampled at

● = non-isokinetic / combustion gases sample point

APPENDIX 4

PRELIMINARY STACK SURVEY: CALCULATIONS

General Stack Details

Stack Details (from Traverse)	Units	Value
Stack Diameter / Depth, D	m	0.65
Stack Width, W	m	-
Stack Area, A	m²	0.33
Average Stack Gas Temperature, T_a	°C	261.5
Average Stack Gas Pressure	mmH_2O	5.4
Average Stack Static Pressure, P_{static}	kPa	-0.038
Average Barometric Pressure, P_b	kPa	100.0
Average Pitot Tube Calibration Coefficient, C_p	-	0.83

Stack Gas Composition & Molecular Weights

Component	Conc ppm	Conc Dry % v/v	Conc Wet % v/v	Volume Fraction r	Molar Mass M	Density kg/m³ p	Conc kg/m³ p_i
CO_2	-	1.00	0.93	0.0100	44.01	1.9635	0.01964
O_2	-	19.85	18.46	0.1985	32.00	1.4277	0.28339
N_2	-	79.15	73.61	0.7915	28.01	1.2498	0.98925
Moisture (H_2O)	-	-	7.00	0.0700	18.02	0.8037	0.05626

Where: p = M / 22.41

p_i = r x p

Calculation of Stack Gas Densities

Determinand	Units	Result
Dry Density (STP), P_{STD}	kg/m³	1.292
Wet Density (STP), P_{STW}	kg/m³	1.258
Dry Density (Actual), P_{Actual}	kg/m³	0.651
Average Wet Density (Actual), $P_{ActualW}$	kg/m³	0.692

Where: P_{STD} = sum of component concentrations, kg/m³ (not including water vapour)

P_{STW} = sum of all wet concentrations / 100 x density, kg/m³ (including water vapour)

$P_{Actual} = P_{STD} \times (T_{STP} / (P_{STP})) \times ((P_{static} + P_b) / T_a)$

$P_{ActualW}$ (at each sampling point) = $P_{STW} \times (T_s / P_s) \times (P_a / T_a)$

Calculation of Stack Gas Volumetric Flowrate, Q

Duct gas flow conditions	Units	Actual	REF ¹
Temperature	°C	261.5	0.0
Total Pressure	kPa	100.0	101.3
Moisture	%	4.85	0.00
Oxygen (Dry)	%	19.8	17.0

Gas Volumetric Flowrate (from Traverse)	Units	Result
Gas Volumetric Flowrate (Actual)	m³/hr	12624
Gas Volumetric Flowrate (STP, Wet)	m³/hr	6363
Gas Volumetric Flowrate (STP, Dry)	m³/hr	6054
Gas Volumetric Flowrate REF ¹	m³/hr	1741

APPENDIX 4

PRELIMINARY STACK SURVEY: VELOCITY TRAVERSE

(1 of 2)

Parameter	Units	Value
Date of Survey	-	02/11/2010
Time of Survey	-	08:30 - 08:50
Atmospheric Pressure	kPa	100.0
Stack Static Pressure	Pa	-30
Type of Pitot Used	-	S-Type Pitot
Are Water Droplets Present?	-	No

Parameter	Units	Value
Initial Pitot Leak Check	-	Pass
Final Pitot Leak Check	-	Pass
Orientation of Duct	-	Vertical
Pitot Tube, C_p	-	0.83
Number of Lines Available	-	2
Number of Lines Used	-	2

	Swirl Point (taken at the sampling points used during testing)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Angle of Swirl (°)	5																			

		Sampling Line A				Sampling Line B			
Traverse Point	Depth m	ΔP mmH_2O	Temp °C	Wet Density kg/m³	Velocity m/s	ΔP mmH_2O	Temp °C	Wet Density kg/m³	Velocity m/s
1	0.03	2.0	109.0	0.887	5.51	4.1	102.0	0.904	7.81
2	0.10	2.2	109.0	0.887	5.78	4.3	102.0	0.904	8.00
3	0.16	2.0	109.0	0.887	5.51	4.4	103.0	0.901	8.10
4	0.23	1.8	112.0	0.880	5.25	4.1	103.0	0.901	7.82
5	0.29	1.9	112.0	0.880	5.39	3.8	103.0	0.901	7.53
6	0.36	2.7	111.0	0.883	6.42	3.2	103.0	0.901	6.91
7	0.42	3.2	111.0	0.883	6.98	3.2	103.0	0.901	6.91
8	0.49	3.6	111.0	0.883	7.41	3.5	104.0	0.899	7.24
9	0.55	4.5	111.0	0.883	8.28	3.3	104.0	0.899	7.03
10	0.62	4.6	109.0	0.887	8.35	3.4	104.0	0.899	7.13
Mean		**2.9**	**110.4**	**0.884**	**6.49**	**3.7**	**103.1**	**0.901**	**7.45**

APPENDIX 4

PRELIMINARY STACK SURVEY: VELOCITY TRAVERSE

(2 of 2)

Parameter	Units	Value
Date of Survey	-	02/11/2011
Time of Survey	-	11:30 - 11:50
Atmospheric Pressure	kPa	100.0
Stack Static Pressure	Pa	-46
Type of Pitot Used	-	S-Type Pitot
Are Water Droplets Present?	-	No

Parameter	Units	Value
Initial Pitot Leak Check	-	Pass
Final Pitot Leak Check	-	Pass
Orientation of Duct	-	Vertical
Pitot Tube, C_p	-	0.83
Number of Lines Available	-	2
Number of Lines Used	-	2

		Sampling Line A				Sampling Line B			
Traverse	Depth	ΔP	Temp	Wet Density	Velocity	ΔP	Temp	Wet Density	Velocity
Point	m	mmH_2O	°C	kg/m³	m/s	mmH_2O	°C	kg/m³	m/s
1	0.03	5.2	435.0	0.479	12.09	9.0	402.0	0.502	15.53
2	0.10	5.1	435.0	0.479	11.97	9.1	401.0	0.503	15.61
3	0.16	5.7	435.0	0.479	12.66	9.1	400.0	0.504	15.59
4	0.23	5.9	435.0	0.479	12.88	8.8	400.0	0.504	15.34
5	0.29	5.7	436.0	0.478	12.67	8.5	399.0	0.504	15.06
6	0.36	7.5	436.0	0.478	14.53	6.6	396.0	0.507	13.24
7	0.42	9.3	437.0	0.477	16.19	6.5	394.0	0.508	13.12
8	0.49	9.4	437.0	0.477	16.28	6.7	392.0	0.510	13.30
9	0.55	9.3	438.0	0.477	16.20	5.8	391.0	0.510	12.37
10	0.62	9.3	438.0	0.477	16.20	5.9	388.0	0.513	12.44
Mean		**7.2**	**436.2**	**0.478**	**14.17**	**7.6**	**396.3**	**0.506**	**14.16**

APPENDIX 5

METHANE: MEASUREMENT UNCERTAINTY CALCULATIONS

		Value		
Measured Quantities	**Units**	**AF ON**	**AF OFF**	
Measured Reading	ppm	4.2	3.7	

		Individual Errors as Standard Uncertainties		
Measured Quantities	**Units**	**Run 1**	**Run 2**	
Nonlinearity	ppm	0.2	0.2	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.0	0.0	
Accuracy of Analysis Function	ppm	0.1	0.1	
Calibration Gas Uncertainty	ppm	0.0	0.0	

Parameter	**Units**	**Run 1**	**Run 2**	
Combined uncertainty	ppm	0.3	0.3	
Expanded uncertainty (95% confidence)	ppm	0.6	0.5	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.6	0.5	
Reported Uncertainty	ppm	0.6	0.5	
Expanded uncertainty (95% confidence)	%	13.3	14.6	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	13.3	14.6	
Reported Uncertainty	%	13.3	14.6	

APPENDIX 5

FORMALDEHYDE: MEASUREMENT UNCERTAINTY CALCULATIONS

		Value		
Measured Quantities	**Units**	**AF ON**	**AF OFF**	
Measured Reading	ppm	1.0	4.0	

		Individual Errors as Standard Uncertainties		
Measured Quantities	**Units**	**Run 1**	**Run 2**	
Nonlinearity	ppm	0.3	0.3	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.0	0.0	
Accuracy of Analysis Function	ppm	0.0	0.1	
Calibration Gas Uncertainty	ppm	0.0	0.0	

Parameter	**Units**	**Run 1**	**Run 2**	
Combined uncertainty	ppm	0.3	0.3	
Expanded uncertainty (95% confidence)	ppm	0.6	0.7	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.6	0.7	
Reported Uncertainty	ppm	0.6	0.7	
Expanded uncertainty (95% confidence)	%	62.1	16.4	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	62.1	16.4	
Reported Uncertainty	%	62.1	16.4	

APPENDIX 5

ACETALDEHYDE: MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			
Measured Quantities	**Units**	**AF ON**	**AF OFF**	
Measured Reading	ppm	0.2	2.6	

	Individual Errors as Standard Uncertainties			
Measured Quantities	**Units**	**Run 1**	**Run 2**	
Nonlinearity	ppm	0.2	0.2	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.0	0.0	
Accuracy of Analysis Function	ppm	0.0	0.1	
Calibration Gas Uncertainty	ppm	0.0	0.0	

Parameter	**Units**	**Run 1**	**Run 2**	
Combined uncertainty	ppm	0.2	0.3	
Expanded uncertainty (95% confidence)	ppm	0.5	0.5	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.5	0.5	
Reported Uncertainty	ppm	0.5	0.5	
Expanded uncertainty (95% confidence)	%	286.3	19.6	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	286.3	19.6	
Reported Uncertainty	%	286.3	19.6	

APPENDIX 5

STYRENE: MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			
Measured Quantities	**Units**	**AF ON**	**AF OFF**	
Measured Reading	ppm	0.3	5.6	

	Individual Errors as Standard Uncertainties			
Measured Quantities	**Units**	**Run 1**	**Run 2**	
Nonlinearity	ppm	0.2	0.2	
Temperature Dependent Zero Drift	ppm	0.0	0.0	
Temperature Dependent Span Drift	ppm	0.1	0.1	
Cross-Sensitivity	ppm	0.0	0.1	
Accuracy of Analysis Function	ppm	0.0	0.2	
Calibration Gas Uncertainty	ppm	0.0	0.0	

Parameter	**Units**	**Run 1**	**Run 2**	
Combined uncertainty	ppm	0.2	0.3	
Expanded uncertainty (95% confidence)	ppm	0.5	0.6	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.5	0.6	
Reported Uncertainty	ppm	0.5	0.6	
Expanded uncertainty (95% confidence)	%	182.0	10.7	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	182.0	10.7	
Reported Uncertainty	%	182.0	10.7	

APPENDIX 5

TOTAL VOCs (as CARBON): MEASUREMENT UNCERTAINTY CALCULATIONS

		Value		
Measured Quantities	**Units**	**AF ON**	**AF OFF**	**Run 3**
MCERTS Certified Range of Analyser	ppm	9.3	9.3	
Operational Range of Analyser	ppm	100.0	1000.0	
Measured Reading	ppm	2.2	20.3	

		Individual Errors as Standard Uncertainties		
Measured Quantities	**Units**	**Run 1**	**Run 2**	**Run 3**
Nonlinearity	ppm	0.013	0.013	
Temperature Dependent Zero Drift	ppm	0.027	0.027	
Temperature Dependent Span Drift	ppm	0.027	0.027	
Cross-Sensitivity	ppm	0.051	0.469	
Leak	ppm	0.00	0.01	
Calibration Gas Uncertainty	ppm	0.01	0.12	
Mass Flow Controllers (dilution) Uncertainty	ppm	0.02	0.17	

Parameter	**Units**	**Run 1**	**Run 2**	**Run 3**
Combined uncertainty	ppm	0.07	0.51	
Expanded uncertainty (95% confidence)	ppm	0.13	1.01	
Expanded uncertainty (95% confidence), estimated with Method Deviations	ppm	0.13	1.01	
Reported Uncertainty	ppm	0.13	1.01	
Expanded uncertainty (95% confidence)	%	6.1	5.0	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	6.1	5.0	
Reported Uncertainty	%	6.1	5.0	

Although measured concentrations greater than the MCERTS Certified range of the analyser (15 mg/m³) were recorded, Catalyst's Internal Annual Systems Checks cover the use of the analyser up to 16061 mg/m³.

Pyrolysis-test
on polystyrene core
Honeywell International Technologies Limited

Report –No. 15513-001 B01

presented
by

Eurofins GfA GmbH
Otto-Hahn-Str. 22
48161 Münster / Germany

Client: **Honeywell International Technologies Limited**
Unit 411, IDA Estate, Cork Road
Waterford, Ireland

December 13, 2010 **13 pages**

Contents

1 Purpose of investigation

In compliance with the client pyrolysis-tests on a polystyrene core were carried out in a special pyrolysis-apparatus to determine the chemical composition of the emitted flue gas esp. the concentration of volatile organic compounds.

2 Pyrolysis test

2.1 Pyrolysis apparatus

The pyrolysis-tests were carried out in an inlet system containing a furnace that can reach high temperatures. Inside the furnace there is a quartz-tube to minimize catalytic reactions with the furnace wall during the test. The apparatus can be used either to volatilize or to decompose the components of the sample being analyzed.

The test material is inserted in one piece into the quartz-tube. During the test a continuous air-stream flows through the furnace. The material is pyrolysed at defined temperatures. The pyrolysed compounds are sampled with special sampling tubes for analysis by GC/MS or injected directly in a GC and detected by the MS detector.

2.2 Test procedure

A part of the test material is weighed and broken into a defined piece. The piece has been transmitted into the funnel. According to the requirements of the client the furnace has been heated slowly starting at room temperature (20℃) up to 280℃ (Heating-period 0.5 h). A continuous air flow is adjusted.

Before starting the sampling, several pre-tests have been performed. The material has been heated without sampling, to determine the temperature of decomposition of the material. At 220 – 230℃ no more decomposition was noticeable.

. The exhaust gas stream is led completely through the sampling device. The following methods for sampling have been used:

1. For screening analysis and analysis on benzaldehyde and aromatic hydrocarbons the exhaust gas stream has been sampled with a Tenax tube (tube filled with a synthetic resin for sampling of organic compounds). The samples were analyzed by thermodesorption and GC/MS. After the polystyrene core is broken down, sampling is carried on for 10 minutes.
2. For methane analysis the exhaust gas stream has been sampled with a gas bag. The samples are analyzed by GC/MS. After the polystyrene core is broken down, sampling is carried on for 60 minutes to get a better detection limit for methane
3. In a second step the gas stream has been transmitted to the GC/MS directly. This was necessary, because in the first step a quantification of the compounds was not possible (the Tenax tubes were overloaded). After the polystyrene core is broken down, sampling is carried on for 10 minutes.

Before pyrolysis-test one blank value is taken by sampling the heated gas flow without pyrolyzing of the test materials.

3 Results

3.1 Analysis on methane

Sample	Blank value	CH1	CH2
Net weight of the pyrolysed material [mg]	---	42.18	42.95
Net weight after pyrolysis [mg]		35.01	40.44
Net weight of emitted flue gas [mg]		7.71	2.51
Pyrolysing time [min]	60	60	60
Pyrolysing temperature [°C]	20-280	20-280	20-280
Methane	< detection limit	< 3.48 g/kg	< 3.64 g/kg

3.2 Screening analysis/ benzaldehyde / aromatic hydrocarbons

In a first step the flue gas has been sampled with Tenax-tubes. It was not possible to quantify the compounds, because the tubes were overloaded. The main detected compounds have been styrene and styrene-fractions, benzaldehyde and aromatic hydrocarbons.

In a second step the test-material has been reduced and transmitted to the GC/MS directly. The compounds have been determined semi-quantitative. The mass of each compound has been calculated from per cent by weight.

Sample	Blank value	CH1	CH2
Net weight of the pyrolysed material [mg]	---	0.3671	0.3659
Net weight after pyrolysis [mg]	---	0.3585	0.3574
Net weight of emitted flue gas [mg]	---	0.0086	0.0085
Pyrolysing time [min]	30	30	30
Pyrolysing temperature [°C]	20-280	20-280	20-280

List of analyzed compounds

Identification	CAS	Emitted flue gas per kg Polystyrene core	
		22269a	22269b
		g/kg	g/kg
Probably 2-Methylbutane	78-78-4	0,72	0,35
Benzene	71-43-2	0,03	0,03
Pentanal	110-62-3	0,02	0,01
Toluene	108-88-3	0,03	0,02
Hexanal	66-25-1	0,01	0,01
Ethylbenzene	100-41-4	0,09	0,08
Styrene	**100-42-5**	**3,73**	**3,39**
Heptanal	111-71-7	0,02	0,01
Isopropylbenzene	98-82-8	0,03	0,03
Propenylbenzene Isomer	N/P	0,11	0,10
Propylbenzene	103-65-1	0,03	0,02
Benzaldehyde	**100-52-7**	**3,93**	**3,75**
Phenol	108-95-2	0,08	0,08
à-Methylstyrene	98-83-9	0,21	0,17
Benzonitrile	100-47-0	0,01	--
Propenylbenzene Isomer	N/P	--	--
Octanal	124-13-0	0,02	--
Benzyl Alcohol	100-51-6	0,02	0,02
Phenylacetaldehyde	122-78-1	0,09	0,11
Ethylstyrene Isomer	N/P	0,04	0,03
Acetophenone	98-86-2	0,72	0,65
Dihydroxyacetophenone Isomer	N/P	0,04	0,04
à-Cumyl alcohol	617-94-7	0,07	0,06
Probably Methyl cumyl ether	935-67-1	0,07	0,06
Nonanal	124-19-6	0,03	0,02
Cumene aldehyde	93-53-8	0,01	0,01
Benzyl methyl ketone	103-79-7	0,01	--
Phenylpentene Isomer	N/P	0,01	--
Phenylpropenal Isomer	N/P	0,76	0,90
Phenylethylketone	93-55-0	0,03	--
Decanal	112-31-2	0,04	0,03
Phenylpropenol Isomer	N/P	0,15	0,19
Phenylpropenal Isomer	N/P	0,04	0,04
Undecanal	112-44-7	0,02	0,01
Phenylalkenal Isomer	N/P	--	0,02
Dodecanal	112-54-9	0,03	0,02
Tridecanal	10486-19-8	0,02	--
Stilbene Isomer	N/P	0,02	0,02
Tetradecanal	124-25-4	0,02	0,02
chromatography artefact	N/P	0,01	0,03
Alkyldiphenyl	N/P	0,09	0,10
Benzophenone	119-61-9	0,03	0,03
Diphenylpropane Isomer	N/P	0,12	0,10
Alkyldiphenyl	N/P	0,23	0,23
Aldehyde	N/P	--	0,03
Stilbene Isomer	N/P	0,12	0,12
Diphenylalkene	N/P	1,29	1,21
Probably Phenylalkene	N/P	0,07	0,07
Mix of Diphenylketone	N/P	0,15	0,16

Identification	CAS	Emitted flue gas per kg Polystyrene core	
		22269a g/kg	22269b g/kg
and Diphenylalkene	N/P	0,00	--
Diphenylcyclobutane Isomer	N/P	0,04	--
Possibly Alkyldiphenyl	N/P	0,08	0,07
Possibly Diphenyldiazacycloalkene	N/P	0,09	0,09
Mix of Diphenyldiketone	N/P	0,07	0,08
and Diphenylalkene	N/P	0,00	0,03
Diphenylalkene	N/P	0,37	0,38
Diphenylalkenone	N/P	0,17	0,18
Diphenylketone	N/P	0,33	0,31
Unknown	N/P	0,08	0,10
Possibly Diphenylalkenone	N/P	0,12	0,13
Diphenylketone	N/P	0,05	0,04
Diphenylalkene	N/P	0,06	--
Diphenylalkenone	N/P	--	0,03
Diphenylketone	N/P	--	0,06
Diphenylalkene	N/P	--	0,07
Possibly Diphenyldiazacycloalkene	N/P	0,14	0,14
Diphenylpropenone Isomer	N/P	0,20	0,25
Diphenylbutenone Isomer	N/P	0,46	0,54
Possibly Diphenylalkenone	N/P	0,14	0,17
Diphenylfuran Isomer	N/P	0,07	0,08
Aromatic compound	N/P	0,16	0,15
Possibly Phenacyl acetate	2243-35-8	--	0,04
Diphenyldiketone	N/P	0,05	0,09
Aromatic compound	N/P	0,07	0,07
Possibly Diphenylalkene	**N/P**	**6,04**	**6,46**
Aromatic compound	N/P	0,07	0,06
Probably Diphenylalkene	N/P	0,22	0,25
Probably Diphenylalkene	N/P	0,22	0,21
Possibly Diphenylketone	N/P	0,37	0,42
Probably Diphenylalkene	N/P	0,32	0,41

There is no methane detected in the screening analysis. There have been detected no compounds in the blanks.

The main emitted compound has not been identified exactly. It is a high volatile compound and can be expected as a diphenylalkene.

December 13, 2010

Dipl.-Chem. G. Volkmer

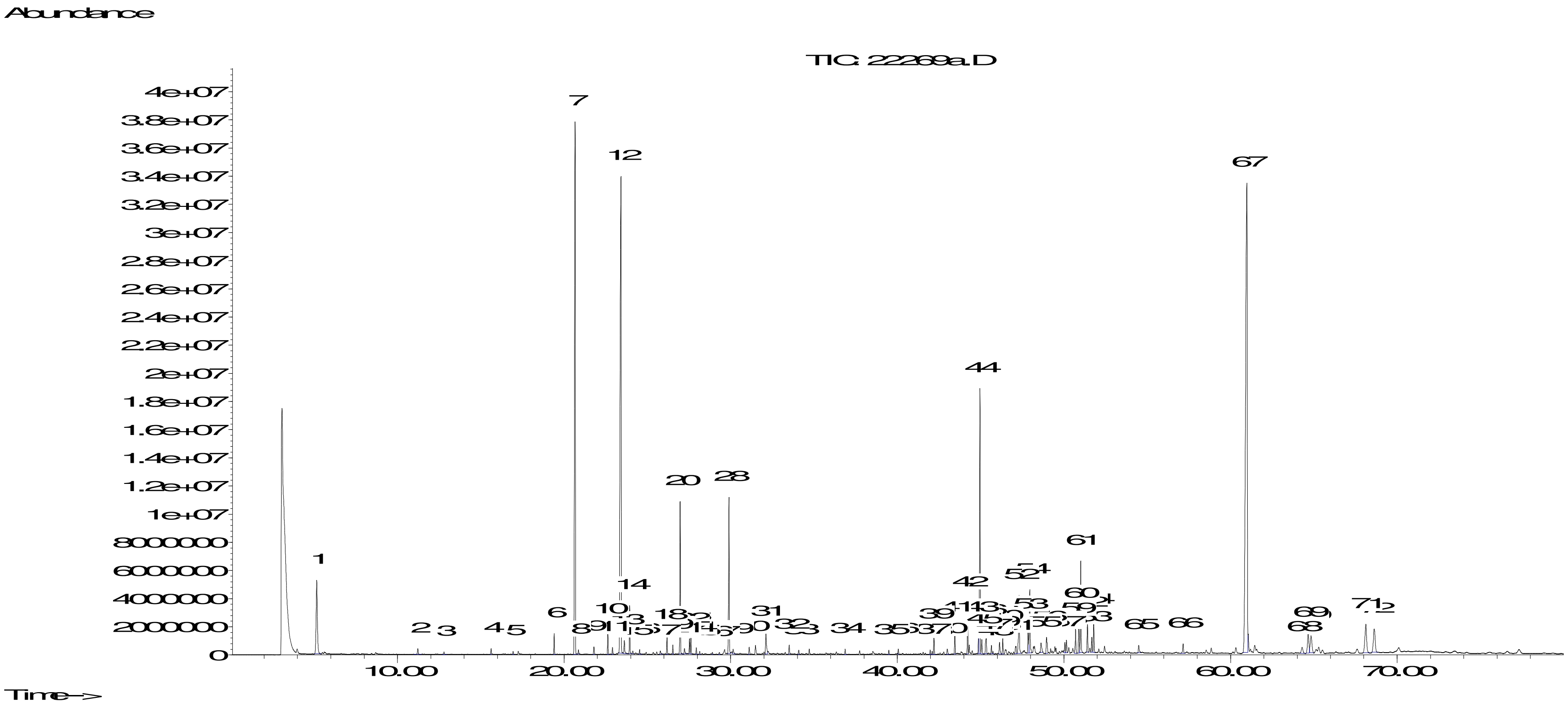
Pyrolysis GC/MS Analysis of	Polystyrene, 22269a		
Analysis performed by :	RGOTHVOMENDE	**Date:**	24.11.2010
Work Requested:	Pyrolysis 20 ℃ to 280 ℃		
Sample weight/volume:	**0.3671 mg**		
Sample weight after pyrolysis:	**0.3585 mg**		
Number of peaks integrated:	72		
Notes:	first peak in the chromatogram: air		

Peak #	RT	MW	Identification	Area %	CAS #
1	5,15	72	Probably 2-Methylbutane	3,06%	78-78-4
2	11,23	78	Benzene	0,14%	71-43-2
3	12,79	86	Pentanal	0,08%	110-62-3
4	15,62	92	Toluene	0,11%	108-88-3
5	16,94	100	Hexanal	0,06%	66-25-1
6	19,41	106	Ethylbenzene	0,39%	100-41-4
7	20,66	104	Styrene	15,93%	100-42-5
8	20,86	114	Heptanal	0,08%	111-71-7
9	21,79	120	Isopropylbenzene	0,14%	98-82-8
10	22,63	N/MW	Propenylbenzene Isomer	0,45%	N/P
11	22,91	120	Propylbenzene	0,13%	103-65-1
12	23,42	106	Benzaldehyde	16,79%	100-52-7
13	23,62	94	Phenol	0,32%	108-95-2
14	23,94	118	à-Methylstyrene	0,89%	98-83-9
15	24,13	103	Benzonitrile	0,06%	100-47-0
16	24,53	128	Octanal	0,10%	124-13-0
17	25,78	108	Benzyl Alcohol	0,09%	100-51-6
18	26,18	120	Phenylacetaldehyde	0,37%	122-78-1
19	26,53	N/MW	Ethylstyrene Isomer	0,17%	N/P
20	26,97	120	Acetophenone	3,08%	98-86-2
21	27,23	N/MW	Dihydroxyacetophenone Isomer	0,16%	N/P
22	27,52	136	à-Cumyl alcohol	0,29%	617-94-7
23	27,61	150	Probably Methyl cumyl ether	0,32%	935-67-1
24	27,94	142	Nonanal	0,11%	124-19-6
25	28,14	134	Cumene aldehyde	0,06%	93-53-8
26	28,90	134	Benzyl methyl ketone	0,04%	103-79-7
27	29,32	N/MW	Phenylpentene Isomer	0,05%	N/P
28	29,89	N/MW	Phenylpropenal Isomer	3,24%	N/P
29	30,15	134	Phenyl ethyl ketone	0,14%	93-55-0
30	31,12	156	Decanal	0,15%	112-31-2
31	32,12	N/MW	Phenylpropenol Isomer	0,65%	N/P
32	33,51	N/MW	Phenylpropenal Isomer	0,18%	N/P
33	34,09	170	Undecanal	0,07%	112-44-7
34	36,87	184	Dodecanal	0,12%	112-54-9
35	39,49	198	Tridecanal	0,07%	10486-19-8
36	40,06	N/MW	Stilbene Isomer	0,10%	N/P
37	41,97	212	Tetradecanal	0,08%	124-25-4
38	42,09	N/MW	chromatography artefact	0,05%	N/P
39	42,20	N/MW	Alkyldiphenyl	0,38%	N/P

40	43,00	182	Benzophenone	0,14%	119-61-9
41	43,45	N/MW	Diphenylpropane Isomer	0,53%	N/P
42	44,22	N/MW	Alkyldiphenyl	0,98%	N/P
43	44,89	N/MW	Stilbene Isomer	0,53%	N/P
44	44,96	N/MW	Diphenylalkene	5,52%	N/P
45	45,07	N/MW	Probably Phenylalkene	0,32%	N/P
46	45,34	N/MW	Mix of Diphenylketone	0,66%	N/P
		N/MW	and Diphenylalkene		N/P
47	45,65	N/MW	Diphenylcyclobutane Isomer	0,17%	N/P
48	45,75	N/MW	Possibly Alkyldiphenyl	0,06%	N/P
49	46,13	N/MW	Possibly Alkyldiphenyl	0,31%	N/P
50	46,33	N/MW	Possibly Diphenyldiazacyclo-alkene	0,37%	N/P
51	47,12	N/MW	Mix of Diphenyldiketone	0,28%	N/P
		N/MW	and Diphenylalkene		N/P
52	47,31	N/MW	Diphenylalkene	1,59%	N/P
53	47,85	N/MW	Diphenylalkenone	0,72%	N/P
54	47,95	N/MW	Diphenylketone	1,41%	N/P
55	48,63	N/MW	Unknown	0,33%	N/P
56	48,96	N/MW	Possibly Diphenylalkenone	0,53%	N/P
57	50,06	N/MW	Diphenylketone	0,23%	N/P
58	50,16	N/MW	Diphenylalkene	0,26%	N/P
59	50,70	N/MW	Possibly Diphenyldiazacyclo-alkene	0,58%	N/P
60	50,90	N/MW	Diphenylpropenone Isomer	0,86%	N/P
61	51,02	N/MW	Diphenylbutenone Isomer	1,98%	N/P
62	51,41	N/MW	Possibly Diphenylalkenone	0,59%	N/P
63	51,67	N/MW	Diphenylfuran Isomer	0,31%	N/P
64	51,79	N/MW	Aromatic compound	0,67%	N/P
65	54,49	N/MW	Diphenyldiketone	0,23%	N/P
66	57,15	N/MW	Aromatic compound	0,30%	N/P
67	60,98	N/MW	Possibly Diphenylalkene	25,78%	N/P
68	64,30	N/MW	Aromatic compound	0,31%	N/P
69	64,66	N/MW	Probably Diphenylalkene	0,92%	N/P
70	64,83	N/MW	Probably Diphenylalkene	0,93%	N/P
71	68,12	N/MW	Possibly Diphenylketone	1,59%	N/P
72	68,62	N/MW	Probably Diphenylalkene	1,35%	N/P

Attachment: **Figure 1**

Key:
N/P-- Not possible to assign CAS # because only functionality is named.
N/MW -- Not possible to determine molecular weight
N/CAS--No CAS # assinged to this compound.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3.2e+07
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1.6e+07
1.4e+07
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1e+07
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6000000
4000000
2000000
0
10.00
20.00
30.00
40.00
50.00
60.00
70.00

Pyrolysis GC/MS Analysis of Polystyrene, 22269b
Analysis performed by : RGOTHVOMENDE **Date:** 24.11.2010
Work Requested: Pyrolysis 20 ℃ to 280 ℃
Sample weight/volume: **0.3659 mg**
Sample weight after pyrolysis: **0.3574 mg**
Number of peaks integrated: 71
Notes: first peak in the chromatogram: air

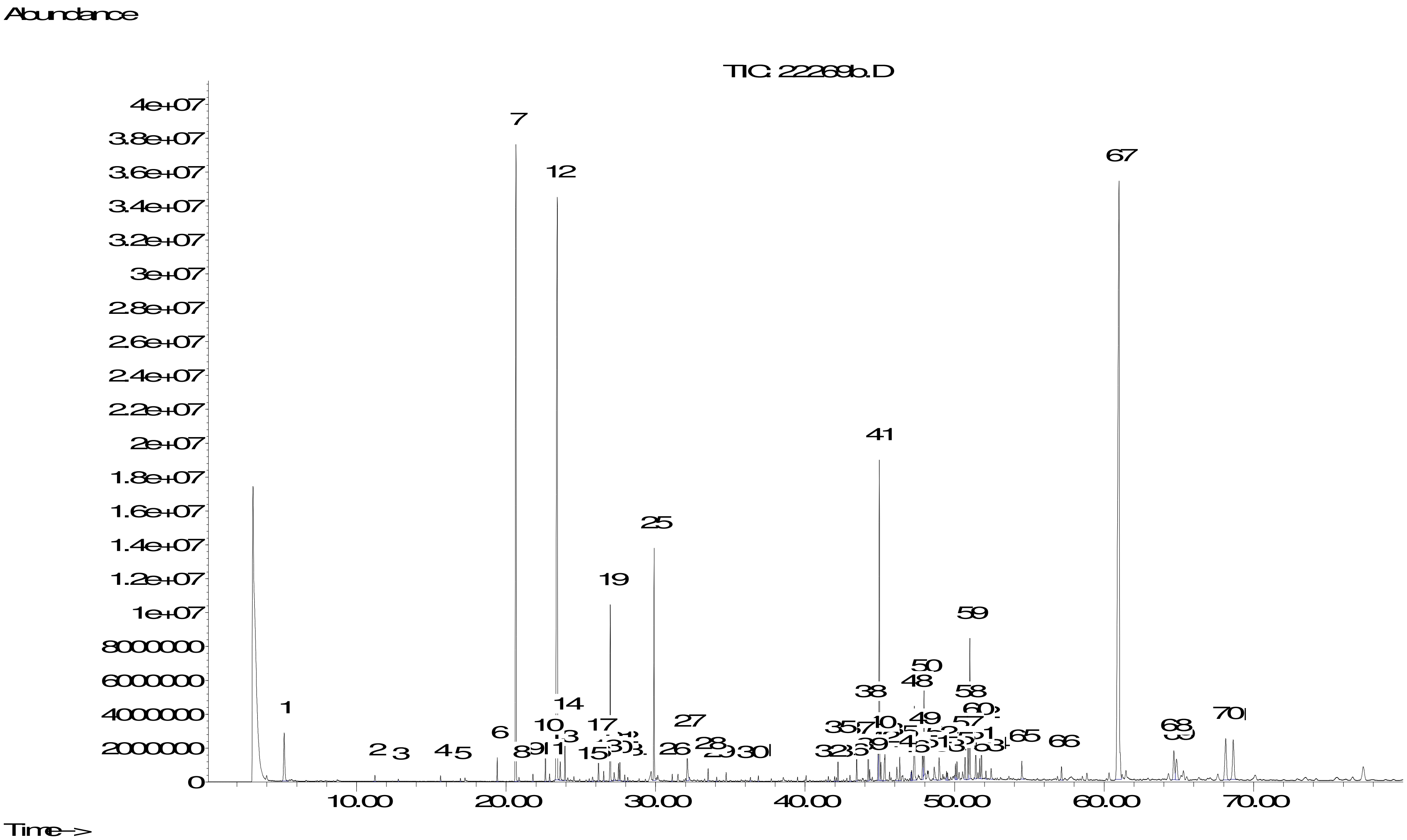
Peak #	RT	MW	Identification	Area %	CAS #
1	5,16	72	Probably 2-Methylbutane	1,50%	78-78-4
2	11,23	78	Benzene	0,11%	71-43-2
3	12,80	86	Pentanal	0,03%	110-62-3
4	15,62	92	Toluene	0,08%	108-88-3
5	16,95	100	Hexanal	0,04%	66-25-1
6	19,41	106	Ethylbenzene	0,34%	100-41-4
7	20,66	104	Styrene	14,60%	100-42-5
8	20,87	114	Heptanal	0,05%	111-71-7
9	21,80	120	Isopropylbenzene	0,11%	98-82-8
10	22,63	N/MW	Propenylbenzene Isomer	0,43%	N/P
11	22,91	120	Propylbenzene	0,11%	103-65-1
12	23,42	106	Benzaldehyde	16,16%	100-52-7
13	23,62	94	Phenol	0,36%	108-95-2
14	23,94	118	à-Methylstyrene	0,73%	98-83-9
15	25,56	N/MW	Propenylbenzene Isomer	0,05%	N/P
16	25,78	108	Benzyl Alcohol	0,10%	100-51-6
17	26,18	120	Phenylacetaldehyde	0,46%	122-78-1
18	26,53	N/MW	Ethylstyrene Isomer	0,14%	N/P
19	26,97	120	Acetophenone	2,82%	98-86-2
20	27,22	N/MW	Dihydroxyacetophenone Iso-mer	0,17%	N/P
21	27,53	136	à-Cumyl alcohol	0,26%	617-94-7
22	27,61	150	Probably Methyl cumyl ether	0,26%	935-67-1
23	27,93	142	Nonanal	0,10%	124-19-6
24	28,14	134	Cumene aldehyde	0,06%	93-53-8
25	29,90	N/MW	Phenylpropenal Isomer	3,86%	N/P
26	31,11	156	Decanal	0,11%	112-31-2
27	32,12	N/MW	Phenylpropenol Isomer	0,80%	N/P
28	33,51	N/MW	Phenylpropenal Isomer	0,19%	N/P
29	34,09	170	Undecanal	0,06%	112-44-7
30	36,34	N/MW	Phenylalkenal Isomer	0,07%	N/P
31	36,87	184	Dodecanal	0,08%	112-54-9
32	41,55	N/MW	Chromatography artefact	0,08%	N/P
33	41,97	212	Tetradecanal	0,07%	124-25-4
34	42,09	N/MW	chromatography artefact	0,05%	N/P
35	42,21	N/MW	Alkyldiphenyl	0,43%	N/P
36	43,00	182	Benzophenone	0,13%	119-61-9
37	43,45	N/MW	Diphenylpropane Isomer	0,43%	N/P
38	44,22	N/MW	Alkyldiphenyl	0,97%	N/P
39	44,32	N/MW	Aldehyde	0,15%	N/P
40	44,89	N/MW	Stilbene Isomer	0,50%	N/P
41	44,96	N/MW	Diphenylalkene	5,20%	N/P
42	45,07	N/MW	Probably Phenylalkene	0,32%	N/P
43	45,34	N/MW	Mix of Diphenylketone	0,69%	N/P
		N/MW	and Diphenylalkene		N/P

44	46,14	N/MW	Possibly Alkyldiphenyl	0,30%	N/P
45	46,33	N/MW	Possibly Diphenyldiazacyclo-alkene	0,38%	N/P
46	47,09	N/MW	Mix of Diphenyldiketone	0,10%	N/P
47	47,13	N/MW	Mix of Diphenyldiketone	0,14%	N/P
		N/MW	and Diphenylalkene		N/P
48	47,31	N/MW	Diphenylalkene	1,63%	N/P
49	47,85	N/MW	Diphenylalkenone	0,77%	N/P
50	47,95	N/MW	Diphenylketone	1,33%	N/P
51	48,63	N/MW	Unknown	0,43%	N/P
52	48,96	N/MW	Possibly Diphenylalkenone	0,57%	N/P
53	49,46	N/MW	Diphenylalkene	0,18%	N/P
54	49,52	N/MW	Diphenylalkenone	0,13%	N/P
55	50,06	N/MW	Diphenylketone	0,28%	N/P
56	50,16	N/MW	Diphenylalkene	0,30%	N/P
57	50,70	N/MW	Possibly Diphenyldiazacyclo-alkene	0,61%	N/P
58	50,90	N/MW	Diphenylpropenone Isomer	1,08%	N/P
59	51,02	N/MW	Diphenylbutenone Isomer	2,32%	N/P
60	51,42	N/MW	Possibly Diphenylalkenone	0,74%	N/P
61	51,67	N/MW	Diphenylfuran Isomer	0,34%	N/P
62	51,79	N/MW	Aromatic compound	0,66%	N/P
63	52,10	178	Possibly Phenacyl acetate	0,15%	2243-35-8
64	52,44	N/MW	Aromatic compound	0,27%	N/P
65	54,49	N/MW	Diphenyldiketone	0,39%	N/P
66	57,15	N/MW	Aromatic compound	0,30%	N/P
67	61,00	N/MW	Possibly Diphenylalkene	27,80%	N/P
68	64,66	N/MW	Probably Diphenylalkene	1,06%	N/P
69	64,84	N/MW	Probably Diphenylalkene	0,91%	N/P
70	68,13	N/MW	Possibly Diphenylketone	1,83%	N/P
71	68,63	N/MW	Probably Diphenylalkene	1,76%	N/P

Attachment: **Figure 1**

Key:

N/P-- Not possible to assign CAS # because only functionality is named.
N/M
W -- Not possible to determine molecular weight
N/CAS--No CAS # assinged to this compound.


Abundance
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3.6e+07
3.4e+07
3.2e+07
3e+07
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48
38
58
14
1
6
10
17
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26
28
70
68
65
66

Report of the

VOC Emissions Monitoring
carried out at

Honeywell– Waterford.

Mr. Cecil Black
Honeywell
IDA Ireland
Waterford

Work carried out on;-

28^{th} & 29^{th} March 2010
13^{th} & 14^{th} April, 2010
27^{th} & 28^{th} April 2010

Job No: 5025_Honeywell
By Mr. Jon Connor

Report Approved by:

Mr. Jon Connor
Senior Environmental Consultant
MCERTS Level 2

CONTENTS

Executive Summary

MONITORING OBJECTIVES

Honeywell Waterford

Introduction

City analysts were requested to carry out an emissions monitoring survey on four stacks at the plant in Waterford. The survey was carried out over six days.

The first visit in March was to monitor the ovens for Total Organic Carbon whilst the process was running with the afterburners on. This was done using an FID analyser.

The second visit in April was to monitor the ovens with the afterburners off. This was done using an FID analyser on all four ovens and an FTIR Analyser on ovens A2-5 & A2-6.

The third visit later in April was to monitor the ovens with the afterburners on using FTIR only.

Tenax tube samples were also taken on all four ovens during the visit in March and the first visit in April. The results are tabulated in Appendix 3

The Data collected by the FTIR has been tabulated as Total VOC's (Volatile Organic Compounds) as Carbon, Methane as Carbon and NMVOC's (Non Methane Volatile Organic Compounds) as Carbon.

The VOC emissions that were detected by the FTIR monitoring have been converted into mg/m^3 as Carbon. Example 1 mg/m^3 of Methane is equal to $^{12}/_{16}$ mg/m^3 of Methane as Carbon.

No data was collected for moisture or oxygen content on the 29th/30th March visit. FTIR data collected for oxygen and moisture content on the 27th/28th April has been used to reference that data. During both visits the afterburners were on.

On the 13th/14th April FTIR data was collected that included oxygen and moisture for A2-5 and A2-6, with the afterburners off. These have been used to reference the FID data collected on those dates. For A2-1and A2-2 oxygen data was collected on these dates but no moisture data. The results for A2-1 and A2-2 are referenced on a wet gas basis. This is noted in tables where this data appears.

EXECUTIVE SUMMARY

Monitoring Dates & Times

Emission Point	Sampling Date	Sampling Times	Duration (mins)
A2-1 Afterburner on	30/03/10	07:26 – 13:37	372
A2-1 Afterburner off	14/04/10	06:38 – 14:43	475
A2-1 Afterburner on	28/04/10	12:38 – 20:12	454
A2-2 Afterburner on	29/03/10	06:30 – 14:50	500
A2-2 Afterburner off	13/04/10	07:34 – 14:22	408
A2-2 Afterburner on	28/04/10	06:40 – 11:14	254
A2-5 Afterburner on	30/03/10	06:54 – 13:25	391
A2-5 Afterburner off	14/04/10	10:12 – 14:35	263
A2-5 Afterburner on	27/04/10	06:14 – 13:34	440
A2-6 Afterburner on	29/03/10	06:40 – 14:50	490
A2-6 Afterburner off	13/04/10	06:55 – 14:38	463
A2-6 Afterburner on	27/04/10	14:10 – 20:40	390

City Analysts Limited

SUMMARY OF RESULTS

Emission Point	A2-1 ON (FID)	A2-1 OFF (FID) *Wet gas*	A2-1 ON (FTIR)	A2-2 ON (FID)	A2-2 OFF (FID) *Wet gas*	A2-2 ON (FTIR)	A2-5 ON (FID)	A2-5 OFF (FID)	A2-5 OFF (FTIR)	A2-5 ON (FTIR)	A2-6 ON (FID)	A2-6 OFF (FID)	A2-6 (OFF) FTIR	A2-6 ON (FTIR)
Time (mins)	Total VOC's (as C) mg/m^3													
0 -30	**6.4**	7.3	**9.5**	12	3.1	-	**69**	-	-	-	**295**	215	256	-
30 – 60	4.2	5.2	9.0	11	2.9	-	55	-	-	**281**	276	208	257	**316**
60 – 90	3.7	3.8	7.1	5.8	12	-	48	-	-	240	226	**216**	267	247
90 – 120	3.9	3.8	7.3	**17**	57	-	24	-	-	187	214	**216**	**268**	159
120- 150	3.4	3.8	7.5	10	94	-	9.6	-	-	133	177	180	**268**	101
150 - 180	2.1	4.2	6.0	11	**113**	-	8.4	-	-	112	140	112	152	54
180 – 210	1.5	4.4	5.7	4.3	26	**27**	6.7	-	-	27	77	69	97	10
210 – 240	1.6	4.8	4.2	1.7	18	21	9.5	**239**	246	11	60	51	74	9.8
240 – 270	1.6	5.2	3.8	3.2	14	6.3	9.7	233	240	9.1	85	47	81	9.0
270 – 300	1.7	10	3.6	0.7	8.6	4.1	22	234	243	8.0	29	42	92	8.7
300 – 330	1.6	28	2.0	0.6	4.2	3.6	8.1	233	**251**	8.3	4.5	40	103	9.4
330 – 360	1.6	71	1.9	1.4	2.2	2.6	8.3	133	163	8.3	3.3	35	94	9.7
360 – 390	-	114	2.0	0.4	0.7	2.6	9.7	107	130	7.1	2.3	28	73	12
390 – 420	-	**139**	2.2	0.2	5.2	2.6	-	113	137	5.9	7.1	28	53	12
420 – 450	-	122	2.6	0.2	-	2.5	-	113	130	6.0	6.7	27	45	-
450 – 480	-	49	-	0.2	-	-	-	107	123	5.6	1.8	-	34	-
480 - 510	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-
ELV	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Mean	2.8	36	5.0	4.7	26	8.1	27	168	185	70	100	101	136	74

Refer to appendices for data and detailed information. Reference conditions 273K, 101.3 kPa, 17% Oxygen, dry gas

Executive Summary

MONITORING & ANALYTICAL METHODS

	Monitoring			Analysis			
Parameter	Standard	Technical Procedure	Accreditation	Analytical Technique	UKAS Analysis	UKAS No	LOD
Speciated VOC's	CEN 13649	TPM -06	None	GC-MS	Yes - Subcontracted	1549	1 µg
Total VOC's (as C)	CEN 13526	TPM -12	None	FID Bernath Analyser			0.2 ppm
Oxygen	ISO 12039	TPM-07	None	Zirconia Cell by Gas Met Analyser			0.1%
Speciated VOC's	ASTM D6348-03	TPM – 22	None	FTIR by Gas Met Analyser			0.01 ppm
Water Vapour	ASTM D6348-03	TPM - 22	None	FTIR by Gas Met Analyser			0.01%

SUMMARY OF SAMPLING DEVIATIONS

There were no deviations with the sampling employed

APPENDICES

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

NAME	Jonathan Connor
MCERTS ACCREDITATION	LEVEL 2
MCERTS NUMBER	MM 04 526
TECHNICAL ENDORSEMENTS	TE1

LIST OF EQUIPMENT

Manual Extractive Sampling Equipment		Instrumental Analysers	
Type	Identification	Type	Identification
SKC PUMP	C100	Bernath FID	Ashtead Technology Hire PO No:- AM
ROTAMETER (0-100mls/Min)	C312	Bernath FID	Quantitech Hire PO No:- AM
S-type Pitot	C203	Gas met FTIR	Quantitech Hire PO No:- AM
K Type Thermocouple	C202		
Digital Manometer	C301		
Digital Thermometer	C302		

Gas Type	Value	Cylinder Reference
Nitrogen – Zero	99.99% Nitrogen	CALGAZ 705317(12)
Propane- Span	100ppm Propane	AIR LIQUIDE 8446829
Oxygen	20.9% Oxygen	AIR LIQUIDE 8446829

APPENDIX 2

Total VOC's (as C): Results Summary

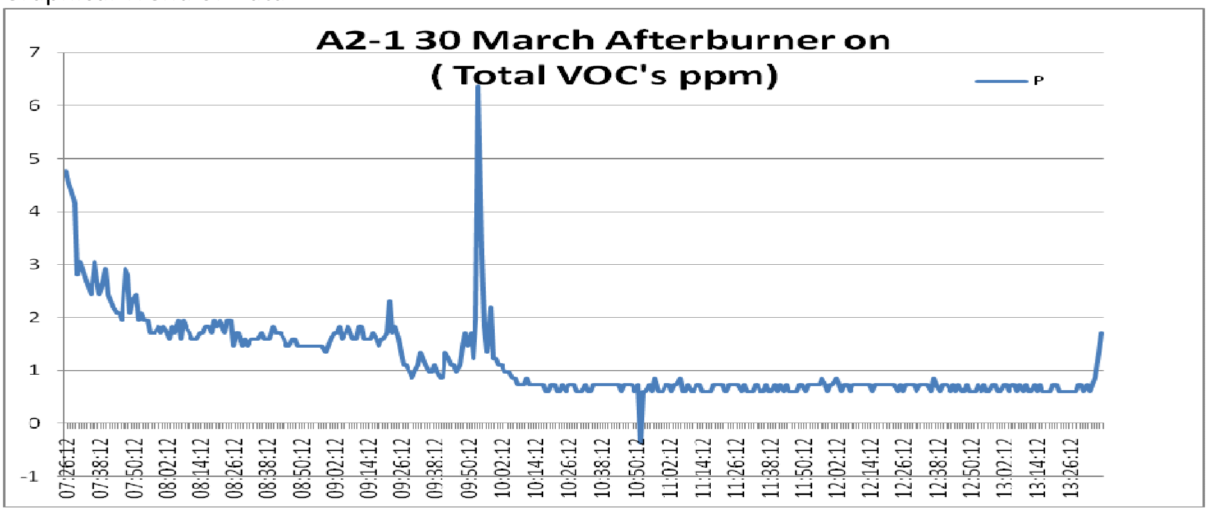
A2-1 (Afterburner ON) 30th March 2010

30 min Averages

Sample Time (mins)	Afterburner	Total VOC'S (as C) mg/m^3	Moisture (%)	Velocity (m/s)	Oxygen (%)
0-30	ON	**6.4**			
30-60		4.2		5.93	
60-90		3.7			
90-120		3.9			
120 – 150		3.4			
150 – 180		2.1			
180 – 210		1.5			
210 – 240		1.6			
240 – 270		1.6			
270 – 300		1.7			
300 – 330		1.6			
330 – 360		1.6			
360 – 390					
390 - 420					
420 – 450					
450 – 480					
480 - 500					
Emission Limit		20			
Average over full Cycle	-	2.8	1.07	5.93	18.04

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.
Corrections to data were applied by using FTIR results obtained on 28th April.

Graphical Trend of Data



APPENDIX 2

Total VOC's (as C): Sampling Details & Span/Zero Data
A2-1 Afterburner on 30th March 2010

Sampling Details

Parameter	Units	
Sampling Times	-	07:26 – 13:37
Sampling Dates	-	30th March 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100

Span and Zero

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	90

Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	1

Zero Drift is 1% [(Zero Finish – Zero Start)/(Analyser Range)] x 100
Less than 2% is Acceptable

Span Drift is 0.9% [(Span Finish – Span Start – Zero Finish)/(Analyser Range)] x 100
Less than 4% is Acceptable

APPENDIX 2

Total VOC's (as C): Results Summary

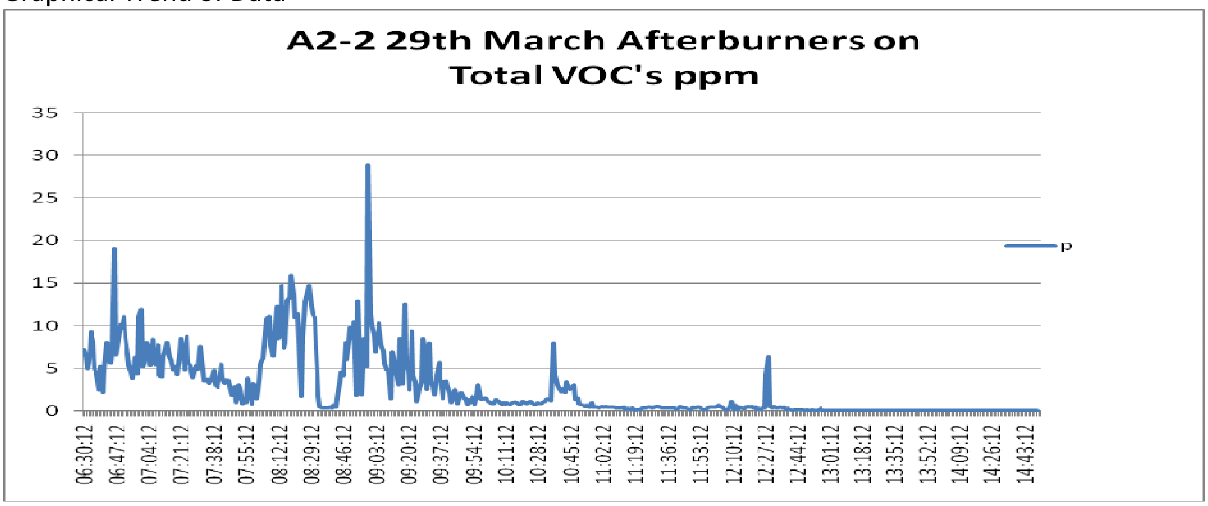
A2-2 (Afterburner ON) 29th March 2010

30 min Averages

Sample Time (mins)	Afterburner	Total VOC's (as C) mg/m^3	Moisture (%)	Velocity (m/s)	Oxygen (%)
0-30	ON	12			
30-60		11			
60-90		5.8			
90-120		**17**			
120-150		10			
150 - 180		11			
180 – 210		4.3			
210 - 240		1.7			
240-270		3.2			
270 – 300		0.7			
300 – 330		0.6			
330 – 360		1.4			
360 – 390		0.4			
390 – 420		0.2			
420 – 450		0.2			
450 - 480		0.2			
Emission Limit		20			
Average over full Cycle	-	4.75	6.51	5.80	17.11

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.
Corrections to data were applied by using FTIR results obtained on 28th April.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-2 Afterburner on 29th March 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:30 – 14:50
Sampling Dates	-	29th March 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100

Span and Zero

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	120

Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	4

% Zero Drift is 0.4 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 1.6 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

TOTAL VOC'S (as C): Results Summary

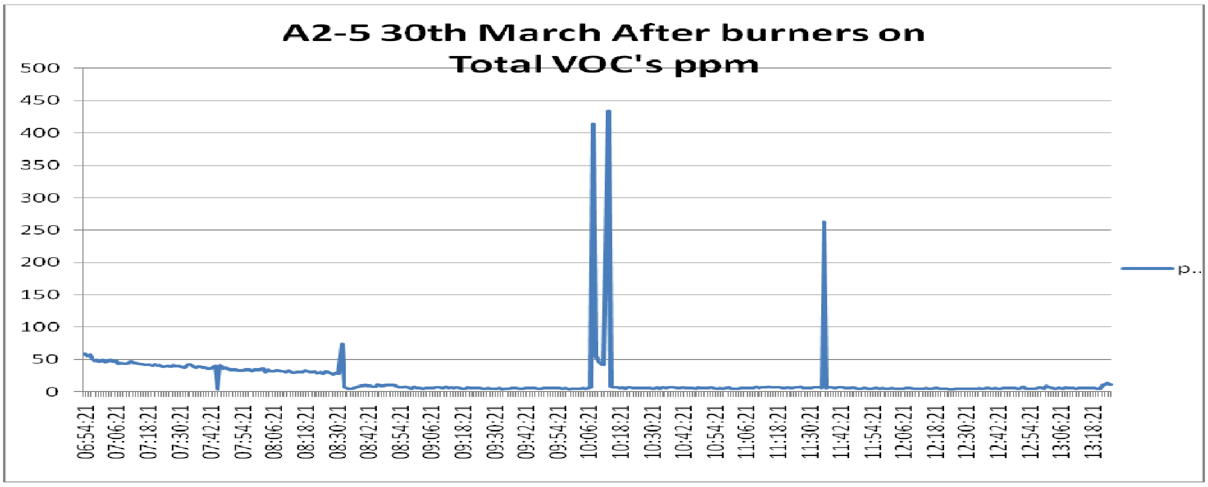
A2-5 (Afterburner ON) 30th March 2010

30 min Averages

Sample Time (mins)	Afterburner	TOTAL VOC'S (as C) mg/m^3	Moisture (%)	Velocity (m/s)	Oxygen (%)
0-30	ON	**69**			
30-60		55			
60-90		48		5.59	
90-120		24			
120-150		9.6			
150 - 180		8.4			
180 – 210		6.7			
210 - 240		9.5			
240-270		9.7			
270 – 300		22			
300 – 330		8.3			
330 – 360		9.7			
360 – 390		-			
390 – 420		-			
420 – 450		-			
450 - 480		-			
Emission Limit		20			
Average over full Cycle	-	27	6.06	5.59	16.32

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.
Corrections to data were applied by using FTIR results obtained on 28th April.

Graphical Trend of Data



City Analysts Limited

APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-5 Afterburner on 29th March 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:54 – 13:25
Sampling Dates	-	30th March 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100

Span and Zero

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	122

Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	4

% Zero Drift is 0.4 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 1.8 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Total VOC'S (as C): Results Summary

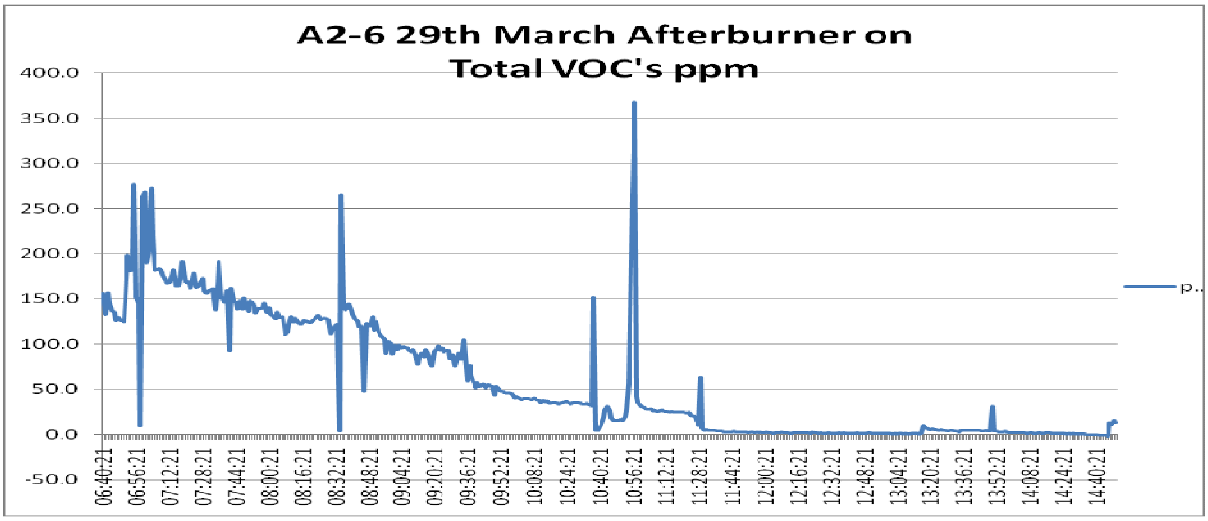
A2-6 (Afterburner ON) 29th March 2010

30 min Averages

Sample Time (mins)	Afterburner	TOTAL VOC'S (as C) mg/m^3	Moisture (%)	Velocity (m/s)	Oxygen (%)
0-30	ON	**295**			
30-60		276			
60-90		226			
90-120		214			
120-150		177			
150 - 180		140		5.41	
180 – 210		77			
210 - 240		60			
240-270		85			
270 – 300		29			
300 – 330		4.5			
330 – 360		3.3			
360 – 390		2.3			
390 – 420		7.1			
420 – 450		6.7			
450 - 480		1.8			
Emission Limit		20			
Average over full Cycle	-	100	6.19	5.41	16.92

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.
Corrections to data were applied by using FTIR results obtained on 28th April.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-6 Afterburner on 29th March 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:40 – 14:50
Sampling Dates	-	29th March 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100

Span and Zero

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	110

Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	6

% Zero Drift is 0.6 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 0.4% (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Total TOTAL VOC'S (as C): Results Summary

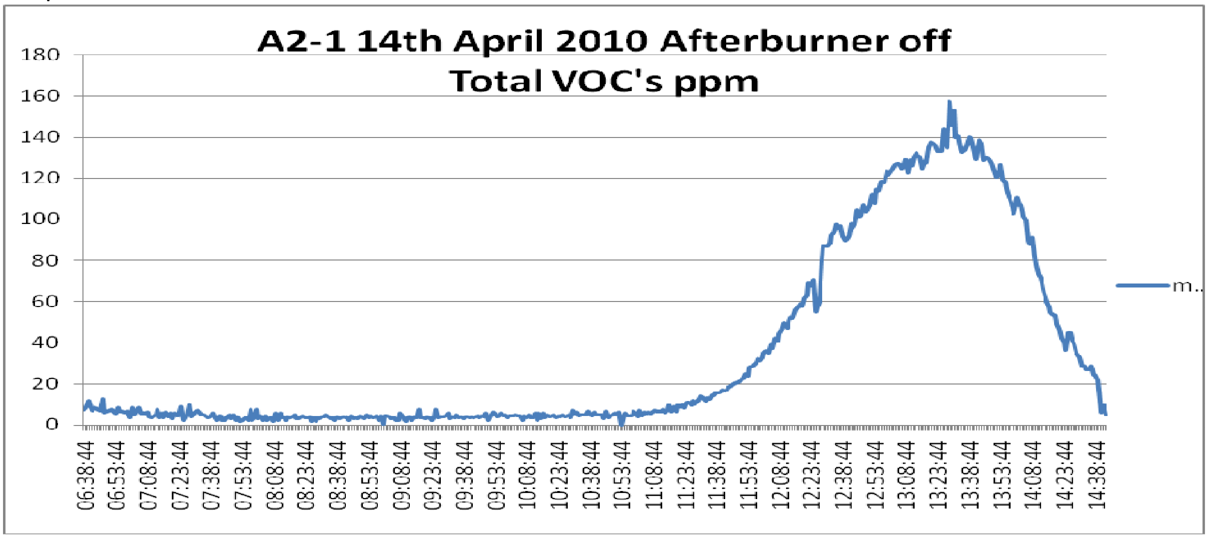
A2-1 (Afterburner Off) 14th April 2010

30 min Averages

Sample Time (mins)	Afterburner	TOTAL VOC'S (as C) mg/m^3	Moisture (%)	Velocity (m/s)	Oxygen (%)
0-30	OFF	7.3			
30-60		5.2			
60-90		3.8			
90-120		3.8			
120-150		3.8			
150 - 180		4.2			
180 – 210		4.4			
210 - 240		4.8			
240-270		5.2			
270 – 300		10			
300 – 330		28			
330 – 360		71			
360 – 390		114			
390 – 420		**139**			
420 – 450		122			
450 - 480		49			
Emission Limit		20			
Average over full Cycle	-	36	-	-	19.40

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference wet gas.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-1 Afterburner off 14th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:38-14:43
Sampling Dates	-	13th March 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100

Span and Zero

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	122

Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	4

% Zero Drift is 0.4 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 1.8 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

TOTAL VOC'S (as C): Results Summary

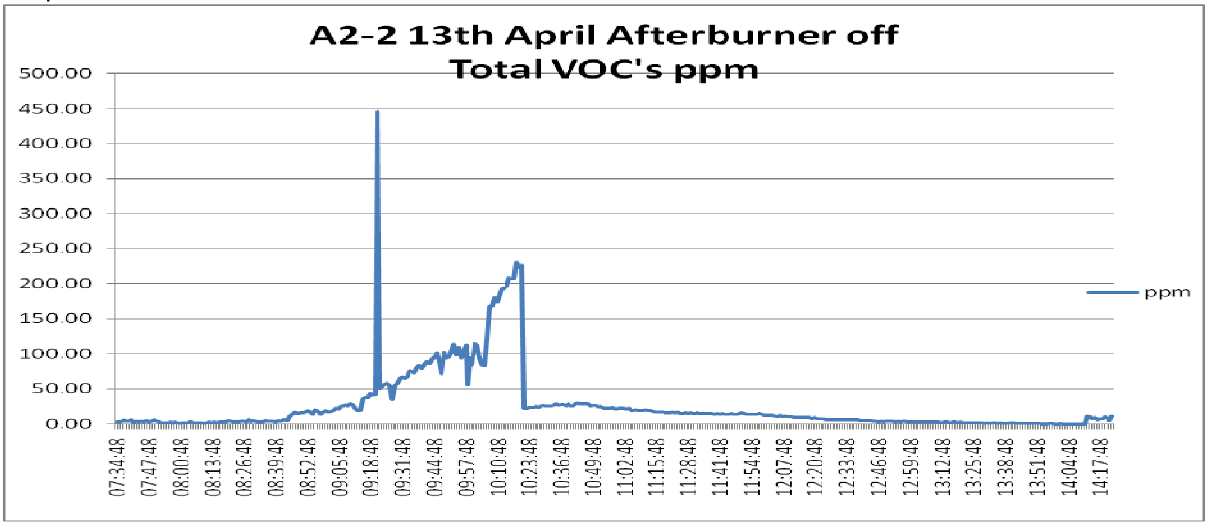
A2-2 (Afterburner Off) 13th April 2010

30 min Averages

Sample Time (mins)	Afterburner	TOTAL VOC'S (as C) mg/m^3	Moisture (%)	Velocity (m/s)	Oxygen (%)
0-30	OFF	3.1			
30-60		2.9			
60-90		12			
90-120		57			
120-150		94			
150 - 180		**113**			
180 – 210		26			
210 - 240		18			
240-270		14			
270 – 300		8.6			
300 – 330		4.2			
330 – 360		2.2			
360 – 390		0.7			
390 – 420		5.2			
420 – 450		-			
450 - 480		-			
Emission Limit		20			
Average over full Cycle	-	26	-	-	20.1

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference wet gas.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-2 Afterburner off 13th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	07:34-14:22
Sampling Dates	-	13th April 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100

Span and Zero

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	136

Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	8

% Zero Drift is 0.8 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 2.8 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Total VOC'S (as C): Results Summary

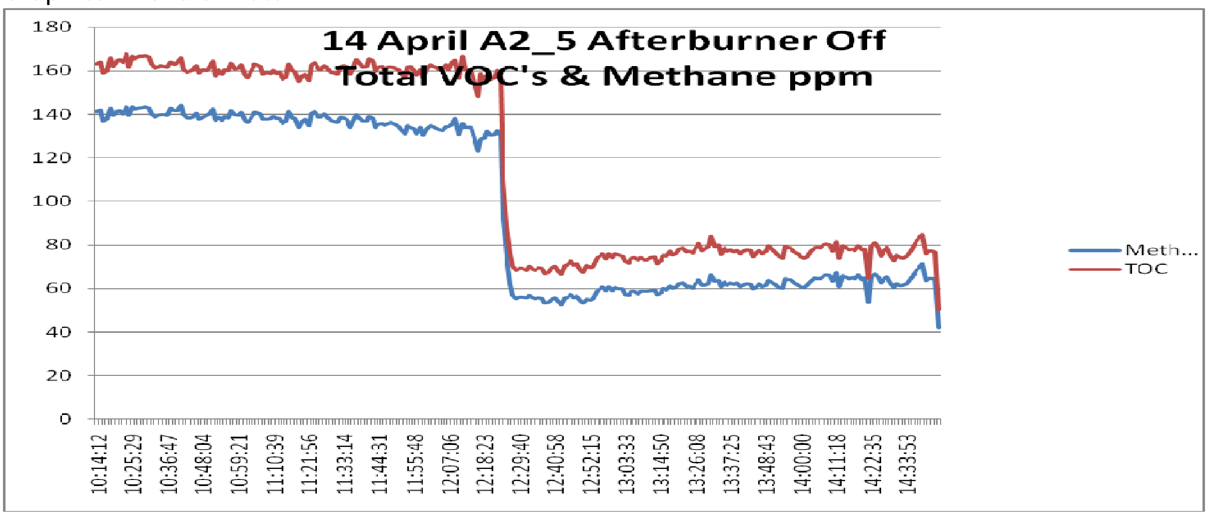
A2-5 (Afterburner Off) 14th April 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FID (as C) mg/m^3	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane FTIR (as C) mg/m^3	NMVOC's FTIR (as C) mg/m^3	H_2O (%)	Velocity (m/s)	Oxygen (%)
0-30	OFF	-	-	-	-	-	-	-
30-60		-	-	-	-	-	-	-
60-90		-	-	-	-	-	-	-
90-120		-	-	-	-	-	-	-
120-150		-	-	-	-	-	-	-
150 - 180		-	-	-	-	-	-	-
180 – 210		-	-	-	-	-	-	-
210 - 240		**239**	246	190	57	3.5	-	18.70
240-270		233	240	187	54	3.0	-	19.00
270 – 300		234	243	185	59	2.6	-	19.10
300 – 330		233	**251**	180	71	2.2	-	19.10
330 – 360		133	163	108	55	1.8	-	19.10
360 – 390		107	130	78	53	1.7	-	19.70
390 – 420		113	137	83	54	1.7	-	19.60
420 – 450		113	130	85	45	1.6	-	19.60
450 - 480		107	123	85	38	1.6	-	19.90
Emission Limit		20	20	-	-	-	-	-
Average over full Cycle	-	168	185	131	53	2.2	-	19.40

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data



City Analysts Limited

APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-5 Afterburner off 14th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	10:12-14:35
Sampling Dates	-	14th April 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FID)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	132
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	8

% Zero Drift is 0.8 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 2.8 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	102
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	0

% Zero Drift is 0.8 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 2.8 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Total TOTAL VOC'S (as C): Results Summary

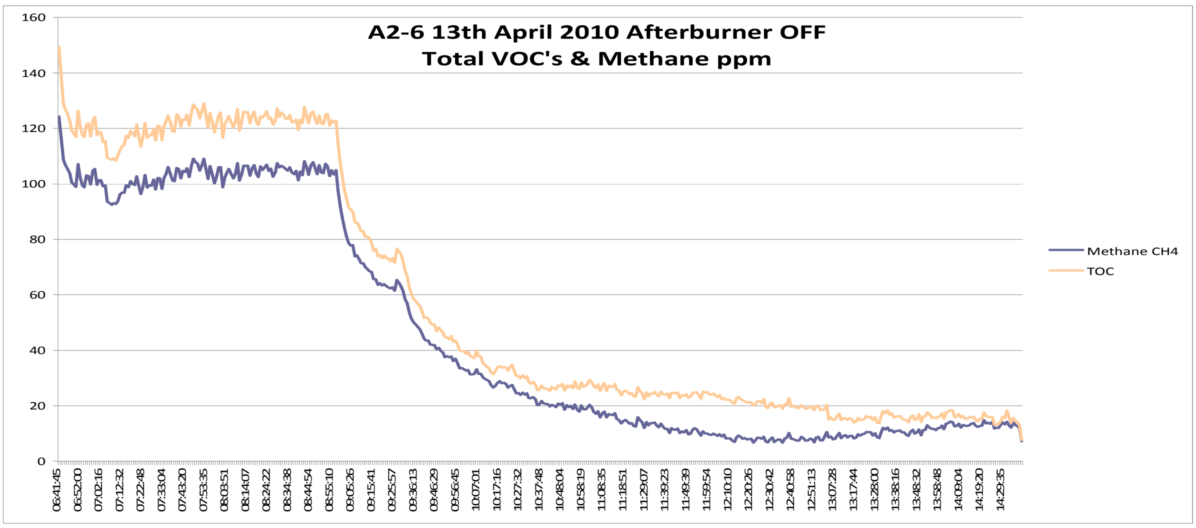
A2-6 (Afterburner Off) 13th April 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by $_{FID}$ (as C) mg/m^3	TOTAL VOC'S by $_{FTIR}$ (as C) mg/m^3	Methane $_{FTIR}$ (as C) mg/m^3	NMVOC's $_{FTIR}$(as C) mg/m^3	H_2O (%)	Velocity (m/s)	Oxygen (%)
0-30	OFF	215	256	191	64	6.9	-	18.4
30-60		208	257	190	66	6.0	-	18.6
60-90		**216**	**267**	197	69	5.5	-	18.5
90-120		**216**	**268**	198	69	5.0	-	18.6
120-150		180	**268**	175	60	4.0	-	18.9
150 - 180		112	152	111	40	3.6	-	19.5
180 – 210		69	97	67	29	3.0	-	20.1
210 - 240		51	74	47	27	2.5	-	20.3
240-270		47	81	36	46	2.2	-	20.2
270 – 300		42	92	26	66	2.0	-	20.2
300 – 330		40	103	19	84	1.8	-	20.2
330 – 360		35	94	15	79	1.8	-	20.4
360 – 390		28	73	16	57	1.6	-	20.5
390 – 420		28	53	19	34	1.3	-	20.9
420 – 450		27	45	22	22	1.2	-	21.0
450 - 480		-	34	24	10	1.2	-	21.0
Emission Limit		20	20	-	-	-	-	-
Average over full Cycle	-	101	136	85	51	3.1	-	19.9

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-6 Afterburner off 13th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:55 – 14:38
Sampling Dates	-	13th April 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FID)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	110
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	2	0	10

% Zero Drift is 0.8 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is <0.1 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	96
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0.2	0	0.8

% Zero Drift is <0.1 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is <0.1 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Total VOC'S (as C): Results Summary

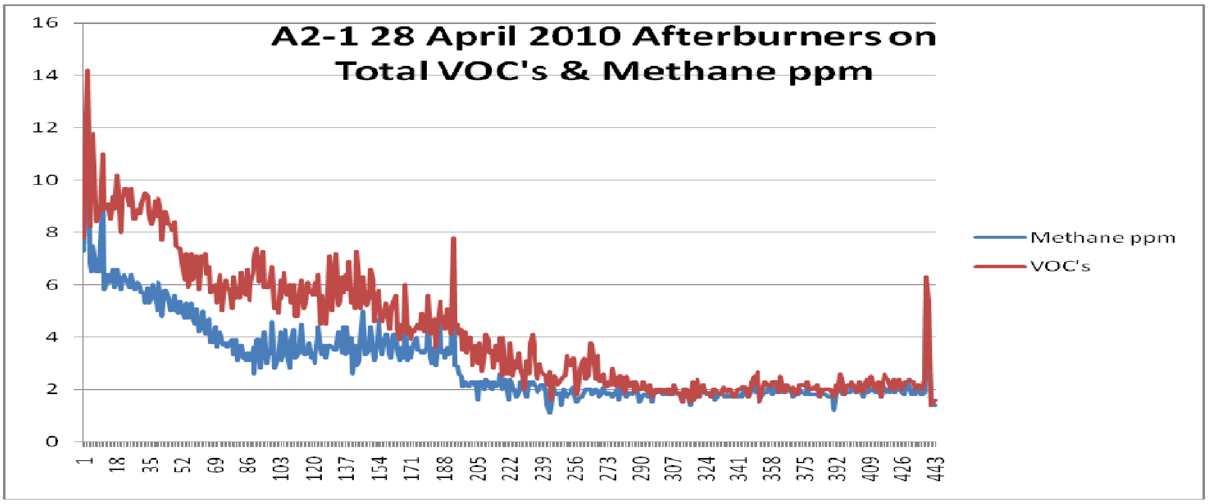
A2-1 (Afterburner On) 28th April 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane FTIR (as C) mg/m^3	NMVOC's FTIR (as C) mg/m^3	H_2O (%)	Velocity (m/s)	Oxygen (%)
0-30	ON	**9.5**	**5.3**	4.2	10	-	17.3
30-60		9.0	4.1	4.9	13	-	16.9
60-90		7.1	3.0	4.1	12	-	17.1
90-120		7.3	2.7	4.6	10	-	18.1
120-150		7.5	2.8	4.7	7.3	-	19.0
150 - 180		6.0	2.8	3.2	5.4	-	19.7
180 – 210		5.7	2.4	3.3	5.4	-	18.7
210 - 240		4.2	1.7	2.6	5.6	-	17.6
240-270		3.8	1.4	2.4	5.5	-	17.6
270 – 300		3.6	1.4	2.1	5.4	-	17.6
300 – 330		2.0	1.4	0.6	4.8	-	17.9
330 – 360		1.9	1.4	0.5	4.5	-	18.1
360 – 390		2.0	1.5	0.6	4.3	-	18.1
390 – 420		2.2	1.4	0.8	4.1	-	18.2
420 – 450		2.6	1.6	0.9	4.0	-	18.8
450 - 480		-	-	-	-	-	-
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	5.0	2.3	2.6	6.8		18.1

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-1 Afterburner on 28th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	12:38 – 20:12
Sampling Dates	-	28th April 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	111
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	1	0	2

% Zero Drift is 0.1 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 0.1 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

City Analysts Limited

APPENDIX 2

Total VOC'S (as C): Results Summary

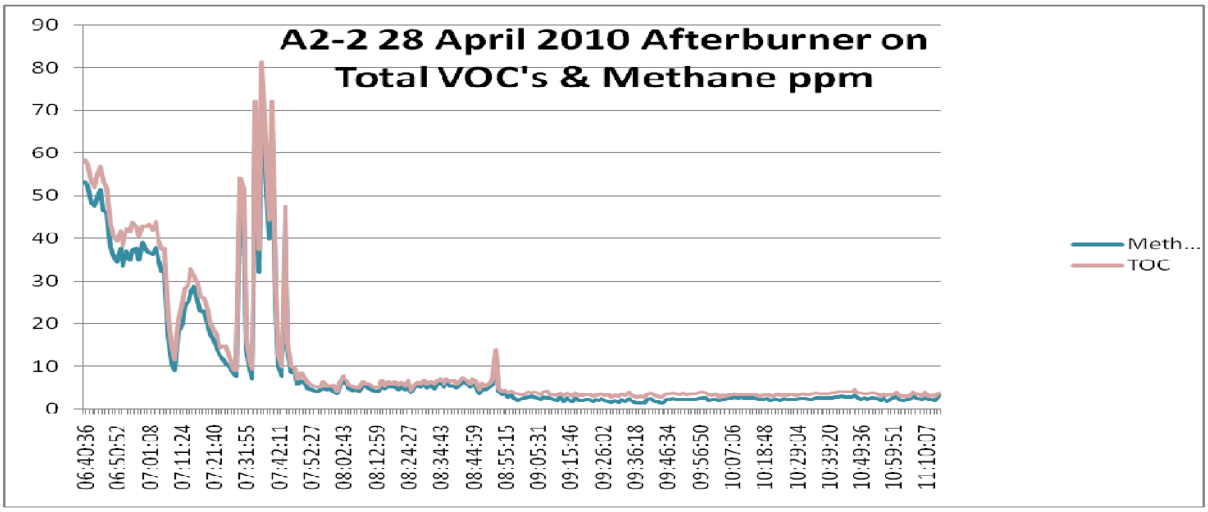
A2-2 (Afterburner On) 28th April 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane by FTIR (as C) mg/m^3	NMVOC's FTIR(as C) mg/m^3	H_2O (%)	Velocity (m/s)	Oxygen (%)
0-30		-	-	-		-	
30-60		-	-	-		-	
60-90		-	-	-		-	
90-120		-	-	-		-	
120-150		-	-	-		-	
150 - 180		-	-	-		-	
180 – 210		**27**	**21**	6.2	12	-	15.0
210 - 240	ON	21	15	5.2	9.6	-	15.6
240-270		6.3	4.5	1.8	6.9	-	18.5
270 – 300		4.1	3.0	1.2	5.7	-	19.6
300 – 330		3.6	2.4	1.3	4.9	-	18.5
330 – 360		2.6	1.2	1.4	5.5	-	17.7
360 – 390		2.6	1.3	1.3	4.9	-	17.9
390 – 420		2.6	1.4	1.2	4.5	-	18.1
420 – 450		2.5	1.4	1.1	4.2	-	18.3
450 - 480		-	-	-	-	-	-
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	8.1	5.8	2.3\	6.5	-	17.1

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-2 Afterburner on 28th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:40 – 11:14
Sampling Dates	-	28th April 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	128
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	2	0	6

% Zero Drift is 0.4 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 2.4 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Total VOC'S (as C): Results Summary

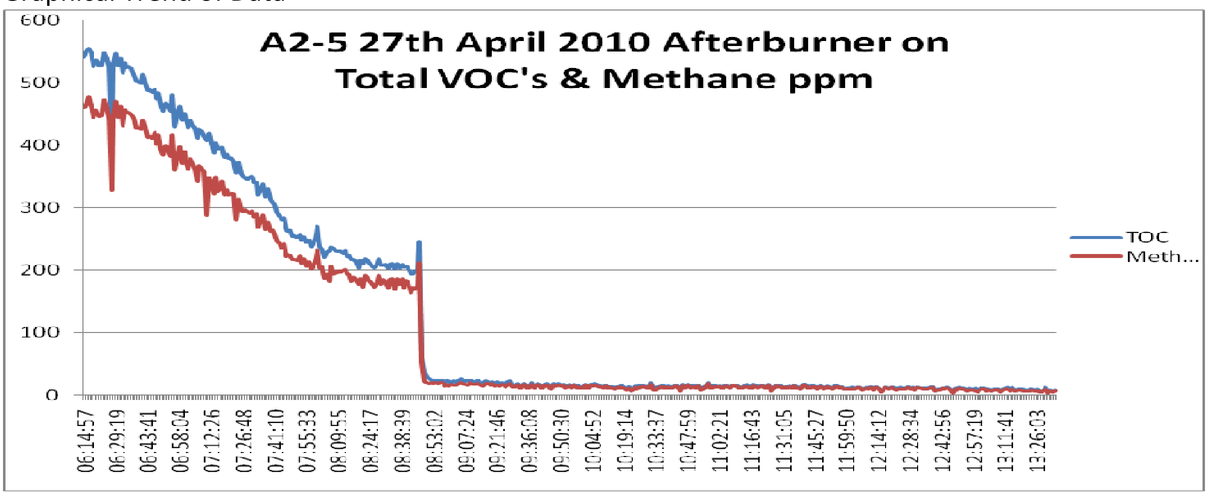
A2-5 (Afterburner On) 27th April 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane by FTIR (as C) mg/m^3	NMVOC's FTIR(as C) mg/m^3	H_2O (%)	Velocity (m/s)	Oxygen (%)
0-30	ON	-	-	-	-		-
30-60		**281**	**213**	67	12		11.8
60-90		240	182	59	11		12.5
90-120		187	141	46	8.9		13.8
120-150		133	102	31	7.2		15.6
150 - 180		112	87	25	5.1		17.3
180 – 210		27	20	7.5	6.0		16.8
210 - 240		11	7.4	3.4	5.1		7.1
240-270		9.1	6.6	2.5	4.8		17.0
270 – 300		8.0	5.4	2.6	5.1		17.4
300 – 330		8.3	6.1	2.1	4.4		17.4
330 – 360		8.3	6.1	2.3	4.3		17.4
360 – 390		7.1	5.4	1.7	4.0		17.8
390 – 420		5.9	4.8	1.1	4.2		17.7
420 – 450		6.0	4.0	2.0	4.0		17.8
450 - 480		5.6	3.5	2.1	4.0		17.9
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	70	53	17	6.0	-	16.3

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-5 Afterburner on 27th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:14 – 13:34
Sampling Dates	-	27th April 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	130
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	10

% Zero Drift is 1.0 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 2.0 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

City Analysts Limited

APPENDIX 2

Total VOC'S (as C): Results Summary

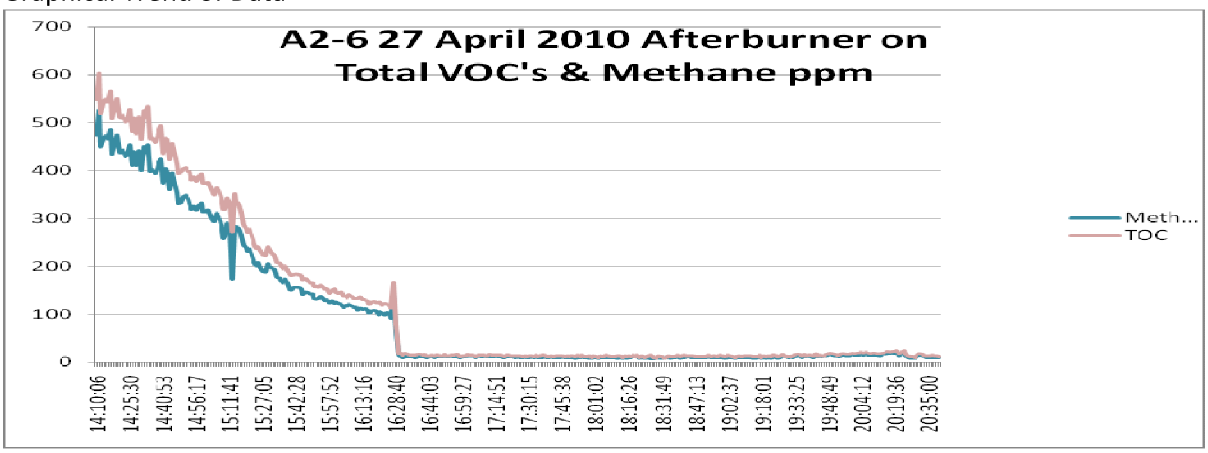
A2-6 (Afterburner On) 27th April 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m3	Methane by FTIR (as C) mg/m3	NMVOC's FTIR(as C) mg/m3	H_2O (%)	Velocity (m/s)	Oxygen (%)
0-30	ON	-	-	-	-		-
30-60		-	-	-	-		-
60-90		**316**	**243**	73	13		11.4
90-120		247	187	60	12		12.8
120-150		159	118	41	9		15.6
150 - 180		101	75	26	6		17.4
180 – 210		54	38	16	5.6		17.7
210 - 240		10	6.5	3.6	5.4		17.6
240-270		9.8	5.9	3.9	5.4		17.6
270 – 300		9.0	5.4	3.6	4.6		18.0
300 – 330		8.7	5.1	3.6	4.6		18.1
330 – 360		9.4	5.4	4.0	3.9		18.3
360 – 390		9.7	5.8	3.9	3.9		18.4
390 – 420		12	7.5	4.2	3.7		18.4
420 – 450		12	7.4	5.0	3.7		18.5
450 - 480		-	-	-	-		-
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	74	55	19	6.2	-	16.9

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-6 Afterburner on 27th April 2010

Sampling Details

Parameter	Units	
Sampling Times	-	14:10 – 20:40
Sampling Dates	-	27th April 2010
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	104	100	114
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	1	0	8

% Zero Drift is 0.7 (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 0.3 (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 3

VOC Results

The sampling was undertaken by using SKC charcoal tubes or Tenax Tubes and de ionised water.

All analysis was performed by SAL Ltd, Manchester who are UKAS ISO 17025 accredited for the tests.

There were a number of alkanes, alkenes, aldehydes and benzene related compounds identified in the analysis. Methane cannot be detected using this method and analysis technique

De ionised water was used but analysis on this media came back with results below the limit of detection.

Table 4.2 VOC Results
Tenax Tubes (30 min samples)

Stack ID	**Date of Monitoring**	**Afterburner On or Off**	**Concentration/ mg/m³**			***P0525-01 Licence Limit/ mg/m³***
			@ Actual Conditions	**@ STP**	**@ STP, 17% O_2 ref, dry gas**	
A2-1	30/03/10	On	Total VOC – 2.0	3.4	13.7	***None***
A2-2	29/03/10	On	Run 1 Total VOC – 1.3	2.2	8.9	***None***
		On	Run 2 Total VOC <0.7	<1.2	<4.8	
A2-5	30/03/10	On	Total VOC – 8.0	14	56	***None***
A2-6	29/03/10	On	Run 1 Total VOC – 25 Propane - 13	43 22	175 91	***None***
			Run 2 Total VOC – 1.0	1.7	7.0	
A2-2	13/04/10	Off	Run 1 Total VOC 0.14 Acetone - 0.017 Epoxy butadiene 0.003 Benzene – 0.095	0.193 0.024 0.005 0.131	0.774 0.096 0.020 0.527	***None***

Table 4.2 VOC Results (Continued) Tenax Tubes						
Stack ID	Date of Monitoring	Afterburner On or Off	Concentration/ mg/m^3 @ Actual Conditions	Concentration/ mg/m^3 @ STP	Concentration/ mg/m^3 @ STP, 17% O_2 ref, dry gas	*P0525-01 Licence Limit/ mg/m^3*
A2-2	13/04/10	Off	Run 1 Toluene – 0.004	0.006	0.025	***None***
			Benzaldehyde – 0.002	0.004	0.014	
			Benzoic Acid- 0.002	0.003	0.011	
			Run 2 Total VOC-0.146	0.199	0.798	***None***
			Acetone - 0.008	0.010	0.041	
			Methyl Ketone – 0.003	0.004	0.014	
			Benzene – 0.104	0.142	0.569	
			Toluene – 0.005	0.007	0.027	
			Styrene – 0.005	0.007	0.027	
			Benzaldehyde – 0.012	0.017	0.066	
A2-1	14/04/10	Off	Run 1 Total VOC-0.287	0.395	0.987	***None***
			Acetone-0.023	0.032	0.080	
			Epoxy butadiene-.005	0.006	0.016	
			Butanone-0.004	0.006	0.014	
			Benzene-0.220	0.303	0.758	
			Toluene-0.011	0.016	0.039	
			Styrene-0.014	0.019	0.048	
			Benzaldehyde-0.009	0.012	0.030	
			Acetophenone-0.004	0.005	0.013	
			Benzoic Acid-0.007	0.009	0.023	
			Run 2 Total VOC-0.179	0.245	0.614	
			Acetone- 0.017	0.023	0.059	
			Alkane C5 - 0.015	0.020	0.052	
			Epoxybutadiene 0 .004	0.006	0.016	
			Pentane- 0.008	0.118	0.029	
			Butanone- 0.003	0.004	0.011	
			Benzene- 0.113	0.154	0.387	
			Benzaldehyde- 0.006	0.008	0.021	

Table 4.2 VOC Results (Continued) Tenax Tubes						
Stack ID	Date of Monitoring	Afterburner On or Off	Concentration/ mg/m³			***P0525-01 Licence Limit/ mg/m³***
			@ Actual Conditions	@ STP	17% O_2 ref, dry gas	
A2-5	14/04/10	Off	Run 1 Total VOC- 0.171	0.236	0.582	***None***
			Butane- 0.004	0.005	0.013	
			Acetone- 0.008	0.011	0.027	
			Alkane C5- 0.040	0.055	0.136	
			Pentane- 0.021	0.029	0.072	
			Butanone- 0.004	0.005	0.013	
			Benzene- 0.023	0.032	0.079	
			Toluene- 0.005	0.007	0.018	
			Benzaldehyde- 0.007	0.009	0.023	
			Acetophenone- 0.005	0.007	0.016	
			Benzoic Acid- 0.014	0.019	0.047	
			Run 2 Total VOC- 0.12	0.008	0.026	
A2-6	13/104/10	Off	Run 1 Total VOC- 0.175	0.240	0.959	***None***
			Acetone – 0.021	0.028	0.114	
			Pentane- 0.004	0.006	0.022	
			DCM- 0.012	0.16	0.064	
			Butanone- 0.002	0.003	0.012	
			Hexane- 0.003	0.005	0.018	
			Benzene- 0.096	0.131	0.524	
			Toluene- 0.011	0.015	0.061	
			Xylene- 0.002	0.003	0.012	
			Run 2 Total VOC -0.107	0.147	0.588	
			Acetone- 0.007	0.009	0.037	
			Benzene- 0.079	0.109	0.436	
			Toluene- 0.003	0.003	0.014	
			Styrene- 0.004	0.005	0.021	
			Benzaldehyde- 0.006	0.009	0.034	

City Analysts Limited

Report of the

VOC Emissions Monitoring
carried out at

Honeywell– Waterford.

Mr. Cecil Black
Honeywell
IDA Ireland
Waterford

Work carried out on:

4th & 5th November 2010

Job No: 5064_Honeywell
By Mr. Jon Connor & Mr. Sean Culhane

Report Approved by:

Mr. Jon Connor
Senior Environmental Consultant
MCERTS Level 2

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CONTENTS

Executive Summary

MONITORING OBJECTIVES

Honeywell Waterford

Introduction

City analysts were requested to carry out an emissions monitoring survey on one stack at the plant in Waterford. The survey was carried out over two days.

Oven A2-5 was monitored using an FTIR gasmet analyser. On the 1st day the afterburner was off and the next day the afterburner was on.

The Data collected by the FTIR analyser has been tabulated as Total VOC's (Volatile Organic Compounds) as Carbon , NMVOC's (Non Methane Volatile Organic Compounds) as Carbon and Methane as Carbon.

The VOC emissions that were detected by the FTIR monitoring have been converted into mg/m^3 as Carbon. Example 1 mg/m^3 of Methane is equal to $^{12}/_{16}$ mg/m^3 of Methane as Carbon.

All the data has been corrected for Oxygen and moisture content. All values are referenced at 273K, 101.3kPa, dry gas at 17% O_2 unless stated otherwise.

EXECUTIVE SUMMARY

Monitoring Dates & Times

Emission Point	Sampling Date	Sampling Times	Duration (mins)
A2-5 Afterburner off	4th November	06:11 – 14:45	514
A2-5 Afterburner on	5th November	00:50 – 09:26	516

SUMMARY OF RESULTS

Time	A2-5 Afterburner off	A2-5 Afterburner on
Total VOC's (as C) mg/m^3		
0 -30	154	189
30 – 60	171	201
60 – 90	154	189
90 – 120	111	178
120- 150	108	143
150 - 180	95	135
180 – 210	103	145
210 – 240	100	151
240 – 270	103	111
270 – 300	114	39
300 – 330	139	38
330 – 360	222	37
360 – 390	297	38
390 – 420	**356**	37
420 – 450	341	43
450 – 480	301	44
480 - 510	260	45
ELV	20	20
Mean	185	102

Refer to appendices for data and detailed information.
Reference conditions 273K, 101.3 kPa, 17% Oxygen, dry gas

Executive Summary

MONITORING & ANALYTICAL METHODS

	Monitoring			Analysis	
Parameter	Standard	Technical Procedure	Accreditation	Analytical Technique	LOD
Oxygen	ISO 12039	TPM-07	None	Zirconia Cell by Gas Met Analyser	0.01%
Speciated VOC's	ASTM D6348-03	TPM – 22	None	FTIR by Gas Met Analyser	0.01 ppm
Water Vapour	ASTM D6348-03	TPM - 22	None	FTIR by Gas Met Analyser	0.1%

SUMMARY OF SAMPLING DEVIATIONS

There were no deviations with the sampling employed

APPENDICES

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

NAME	Jonathan Connor	Sean Culhane
MCERTS ACCREDITATION	Level 2	Level 1
MCERTS NUMBER	MM 04 526	MM 07
TECHNICAL ENDORSEMENTS	TE1	None

LIST OF EQUIPMENT

Manual Extractive Sampling Equipment		Instrumental Analysers	
Type	Identification	Type	Identification
S-type Pitot	C203	Gas met FTIR	Quantitech Hire PO No:- AM0290
K Type Thermocouple	C202		
Digital Manometer	C301		
Digital Thermometer	C302		

Gas Type	Value	Cylinder Reference
Nitrogen – Zero	99.99% Nitrogen	CALGAZ 705317(12)
Propane- Span	100ppm Propane	CALGAZ F21/07/10
Oxygen	20.9% Oxygen	AMBIENT AIR

APPENDIX 2

Total VOC'S (as C): Results Summary

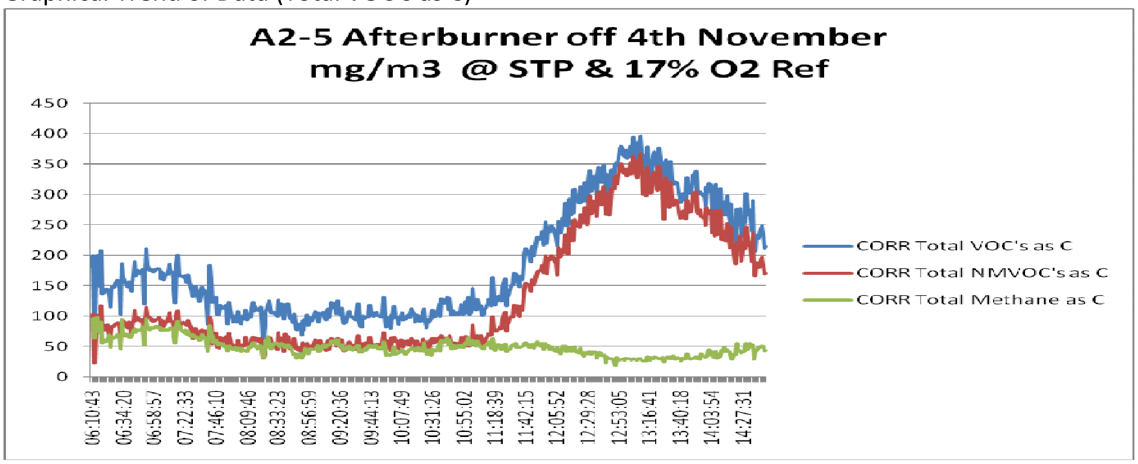
A2-5 (Afterburner Off) 4th November 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane by FTIR (as C) mg/m^3	NMVOC's by FTIR (as C) mg/m^3	H_2O (%)	Volume Flow (m^3/hr)	Oxygen (%)
0 - 30	OFF	154	71	83	**10.3**	4,292	18.41
30 - 60		171	**78**	93	**10.3**		18.38
60 - 90		154	72	82	9.5		18.41
90 - 120		111	52	59	8.1		18.73
120 - 150		108	52	56	6.2		18.98
150 - 180		95	44	51	5.2		19.13
180 – 210		103	50	53	3.5		19.43
210 - 240		100	45	55	2.7		19.59
240 - 270		103	46	57	2.1		**19.80**
270 – 300		114	54	60	1.7		19.76
300 – 330		139	51	88	1.4		19.77
330 – 360		222	50	172	1.1		19.76
360 – 390		297	42	255	0.9		19.65
390 – 420		**356**	30	**326**	0.8		19.42
420 – 450		341	30	311	0.7		19.25
450 - 480		301	33	268	0.7		19.38
480 - 510		260	43	217	0.6		19.57
Emission Limit		20	-	-	-	5,500	-
Average over full Cycle	-	185	50	135	3.8	4,292	19.26

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data (Total VOC's as C)



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-5 Afterburner off 4th November 2010

Sampling Details

Parameter	Units	
Sampling Times	-	06:11 – 14:45
Sampling Dates	-	4th November
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	110
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	6

% Zero Drift is 0.6% (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 0.4% (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Raw Data

A2-5 Afterburner off 4th November 2010

APPENDIX 2

Total VOC'S (as C): Results Summary

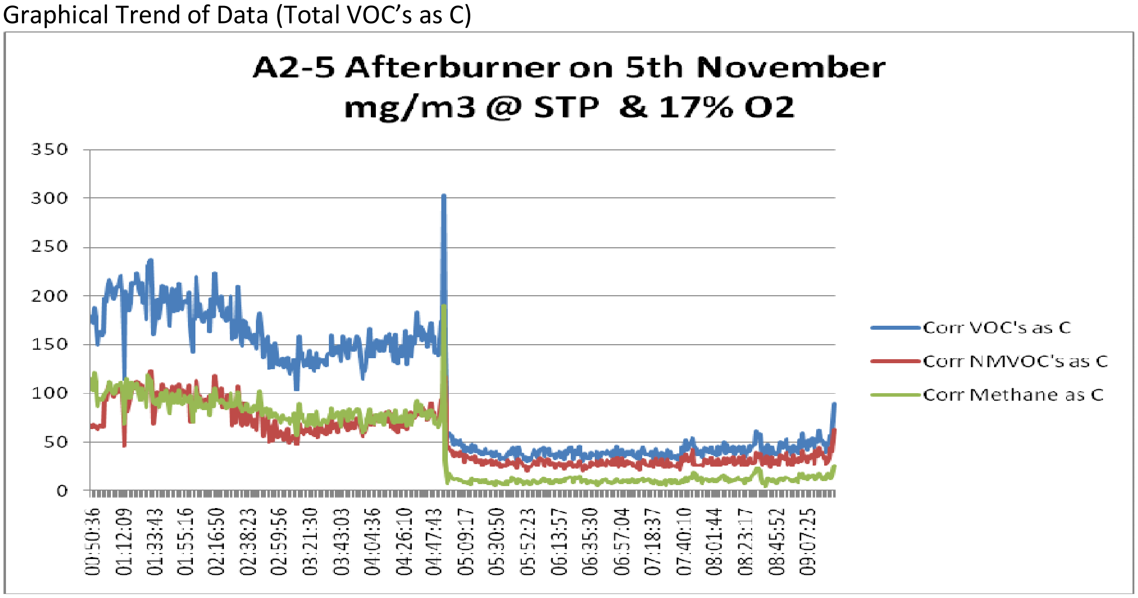
A2-5 (Afterburner on) 5th November 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane FTIR (as C) mg/m^3	NMVOC's FTIR(as C) mg/m^3	H_2O (%)	Volume Flow (m^3/hr)	Oxygen (%)
0 - 30		189	**103**	86	8.9	4,397	18.42
30 - 60		**201**	101	**100**	**10.4**		18.30
60 - 90		189	91	98	10.3		18.40
90 - 120		178	89	89	9.3		18.76
120 - 150		143	79	64	7.6		18.95
150 - 180		135	73	62	5.7		19.25
180 – 210		145	76	69	3.9		19.58
210 - 240		151	77	74	2.8		**19.76**
240 - 270	on	111	48	63	3.0		19.01
270 – 300		39	9	30	3.4		18.22
300 – 330		38	10	28	3.0		18.35
330 – 360		37	11	26	2.7		18.43
360 – 390		38	10	28	2.5		18.47
390 – 420		37	10	27	2.2		18.58
420 – 450		43	13	30	2.1		19.08
450 - 480		44	13	31	1.9		19.20
480 - 510		45	13	32	2.0		19.23
Emission Limit		20	-	-	-	5,500	-
Average over full Cycle	-	102	47	54	4.7	4,397	18.82

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data (Total VOC's as C)



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-5 Afterburner on 5th November 2010

Sampling Details

Parameter	Units	
Sampling Times	-	00:50 – 09:26
Sampling Dates	-	5th November
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	102	100	110
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	5

% Zero Drift is 0.5 % (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 0.3 % (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Raw Data

A2-5 Afterburner on 5th November 2010

APPENDIX 2

Comment

Comparing the graphs of A2-5 Afterburner on and A2-5 Afterburner off the general trend for methane and total VOC's is very similar in shape and magnitude. For the first 4 hours the methane is approximately half the contribution of total VOC's on both graphs. Then after 4 hours on the Afterburner off graph the methane drops a little and the total VOC's rise steadily, peak and fall off again with a similar gradient. The last four hours are when the highest VOC emissions occur and the contribution to the total VOC's from methane becomes less from 4 hours to 6 hours then increases again from 6 hours to 8 hours.

After 4 hours on the Afterburner on graph there is a sudden pulse and then the total VOC's and methane fall off but remain at a steady magnitude with the methane contributing approximately 25% to the total VOC's.

Comparing the overall average values for the total VOC's, the methane and the NMVOC's during both processes, the methane concentration is almost the same when afterburners are on or off, the NMVOC's and VOC's concentration are approximately 50% higher when the afterburners are off compared to when the afterburners are on.

Finally, the monitoring by FTIR has shown, at this time, that oven A2-5 can't meet the emission limit value of 20mg/m^3 at the reference conditions for total VOC's with the afterburner on or off

APPENDIX 2

Calculations

The calculations used in this report are as follows:

Convert ppm to mg/m^3

Concentration (mg/m^3) = ppm x (molecular weight / molar volume constant)

Mositure Correction

Correction factor = 100/(100- moisture(%))

Oxygen Correction

Correction Factor = (21-O_2 % Reference)/(21-O_2 %measured)

City Analysts Limited

Report of the

VOC Emissions Monitoring carried out at

Honeywell– Waterford.

Mr. Cecil Black
Honeywell
IDA Ireland
Waterford

Work carried out on:

7th & 8th September 2010

Job No: September_Honeywell
By Mr. Jon Connor

Report Approved by:

Mr. Jon Connor
Senior Environmental Consultant
MCERTS Level 2

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CONTENTS

Executive Summary

MONITORING OBJECTIVES

Honeywell Waterford

Introduction

City analysts were requested to carry out an emissions monitoring survey on two stacks at the plant in Waterford. The survey was carried out over two days.

Ovens A2-3 and A2-4 were monitored using an FTIR gasmet analyser.

The Data collected by the FTIR analyser has been tabulated as Total VOC's (Volatile Organic Compounds) as Carbon and NMVOC's (Non Methane Volatile Organic Compounds) as Carbon.

The VOC emissions that were detected by the FTIR monitoring have been converted into mg/m^3 as Carbon. Example 1 mg/m^3 of Methane is equal to $^{12}/_{16}$ mg/m^3 of Methane as Carbon.

All the data has been corrected for Oxygen and water concentration. All values are referenced at 273K, 101.3kPa, dry gas at 17% O_2 unless stated otherwise.

Ovens A2-3 and A2-4 were monitored with afterburners on.

EXECUTIVE SUMMARY

Monitoring Dates & Times

Emission Point	Sampling Date	Sampling Times	Duration (mins)
A2-4 Afterburner off	7th September	14:31 – 21:41	420
A2-3 Afterburner off	8th September	14:32 – 21:45	420

SUMMARY OF RESULTS

Time	A2-3 Afterburner ON	A2-4 Afterburner ON
Total VOC's (as C) mg/m^3		
0 -30	-	-
30 – 60	-	-
60 – 90	63	125
90 – 120	116	84
120- 150	254	153
150 - 180	404	27
180 – 210	156	42
210 – 240	82	22
240 – 270	62	21
270 – 300	28	25
300 – 330	24	24
330 – 360	23	28
360 – 390	21	32
390 – 420	21	32
420 – 450	21	32
450 – 480	23	33
ELV	20	20
Mean	90	49

Refer to appendices for data and detailed information.
Reference conditions 273K, 101.3 kPa, 17% Oxygen, dry gas

Executive Summary

MONITORING & ANALYTICAL METHODS

	Monitoring			Analysis			
Parameter	Standard	Technical Procedure	Accreditation	Analytical Technique	UKAS Analysis	UKAS No	LOD
Oxygen	ISO 12039	TPM-07	None	Zirconia Cell by Gas Met Analyser			0.1%
Speciated VOC's	ASTM D6348-03	TPM – 22	None	FTIR by Gas Met Analyser			0.01 ppm
Water Vapour	ASTM D6348-03	TPM - 22	None	FTIR by Gas Met Analyser			0.01%

SUMMARY OF SAMPLING DEVIATIONS

There were no deviations with the sampling employed

APPENDICES

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

NAME	Jonathan Connor
MCERTS ACCREDITATION	LEVEL 2
MCERTS NUMBER	MM 04 526
TECHNICAL ENDORSEMENTS	TE1

LIST OF EQUIPMENT

Manual Extractive Sampling Equipment		Instrumental Analysers	
Type	Identification	Type	Identification
S-type Pitot	C203	Gas met FTIR	Quantitech Hire PO No:- AM0265
K Type Thermocouple	C202		
Digital Manometer	C301		
Digital Thermometer	C302		

Gas Type	Value	Cylinder Reference
Nitrogen – Zero	99.99% Nitrogen	CALGAZ 705317(12)
Propane- Span	100ppm Propane	CALGAZ F21/07/10
Oxygen	20.9% Oxygen	AMBIENT AIR

APPENDIX 2

Total VOC'S (as C): Results Summary

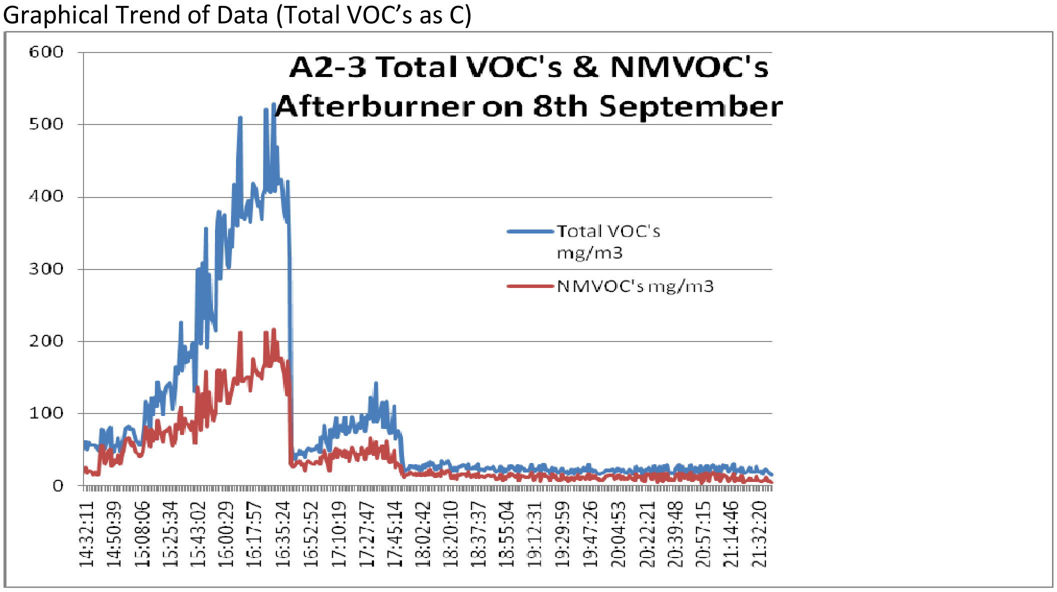
A2-3 (Afterburner On) 8th September 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane FTIR (as C) mg/m^3	NMVOC's FTIR(as C) mg/m^3	H_2O (%)	Volume Flow (m^3/hr)	Oxygen (%)
0-30		-	-	-	-	-	-
30-60		-	-	-	-	-	-
60-90		63	25	39	7.2	-	17.17
90-120		116	47	69	5.2	-	17.37
120-150		254	145	109	3.5	-	18.20
150 - 180		404	244	160	2.5	-	18.90
180 – 210		156	84	72	2.1	-	18.85
210 - 240	ON	82	38	44	1.7	-	19.24
240 - 270		62	31	31	2.1	-	18.04
270 – 300		28	11	16	2.7	-	17.16
300 – 330		24	10	13	2.5	-	16.89
330 – 360		23	10	12	2.3	-	16.95
360 – 390		21	9	11	2.3	-	16.97
390 – 420		21	9	12	2.2	-	17.22
420 – 450		21	9	12	2.1	-	17.53
450 - 480		23	12	11	2.0	-	18.35
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	90	48	42	2.9		17.78

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data (Total VOC's as C)



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-3 Afterburner off 8th September 2010

Sampling Details

Parameter	Units	
Sampling Times	-	14:32 – 21:32
Sampling Dates	-	8th September
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	108
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	4

% Zero Drift is 0.4 % {(Zero Finish – Zero Start)/(Analyser Range) x 100}
Less than 2% is Acceptable

% Span Drift is 0.4 % {(Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100}
Less than 4% is Acceptable

APPENDIX 2

Raw Data

A2-3 Afterburner off 8th September 2010

APPENDIX 2

Total VOC'S (as C): Results Summary

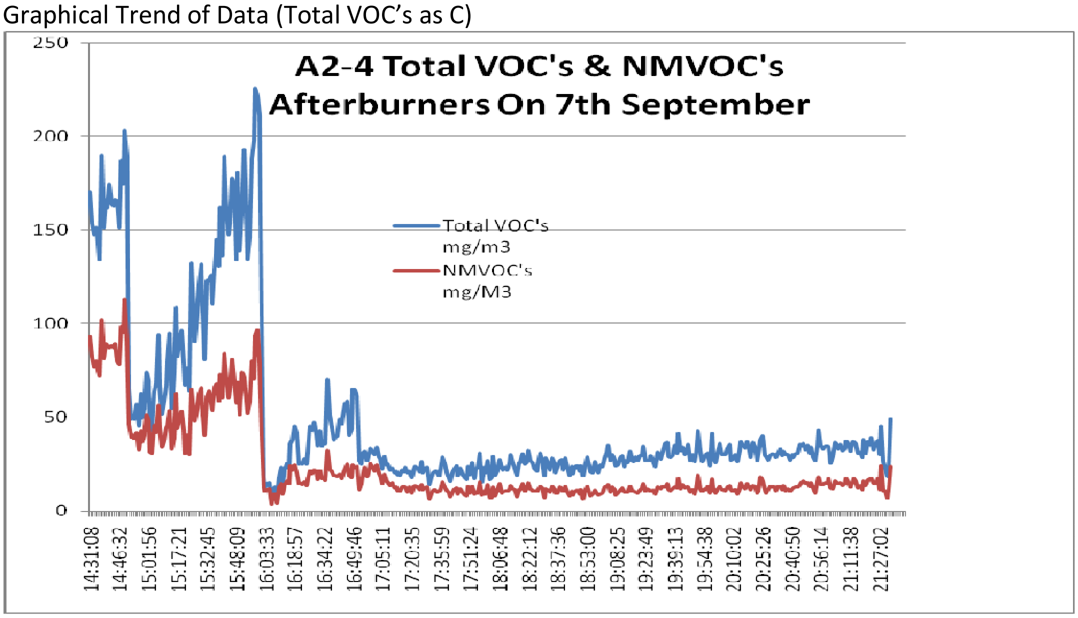
A2-4 (Afterburner Off) 7th September 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane FTIR (as C) mg/m^3	NMVOC's FTIR(as C) mg/m^3	H_2O (%)	Volume Flow (m^3/hr)	Oxygen (%)
0 - 30	OFF						
30 - 60							
60 - 90		131	58	73	7.4		16.82
90 - 120		81	35	46	5.9		17.35
120 - 150		154	88	66	4.2		17.80
150 - 180		29	13	16	3.0		18.44
180 – 210		43	22	20	2.8		18.06
210 - 240		23	9	14	3.4		16.64
240 - 270		21	11	11	3.1		16.73
270 – 300		25	14	11	3.0		17.21
300 – 330		24	14	11	2.7		17.00
330 – 360		29	17	11	2.5		17.34
360 – 390		32	19	12	2.4		17.49
390 – 420		32	19	12	2.2		17.41
420 – 450		33	19	14	2.2		17.11
450 - 480		28	15	12	2.1		17.12
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	49	25	24	3.4		17.32

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data (Total VOC's as C)



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-4 Afterburner on 7th September 2010

Sampling Details

Parameter	Units	
Sampling Times	-	14:30 – 21:30
Sampling Dates	-	7th September
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	98	100	109
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	6

% Zero Drift is 0.6 % (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 0.5 % (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Raw Data

A2-4 Afterburner on 7th September 2010

APPENDIX 2

Calculations

The calculations used in this report are as follows:

Convert ppm to mg/m^3

Concentration (mg/m^3) = ppm x molecular weight / molar volume constant

Mositure Correction

Correction factor = 100/(100- moisture(%)

Oxygen Correction

Correction Factor = (21-O_2 % Reference)/(21-O_2 %measured)

Report of the

VOC Emissions Monitoring carried out at

Honeywell– Waterford.

Mr. Cecil Black
Honeywell
IDA Ireland
Waterford

Work carried out on:

7th & 8th September 2010

Job No: September_Honeywell
By Mr. Jon Connor

Report Approved by:

Mr. Jon Connor
Senior Environmental Consultant
MCERTS Level 2

CONTENTS

Executive Summary

MONITORING OBJECTIVES

Honeywell Waterford

Introduction

City analysts were requested to carry out an emissions monitoring survey on two stacks at the plant in Waterford. The survey was carried out over two days.

Ovens A2-3 and A2-4 were monitored using an FTIR gasmet analyser.

The Data collected by the FTIR analyser has been tabulated as Total VOC's (Volatile Organic Compounds) as Carbon and NMVOC's (Non Methane Volatile Organic Compounds) as Carbon.

The VOC emissions that were detected by the FTIR monitoring have been converted into mg/m^3 as Carbon. Example 1 mg/m^3 of Methane is equal to $^{12}/_{16}$ mg/m^3 of Methane as Carbon.

All the data has been corrected for Oxygen and water concentration. All values are referenced at 273K, 101.3kPa, dry gas at 17% O_2 unless stated otherwise.

Ovens A2-3 and A2-4 were monitored with afterburners on.

EXECUTIVE SUMMARY

Monitoring Dates & Times

Emission Point	Sampling Date	Sampling Times	Duration (mins)
A2-4 Afterburner off	7th September	14:31 – 21:41	420
A2-3 Afterburner off	8th September	14:32 – 21:45	420

SUMMARY OF RESULTS

Time	A2-3 Afterburner ON	A2-4 Afterburner ON
Total VOC's (as C) mg/m^3		
0 -30	-	-
30 – 60	-	-
60 – 90	63	125
90 – 120	116	84
120- 150	254	153
150 - 180	404	27
180 – 210	156	42
210 – 240	82	22
240 – 270	62	21
270 – 300	28	25
300 – 330	24	24
330 – 360	23	28
360 – 390	21	32
390 – 420	21	32
420 – 450	21	32
450 – 480	23	33
ELV	20	20
Mean	90	49

Refer to appendices for data and detailed information.
Reference conditions 273K, 101.3 kPa, 17% Oxygen, dry gas

Executive Summary

MONITORING & ANALYTICAL METHODS

	Monitoring			Analysis			
Parameter	Standard	Technical Procedure	Accreditation	Analytical Technique	UKAS Analysis	UKAS No	LOD
Oxygen	ISO 12039	TPM-07	None	Zirconia Cell by Gas Met Analyser			0.1%
Speciated VOC's	ASTM D6348-03	TPM – 22	None	FTIR by Gas Met Analyser			0.01 ppm
Water Vapour	ASTM D6348-03	TPM - 22	None	FTIR by Gas Met Analyser			0.01%

SUMMARY OF SAMPLING DEVIATIONS

There were no deviations with the sampling employed

APPENDICES

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

NAME	Jonathan Connor
MCERTS ACCREDITATION	LEVEL 2
MCERTS NUMBER	MM 04 526
TECHNICAL ENDORSEMENTS	TE1

LIST OF EQUIPMENT

Manual Extractive Sampling Equipment		Instrumental Analysers	
Type	Identification	Type	Identification
S-type Pitot	C203	Gas met FTIR	Quantitech Hire PO No:- AM0265
K Type Thermocouple	C202		
Digital Manometer	C301		
Digital Thermometer	C302		

Gas Type	Value	Cylinder Reference
Nitrogen – Zero	99.99% Nitrogen	CALGAZ 705317(12)
Propane- Span	100ppm Propane	CALGAZ F21/07/10
Oxygen	20.9% Oxygen	AMBIENT AIR

APPENDIX 2

Total VOC'S (as C): Results Summary

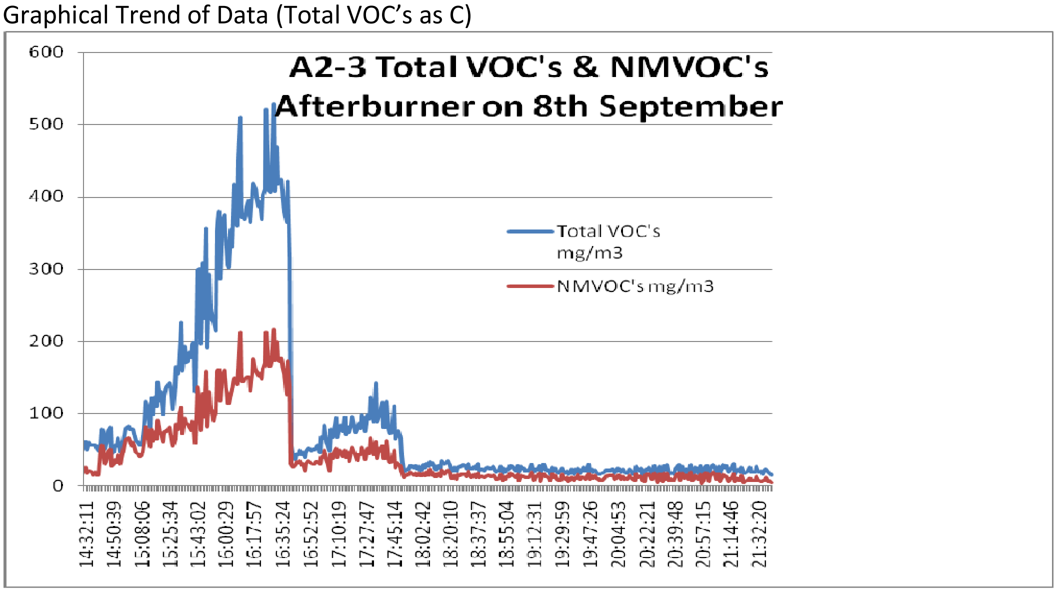
A2-3 (Afterburner On) 8th September 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane FTIR (as C) mg/m^3	NMVOC's FTIR(as C) mg/m^3	H_2O (%)	Volume Flow (m^3/hr)	Oxygen (%)
0-30	ON	-	-	-	-	-	-
30-60		-	-	-	-	-	-
60-90		63	25	39	7.2	-	17.17
90-120		116	47	69	5.2	-	17.37
120-150		254	145	109	3.5	-	18.20
150 - 180		404	244	160	2.5	-	18.90
180 – 210		156	84	72	2.1	-	18.85
210 - 240		82	38	44	1.7	-	19.24
240 - 270		62	31	31	2.1	-	18.04
270 – 300		28	11	16	2.7	-	17.16
300 – 330		24	10	13	2.5	-	16.89
330 – 360		23	10	12	2.3	-	16.95
360 – 390		21	9	11	2.3	-	16.97
390 – 420		21	9	12	2.2	-	17.22
420 – 450		21	9	12	2.1	-	17.53
450 - 480		23	12	11	2.0	-	18.35
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	90	48	42	2.9		17.78

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data (Total VOC's as C)



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-3 Afterburner off 8th September 2010

Sampling Details

Parameter	Units	
Sampling Times	-	14:32 – 21:32
Sampling Dates	-	8th September
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	100	100	108
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	4

% Zero Drift is 0.4 % {(Zero Finish – Zero Start)/(Analyser Range) x 100}
Less than 2% is Acceptable

% Span Drift is 0.4 % {(Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100}
Less than 4% is Acceptable

APPENDIX 2

Raw Data

A2-3 Afterburner off 8th September 2010

APPENDIX 2

Total VOC'S (as C): Results Summary

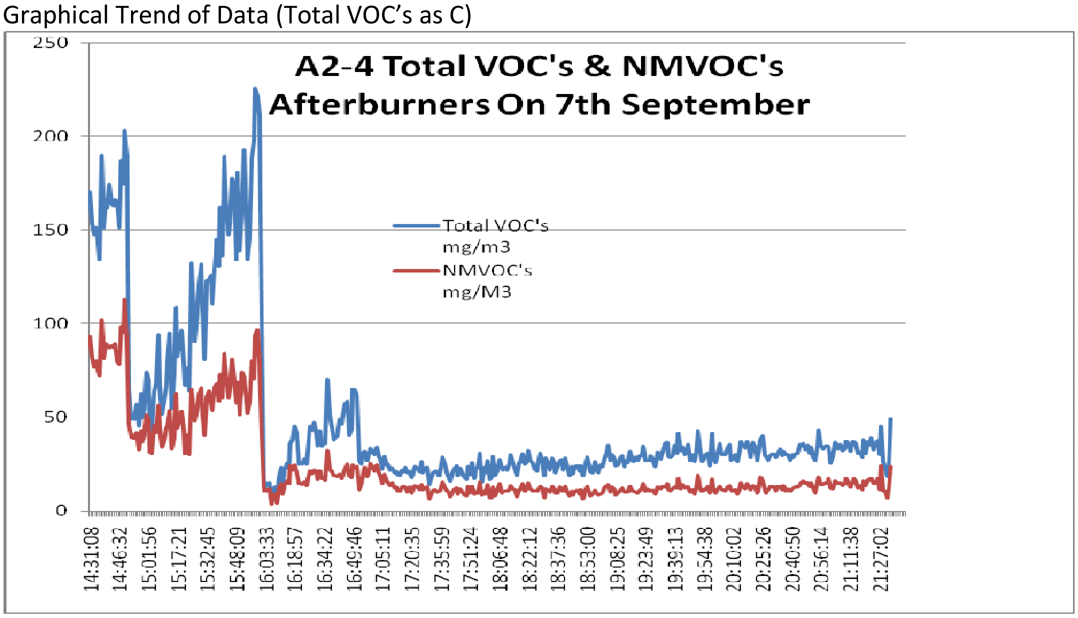
A2-4 (Afterburner Off) 7th September 2010

30 min Averages

Sample Time (mins)	After burner	TOTAL VOC'S by FTIR (as C) mg/m^3	Methane FTIR (as C) mg/m^3	NMVOC's FTIR(as C) mg/m^3	H_2O (%)	Volume Flow (m^3/hr)	Oxygen (%)
0 - 30	OFF						
30 - 60							
60 - 90		131	58	73	7.4		16.82
90 - 120		81	35	46	5.9		17.35
120 - 150		154	88	66	4.2		17.80
150 - 180		29	13	16	3.0		18.44
180 – 210		43	22	20	2.8		18.06
210 - 240		23	9	14	3.4		16.64
240 - 270		21	11	11	3.1		16.73
270 – 300		25	14	11	3.0		17.21
300 – 330		24	14	11	2.7		17.00
330 – 360		29	17	11	2.5		17.34
360 – 390		32	19	12	2.4		17.49
390 – 420		32	19	12	2.2		17.41
420 – 450		33	19	14	2.2		17.11
450 - 480		28	15	12	2.1		17.12
Emission Limit		20	-	-	-	-	-
Average over full Cycle	-	49	25	24	3.4		17.32

Reference Conditions are 273K, 101.3kPa, 17% Oxygen reference dry gas.

Graphical Trend of Data (Total VOC's as C)



APPENDIX 2

TOTAL VOC'S (as C): Sampling Details & Span/Zero Data
A2-4 Afterburner on 7th September 2010

Sampling Details

Parameter	Units	
Sampling Times	-	14:30 – 21:30
Sampling Dates	-	7th September
Instrument Range	ppm	1000
Span Gas Value	ppm	100 (PROPANE)

Span and Zero (FTIR)

Span (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Span Value	Span Reading	Span Value	Span Reading
100	98	100	109
Zero (via sampling line)			
Pre Sample/ppm		Post Sample/ppm	
Zero Value	Zero Reading	Zero Value	Zero Reading
0	0	0	6

% Zero Drift is 0.6 % (Zero Finish – Zero Start)/(Analyser Range) x 100
Less than 2% is Acceptable

% Span Drift is 0.5 % (Span Finish – Span Start – Zero Finish)/(Analyser Range) x 100
Less than 4% is Acceptable

APPENDIX 2

Raw Data

A2-4 Afterburner on 7th September 2010

APPENDIX 2

Calculations

The calculations used in this report are as follows:

Convert ppm to mg/m^3

Concentration (mg/m^3) = ppm x molecular weight / molar volume constant

Mositure Correction

Correction factor = 100/(100- moisture(%)

Oxygen Correction

Correction Factor = (21-O_2 % Reference)/(21-O_2 %measured)

Report of the
Emissions Monitoring carried
out at
Honeywell – Waterford.
January 2010

Mr. Cecil Black
Honeywell
IDA Ireland
Waterford

Work carried out on: 21st January 2010
Job No: 5009_Honeywell
By Mr. Jon Connor

Report Prepared by:

Mr. Sean Culhane
Senior Environmental Consultant

Report Approved by:

Mr. Jon Connor
Senior Environmental Consultant
MCERTS Level 2

1.0 INTRODUCTION

City analysts were requested to carry out an emissions monitoring survey on one stack at the plant in Waterford. The survey was carried out over one day. Emission points A2-13 was monitored on the 21st January for Total Organic Carbon (TOC) and Combustion Gases. The process was running normally during the monitoring.

This monitoring was due to be carried out in December but due to inclement weather on four occasions during December and the snow during January the 21st January was the earliest date that this monitoring could be carried out.

2.0 METHODOLOGY

The Methods used for the monitoring survey and the parameters sampled for are detailed in table 2.1 below:

Table 2.1 Monitoring Methods

Emission Point Ref ^	Parameter	Method	Analysis
A2-13	Oxides of Nitrogen (as NO_X)	ISO 12039	ElectroChemical Cell
	Carbon Monoxide (CO)	ISO 10849	ElectroChemical Cell
	TOC (as C)	CEN 13526	FID

*Analysis was carried out by a sub contracted UKAS Laboratory.

^ Temperature and flow were determined by using a pitot and thermocouple as detailed in CEN 13284

2.1 Monitoring of emissions to the atmosphere

Sampling was carried out by Mr. Jon Connor, a member of the technical staff from City Analysts Air Monitoring Department, who has MCERTS Level 2 personnel certification. All sampling was carried out in strict accordance with recognised standard procedures as detailed below.

2.2 Total Organic Carbon (TOC)

The TOC emissions were determined using a Bernath Atomic Flame Ionization Detector (FID). The Analyser uses a hydrogen flame which the sample gas passes through. Each carbon atom is ionized and this produces a signal that the analyser converts into a reading in parts per million (ppm). The analyser is calibrated using a zero gas and span gas of known concentration. The results are expressed in mg/Nm^3.

2.3 Combustion Gases

A Testo 350 xl combustion gas analyser was used to determine the concentration of NO_X and CO from the stack. The analyser uses electrochemical cell technology to provide a value in mg/m^3.

3.0 SAMPLING RECORD

The times of the sampling are detailed in table 3.1

Table 3.1 Sampling Record		
Emission Point Ref No	**Date and Time**	**Parameter**
A2-13	21st January 2009 12:25 – 12:55	TOC and Combustion Gases

4.0 RESULTS

The results of the monitoring are detailed in tables 4.1 to 4.3 below:-

Table 4.1 TOC (as C) Results			
Emission Point Ref	**Parameter**	**Concentration/ mg/Nm^3**	***P0525-01 Licence Limit/ mg/Nm^3***
A2-13	TOC (as C)	11	***20***

All results are expressed at STP (273K & 101.3kPa)

Table 4.2 NOx & CO Results 21/10/09			
Emission Point Ref	**Parameter**	**Concentration/ mg/Nm^3**	***P0525-01 Licence Limit/ mg/Nm^3***
A2-13	NO_X (as NO_2)	62	***100***
	CO	17	***None Stated***

All results are expressed at STP (273K & 101.3kPa) wet gas

Table 4.3 Volume Flow Results		
Emission Point Ref	**Nm^3/hr**	***P0525-01 Licence Limit/ Nm^3/hr***
A2-13	1,348	***None Stated***

All results are expressed at STP (273K & 101.3kPa)

5.0 COMMENTS

The results show that the emissions from stack A2-13 are below the limits stated in IPPC Licence No:-P0525-01 for NO_X Concentration and TOC Concentration.

Appendices

- Worksheet A2-13

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 05.05.2010
Date Received:06.05.2010
Date Analysis Commenced:06.05.2010
Our Ref: WS-27043, 10-38020
Certificate No: L/10/0970

	Sample ID	Well 2	Well 1
Determinand	**Lab ID**	**88238**	**88239**
Aluminium (ug/l)#	n/a	35	<10
BOD	n/a	<2	<2
Cadmium #	**	<0.03	<0.03
Chromium #	**	<0.05	<0.05
COD	n/a	<4	<4
Conductivity (uS/cm @ 20'C)	**	196	456
Copper #	**	<0.05	<0.05
Manganese #	**	<0.03	0.76
Nickel #	**	<0.10	<0.10
Nitrate	**	9	1
Sulphate	**	25	35
Zinc #	**	0.02	0.17

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

#: Analysis of metals are performed on the filtered sample.

Exceedances are highlighted in bold.
MAC = Maximum Admissable Concentration.
MRC = Minimum Required Concentration.

TelLab

ANALYSIS OF AQUEOUS SAMPLE.

Date Sampled: 29.09.2010
Date Received: 30.09.2010
Date Analysis Commenced: 30.09.2010
Our Ref: WS-28117
Certificate No: L/10/2079

	Sample ID	**Well 1**	**Well 2**
Determinand	**Lab ID**	**91377**	**91378**
Aluminium (ug/l)	n/a	<10	<10
BOD	n/a	<2	<2
COD	n/a	<4	<4
Copper#	**	<0.05	<0.05
Cadmium#	**	<0.03	<0.03
Chromium#	**	<0.05	<0.05
Conductivity (uS/cm @ 20'C)	**	456	502
Manganese#	**	0.61	0.12
Nickel#	**	<0.10	<0.10
Zinc#	**	0.14	0.05
Nitrate	**	2	5
Sulphate	**	33	37

Results expressed as mg/l (ppm)
unless stated otherwise

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests

Analysis of metals are performed on the filtered sample.

The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

ANALYSIS OF AQUEOUS SAMPLE.
Date Sampled: 05.05.2010
Date Received:06.05.2010
Date Analysis Commenced:06.05.2010
Our Ref: WS-27043, 10-38020
Certificate No: L/10/0970
Volatile Organic Compounds ++

Determinand	Sample ID Lab ID	Well 2 88238	Well 1 88239
Total VOC's		12	17
1,1 Dichloroethylene		<1	<1
Methylene Chloride		<1	<1
Trans-1,2-dichloroethylene		<1	<1
1,1-dichloroethane		<1	<1
2,2-dichloropropane+1,2-dichloroethylene		<1	<1
Bromochloromethane		<1	<1
Chloroform		12	<1
1,1,1-trichloroethane		<1	17
Carbon tetrachloride + 1,1-dichloropropene		<1	<1
Benzene		<1	<1
1,2-dichloroethane		<1	<1
Trichloroethylene		<1	<1
1,2-dichloropropane		<1	<1
Dibromomethane		<1	<1
Bromodichloromethane		<1	<1
cis-1,3-dichloropropene		<1	<1
Toluene		<1	<1
trans-1,3-dichloropropene		<1	<1
1,1,2-trichloroethane		<1	<1
Tetrachloroethylene		<1	<1
1,3-dichloropropane		<1	<1
Dibromochloromethane		<1	<1
1,2-dibromoethane		<1	<1
Chlorobenzene		<1	<1
Ethylbenzene+1,1,1,2-tetrachloroethane		<1	<1
m+p-Xylene		<1	<1
o-Xylene		<1	<1
Styrene		<1	<1
Bromoform		<1	<1
Isopropylbenzene		<1	<1
Bromobenzene		<1	<1
1,2,3-trichloropropane		<1	<1
n-propylbenzene		<1	<1
2-chlorotoluene		<1	<1
1,3,5-trimethylbenzene		<1	<1
4-chlorotoluene		<1	<1
Tert-butylbenzene		<1	<1
1,2,4-trimethylbenzene		<1	<1
sec-butylbenzene		<1	<1
1,3-dichlorobenzene+p-isopropyltoluene		<1	<1
1,4-dichlorobenzene		<1	<1
n-butylbenzene		<1	<1
1,2-dichlorobenzene		<1	<1
1,2-dibromo-3-chloropropane		<1	<1
1,2,4-trichlorobenzene		<1	<1
Hgexachlorobutadiene		<1	<1
Naphthalene		<1	<1
1,2,3-trichlorobenzene		<1	<1

Concentrations expressed in ug/L (ppb) unless otherwise stated

** = INAB Accredited Tests ++ = Subcontracted Tests n/a = Non-INAB Accredited Tests
The above results relate only to the sample tested
This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

Document Type:	Standard Operating Procedure
Document Title:	Environmental Management Plan 2010
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-065
Authorised by:	HS&E Manager

Revision Record

Revision Number	Date	Description	Revised by
001	17/01/07	**Reformat, renumber and revise EMP**	**Cecil Black**
002	01/02/08	**Annual Review**	**A. Fahey**
003	06/02/08	**Creation of 2008 EMP**	**A. Fahey**
004	13.01.09	**Annual Review**	**A. Fahey**
005	15.01.09	**Creation of 2009 EMP**	**A. Fahey**
006	12.01.10	**Annual Review**	**A. Fahey**
007	13.01.10	**Creation of 2010 EMP**	**A. Fahey**
008	04.01.11	**Annual review**	**A. Fahey**

Document Type:	Standard Operating Procedure
Document Title:	Environmental Management Plan 2010
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-065
Authorised by:	HS&E Manager

1. PURPOSE

1.1. The purpose of this procedure is to identify the Environmental objectives and targets and action plans which have been created by the Health, Safety and Environmental Manager.

2. SCOPE

2.1. Environmental objectives and targets may address any area of company activities, products and services to improve Environmental performance consistent with the company's Health, Safety and Environmental Policy and legislative requirements.

3. ABBREVATIONS

3.1. An **HS&E Objective** is defined as an overall HS&E goal, arising from the HS&E policy and risk evaluation, that a company sets itself to achieve, and which is quantified where possible.

3.2. An **HS&E Target** is a detailed performance requirement, quantified where practical, applicable to the organisation or parts thereof, that arises from the HS&E objectives and that needs to be set and met in order to achieve those objectives.

3.3. **Environmental Management Plan (EMP):** Environmental Management Plan: Specifies the means by which the HS&E objectives and targets are achieved.

4. REFERENCE DOCUMENTS

4.1. HTTW-SOP-HSE-G-018 Management Systems Objectives and Targets: S:\QA-systems\01. DOCUMENTATION CONTROL\PROCEDURES\departmental procedures\HS&E\ENVIRONMENTAL\HTTW-SOP-HSE-G-018 Management Systems Objectives and Targets

5. RESPONISBILITIES

5.1. The HS&E manager, in conjunction with the relevant personnel, shall review the EMP on an annual basis with a view to demonstrating a commitment to continual improvement of environmental performance within the company.

6. PROCEDURE

6.1. Energy & Resource Usage

Environmental Aspect: Energy & Resource Usage

Objective No. 6.1: Minimise Energy use & Maximise Effectiveness of Systems

Objective No. 6.1	Target	Action	Due Date	Resp.	Status
Minimise the Environmental Impact of HTTs Energy Use.	Introduce and Implement comprehensive plant shutdown procedure	• Review possibility of grant aid assistance for adoption of monitoring measurement throughout the plant.	Q3 2010	A Fahey J Sheahan M Dolan J Kirwan	Outstanding
		• Work with EPA and on site engineering to design and deliver alternative process to satisfy the GGPP initiative submitted in 08	Q1 2011	T. James HSE Team	Ongoing

Document Type:	Standard Operating Procedure
Document Title:	Environmental Management Plan 2010
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-065
Authorised by:	HS&E Manager

	Oven Efficiency (CW & TW)	• Review oven output efficiencies • Compare and contrast outputs and gas usage • Identify and resolve any problems that may arise	Q2 2010	C.Kiely (cw)/HSE Team J Sheahan J kirwan	Ongoing
	Energy Efficiency	Design and implement ISO 393 SEI energy standard	Q4 2010	C. Black M Morrissey J Sheahan J Kirwan D O'Sullivan M Dolan	Ongoing Pre audit assessment completed

Document Type:	Standard Operating Procedure
Document Title:	Environmental Management Plan 2010
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-065
Authorised by:	HS&E Manager

6.2. Hazardous Materials

Environmental Aspect **Hazardous Materials**

Objective No. 6.2: **Control of storage and use**

Objective No. 6.2	Target	Action	Due Date	Resp.	Status
Control of Hazardous Materials	Upgrade Chemical storage area	• Reduce significant storage of chemicals in designated areas to 1 load per storage capacity. • Review in line with Corporate policy internal waste storage and segregation • Identify new hazardous waste & oil storage re-layout with consideration for the SST area.	Q4 2010 Q4 2010 Q4 2010	A Fahey J Sheahan M Dolan J Kirwan	Ongoing New chemstore unit to be delivered Q1 2011
	REACH Compliance	• Incorporate all hazardous chemicals into site risk assessments • Ensure all hazardous materials are clearly identified in line with REACH legislation. Communicate with suppliers considering on site usage, new Safety Data Sheets (SDS's). • Submit quarterly self assessments to meet Corporate requirements in line with REACH legislation.	Q4 2010 Q4 2010 Q4 2010	A Fahey A Fahey A Fahey	**Overdue** Ongoing Complete

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	Approval of Hazardous waste disposal facilities	• Ensure all hazardous waste facilities and transfer stations are reviewed and approved in line with Corporate hazardous waste policy	Q1 2010	A. Fahey	Ongoing Buck to be audited in Q1 2011
	Ensure bund capacity in accordance with IPPC licence requirements	• Receive approval from EPA to amend the feed tank bund and the sludge dewatering plant bund. • Incorporate plan into site activities, monitor project and ensure completion in a timely manner. • Test bund areas to ensure integrity in line with IPPC licence requirements	Q1 2010 Q1-Q4 2010 Q4 2010	A. Fahey A. Fahey A. Fahey	Complete Complete Ongoing Testing on hold due to weather

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6.3. Emissions to Sewer

Environmental Aspect: Emissions to Sewer

Objective No. 6.3: Compliance with IPPC License effluent parameters

Objective No. 6.3	Target	Action	Due Date	Resp.	Status
Formulate an environmentally friendly solution to deal with waste stream to SE-1	• Continue to Reduce Sulphates & toxicity levels	• Monitor and evaluate sulphates& toxicity arising in Sludge Dewatering Plant (SDP) to determine and explore possible abatement processes • Implement corrective actions as required to reduce sulphates & toxicity	Q2 2010	A. Fahey /M. O 'Krajek J. Sheahan Indaver Declan O'Sullivan	**Overdue**
	• Implement Tank Cleaning Programme	• Work with Indaver to implement the tank cleaning programme in the Sludge Dewatering Plant (SDP). Ensure robustness of programme with consideration for any scheduled overtime.	Q1 2010	A. Fahey Indaver	Complete

	EPA licence Review	• Following acceptance of licence review process, implement additional requirements, monitoring and measurements. • Complete and submit environmental liability assessment as requested by EPA	Q4 2010 Q1 2010	A Fahey/C. Black A. Fahey	Ongoing Complete
	Progress Reporting on Effluent Projects	• Continue to champion site project team to track site activities concerning effluent projects	Q4 2010	C Black	Complete

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6.4. Emissions to Surface Water

Environmental Aspect: Emissions to Surface Waters/Groundwater

Objective No. 6.4: Improve Surface Water Protection Systems

Objective No. 6.4	Target	Action	Due Date	Resp.	Status
	Fire water retention study	• Implement fire water retention study Report Recommendations	Q4 2010	C. Black	**Overdue**
Spill Response Plan – Update	Update and include extra protection measures for SW	• Retrain Spill teams & Utility men – annual requirement • In line with IDA/HTT meeting, submit SW drain reports to confirm non contamination and integrity. • Work with contractors to carry out integrity tests of trade effluent drains. Submit reports to the EPA and carry out any repair works that may be required.	Q4 2010 Q1 2010 Q3 2010	A. Fahey A. Fahey A. Fahey	Complete **Overdue** One drain still requiring attention – on hold due to weather conditions **Overdue**

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6.5. Air Emissions

Environmental Aspect: Air emissions

Objective No. 6.5: Complete all necessary monitoring and reports as required by Corporate and EPA

Objective No. 6.5	Target	Action	Due Date	Resp.	Status
Air monitoring	• **Carry out Air monitoring**	• Complete annual monitoring in accordance with IPPC licence • Complete dispersion modelling	Q3 2009	C. Black/Consultancy/ Chris Kiely/Declan O' Suliivan	Complete Overdue
	• **Procedures for air abatement equipment**	• Develop procedures for the handing of air abatement equipment plant wide. • Train all employees on their roles & responsibilities concerning air abatement equipment. • Ensure procedures are implemented plant wide.	Q1 2010 Q1 2010 Q1 2010	A. Fahey/Declan O'Sullivan/Declan Power	Ongoing Ongoing Ongoing

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6.6. Non Hazardous Waste

Environmental Aspect: Non-Hazardous Waste

Objective No. 6.5: Minimise Impact of Non-Hazardous Effluent Streams

Objective No. 6.5	Target	Action	Due Date	Resp.	Status
Hazardous Waste Reduction Over 2008 Levels	Waste reduction at source	• Review non hazardous waste generating processes on-site with a view to elimination / reduction • Improve in house segregation to reduce waste going to landfill • Review in house waste skips and segregation areas. • Improve waste segregation awareness amongst employees • Reduce spill kit material usage at source	Q4 2010 Q3 2010 Q3 2010 Q1 2010 Q4 2010	A Fahey A Fahey A Fahey A Fahey A Fahey	Ongoing **Overdue** **Overdue** **Overdue** **Overdue**

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6.7. Compliance

Environmental Aspect	Compliance				
Objective No. 6.6	**Target**	**Action**	**Due Date**	**Resp.**	**Status**
ISO 14001	Re-Accreditation to ISO 14001;	• Update / Review Policy & procedures to ISO 18001 & 14001 : • Communicate ISO 14001 & EPA requirements on plant wide basis	Q4 2010	A. Fahey	Complete Complete
IPPC 525-01 : AER	AER Submission	• Prepare 2009 AER for submission March 10 • Submit Report to EPA for review	Q1/ 2010	A. Fahey	Complete
Environmental Communications	IPPC licence	• Create a programme to communicate to all employees the requirements as outlined in IPPC Licence PO525-01. • Complete sign off sheets and file accordingly	Q1 2010	A. Fahey A. Fahey	**Overdue** **Overdue**

7. FLOWCHART

7.1. N/A

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Revision Record

Revision Number	Date	Description	Revised by
001	**17/01/07**	**Reformat, renumber and revise EMP**	**Cecil Black**
002	**01/02/08**	**Annual Review**	**A. Fahey**
003	**06/02/08**	**Creation of 2008 EMP**	**A. Fahey**
004	**13.01.09**	**Annual Review**	**A. Fahey**
005	**15.01.09**	**Creation of 2009 EMP**	**A. Fahey**
006	**12.01.10**	**Annual Review**	**A. Fahey**
007	**13.01.10**	**Creation of 2010 EMP**	**A. Fahey**
008	**04.01.11**	**Annual review**	**A. Fahey**
009	**24.01.11**	**Creation of 2011 EMP**	**A. Fahey**

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1. PURPOSE

1.1. The purpose of this procedure is to identify the Environmental objectives and targets and action plans which have been created by the Health, Safety and Environmental Manager.

2. SCOPE

2.1. Environmental objectives and targets may address any area of company activities, products and services to improve Environmental performance consistent with the company's Health, Safety and Environmental Policy and legislative requirements.

3. ABBREVATIONS

3.1. An **HS&E Objective** is defined as an overall HS&E goal, arising from the HS&E policy and risk evaluation, that a company sets itself to achieve, and which is quantified where possible.

3.2. An **HS&E Target** is a detailed performance requirement, quantified where practical, applicable to the organisation or parts thereof, that arises from the HS&E objectives and that needs to be set and met in order to achieve those objectives.

3.3. **Environmental Management Plan (EMP):** Environmental Management Plan: Specifies the means by which the HS&E objectives and targets are achieved.

4. REFERENCE DOCUMENTS

4.1. HTTW-SOP-HSE-G-018 Management Systems Objectives and Targets: S:\QA-systems\01. DOCUMENTATION CONTROL\PROCEDURES\departmental procedures\HS&E\ENVIRONMENTAL\HTTW-SOP-HSE-G-018 Management Systems Objectives and Targets

5. RESPONISBILITIES

5.1. The HS&E manager, in conjunction with the relevant personnel, shall review the EMP on an annual basis with a view to demonstrating a commitment to continual improvement of environmental performance within the company.

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6. PROCEDURE
6.1. Emissions to Sewer

Environmental Aspect: Emissions to Sewer

Objective No. 6.1: Compliance with IPPC License effluent parameters

Objective No. 6.1	Target	Action	Due Date	Resp.	Status
Formulate an environmentally friendly solution to deal with waste stream to SE-1	• Continue to Reduce Sulphates & toxicity levels	• Monitor and evaluate sulphates& toxicity arising in Sludge Dewatering Plant (SDP) to determine and explore possible abatement processes • Implement corrective actions as required to reduce sulphates & toxicity	Q1 2011	Trade effluent Team	
	• Standard work systems	• Design and implement standard work sheets for Veolia employees to incorporate both the yard and sludge dewatering plant.	Q1 2011	A. Fahey Veolia	
	EPA licence Review	• Following acceptance of licence review process, implement additional requirements, monitoring and measurements.	Q4 2011 Q1 2011	A Fahey/C. Black A. Fahey	

	Progress Reporting on Effluent Projects	• Continue to champion site project team to track site activities concerning effluent projects	Q1 2011	C Black	

6.2. Energy & Resource Usage

Objective No. 6.1	Target	Action	Due Date	Resp.	Status
Environmental Aspect: Energy & Resource Usage **Objective No. 6.2: Minimise Energy use & Maximise Effectiveness of Systems**					
Minimise the Environmental Impact of HTTs Energy Use.	Introduce and Implement comprehensive plant shutdown procedure	• Review possibility of grant aid assistance for adoption of monitoring measurement throughout the plant. • Work with EPA and on site engineering to design and deliver alternative process to satisfy the GGPP initiative submitted in 08	Q3 2011 Q2 2011	J Doyle T. James HSE Team	

	Oven Efficiency (CW & TW)	• Review oven output efficiencies • Compare and contrast outputs and gas usage • Identify and resolve any problems that may arise	Q2 2011	J Doyle	
	Energy Efficiency	• Design and implement EN16001 into site policies and procedures. • Identify three core improvement projects and deliver to improve overall environmental performance	Q1 2011 Q4 2011	C. Black M Morrissey P Mcnamara J Kirwan D O'Sullivan M Dolan J Doyle	

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6.3. Hazardous Materials

Environmental Aspect **Hazardous Materials**

Objective No. 6.3: **Control of storage and use**

Objective No. 6.3	Target	Action	Due Date	Resp.	Status
Control of Hazardous Materials	Upgrade Chemical storage area	• Reduce significant storage of chemicals in designated areas to 1 load per storage capacity. • Review in line with Corporate policy internal waste storage and segregation • Commission new hazardous waste store	14 2011 Q4 2011 Q1 2011	A Fahey P McNamara M Dolan J Kirwan D Comerford	

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	REACH Compliance	• Incorporate all hazardous chemicals into site risk assessments • Ensure all hazardous materials are clearly identified in line with REACH legislation. Communicate with suppliers considering on site usage, new Safety Data Sheets (SDS's). • Submit quarterly self assessments to meet Corporate requirements in line with REACH legislation. • Find alternatives or remove from the process any substances which have been identified as concern under REACH	Q3 2011 Q4 2011 Q4 2011 Q1 2011	A Fahey A Fahey A Fahey A Fahey D Power	
	Approval of Hazardous waste disposal facilities	• Ensure all hazardous waste facilities and transfer stations are reviewed and approved in line with Corporate hazardous waste policy	Q1 2011	A. Fahey	
	Ensure bund capacity in accordance with IPPC licence requirements	• Seal all bund areas following construction work completed in Q4 2011 • Test bund areas to ensure integrity in line with IPPC licence requirements	Q1 2011 Q1 2011	D Comerford A Fahey	

6.4. Air emissions

Environmental Aspect: Air emissions Objective No. 6.4: Complete all necessary monitoring and reports as required by Corporate and EPA					
Objective No. 6.4	**Target**	**Action**	**Due Date**	**Resp.**	**Status**
Air monitoring	• **Carry out Air monitoring**	• Complete annual monitoring in accordance with IPPC licence • Complete dispersion modelling & monitoring on SST oven & SST fugitive emission points.	Q2 2011	C. Black/Consultancy/ Chris Kiely/Declan O' Suliivan	
	• **Procedures for air abatement equipment**	• Develop procedures for the handing of air abatement equipment plant wide. • Train all employees on their roles & responsibilities concerning air abatement equipment. • Ensure procedures are implemented plant wide.	Q1 2011 Q1 2011 Q1 2011	A. Fahey/Declan O'Sullivan/Declan Power	

6.5. Air Emissions

Environmental Aspect: Emissions to Surface Waters/Groundwater

Objective No. 6.5: Improve Surface Water Protection Systems

Objective No. 6.5	Target	Action	Due Date	Resp.	Status
	Fire water retention study	• Implement fire water retention study Report Recommendations	Q2 2011	C. Black	
Spill Response Plan – Update	Update and include extra protection measures for SW	• Retrain Spill teams & Utility men – annual requirement • Work with contractors to carry out integrity tests of trade effluent drains. Submit reports to the EPA and carry out any repair works that may be required.	Q4 2011 Q3 2011	A. Fahey . A. Fahey	

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6.6. Non Hazardous Waste

Environmental Aspect: Non-Hazardous Waste **Objective No. 6.6: Minimise Impact of Non-Hazardous Effluent Streams**					
Objective No. 6.6	**Target**	**Action**	**Due Date**	**Resp.**	**Status**
Hazardous Waste Reduction Over 2011 Levels	Waste reduction at source	• Review non hazardous waste generating processes on-site with a view to elimination / reduction	Q3 2011	A Fahey	
		• Improve in house segregation to reduce waste going to landfill	Q3 2011	A Fahey	
		• Review in house waste skips and segregation areas.	Q3 2011	A Fahey	
		• Improve waste segregation awareness amongst employees	Q2 2011	A Fahey	
		• Reduce spill kit material usage at source	Q4 2011	A Fahey	

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6.7. Compliance

Environmental Aspect	**Compliance**				
Objective No. 6.7	**Target**	**Action**	**Due Date**	**Resp.**	**Status**
ISO 14001	Re-Accreditation to ISO 14001;	• Update / Review Policy & procedures to OHSAS 18001 & 14001 : • Communicate ISO 14001 & EPA requirements on plant wide basis	Q4 2011	A. Fahey	
IPPC 525-01 : AER	AER Submission	• Prepare 2010 AER for submission March 11 • Submit Report to EPA for review	Q1/ 2011	A. Fahey	
Environmental Communications	IPPC licence	• Create a programme to communicate to all employees the requirements as outlined in IPPC Licence PO525-01. • Complete sign off sheets and file accordingly	Q1 2011	A. Fahey A. Fahey	

7. FLOWCHART

7.1. N/A

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Document Title:	Register of Environmental Aspects
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-067
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Revision Record

Revision Number	Date	Description	Revised by
001	09/01/07	Reformat, renumber and revise H.S.&E. - P 01 Register of Environmental Aspects	Amy Fahey
002	12.09.07	Twice yearly review	Amy Fahey
003	12-10-07	Inclusion of groundwater and municipal supply as an aspect	Amy Fahey
004	20.02.08	Annual Review	Amy Fahey
005	09.02.09	Annual Review	Amy Fahey
006	24.09.09	6 Monthly Review	Cecil Black
007	18.03.10	Annual Review	Amy Fahey
008	24.01.11	Annual Review	Amy Fahey

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1. PURPOSE

1.1. To identify the environmental aspects associated with each of the site's activities, products and services.

1.2. To determine the significance level of any identified aspects/impacts.

2. SCOPE

2.1. This register applies to the entire Waterford site (Unit 411) and the aspects that it can practically control or have influence over.

2.2. Identification of environmental Impacts takes account of the organisation's current, past and planned activities, products and/or services.

2.3. It should be noted that even though an impact may have a significance rating of <1300, all impacts will be reviewed periodically to ensure the significance has not changed. Indeed some of these impacts may be controlled by means of documented procedures, etc., so as to enhance the environmental performance of the company.

2.4. The determination of the significance of an environmental aspect is based on simple risk assessment methodology or failure mode and effect analysis (FMEA), as outlined in **HTTW-SOP-HSE-G-023 Identification and Evaluation of Aspects.**

3. ABBREVATIONS

3.1. EN 16001: EN 16001 represents the latest best practice in energy management building upon existing national standards and initiatives

3.2. Cleaner Greener Production Programme (CGPP): An EPA grant scheme to encourage Irish organisations to implement cleaner greener practice.

3.3. Environmental Aspect: Environmental Aspect is an element of an organization's activities, products or services that can interact with the environment.

3.4. Environment: Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation. **NOTE:** Surroundings in this context extend from within an organisation to the global system.

3.5. Environmental Protection Agency (EPA): The Environmental Protection Agency (EPA) is an independent public body established under the Environmental Protection Agency Act, 1992 and has a wide range of functions to protect the environment.

3.6. Integrated Pollution Prevention & Control (IPPC): An IPPC licence is a single integrated licence which deals with emissions to all environmental media and the environmental management of the facility. IPPC licences aim to prevent or reduce emissions to air, water and land, reduce waste and use energy/resources efficiently.

4. REFERENCE DOCUMENTS

4.1. HTTW-SOP-HSE-G-006 Air Quality and Emissions
4.2. HTTW-SOP-HSE-G-008 Spill Prevention and Control.
4.3. HTTW-SOP-HSE-G-009 Waste Minimisation
4.4. HTTW-SOP-HSE-G-010 Oil Coolant Management
4.5. HTTW-SOP-HSE-G-012 Water Quality
4.6. HTTW-SOP-HSE-G-013 Surface Water Drain Inspection
4.7. HTTW-F-HSE-G-014 Environmental Monitoring and Measurements Schedule
4.8. HTTW-SOP-HSE-G-018 Management System Objectives and Targets
4.9. HTTW-SOP-HSE-G-019 Excursion-Incident Investigation & Reporting
4.10. HTTW-SOP-HSE-G-020 Assessment Control Suppliers / Contractors
4.11. HTTW-SOP-HSE-G-023 Identification and Evaluation of Aspects
4.12. HTTW-SOP-HSE-G-024 Waste Segregation
4.13. HTTW-SOP-HSE-G-037 Safe Use and Storage of Compressed Gas Cylinders.
4.14. HTTW-SOP-HSE-G-041 Forklift Truck Policy
4.15. HTT Contractor Safety Booklet
4.16. HTTW-F-HSE-G-019 Calculation of Significant Ratings Summary Form
4.17. HTTW-F-HSE-G-022 Environmental Probity Questionnaires

5. RESPONSIBILITIES

5.1. The HSE Manager is responsible for ensuring that the Register of Environmental Aspects is regularly reviewed and updated, if necessary.

6. PROCEDURE

6.1. The significant environmental aspects in order of importance are:

6.1.1. Emissions to Sewer
6.1.2. Energy & Resource Usage
6.1.3. Hazardous Materials
6.1.4. Hazardous waste

6.2. Each aspect is assigned a Significance Rating. Aspects with a significance rating of <1300 are deemed not significant. These include the following:

6.2.1. Supply Side Activities
6.2.2. Emissions to Atmosphere
6.2.3. Contractors
6.2.4. Emissions to Surface Water
6.2.5. Non Hazardous Waste
6.2.6. Groundwater and municipal water
6.2.7. Transport
6.2.8. Visual Impact
6.2.9. Environmental Noise
6.2.10. Ecosystems
6.2.11. Emissions to Ground

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6.3. Environmental Aspect No 1.

Environmental Aspect No. 1: Emissions to Sewer

Activity

Combined discharge of trade effluent and domestic sewage to Waterford Corporation Foul Sewer at the front car park SE-1 location arises from:

1. Trade effluent from plaster mixers at Blockmould (transferred to the sludge dewatering facility).
2. Trade effluent from production activities of zyglo washings which are transferred to the sludge dewatering facility outflow point.
3. Trade effluent from Sludge Dewatering Facility outflow which is generally clean water that is not required to be recirculated through the system.
4. Dip room sink line joins SE-1
5. Trade effluent from APFC and copper ring washer

Domestic sewage and kitchen sink line go to a separate foul sewer.

Aspect

The combined streams pass through a monitoring chamber on the site where flow, pH and temperature is continuously monitored and linked to the Cimplicity System. The System logs any limit breaches. Weekly samples are taken and sent to an external laboratory for analysis according to Schedule 2(i) of the IPPC PO525-01. Daily samples are checked internally for COD, Suspended solids and sulphates.

Associated Impacts

Honeywell Transportation Ireland Limited are Licenced by the EPA to discharge 700m^3 per day or 47m^3 per hour at this location. The site is within this limit at all times. The effluent from Waterford Corporation Sewer receives preliminary treatment prior to discharge to the River Suir. A Waste Water Treatment facility is now accepting trade effluent from the IDA including that of Honeywell. Identifying the impact of Honeywell trade effluent is extremely difficult as the waste stream is mixed with other waste streams in the IDA prior to final discharge.

	Score
(1) Frequency, F Discharges to the Foul Sewer occur continuously.	**F** = 10
(2) Likelihood of Loss of Control, L Effluent abatement a waste sludge dewatering facility. The waste-sludge dewatering facility flow capacity and dosing parameters are being continually monitored and assessed. All flow meters and in-line meters are calibrated when required. March 2006 a bubble flow meter was installed at SE1 to ensure more accurate readings. Composite effluent samples from SE-1 are sent for analysis on a weekly basis. Honeywell Transportation Ireland Limited have a detailed maintenance and operational manual for the waste sludge dewatering facility. The Sludge Dewatering Plant is operated by an external contractor (Veolia Environmental Ltd). There are continued non compliances at the site final discharge location for sulphates and occasional non compliances for COD. Water Quality procedure (HTTW-SOP-HSE-G-012 Water Quality) defines the treatment and controls necessary to ensure all contaminated waste water and discharges are controlled to the limits specified by the licence parameters. A water based zyglo has recently been incorporated into the process in order to reduce COD and toxicity levels at SE1. This material substitution is a change from a hazardous to non hazardous material.	**L** = 10

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Environmental Aspect No. 1: Emissions to Sewer	
In Q1 2009, Trade effluent from both block mould processes was fully diverted to the sludge dewatering facility where flocculation is the treatment process. The zyglo was also diverted to the sludge dewatering facility outflow point for greater dilution prior to final discharge at SE1. The removal of the block mould clarifier has eliminated foaming which previously caused visual impacts. The success of the sludge dewatering plant in minimising sulphate and suspended solids is heavily dependant on a manual cleaning regime of all on site tank vessels, standard work practices and reaction plans. The site is currently pursing review areas with intent to ensure continued compliance with IPPC licence requirements.	
(3)Severity of Consequences, C	**1. Sub-Totals**
(i) Legislative and Regulatory Control Honeywell Transportation Ireland Limited operate under IPPCL PO525-01 which replaced the existing effluent discharge licence. In March 2007, the EPA amended Licence Reg. No. PO525-01, under Section 91(1) (c) of the EPA Acts 1992 and 2003, to incorporate request based on increased productivity rates. Continuous sulphate exceedances at present. Occasional exceedences of some other parameters occur. These include suspended solids, toxicity and COD.	5
(ii) Community/Employee Sensitivity Releases from the Honeywell Transportation Ireland Limited site would not be considered a major load to Waterford Corporation sewer.	2
(iii) Impact on Air, Land and Water Effluent emissions from the Honeywell Transportation Ireland Limited site are not likely to contribute to significant pollution in the River Suir. The emissions from Honeywell Transportation Ireland Limited would only constitute a small fraction of all emissions discharged to the River Suir. Waterford Corporation have indicated that trade effluent from Honeywell will have no impact on the Waterford Waste Water Treatment Plant	3
iv) Cost Benefits Effluent treatment and monitoring are a significant cost to the Company. Equipment maintenance is also a significant cost. External laboratory work costs the company a significant amount annually.	5
v) Potential for Resource Depletion Water is a renewable resource. However, damage to a water body such as the River Suir could result in long-term ecological damage. This is extremely unlikely to occur solely as a result of discharges from the Honeywell Transportation Ireland Limited site. All exceedences are logged by Cimplicity and by Environmental Lab Staff.	2
vi) Accidents and Emergency Accidental situations could arise as a result of a failure of abatement equipment, firewater generation or a significant unauthorised discharge to the sewer. The potential for a spillage to reach the sewer system has been minimised by the HTTW-SOP-HSE-G-008 Spill Prevention and Control. Effluent has a low possibility of run-off to surface water during Sludge dewatering as the area has been bunded and is manually operated at all times in association with PLC and alarm systems.	3
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	S = 20
Significance Ratings C = F x L x S	C = 2000

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Environmental Aspect No. 1: Emissions to Sewer	
Management of this activity by:	
Objective No.:	1
Procedure(s):	Blockwasher water Recycling Facility Operational and Maintenance Manual HTTW-SOP-HSE-G-008 Spill prevention and control procedure HTTW-SOP-HSE-G-012 Water Quality HTTW-SOP-HSE-G-017 Environmental Monitoring and Measurements
Monitoring & Measurement:	HTTW-F-HSE-G-014 Environmental Monitoring and Measurements Schedule Integrated Pollution Prevention & Control (IPPC) Licence

6.4. Emission Limit Values

Parameter	Emission Limit Value
Temperature	43°C
pH	6-9
Toxicity	10 TU
	mg/l
BOD	400
COD	1000
Suspended Solids	600
Nitrates (as N)	4.2
Ammonia (as N)	30
Sulphate	1500
Fluoride	3.3
Fats, Oil, and Greases	100
Detergents (MBAS)	30
Total Heavy Metals	1.0

6.5. Environmental Aspect No.2

Environmental Aspect No. 2 Hazardous Materials

Activity

The storage and use of hazardous materials in production:

- Surface Cleaning – acid and caustic cleaning agents.
- UV Light Detection – Petroleum Products
- Surface Coating – Petroleum Napthas, Organic solvents
- Machining – Cutting Oils & printing inks
- Machinery maintenance – lube, transmission and industrial oils
- Main Power Transformer – Dielectric fluid, non-PCB Mineral Oil.
- Forklifts – Liquid Propane
- Compressor Wheel moulding material
- Turbine Wheel Manufacture

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Environmental Aspect No. 2 Hazardous Materials

- Ceramics
- Resins and Primers
- Fluxes

- Cooling Towers – Biomate
- Hot Water System – Flomate
- Liquid Nitrogen
- Argon gas
- Glues

Aspect

This aspect includes hazardous chemicals, maintenance oils and pressurised gases. This aspect includes materials with toxic, corrosive, flammable hazardous and irritant properties. Hazardous wastes are dealt with in the hazardous waste section of this document. Chemicals are stored in a portable Chemstore unit.
Bund Integrity Tests were carried out in 2010 on the Ludox Store and Flammable stores. The feed tank bund and sludge dewatering plant bund areas were identified as under capacity in recent bund tests and amendments were carried out in 2010 to ensure continual compliance with PO52501. The new bund areas will be integrity tested in Q1 2011
Raw material drums are generally 205L with the exception of Ludox (Auto) which is delivered in a 1000L container.
Continuous reviews of all hazardous materials are being carried out as part of the Honeywell REACH compliance Programme. All incoming chemicals are monitored through REACH compliance and have to be fully approved by the HSE department prior to trialling or introducing on site.

Associated Impacts

The main potential inputs arise from possible spillages during delivery in production, during storage or in the transfer from one location to another within the site. Spills of chemicals or oil outside of bunded areas could enter the surface water runoff system which joins the Waterford Corporation storm drainage system.

(1) Frequency, F Hazardous materials are stored and used on site continuously. However, chemicals including alcast plaster and ludox are only delivered to the site as required.	**F** = 10
(2) Likelihood of Loss of Control, L The chemical storage areas are bunded. The integrity of these bunds has been confirmed during Bund Testing in 2009. Three spills have been recorded to date. There were no drains/water in this area and no contamination of water occurred. Detailed procedures for spill prevention and control and drum handling exist. Control and use of oil/coolants is managed by HTTW-SOP-HSE-G-010 Oil Coolant Management. Employees undergo annual training in chemical handling and spillage response. Spill and leakage prevention inspections take place on a daily/weekly basis. The storage of chemicals in the designated areas needs to be strictly enforced. All new chemicals entering the site must go through a Chemical Approval Request System HTTW-F-HSE-G-036 prior to entry onto the site. PAR Checklists also capture any new products. Risk assessments have been completed for all bulk deliveries and are considered low risk.	**L** = 7
(3) Severity of Consequences, C	Sub-Totals
(i) Legislative and Regulatory Control The Dangerous Substances Act 1972 – 1979, the dangerous substances Act 2004, the DGSA Regulations (S.I. 6/2001) and the Classification, Packaging, Labelling and Notification of Dangerous Substances Regulations (S.I. 393/2000) are relevant. S.I. No 498 of 2003 Protection of the Environment Act. European Communities (Classification,	3

Environmental Aspect No. 2 Hazardous Materials	
Packaging, Labeling and Notification of Dangerous Substances) Regulations 2003, REACH regulations 2006/1907/EC, Waste Management (Shipments of Waste) Regulations 2007	
(ii) Community/Employee Sensitivity There has been no observed community sensitivity to hazardous materials delivered to and stored at the Honeywell Transportation Ireland Limited site. However in the event of an incident during transport/delivery, it is likely that some concern would be raised.	2
(iii) Impact on Air, Land and Water The main environmental impact of hazardous materials would occur under emergency conditions due to fire or spillage of oil or chemicals. The risk of such an occurrence has been minimised by the provision of secure storage arrangements, chemical handling procedures and spillage response procedures. Fire water retention facilities have not been incorporated by the site. Such facilities could prevent accidental release of chemical spills to drains.	3
(iv) Cost Benefits Hazardous materials constitute a major cost to the company, in terms of storage, training and insurance premiums. An accident involving hazardous materials on site could involve remediation of spill sites and potential contamination of surface and ground water, as well as an insurance liability.	5
(v) Potential for Resource Depletion Use of hazardous materials mentioned above results in large scale depletion of non-renewable natural resources.	5
(vi) Accidents and Emergency Any accident involving hazardous materials in use at the site could result in a high environmental load. Controls are in place to mitigate emissions from hazardous materials due to spill or fire. Probability is deemed low resulting in an overall moderate risk level.	3
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 21
Significance Ratings C = F x L x S	**C** = 1470

Management of this activity by:

Objective No.: **Target No.:**	2
Procedure(s):	HTTW-SOP-HSE-G-008 Spill Prevention & Control HTTW-SOP-HSE-G-009 Waste Management HTTW-SOP-HSE-G-010 Oil-Coolant Management HTTW-SOP-HSE-G-037 Safe Use and Storage of Compressed Gas Cylinders. HTTW-SOP-HSE-G-029 Chemical Pre-Purchase Policy
Monitoring & Measurement:	REACH inventory Training Records Weekly Inspections

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6.6. Environmental Aspect No. 3

Environmental Aspect No. 3 Emissions to Atmosphere

Activity

Emissions to Atmosphere at Honeywell Transportation Ireland Limited may be grouped under the following headings:

2. Oven emissions
   6 ovens in CW Compressor Wheel;
   4 operating Ovens in TW Turbine Wheel (plus 2 out of commission);
   1 SST oven
3. Local/Closed extraction system.
4. Two natural gas fired boilers.
5. Fugitive emissions of dust and vapour are generated from:
   - Dipping Area in TW process and Gypsum area
   - Grinding operations
   - Sandblasting
   - TW Shot blasting
   - Aluminium melting and Degassing
   - Plaster Knockout Process

Aspect

Oven emissions and local/closed extraction systems number 33 emission points and are considered major and minor emissions respectively. Minor fugitive emissions from the process are extracted via various points of emission to atmosphere. These emissions consist of emissions from transfer of finely divided powders, grinding operations, sand blasting, TW shotblasting, and the melting and degassing of Aluminium.

The 6 CW Ovens are used for baking gypsum moulds over an 8 hour cycle, during which the polystyrene core within the block burns off when the oven reaches 280ºC. The TW ovens operate in excess of 1100 ºC and are used to harden moulds and burn off the polystyrene plastic interior.

As a result of recent monitoring the site has received approval from the EPA to remove both dioxins and particulates from our monitoring program. Following numerous air monitoring events in conjunction with the EPA, it was confirmed that VOC emissions are possible from the JLS ovens and therefore afterburners are required in line with site procedures.

Analysis to quantify fugitive emissions have shown that there are minimal fugitive emissions to air. The level of emissions is such that they have no significant impact on air quality.

There is a halon fire suppression system in Computer room.

CW & TW ovens are shutdown during the Christmas and Summer holiday period.

Associated Impacts

Combustion gases SOx, NOx, and CO are produced in the ovens and boilers and have an adverse effect on air quality in terms of acid rain and greenhouse gases. Dioxins that are produced are highly toxic gases which have the potential to bioaccumulate with adverse implications for human health. Solvents also have a deleterious effect on air quality and global warming.

Little or no impact has been detected during start-up / shutdown of CW / TW ovens.

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Environmental Aspect No. 3 Emissions to Atmosphere	
	Score
1. Frequency, F Atmospheric emissions from the facility arise from normal operations on Monday-Friday. Occasionally, some production occurs on Saturdays. Ovens are shut down only during Christmas holidays and Summer Maintenance shut down.	F = 8
2. Likelihood of Loss of Control, L Likelihood of loss of control is possible in terms of the atmospheric emissions themselves, but is low for the systems involved. All ovens are monitored and controlled on the Cimplicity System, which alarms if there is a problem with them or with the system. Production, Maintenance and HS&E all monitor various aspects of the Cimplicity system throughout production time. HTTW-SOP-HSE-G-006 Air Quality and Emissions details maintenance, monitoring and record keeping for air emissions. A site plan indicating each emissions point was submitted to the EPA as part of the IPPC Licence Application (Attachment 12 Air Emissions). All stack emissions points were physically labelled according to this drawing for ease of identification during sampling. Likelihood of loss of control is possible in terms of the atmospheric emissions themselves, but is low for the systems involved. All ovens and the afterburner are monitored and controlled on the Cimplicity System, which alarms if there is a problem with them or with the system throughout production time.	L = 5
3. Severity of Consequences, C	**Sub-Totals**
(i) Legislative and Regulatory Control Honeywell Transportation Ireland Limited operate under IPPC PO525-01 issued from the Environmental Protection Agency. Condition 5 of the Licence imposes conditions of monitoring and control on Emissions to atmosphere. See table below for parameters covered. The abatement and control requirements under Schedule 1(ii) if the Licence require continuous monitoring of the afterburner plus annual sampling of certain parameters. The Cimplicity system operates a continuous real time monitoring of the afterburner and oven operations. EPA Acts 1992 & 2003. EPA (Licensing) Regulations 2004.	**4**
ii) Community/Employee Sensitivity Uncontrolled releases from the Honeywell Transportation Ireland Limited site could contribute to localised pollution. This could cause concern amoungst the local community.	**Sub-Totals** **3**
iii) Impact on Air, Land and Water The main environmental impact of air emissions would be a contribution to ozone depletion substances in the air. The quantity of emissions released could have a long term adverse impact on environmental media.	**3**
(i) Cost Benefits The afterburners utilise gas which is a major energy usage is a major cost to the company.	**5**

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Environmental Aspect No. 3 Emissions to Atmosphere		
vii) Potential for Resource Depletion Operation of furnace ovens leads to large-scale depletion of non-renewable natural resources. Fugitive emissions of dust or chemicals would result in some depletion of non-renewable natural resources.		**5**
viii) Accidents and Emergency A failure of abatement equipment could result in an uncontrolled emission of VOC's to atmosphere. This has a low probability with a potentially medium environmental load. A fire or explosion could result in uncontrolled emissions to atmosphere. Maximum disruption could include removal of a particular oven from production until the root cause has been identified and corrected.		**4**
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S		**S = 22**
Significance Ratings C = F x L x S		**C = 1100**
Management of this activity by:		
Objective No.: **Target No.:**	3	
Procedure(s):	HTTW-SOP-HSE-G-006 Air Quality and Emissions HTTW-SOP-HSE-G-110 CW afterburner Control	
Monitoring & Measurement:	HTTW-SOP-HSE-G-017 Environmental Monitoring and Measurements	

6.6.1. Emission Point Reference No's.: A2-1 to A2-8 and A2-9 to A2-14

Parameter	Monitoring Frequency	Analysis Method/Technique
Nitrogen Oxides (as NO_2)	Annually	Flue gas analyser
Carbon Monoxide	Annually	Flue gas analyser
VOC's	Annually	Agreed Method
Flow	Annually	Agreed Method

6.7. Environmental Aspect No. 4

Environmental Aspect No. 4 Hazardous Waste
Activity (ii) Eccool D (CWM) (iii) Compressor Wheel and Turbine Wheel machinery generate waste oils/coolants rags and spill kits Fluorescent Tubes are used throughout the plant (iv) Waste glues/empty canisters (v) Lab smalls and miscellaneous waste chemicals (vi) TW Ceramic waste (vii) Waste Electronic and Electric (WEE) (viii) Risers/wheels/ingots

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Aspect

Significant quantities of coolant and waste oil are generated on site. Licensed hazardous waste contractors dispose of all hazardous wastes. Full records of types, quantities, origins and disposal routes are recorded in the Hazardous Waste tracking system and reported to Corporate each month. Hazardous waste is stored in a bunded central Oil & Waste Store. Fluorescent tubes are stored in a plastic 'coffin', which has a lockable lid.
Hazardous waste is managed by Veolia Environmental Limited who have received and submitted to Honeywell the appropriate certificate of registration under the Waste Management Regulations 2008.
The site introduced a swarf briquetter machine in Q3 2009 for compacting swarf, reducing waste tonnages leaving the Honeywell site and improving leachate containment within the swarf waste management process.
Honeywell has also introduced a dry grinding process into one of its business units, this process reduced coolant usage and ultimately waste generation.

Associated Impacts

Disposal of hazardous wastes has impacts on air, land and water through the effects of incineration and physical /chemical treatment. Flammable liquids or solids could ignite and result in a fire explosion giving rise to toxic or noxious fumes, spillages or inappropriate disposal of hazardous waste could lead to contamination of surface or groundwaters. Increase volume of hazardous waste could result in a lack of suitable storage/bunded areas. Damage to containers/barrels holding hazardous waste could leak to drains or soil resulting in a negative impact on the environment.

	Score
1. Frequency, F Hazardous waste is generated consistently site wide during normal operations.	**F** = 10
2. Likelihood of Loss of Control, L Significant reduction in hazardous waste generation over last 2 years. Through the Waste Management Contractor, Veolia. All hazardous waste shipments are tracked using C1/TFS forms and only licenced hazardous waste contractors are used; Waste Disposal Certificates and signed off C1s are retained by the HS&E department. All ceramic waste is collected and transported in UN approved (lined) (1 tonne) bags. A waste minimisation policy aimed at reducing, controlling and recording of waste exists (ref. HTTW-SOP-HSE-G-009). An oil/coolant Management Procedure and a Drum handling and Waste Procedure are used to control hazardous waste generation and disposal. Audits will be undertaken on waste disposal contractor's sites. Hazardous waste is collected on a weekly basis to minimise quantities stored on site at any one time.	**L** = 3
3. Severity of Consequences, S	Sub-Totals
(i) Legislative and Regulatory Control Conditions of Planning Permissions and the Waste Management Act, 1996 and associated Hazardous Waste Regulations, 1998 strictly regulate the disposal of hazardous wastes. Condition 7 of IPPCL PO525-01 details the regulatory requirements. Schedule 3 (i) details the requirements for Hazardous Waste control. Waste Management (Registration of brokers and dealers) regulations 2008	4
Severity of Consequences, S	Sub-Totals
(ii) Community / Employee Sensitivity An accident involving the transportation of a shipment of hazardous waste would generate concern in the community through which the shipment is passing. This would particularly be the case if the accident involved loss of life, serious injury or damage to property. The incineration of hazardous waste is also likely to generate concern in the community over potential emissions.	5

(iii) Impact on Air, Land and Water A release of Hazardous Waste could have a long-term adverse impact on the receiving land, air or water. However, no such incident has occurred in relation to the hazardous wastes generated at Honeywell Transportation Ireland Limited to date. Current disposal methods would result in short term impacts only and spill containment training has been undertaken by relevant staff. Quantities of Hazardous Waste are deemed high. Containing swarf leachate within the briquetter machine reduces the potential risks associated with spills to land or water.	4
(iv) Cost Benefits Disposal of hazardous waste is an increasingly expensive undertaking and is a major cost.	5
(v) Potential for Resource Depletion Generation of hazardous waste results from the use of large quantities of non-renewal natural resources.	4
(vi) Accidents and Emergency situations Rupture of waste oil containers on-site or in transit could lead to an emergency release. Medium probability of drum ruptures, etc., due to control of storage and movement. A spill response procedure (HTTW-SOP-HSE-G-008 Spill Prevention and Control) is in place. Environmental load is expected to be increased due to CD machining activity and tanking of Glycerine & Ultrawet medium. All Hazardous wastes are shipped in UN approved containers.	6
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	S = 25
Significance Ratings C = F x L x S	**C** = 1250

Management of this activity by:	
Objective No.:	4
Procedure(s):	HTTW-SOP-HSE-G-002 Audit of Waste Recycling Disposal Contractors HTTW-SOP-HSE-G-005 Waste Management HTTW-SOP-HSE-G-009 Waste Minimisation HTTW-SOP-HSE-G-010 Oil-Coolant Management
Monitoring & Measurement:	Hazardous Waste Log Book FAET evaluation process Indaver on site contract service company

6.7.1.Waste materials

Waste Materials	Further Treatment, Recovery/Recycling On-Site	On-Site Reuse	Method of Disposal/Recovery
Penetrant Aqua chek WB 100	None	None	Authorised off-site recovery/disposal
Hocut 3380	None	None	Authorised off-site recovery/disposal
Oil/Water Mix	None	None	Authorised off-site recovery/disposal
Used Spill Kit Consumables	None	None	Authorised off-site recovery/disposal
Fluorescent Tubes	None	None	Authorised off-site recovery/disposal
TW Ceramic Waste	None	None	Authorised off-site recovery/disposal
WEE	None	None	Authorised off-site recovery/disposal
Cooking Oil	None	None	Authorised off-site recovery/disposal
Laboratory waste chemicals	None	None	Authorised off-site recovery/disposal
Maintenance Oils General	None	None	Authorised off-site recovery/disposal

6.8. Environmental Aspect No. 5

Environmental Aspect No. 5: Energy & Resource Usage

Activity

Electricity for production (including compressed air) offices, warehousing and all parts of the Honeywell Transportation Ireland Limited facility.
Natural gas for boilers/ovens.
Two diesel powered emergency generators

Aspect

Electricity is used throughout the plant for offices, production areas, plant and equipment. Natural gas is used in the two boilers for heating purposes and in the ovens. Detailed Electricity and Gas consumption figures for the plant are recorded and reported to Corporate and the EPA by means of the CIMPLICITY software system.

In December 2007, a combined compressed air management system was installed allowing for a reduction in off load or non productive energy use by up to 90%. In 2008, there were gas reductions following the elimination of one TW oven and the integration of effective management systems for remaining ovens. Grant aid assistance has been obtained via the Cleaner Greener Production Programme (CGPP). The ongoing project involves removing polystyrene cores from the block mould process in order to:

- reduce VOC emissions (100%),
- reduce gas consumption (20%)
- Reduce oven drying cycles (30%)
- Reduce gypsum plaster generation (15%)

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- Reduce DI water consumption (approximately 1500lts/day)

Also in 2009 the site undertook an energy efficiency site review with Jones Lang LaSalle. The study unearthed multiply findings and opportunities which are currently being pursued through local behavioural changes and capital expenditure. Segregated lighting systems and low energy rating lighting were installed in 2009. The site commenced with the implementation of EN 16001 in 2010 with the first pre- assessment audit being held in Q4 2011.

Associated Impacts

Energy production has impacts on air quality as well as depletion of natural resources. Natural gas is a clean burning fuel although it is a non-renewable resource.

	Score
(1) Frequency, F Energy Usage is continuous and significant quantities are used.	**F** = 10
(2) Likelihood of Loss of Control, L Honeywell Transportation Ireland Limited have a computerised management system that monitors gas and electricity usage in real time. The company are participants in the Irish Energy Centre energy audit scheme and have undergone an energy audit. A full site energy-use audit took place in June 2009 to comply with IPPC PO525-01. Several recommendations were made and an extensive review is currently taking place. Honeywell are part of the Large Industry Energy Network (LIEN) and are committed to maintaining strong energy management and environmental protection practices.	**L** = 7
(3) Severity of Consequences, S	**Sub-Totals**
(ii) Legislative and Regulatory Control Condition 10 of IPPCL PO525-01 controls the Resource use within the company. Emissions Trading Directive 2003/87/EC. Member of the Industrial Best Practice Initiative EN 16001	3
(iii) Community/Employee Sensitivity Energy sources utilised by the company, electricity and gas, are in use throughout the community and so would not generate any undue concern amongst employees or the local community. Greenhouse gas emissions would be a concern to the community.	1
(iv) Impact on Air, Land and Water The quantity of energy used could have a long term adverse impact on environmental media (e.g. large scale use of Natural Gas and Electricity).	4
(v) Cost Benefits Energy usage is a major cost to the company. In 2010, Honeywell energy costs amounted to €1.797,459.	5
(vi) Potential for Resource Depletion There is a significant depletion non-renewable (electricity and natural gas) resources.	5
(vii) Accidents and Emergency situations Electrical fires or natural gas release could occur. The risk of electrical fires, gas leaks is low but a high environmental load would result from an electrical fire or gas leak given the number of people potentially affected.	3

Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 21
Significance Ratings C = F x L x S	**C** = 1470

Management of this activity by:	
Objective No.: **Target No.:**	5
Procedure(s):	HTTW-SOP-HSE-G-17 Environmental Monitoring and Measurements
Monitoring & Measurement:	CIMPLICITY System

6.8.1.Energy Consumption Figures 2010

Energy Consumption			***January 2010 – December 2010***	
Source	**Quantity**	**Units**	**Reporting Period**	**Main Consumption Sources**
Electricity	**15,397,924**	KWh	Jan – Dec 2010	CW Melting Pots CW Heat Treat CWM Machining
Natural Gas	**33,797,712**	KWh	Jan – Dec 2010	CW Afterburners CW ovens TW Aircast

6.9. Environmental Aspect No. 6

Environmental Aspect No. 6 Supply Side Activities	
Activity Supply of goods and raw materials to Honeywell.	
Aspect Refer to the site Chemical Inventory for a detailed description of raw materials and quantities used per annum. The principal raw materials are supplied by 13 main suppliers. All stock item details are recorded on SAP. All contracted services are controlled by the HTT representative requiring the work to be completed. In 2008, a full review of all chemicals used within the site was completed by the HSE department as part of the Honeywell REACH compliance programme. This was continued through 2009 & 2010with the incorporation of all chemical information into SAP. All details relating to the chemicals are filed on the HSE chemical inventory. Safety Data Sheets are logged in areas of use and also at security.	
Associated Impacts The sourcing and supplying of raw materials has indirect impacts associated with company activities. The main raw materials are metal alloys, gypsum and chemicals. Many of the raw materials are derived from the chemical and extractive industries and so have a variety of impacts on air, land and water. The manufacture of packaging (cardboard and paper) also has impacts on the environment.	
	Score
1) Frequency, F Supplies of raw materials, fuels and chemicals arrive and are used on-site on a continuous basis.	**F** = 10

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Environmental Aspect No. 6 Supply Side Activities	
2) Likelihood of Loss of Control, L New suppliers are audited to TS16949 (Automotive Industry Quality Standard). A procedure exists to investigate and control the probity of suppliers. The environment performance of suppliers is covered by HTTW-SOP-HSE-G-020 Assessment Control Suppliers / Contractors and Environmental Probity Questionnaires HTTW-F-HSE-G-022. New EU regulations controlling the use of RCF based substances have put pressure on suppliers to find alternative raw materials. Risk assessments are currently being carried out on all bulk deliveries to site.	**L** = 7
3) Severity of Consequences, S	Sub-Totals
(i) Legislative and Regulatory Control There is currently no specific legislative requirement to monitor the environmental performance of suppliers but they are monitored under Corporate Guidelines. Waste generation by suppliers is covered by Waste Regulations. Suppliers are obliged under the Packaging Regulations to take back packaging in certain circumstances. EU regulations cover the use and supply of RCF based materials, which are used in the TW process	2
(ii) Community/Employee Sensitivity The chemical industry and the extractive industry who supply Honeywell Transportation Ireland Limited would be considered major polluters in the eyes of the public. This could result in negative publicity for Honeywell. Packaging waste is also a serious issue for local communities fighting against incineration in their area.	2
(iii) Impact on Air, Land and Water The extractive industries, who supply aluminium and nickel to Honeywell Transportation Ireland Limited, have a major impact on land and water. Fuels and chemicals are derived from the petrochemical industry, which has a high impact on the environment in terms of global warming, ozone depletion and environmental damage.	4
(iv) Cost Benefits The environmental performance of suppliers is not expected to result in a direct financial cost to the company, but unreturned packaging is becoming an important disposal cost.	4
(v) Potential for Resource Depletion The company uses significant quantities of non-renewable materials. Sustainable economic development is dependent upon striking a balance between resource use and the depletion of such resources. Non-renewable resources can be defined as those, which are barely renewed by nature if at all, e.g., minerals and fossil fuels. Renewable resources are those, which are, renewed over a relatively short period by physical, chemical and/or biological processes, e.g., forests and food.	5
(vi) Accidents and Emergency situations The risk is deemed to be a trivial one.	1
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 18
Significance Ratings C = F x L x S	**C**= 1260
Management of this activity by:	

Objective No.:	N/A
Procedure(s):	HTTW-SOP-HSE-G-020 Assessment Control Suppliers Contractors

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Environmental Aspect No. 6 Supply Side Activities	
Monitoring & Measurement:	Oil & Chemical storage inventory HTTW-F-HSE-G-022 Environmental Probity Questionnaire

6.10. Environmental Aspect No. 7

Environmental Aspect No. 7 Contractors	
Activity Engineering, maintenance and repair, waste management, environmental monitoring, catering, pest/vermin control, landscaping, security, hauliers as well as miscellaneous other services are provided by contractors. Waste disposal contractors are considered in the Non-Hazardous and Hazardous Waste chapters of this document. A complete list of approved contractors is maintained by the HSE Department, security and reception (ref. containing copies of insurance cover, safety statement, method statements and contractor safety declaration from the HTT Contractor Safety Booklet).	
Aspect Contractors may use hazardous materials, energy / resources or generate obsolete equipment, parts, or waste materials during the course of their work.	
Associated Impacts Inappropriate disposal of wastes on-site may pollute air, water or land. Misuse of hazardous materials e.g. due to insufficient training may lead to a fire, explosion or chemical spillage.	
	Score
1. Frequency, F A wide variety of contractors are on-site in any given month.	F = 10
2. Likelihood of Loss of Control, L All contractors will be requested to adhere to the Honeywell Transportation Ireland Limited Waste Minimisation Policy as outlined in HTTW-SOP-HSE-G-009. A contractor safety program & contractor Safety Booklet exists and is strictly controlled. It is the responsibility of the internal Project co-ordinator to ensure that the contractor adheres to the Safety and Waste Management Guidelines. Monthly audits are being carried out on all contractor areas. All hazardous waste disposal facilities are reviewed and audited in line with Corporate requirements.	L = 6
3. Severity of Consequences, S	**Sub-Totals**
(i) Legislative and Regulatory Control Under Condition 7 of IPPC PO525-01, designated pre-approved Waste contractors are required to be used for all waste disposal. There is no specific legislative requirement to monitor the environmental performance of contractors. However any environmental release or incident emanating from the site and	4

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Environmental Aspect No. 7 Contractors	
premises would render Honeywell Transportation Ireland Limited liable.	
(ii) Community/Employee Sensitivity Any environmental incident or release caused by contractors working on-site at the Honeywell Transportation Ireland Limited site could adversely affect the public image of the company. However the activities of most of the contractors on-site would not cause significant incident/release.	3
(iii) Impact on Air, Land and Water On-site contractors could have an impact on air, land or water through unauthorised dumping of waste or spillages of chemicals etc. This impact is only likely to be short-term at worst by virtue of the nature and quantities handled.	3
(iv) Cost Benefits Contractor activities are a relatively minor cost in terms of their selection, monitoring and control. Contractor management uses a lot of internal resources to review documentation. Contractor costs could increase in the event of an environmental incident caused by contractors due to clean-up costs and fines imposed on Honeywell Transportation Ireland Limited as a result of the incident.	4
(v) Potential for Resource Depletion Only relatively small quantities of non-renewable resources are used by contractors in the course of their work.	3
(vi) Accidents and Emergency situations There is a minor risk of an accident such as a fire explosion or spillage of chemicals associated with contractor activities at Honeywell.	2
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 19
Significance Ratings C = F x L x S	**C**= 1140

Management of this activity by:	
Objective No.:	N/A
Procedure(s):	HTTW-SOP-HSE-G-031 Audit of Waste Recycling Disposal/Contractors HTTW-SOP-HSE-G-031Contractor Safety Programme HTTW-SOP-HSE-G009 Waste Minimisation Contractors Safety Booklet.
Monitoring & Measurement:	Contractor Safety Program incorporating submission of all contract company liability insurance and method statements for works to be undertaken.

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Document Title:	Register of Environmental Aspects
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6.11. Environmental Aspect No 8

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Document Title:	Register of Environmental Aspects
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-067
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Environmental Aspect No. 8: Emissions to Surface Waters

Activity

(i) Collection of rainwater from roofs and hardstand areas including car parks
(ii) Handling and movement of chemicals
(iii) Operation of oil water separator on the 7 compressors
(iv) Run off from contractors skips/facility skips

Aspect

Surface water is generated on site from roof water and external impervious areas. All surface water follows an extensive drain network that flows in a generally east or west direction. The network exits the site via 2 manholes which all join the I.D.A. surface water drains (refer to section 13 of IPPCL PO525-01 Application).

Weekly sampling is undertaken on SW-1 in the front car park, with SW-1 linked to Cimplicity for continuous monitoring of pH, conductivity and flow. Due to low flow levels equipment in SW-3 continually dries out. SW-2 is a road gulley drain in the front corner of the car park and is generally dry. Visual checks are carried out weekly and all road gulley's site wide are also assessed as part of Security's protocol. A request has been made to the EPA to remove SW2 & 3 as monitoring points due to the absence of flow. To date, a decision has not been made.

Run off from contractors skips/facility skips is not deemed significant given frequency of exchange and non-hazardous material stored in them. Sealed skips are used for any potentially wet material.

Spills from TW extraction on the yard could potentially be washed in the surface water drains in the area, which would end up at SW-1. The nickel alloy extraction unit has been amended to reduce fallout of nickel dust to surface water drains. Regular inspections are ongoing to reduce any impacts to surface water drains.

Sinks in the VNT and TW grinding area were shut down in 2006. The hand wash sink in the CD area was removed in 2008. A new sink in the maintenance workshop was directed to trade effluent discharge points.

CCTV inspection and cleaning of surface water drains was carried out in August 2008, and repairs works completed during December 2009 & 2010. All faults were minor and there was No impact to the environment.

Associated Impacts

The IDA surface water drainage system discharges to the Lisduggan stream which is a tributary of St. Johns River which is in turn a tributary of the River Suir. Flow rates and available assimilative capacities of these receiving waters have not been documented or calculated and assessment of impact on receiving waters cannot be determined.

	Score
(1) Frequency, F Surface water discharges are dependent primarily on rainfall volume.	**F** = 8
(2) Severity of Consequences, C	Sub-Totals
(i) Legislative and Regulatory Control Condition 9 of IPPC PO525-01 Regulates Non-Process water including Emission to Surface Waters. Schedule 4(i) of the Licence lists parameters and frequency for monitoring.	4

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Environmental Aspect No. 8: Emissions to Surface Waters	
Water Conservation Regulations 2008 European Communities Environmental Objectives (Surface Waters) Regulations 2009 SI 272 of 2009	
Severity of Consequences, C	Sub-Totals
(i) Community/Employee Sensitivity Contaminated releases to surface waters could give rise to employee/community complaints if amenity, abstraction or fisheries uses of receiving waters are affected.	3
(ii) Impact on Air, Land and Water Emissions of surface water discharges could cause a short term adverse impact on water quality in the Lisduggan Stream under normal operating conditions.	3
(iii) Cost Benefits Surface water monitoring is a medium cost to the Company. Capital investment has been provided for the installation of monitoring systems on surface water drains to connect to the Cimplicity System and civil works are required if further connection is deemed necessary.	4
(iv) Potential for Resource Depletion There is limited potential for depletion of surface water which is a renewable resource.	2
(v) Accidents and Emergency Accident and Emergency situations include releases of a spillage/leak of firewater generation. The risk of spill is reduced by procedure ‘Spill Prevention and Control’. Inappropriate storage of chemicals, TW extractions spills on the yard, and discharge of sludge dewatering facility bund overflows increases the score for this risk assessment criterion.	3
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	S = 19
Significance Ratings S = F x L x C	C = 1064

Management of this activity by:

Objective No.:	4
Procedure(s):	Preventive Maintenance HTTW-SOP-HSE-G-008 Spill Prevention & Control HTTW-SOP-HSE-G-012 Water Quality HTTW-SOP-HSE-G-013 Surface Water Drain Inspection
Monitoring & Measurement:	HTTW-SOP-HSE-G-0017 Environmental Monitoring and Measurements

6.11.1. Surface water monitoring requirements

Parameter	Monitoring Frequency	Analysis Method/Technique
pH (SW1 and SW3)	Weekly	pH electrode/meter and recorder
pH (SW2)	Monthly	pH electrode/meter
COD	Weekly	Standard Method
Total Heavy Metals	Quarterly	Standard Method
Sulphate	Quarterly	Standard Method
Conductivity	Weekly	Standard Method
Visual Inspection	Weekly	Not Applicable

6.12. Environmental Aspect No. 8

Environmental Aspect No.8 Non Hazardous Waste	
Activity General Mixed Waste Composting Organic waste Timber/Wood Pallets Cardboard & paper Cardboard and Plastic	
Aspect Nickel and Aluminium wastes are recycled off site. Cardboard packaging and Office paper are shredded and recycled. Waste pallets are recycled and where in suitable condition are returned to the original supplier for re-use. General office waste is disposed of to landfill. Organic Canteen waste is composted and recycled	
Associated Impacts A significant quantity of non-hazardous waste are recovered: ▪ Gypsum • Turbine contaminated with silica dust • Aluminum dross • Risers/Wheels/Ingot • Composting Organic waste • Timber/Wood Pallets • Cardboard & paper • Cardboard and Plastic Wastes are disposed of via Veolia Environmental Limited, the licenced waste contractor for the site.	
	Score
1. Frequency, F Significant quantities of non-hazardous waste are generated on a daily basis at Honeywell.	**F** = 10
2. Likelihood of Loss of Control, L A Waste Minimisation Policy exists (ref. HTTW-SOP-HSE-G-009) which aims to minimise and monitor waste at Honeywell. The Corporate Policy is to audit any landfill sites used by the Company. Honeywell Transportation Ireland Limited has not audited any waste disposal contractors but has planned to do so through the new Waste Management Contractor,. Procedure 'Drum Handling and Waste Management' HTTW-SOP-HSE-G-005 outlines	**L** = 4

Environmental Aspect No.8 Non Hazardous Waste	
controls for the storage, labelling and disposal of drums. HTTW-SOP-HSE-G-005 Waste Management, HTTW-SOP-HSE-G-024 Waste Segregation cover all aspects of non-hazardous waste. Non-hazardous wastes are stored in clearly identifiable drums/skips/compactors. Landfill is the least favoured method of disposal in the waste management hierarchy.	
3. Severity of Consequences, S	**Sub-Totals**
Legislative and Regulatory Control The Waste Management Act, 1996 and associated Regulations as well as the Litter Pollution Act must be complied with. Condition 7 of IPPC PO525-01 details the regulatory requirements. Schedule 3 (ii) details the requirements for Non-Hazardous Waste control.	3
Severity of Consequences, S	**Sub-Totals**
Community/Employee Sensitivity Litter associated with the removal of waste off site could generate a nuisance to the local communities. Landfill sites also cause odour and vermin nuisance and create a negative visual impact. Increasing difficulties in establishing new landfills could result in a negative public image for Honeywell Transportation Ireland Limited if it is deemed to be a major contributor to local landfills. Larger percentages of HTT's non hazardous waste is now going for recycling/recovery.	3
Impact on Air, Land and Water Non-hazardous waste contributes to the long-term environmental problems associated with landfill sites, as these sites are rendered unsuitable for other uses for many years. HTT is continually trying to find alternative routes for non hazardous waste going to landfill.	4
Cost Benefits Landfilling of waste is a significant cost to the company. Costs of landfilling have increased due to the landfill tax and space issues. However, recycling of Nickel and Aluminium generate revenue for the company. Waste disposal is a major cost to the company. Recycling and recovery options provide a cheaper and cleaner alternative, but routes need to be proven before full acceptance. In 2008, the EPA gave approval to return any good conditioned wooden pallets to the supplier for re-use within their company.	5

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Environmental Aspect No.8 Non Hazardous Waste	
Potential for Resource Depletion Use of landfill is a depletion of land, which is a non-renewable natural resource, given the time required to regenerate soil.	5
Accidents and Emergency situations Discharge of company waste during transport could occur. In the event of a fire, the packaging waste on-site is combustible and would release NOx, CO, dust, etc. The environmental load would be low and combined with a low probability, the risk is trivial.	2
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	S = 22
Significance Ratings C = F x L x S	C = 880

Management of this activity by:	
Objective No.:	5
Procedure(s):	HTTW-SOP-HSE-G-005 Waste Management
Monitoring & Measurement:	HTTW-SOP-HSE-G-009 Waste Minimisation

6.12.1. Non Hazardous Waste Materials

Waste Materials	Further Treatment, Recovery/Recycling On-Site	On-Site Reuse	Method of Disposal/Recovery
Nickel alloy dust, tops & revert material	None	None	Authorised off-site recovery/disposal
Cardboard & Plastic	None	None	Authorised off-site recovery/disposal
Gypsum Block	None	None	Authorised off-site recovery/disposal
Gypsum Sludge	None	None	Authorised off-site recovery/disposal
Waste Aluminium	None	None	Authorised off-site recovery/disposal
Domestic and canteen waste	None	None	Authorised off-site recovery/disposal
Pallets & Timber	None	None	Authorised off-site recovery/disposal Returned to supplier for re-use where conditions are acceptable.
Used and obsolete person PPE equipment	None	None	Authorised off-site recovery/disposal

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6.13. Environmental Aspect No. 9

Environmental Aspect No. 9 Groundwater and Municipal water

Activity

Combined use of ground water and municipal water for production and domestic use. Secondary municipal water supply for drinking water fountains and canteen water.

Aspect

There are two on site wells which combine with the municipal water supply sources. This water is used to wash castings from their moulds, washing machined parts, toilet facilities, the sludge dewatering facility and dye rinsing. Annual samples of groundwater are sent to an external laboratory for testing in accordance with IPPC Licence PO525-01.
Drinking water fountains are checked on a random selection basis quarterly and sent to an external laboratory for testing. Water supplied to the canteen for cooking is tested for Coliforms on a quarterly basis. The drinking and cooking water supply is treated with an on site ultraviolet system prior to distribution.
Water consumption from the municipal and ground water wells are integrated into the Cimplicity software system.

Honeywell Transportation Ireland Limited carried out a hydrogeological investigation and risk assessment of concentractions of volatile organic compounds (VOCs) within on site groundwater monitoring wells relating to chlorinated solvents including TCE 1,1, TCA and TCFM. These parameters are known from investigation of the groundwater in particular areas of the estate. The assessment which was carried out by a third party concluded that the source of low level detections of chlorinated organic compounds in the groundwater wells from the Honeywell site is not located within the site boundaries of the site and that the source of the chlorinated solvent contamination is highly likely to be sourced from an off site source.

Associated Impacts

Honeywell Transportation Ireland Limited are licenced to extract from groundwater and are charged on a monthly basis for water supplied from the Local Authority. Process water is discharged via trade effluent drains to the Waterford Corporation Sewer which receives preliminary treatment prior to discharge to the River Suir. Water used externally, i.e. back yard cleaning is discharged to the Lisduggan stream. Impact assessment on receiving environment cannot be determined. Following the identification of low level VOC's in ground water monitoring at the Honeywell Transportation Ireland Limited site, the EPA requested a hydrogeological investigation be completed and submitted to the Agency for review. The assessment concluded that the source of low level detections of chlorinated organic compounds in the groundwater wells from the Honeywell site is not located within the site boundaries of the site and that the source of the chlorinated solvent contamination is highly likely to be sourced from an off site source.

	Score

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Environmental Aspect No. 9 Groundwater and Municipal water	
1. Frequency, F Water Usage is continuous and significant quantities are used.	F = 10
2. Likelihood of Loss of Control, L Mains water is metered and charged to Honeywell on a monthly basis. Blockwasher Water recycling facility minimises water usage on production. Water is susceptible to contamination from chemicals, agriculture run off, etc. All drinking and cooking water is distributed via qualpaex piping thus reducing the possibility of copper or other metal contamination. Monitoring is carried out in accordance with IPPC licence requirements. See also HHT-F-HSE-G-014 Environmental Monitoring and Measurement Schedule. Two meters were installed on each of the site wells during Q3 2007. Based on the data obtained to date, the daily averages are as follows: • **Well 1:** 52,673 litres • **Well 2:** 116,205 litres Honeywell Transportation Ireland Limited's are committed to carrying out annual sampling and data analysis of groundwater in order to monitor changes in concentrations where relevant.	L = 5
3. Severity of Consequences, S	**Sub-Totals**
(i) Legislative and Regulatory Control Condition 10 of IPPC licence regulates use of resources which includes water intended for drinking, sanitary and industrial purposes. Schedule 4(ii) covers all parameters required to be included in the groundwater monitoring programme. European Communities (Drinking water) Regulations 2000 (S.I 439 of 2000) EPA Guidelines: Towards setting guideline values for the Protection of Groundwater in Ireland. Building Regulations (Part G Amendment) Regulations 2008	2
(ii) Community/Employee Sensitivity Municipal water is in use throughout the community and No concern amongst employees or community members has been observed.	1
(iii) Impact on Air, Land and Water The quantity of water used could have a long term adverse impact on groundwater media.	2
(iv) Cost Benefits Water usage from the local authority supply is a major cost to the company.	5
(v) Potential for Resource Depletion There is a significant depletion of renewable (water) resources.	2
(vi) Accidents and Emergency situations	

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Environmental Aspect No. 9 Groundwater and Municipal water		
Damage to water piping is a risk and consequent leaking is a risk. Maintenance and repairs are continually available on site to deal with such an event. Water supplies can be switched off at source to prevent any loss of the resource.		2
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S		**S** = 14
Significance Ratings C = F x L x S		**C**= 700
Management of this activity by:		
Objective No.:	n/a	
Procedure(s):	Blockwasher water Recycling Facility Operational and Maintenance Manual HTTW-SOP-HSE-G-012 Water Quality HTTW-SOP-HSE-G-017 Environmental Monitoring and Measurements	
Monitoring & Measurement:	IPPC Licence PO525-01 Schedule 4 (ii) Groundwater Monitoring HTTW-F-HSE-G-014 Environmental Monitoring and Measurements Schedule	

6.13.1. Water Consumption 2011

2. Water Consumption		***January 2011 December 2011***		
3.1. Source	3.2.	Units	***Reporting Period***	***Main Consumption Sources***
3.3. Municipal Supply	22, 658, 310	Litres	January to December 2011	CW Blockwasher facility; CW Blockmould process CW & TW Zyglo Wash
3.4. On-Site Ground Water Abstraction	57, 097, 410	Litres	January to December 2011	Supplementary to the process reservoir tank

6.13.2. Groundwater monitoring parameters

Parameter	Monitoring Frequency	Analysis Method/Technique
ph	Annual	pH electrode/meter
COD	Annual	Standard Method
Nitrate	Annual	Standard Method
Sulphate	Annual	Standard Method
Conductivity	Annual	Standard Method
Total Heavy Metals Note 1	Annual	Standard Method
Manganese	Annual	Standard Method
Aluminium	Annual	Standard Method

Note 1. Total Heavy Metals analysis to include nickel, zinc, copper, cadmium and chromium.

6.14. Environmental Aspect No. 10

Environmental Aspect No. 10 Transport	
Activity Transport of raw materials, finished product and employee movements to and from the plant.	
Aspect Traffic at the Honeywell Transportation Ireland Limited site typically consists of 20 commercial vehicles per day including heavy goods vehicles and service goods vehicles (refer to Goods Inward & Outward Registers). There would be approximately 10 different waste contractors under the Veolia umbrella collecting waste and delivering empty containment units over a week long period. Maintenance Contractors also have access to a storage container for their tools in the backyard area. Quality check deliveries to the Tooling and Engineering Departments also go through the backyard. All traffic accessing the back yard now travels over a weigh-bridge which is used as part of our waste management control. A 190 space car park provides car parking facilities for employees and visitors. A contractor car park is also in operation at the rear. Long-term contractors add an additional 30 no of vehicles per day.	
Associated Impacts Air quality degradation, resource depletion and hazardous waste generation, as well as oil leaks entering surface water drains. The human and social costs of heavy goods transported by road must also be considered.	
	Score
(1) Frequency, F Use of transport for delivery, shipping and employee transport is an every day occurrence.	**F** = 10
(2)Likelihood of Loss of Control, L The environmental probity questionnaire would have been completed by all long-term transport contractors using the site (HTTW-SOP-HSE-G-020 Assessment control supplier/contractors. Shipments of finished product are optimised for commercial reasons ensuring minimal wastage of fuel. Local deliveries occur on a daily basis. Two vehicle restraint systems were installed in Q4 2008 in the loading/unloading bay to improve safety and prevent release of loading vehicles. Security manage the flow of vehicles into and out of the area.	**L** = 4
(3)Severity of Consequences, C	Sub-Totals

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Environmental Aspect No. 10 Transport	
(i)Legislative and Regulatory Control At present, there is no definitive legislation governing transport from an environmental standpoint and no legal onus on the company to control environmental performance of hauliers (waste hauliers are covered in the Waste management Aspect).	1
(ii)Community/Employee Sensitivity At worst, transport would give rise to sporadic complaints.	1
(iii)Impact on Air, Land and Water Transport has extensive impacts on the environment. The use of land for transport infrastructure, whether road or rail networks, port or airport facilities, encroaches on landscape, natural habitats and biodiversity, and agriculture use. Motor vehicle traffic emits pollutants which affect air quality and human health, and gives rise to excessive noise, which affects the quality of life. Polluted surface water run-off from road surfaces may affect water resources. Road transport is an accepted feature of Irish commercial activity and would only cause a local nuisance at worst.	3
Severity of Consequences, S	**Sub-Totals**
(iv)Cost Benefits Transport is a minor cost to the company.	4
(v)Potential for Resource Depletion The use of petrol, diesel and oil in transportation depletes the non-renewable sources of fossil fuels.	3
(vi)Accidents and Emergency Any accident involving transportation could result in loss of life. The probability of road accidents is low.	3
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 15
Significance Ratings C = F x L x S	**C** = 600

Management of this activity by:	
Objective No.:	N/A
Procedure(s):	Goods Inward & Outward Register (Security) HTTW-SOP-HSE-G-020 Assessment Control Suppliers Contractors Security
Monitoring & Measurement:	

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6.15. Environmental Aspect No 11

Environmental Aspect No.11 Visual Impact	
Activity The visual appearance of buildings, plant facilities, car parks, hard stand areas and the grounds of the Honeywell Transportation Ireland Limited site are included in this activity.	
Aspect The Honeywell Transportation Ireland Limited plant is located in the Cork Road IDA Industrial Estate, in an area zoned for industrial development. The visual appearance of the front of the plant is in keeping with existing facilities in the area. Poor upkeep and maintenance of plant and buildings as well as bad management of waste or litter on-site would constitute abnormal conditions.	
Associated Impacts Examples of negative visual impact include: poor upkeep and maintenance of plant and buildings, badly managed waste on site as well as lack of screening by vegetation in sensitive areas. The company maintains the front of the plant and the site to a high standard. A landscaping contractor is employed for work at the main entrance and car park. Indaver Waste Management are responsible for the cleanliness of the yards and front of the building. There is a Contractor Car park at the rear of the facility. A field adjoining the rear of the plant is undeveloped waste ground. Soft lighting is used at night-time to reduce illumination from the facility.	
	Score
1. Frequency, F Plant and buildings are ever present	**F** = 10
2. Likelihood of Loss of Control, L Plant and buildings to the front are maintained to a high standard by a landscape contractor, and daily sweeping and tidying is undertaken by Indaver. The factory is in keeping with its surroundings. Maintenance is carried out as and when required.	**L** = 4
3. Severity of Consequences, S	**Sub-Totals**
(i) Legislative and Regulatory Control Local Government (Planning and Development) Acts, 1963 to 1993, govern land use and visual amenity. The company maintains copies of all its planning permissions on file and is not in breach of the stated conditions. Visual amenity requirements are specified in various planning permissions for the Honeywell Transportation Ireland Limited site. Under IPPC PO525-01 Honeywell are required to maintain the site and ensure there are no negative visual impacts. The Litter Pollution Act 1977 (No.12/1997) is a wide ranging and up-to-date legislative charter for action against litter.	3
(ii) Community/Employee Sensitivity Honeywell Transportation Ireland Limited have not received any complaints in the past in relation to visual impact or the appearance of the site.	1
(iii) Impact on Air, Land and Water The impact on air, land and water in terms of the visual impact of the plant is deemed to not	1

Environmental Aspect No.11 Visual Impact	
apply.	
Severity of Consequences, S	**Sub-Totals**
(iv) Cost Benefits The company incurs a relatively minor cost on an annual basis for the upkeep of the site, plant and buildings.	4
(v) Potential for Resource Depletion There is some potential for resource depletion, i.e. maintenance materials, etc., associated with this aspect.	3
(vi) Accidents and Emergency situations Emergency conditions would occur in the case of a fire or explosion, which would result in the destruction of plant and building to the extent of causing a negative visual impact. There is a low probability of emergency/accidents relating to visual impact. Therefore, a moderate risk score is assigned to this aspect.	3
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 15
Significance Ratings C = F x L x S	**C** = 600
Management of this activity by:	
Objective No.:	N/A
Procedure(s):	
Monitoring & Measurement:	

6.16. Environmental Aspect No 12

Environmental Aspect No.13 Environmental Noise	
Activity (i) Operation of plant site equipment. (ii) Local traffic (cars and trucks) to and from the site	
Aspect The main sources of noise are identified in Section 16 of the IPC 525-01 Licence Application. Noise monitoring has been carried out at these sources. The factory is located in an industrial estate and is surrounded on all sides by industrial facilities.	
Associated Impacts A noise is liable to disturb people and provoke complaints when its level exceeds the pre-existing ambient level by a certain margin or when it attains a particular absolute value. People's reactions to noise may be influenced by factors such as: Noise level; Noise character; Habituation; Degree of control over the noise; Personal sensitivity to noise; Attitude to the source; State of personal health; Activity engaged in; Time of day or night; Character of area; Visibility or otherwise of the noise source; and Seasonality of the operation. The impact of noise from the factory has not been assessed in relation to planning permission conditions outlined in (i) below.	
	Score

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Environmental Aspect No.13 Environmental Noise	
1. Frequency, F Noise sources identified in Section 16 of the IPPC PO525-01 application are production related and so are continuous. Operation of plant equipment, site traffic, delivery of goods and raw material as well as shipping of finished product are essential elements of site operations and so are prevalent on a continuous basis.	**F** = 10
2. Likelihood of Loss of Control, L Noise monitoring of significant noise sources have been carried out (Section 16 IPPC PO525-01 Application). Environmental noise surveys have been carried out at the plant boundary. Plant and equipment is maintained to a high standard.	**L** = 4
3. Severity of Consequences, S	**Sub-Totals**
(i) Legislative and Regulatory Control Honeywell Transportation Ireland Limited operates under IPPC PO525-01 which imposes boundary/noise limit values and monitoring requirements. Condition 8 states that activities on-site shall not give rise to noise levels off-site, at any noise sensitive locations, which exceed the following sound pressure limits (Leq,T) of the licence: Daytime: 55 dB(A) Leq, 30 minutes. Night-time: 45 dB(A) Leq, 15 minutes. There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.	3
Severity of Consequences, S	**Sub-Totals**
(ii) Community/Employee Sensitivity Elevated noise levels could cause a local nuisance and result in sporadic complaints. No noise complaints have been received to date at Honeywell Transportation Ireland Limited. The nearest noise sensitive locations are located at a considerable distance from the plant and several other factories are situated between Honeywell Transportation Ireland Limited plant and the noise sensitive locations.	2
(iii) Impact on Air, Land and Water Environmental noise is considered as an emission to air. At worst noise would be a local nuisance.	2
(iv) Cost Benefits The company will undertake annual environmental noise surveys. Exceedance of EPA noise levels may require capital investment for noise reduction of equipment.	4
(v) Potential for Resource Depletion There is no depletion of natural resources associated with this aspect at present	1
(vi) Accidents and Emergency situations There is a trivial risk of an accident/emergency situation which could lead to excessive noise levels at the plant.	1
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 13
Significance Ratings C = F x L x S	**C**= 520
Management of this activity by:	

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Environmental Aspect No.13 Environmental Noise	
Objective No.:	N/A
Procedure(s):	HTTW-SOP-HSE-G-017 Environmental Monitoring and Measurements HTTW-F-HSE-G-014 Environmental Monitoring and Measurements Schedule Preventative Maintenance
Monitoring & Measurement:	Noise Survey

6.17. Environmental Aspect No. 14

Environmental Aspect No. 14 Ecosystems	
Activity Discharges of domestic effluent enter Waterford Corporation sewer which currently only have preliminary treatment prior discharges directly to the River Suir. Emissions to atmosphere from the plant also occur. Storm water is discharged to Waterford Corporation storm water drainage system, which enters the River Suir.	
Aspect Discharges to drain are routed to the Waterford Corporation sewer, which in turn discharges to the River Suir with only preliminary treatment. A new Waterford Corporation wastesludge dewatering facility is currently being commissioned and will eliminate discharges of untreated effluent to the River Suir. No impact assessment on the River Suir has been carried out.	
Associated Impacts There is no evidence to suggest that ecosystems are a significant environmental impact. The Honeywell Transportation Ireland Limited plant is located in an industrial area. The main concern would be the sewage discharge, which along with all effluent from the Waterford Corporation sewer system is discharged with only minimal level of treatment to the River Suir. Pollutants from the plant have the potential to impact the normal functioning of ecosystems.	
	Score
(1) Frequency, F Discharges to Waterford Corporation drainage & sewer system, which in turn discharges to the River Suir occur on a daily basis. Emissions to atmosphere from the plant also occur on a daily basis. The impact on Ecosystems is deemed to be rare.	**F** = 8
(2) Likelihood of Loss of Control, L The volumes of effluent discharged are minor compared to the total discharge from the Waterford Corporation Sewer. Therefore loss of control at Honeywell Transportation Ireland Limited would not have major implications for the River Suir. There is a low risk to flora and fauna from Honeywell Transportation Ireland Limited activities due to its location in an urban industrial area. However, no detailed monitoring of impact atmospheric emissions has been undertaken.	**L** = 3
(3) Severity of Consequences, C	5. Sub-Totals
(i) Legislative and Regulatory Control The main relevant legislation is the EPA Act 1992 as well as EU Directives in relation to the protection of species and habitats. The Natural habitats Regulation (S.I. 94/1997) identifies habitats, animals and plants which require special protection and lists Special Areas of	4

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Environmental Aspect No. 14 Ecosystems	
Conservation (SAC). Honeywell Transportation Ireland Limited are not located in a Special Area of Conservation.	
(ii) Community/Employee Sensitivity There is no measurable impact of the discharges from Honeywell Transportation Ireland Limited on the quality of the receiving water in the River Suir.	2
Severity of Consequences, C	**Sub-Totals**
(iii) Impact on Air, Land and Water Effluent discharges from the Honeywell Transportation Ireland Limited site are likely to have an impact on the water quality of the River Suir as Waterford Corporation currently do not treat this effluent prior to discharge. Atmospheric emissions might cause local nuisance and contribute to the Greenhouse effect and acid rain.	2
(iv) Cost Benefits There is no cost associated with this aspect.	3
(v) Potential for Resource Depletion There is no depletion of resources associated with this aspect.	1
(vi) Accidents and Emergency There is low risk to flora, fauna and River Suir water quality from emergency situations at the Honeywell Transportation Ireland Limited plant. The risk associated with hazardous materials and hazardous waste has been considered in other sections of this report.	2
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 14
Significance Ratings C = F x L x S	**C** = 336

Management of this activity by:

Objective No.:	No objective has been set for this aspect.
Procedure(s):	Emergency Response Plan. Controls include bunding of chemical/oil storage areas, protection of drains and spill kits.
Monitoring & Measurement:	HTTW-SOP-HSE-G-019 Excursion-Incident Investigation & Reporting

6.18. Environmental Aspect No. 15

Environmental Aspect No. 15 Emissions to Ground	
Activity Transportation (to and from the site and within the site). Storage of chemicals and wastes on site	
Aspect The original factory was built in 1978 on an undeveloped site. In 1980 a fire occurred which led to the construction of a new building in 1982. Contaminated land could arise from spills of chemicals or oil during delivery, storage and transport. No raw materials or other waste products have been landfilled on-site. No significant spillage of material has been reported at Honeywell. Detailed monitoring of groundwater at the site well indicate that no significant contamination of groundwater has occurred. No soil surveys have been carried out to-date. Surface water monitoring is carried out on a weekly basis to capture any potential contamination.	
Associated Impacts Spillages of chemicals, oil or other materials would influence soil and groundwater quality at the Honeywell Transportation Ireland Limited site. Chemicals and hazardous wastes are stored in bunded location as described in the Hazardous Materials section and the Hazardous Waste sections of this report. The majority of chemicals and hazardous materials are stored in 205 litre drums.	
	Score
(1) Frequency, F There are no direct emissions to land or groundwater. No incidents of soil and groundwater contamination have been reported at the Honeywell Transportation Ireland Limited site.	**F** = 2
(2) Likelihood of Loss of Control, L Integrity of bunded structures was carried out in 2010. Poor housekeeping of chemicals could be a potential problem, although this is captured in internal safety audits. Detailed spillage control and drum management procedures exist. Analysis of groundwater from the site indicates that groundwater concentrations of metals are below that of the Drinking Water Regulations (S.I. 81/1988) (Refer to attachment 15 of the IPPC Licence Application). Annual Analysis of the Groundwater is required under IPPC PO 525-01. Surface water monitoring is undertaken weekly to capture any spills. All Oil and Chemical Storage is monitored on the stores Inventory.	**L** = 3
(3) Severity of Consequences, C	6. Sub-Totals
(i) Legislative and Regulatory Control Condition 9 of IPPCL PO525-01 covers protection of surface and ground waters; - All tank and drum storage areas shall be rendered impervious to the materials stored therein - The integrity and water tightness of all the bunding structures and their resistance to	4

Document Type:	Standard Operating Procedure
Document Title:	Register of Environmental Aspects
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-067
Authorised by:	HS&E Manager

Environmental Aspect No. 15 Emissions to Ground	
penetration by water or other materials stored therein shall be tested and demonstrated. - The loading and unloading of materials shall be carried out in designated areas protected against spillage and leachate run - off. - All pump sumps or other treatment plant chambers from which spillage of environmentally significant materials might occur in such quantities as are likely to breach local or remote containment or interceptors, shall be fitted with high liquid level alarms (or oil detectors as appropriate). - A programme of testing and inspection shall be undertaken of active underground tanks and pipelines to ensure that all such structures are tested at least once every three years. - HTT shall have in storage an adequate supply of containment booms and suitable absorbent material to contain and absorb any spillage. Honeywell Transportation Ireland Limited must comply with the requirements of the Directive on the Protection of Groundwater Against Pollution Caused by Certain Dangerous Substances (80/68/EEC) which prohibit the discharging of certain dangerous chemicals to groundwater.	
(ii) Community/Employee Sensitivity No observed reaction is observed from employees/local community regarding this aspect as no known contamination has occurred as a result of the activities at the Honeywell Transportation Ireland Limited Site.	1
(iii) Impact on Air, Land and Water There is no adverse impact associated with this aspect, as Honeywell Transportation Ireland Limited activities are unlikely to have a measurable impact on groundwater or soil quality.	1
(iv) Cost Benefits Groundwater monitoring is a minor cost to the Company. Annual groundwater investigations are required under the IPPC licence.	4
(v) Potential for Resource Depletion No contamination of soil, therefore depletion of a non-renewable natural resource has not occurred to date.	1
(vi) Accidents and Emergency There is a minor risk of Honeywell Transportation Ireland Limited activities leading to contamination of land as a result of spillage of oil or chemicals. Surface water is the most likely receptor in the case of a spillage. A spill response team is in place and emergency response spill kits are located in high-risk areas for spills of coolants and chemicals.	2
Sum (i) + (ii) + (iii) + (iv) + (v) + (vi) = Severity of Consequences Score, S	**S** = 13
Significance Ratings C = F x L x S	**C** = 78
Management of this activity by:	
Objective No.:	4

Document Type:	Standard Operating Procedure
Document Title:	Register of Environmental Aspects
Responsible Department:	Health Safety & Environment
Document Number:	HTTW-SOP-HSE-G-067
Authorised by:	HS&E Manager

Environmental Aspect No. 15 Emissions to Ground	
Procedure(s):	HTTW-SOP-HSE-G-010 Oil-Coolant Management HTTW-SOP-HSE-G-005 Waste Management HTTW-SOP-HSE-G-008 Spill Prevention & Control
Monitoring & Measurement:	HTTW-SOP-HSE-G-019 Excursion-Incident Investigation & Reporting Oil and Chemical Storage Inventory. HTTW-SOP-HSE-G-017Environmental Monitoring and Measurements HTTW-F-HSE-G-014 Environmental Monitoring and Measurements Schedule

7. Summary of Significance Ratings 2011

No.	Environmental Aspect	Frequency of Occurrence F	Likelihood of Control Loss L	Severity of Consequences S = Sum of Criteria i - vi						S	Significance Rating C C = F x L x S
				i	ii	iii	iv	v	vi		
1	Emissions to Sewer	**10**	**10**	5	2	3	5	2	3	**20**	**2000**
2	Energy & Resource Usage	**10**	**8**	3	1	4	5	5	3	**21**	**1680**
3	Hazardous Materials	**10**	**7**	3	2	3	5	5	3	**21**	**1470**
4	Hazardous Waste	**10**	**5**	3	5	4	6	4	6	**25**	**1400**
5	Supply Side Activities	**10**	**7**	2	2	4	4	5	1	**18**	**1260**
6	Emissions to Atmosphere	**10**	**5**	3	2	2	4	4	4	**19**	**1250**
7	Contractors	**10**	**6**	4	3	3	4	3	2	**19**	**1140**
8	Emissions to surface waters	**8**	**7**	4	3	3	4	2	3	**19**	**1064**
9	Non Hazardous Waste	**10**	**4**	3	3	4	5	5	2	**22**	**880**
10	Groundwater and municipal water supply	**10**	**5**	2	1	2	5	2	2	**14**	**700**
11	Transport	**10**	**4**	1	1	3	4	3	3	**15**	**600**
12	Visual Impact	**10**	**4**	3	1	1	4	3	3	**15**	**600**
13	Environmental Noise	**10**	**4**	3	2	2	4	1	1	**13**	**520**
14	Ecosystems	**8**	**3**	4	2	2	3	1	2	**14**	**336**
15	Emissions to Ground	**2**	**3**	4	1	1	4	1	2	**13**	**78**

HSE
Annual Review Meeting

Presented March 2nd 2011

Prepared : A. Fahey & C. Black

Roles

Scribe ……………….

Process Monitor ….

Timekeeper ……….

HSE Policy – TS 201 HSE Policies

1. Site HSE cardinal Safety Rules: ..\..\..\HSEMS TS 203 Legal\HS&E Legislation Updates\Section 3 Existing Licences, Planning permissions& HSE Policies\cardinal safety rules.pdf

2. HSE Site HSE Policy ..\..\..\HSEMS TS 201 HSE Policy\HSE Sustainable Policy\HSE policy 2009.pdf

3. Corporate Sustainable policy: ..\..\..\HSEMS TS 201 HSE Policy\HSE Sustainable Policy\2009 Policy Renewal.pdf

4. Energy Policy: ..\..\..\..\QA-systems\01. DOCUMENTATION CONTROL\PROCEDURES\departmental procedures\HS&E\HSE PLANS & POLICIES\HTTW-SOP-HSE-G-114 HTT Energy Policy 2010\Rev 2 Approved\HTTW-SOP-HSE-G-114 HTT Energy Policy 2010 Rev 2.doc

2009 – TS 202 Risk Assessments

Risk Assessments completed in 2010:

- Battery chargers
- Feed tank & Sludge dewatering tank bunds
- Pregnant employees
- SST – new equipment & process changes

Overdue

- Manual handling of loads
- Display screen equipment & office ergonomics

Outstanding Risk Assessments (Legally required):

- Chemicals
- Maintenance workshops
- Maintenance tasks
- Working at heights
- Traffic management & driving in the workplace
- Stress
- Noise
- PPE
- Electricity & LOTO
- Night work and Shift work

TS 203 Legal Updates

1. **Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2010:** Assessment of on site radiation sources required – Outstanding

2. **Waste Management (Waste Electrical and Electronic Equipment) (Amendment) Regulations** 2010 SI 143 of 2010 assessment outstanding

3. **REACH regulation** is the most significant addition in 2010

   - **More focus required in 2011 to meet deadlines**
     - Obtaining updated SDS's from all suppliers/Maintaining SAP chemical register/Chemical risk assessments/Elimination of RCF component of crucible/UV white marker supplier information/COD cuvettes

3. **TS Restricted substances:** Elimination of Kalminex/Sticktite T/Wet – in all overdue

4. **Other:** SST building compliance with Building & Fire Regulations

5. **Other:** Several risk assessment legally required not completed (slide 4)

6. **Note:** Site non compliant with disability access regulations

TS 204 Structure & Responsibility

1. HSEMS – Sponsors Roles and Responsibilities
2. ..\..\HSEMS System\HSEMS Sponsors responsibilities rollout.xls
3. HPD Process – Key HSE Inputs into goals and Objectives
4. IPPC License: Plant wide training not completed for roles and responsibilities concerning IPPC licence
5. ..\..\..\HSEMS TS 206 Operation Control\IPPC Licence\IPPC Licence\2003 Licence\525lic.pdf
6. HSE Plant AOP Goals
7. Balanced Score Card .

.\..\..\HSEMS TS 213 Monitoring

TS 205 Document Control & Updates

1. **102 procedures & 92 forms**

2. **7 new procedures:** Afterburner control policy/Energy policy/Health food handlers/Medical case management/Dispensing medication on site/Travel policy/No smoking policy

- **Register of Environmental Aspects**
  - Higher priority for emissions to sewer/air
  - Lower priority for energy & use of resources
  - X ray machine removed from register

- **Safety Statement**
  - No major changes

- **Emergency Response Plan**
  - No major changes

TS 206 – Operational Control

1 **Waste Management:** Potential improvements for waste reduction not investigated as anticipated

2 **Operational failures:** See section on near misses/first aids

3 **PPE Compliance:**

- Commitment from senior level is a must!
- Staff & use of phones
- Operators leaving hearing protection at work stations

4 **Engineering controls:**

Additional afterburner abatement controls

Dust extractors requires continuous monitoring element introduced

New equipment brought on line more quickly ie;(SST Hammer)

TS 206 – Operational Control

1 **Energy Consumption:**
- Gas: 30% usage increase on 2009 (67, 954 euro)
- Electricity: 20% usage increase on 2009 (1,120,505 euro spend)

2 **IPPC licence:** Confirmed afterburners must remain on due to VOC emissions – However CGPP can both eliminate the need for AB plus reward with considerable cost savings in Energy / Raw Material / Waste Removal / Water Reduction – Sulphate Reduction

3 **Chemical exposure:**
- **REACH implications:**
  - **Crucible/COD cuvettes/Kalminex/Penetrant aqua chek wb 100/Sticktite T/Wet in**
  - **Iron Oxide**
  - **Mercury restrictions**

4 **Fire Safety:**
- 2 fire incidents – SST & compactor
- Annual drill – New clocking station

TS 207 Management of Change

1. SST Introduction – State of readiness – learning from hasty introduction – Layout – Operational Controls – Training

2. Need to introduce project acceptance criteria and sign off both before and after project completion. SST new build ideal opportunity to introduce and test.

3. Change from Indaver – Veolia

4. Need for more robust change management programme to be introduced as part of HOS integration roll out across all departmental elements

TS 208 HSE Training

1. 2010 HSE Related Training Needs Analysis Matrix: ..\..\..\HSEMS TS 208 Training\HSE Training Plans\Training matrix 2010.xls
   - 45% Training topics completed 100%
   - 10% Training topics not completed fully
   - 45% not carried out

2. Manual Handling Training need to be completed again this year last completed 2006-2007.

3. Interdepartmental training plan required – Engineers & PLM's

4. HOS/HSE integration

TS 209 HSE Communications

1. Internal Communications: 80% weekly HSE postings completed in 2010 ..\..\..\HSEMS TS 209 Communication\Safety Communication\Communications matrix\HSE communications matrix 2010.doc

2. No # EPA Communication: ..\..\..\HSEMS TS 206 Operation Control\IPPC Licence\EPA Correspondence\2010

3. No # HSA Correspondence ..\..\..\HSEMS TS 209 Communication\HSA

TS 210 Corrective & Preventative Action

1. **Accident & Near status**: ..\..\..\HSEMS TS 213 Monitoring Measurement Self Assessments\HSE Metrics\2010\2010 Accident Analysis environmental excursions.xls

2. **HSE issue tracker:**
   - 164 actions closed
   - 41 actions carried into 2011

3. **Projects completed**
   - Repair to drains
   - Burner/oven upgrades
   - Hazardous waste site audits
   - Lagan Cement
   - Bund upgrades

Need to Improve Closure Rate

TS 210 Corrective & Preventative Action

HSA on site visit during 2010 –

- **Focus on mtce risk assessments**
- **Reach and site implications**
- **Return to industrial focus follow collapse of building industry**

Environmental excursions (MUST BE REVIEWED BY MGMT):

•40 Non compliances reported to EPA

3 reports related to afterburners

2 reports related to drinking water

2 reports related to surface water

2 reports related to toxicity

31 reports related to sulphates, COD & Suspended solids

- Incident Releases Investigation Reports 2010.doc

Need to Improve Closure Rate for all actions raised

TS 213 Monitoring Self Assessment

1. **Balanced Score Card Monthly Review:**
2. **HSE Compliance Programs Status**
   - SAT: 74%
   - HSEMS: 79%
   - Employee HSE Satisfaction Survey: Due 1st Qt 2011
   - FAIR: 6.52
   - TCIR: .79
   - LWCIR: .21

3. **Third party assessments:**
   - Air monitoring/EPA visits
   - 2 x ISO 14001/18001 Assessment
   - 2 x Gunnebo Inspections
   - 1 HSA visit
4. **GRC Compliance /Assessments x 3:**
5. **Racking Inspections/ Assessments plant wide:**

TS 213 Monitoring Self Assessment

6. Waste Streams

- **Gypsum disposal:** Expected 100,000 tonnes saving/annum
- **Approval of hazardous waste disposal sites:**
  - Ellesemere Port, UK
  - Veolia, Fermoy
  - Rilta Environmental, Dublin
  - Sterile Tehnologies, Dublin

TS 214 HSE Objectives & MGT Plan

1.Environmental Plant goals and objectives

On Target/Completed	Overdue
GCPP – coreless BM project	Afterburner/oven failures (2011 Priority)
EN 16001 standard compliance	REACH targets (2011 Priority)
Improved hazardous waste store	Trade effluent non compliances (2011 Priority)
Improvements to bunds	Fire water retention
ISO 14001/OHSAS 18001 certification	Underground pipe integrity testing
Repair work to drains	Air dispersion modelling
	Procedures/training for environmental related activities/responsibilities (2011 Priority)
	Reduce waste streams (spill material)

TS 214 HSE Objectives & MGT Plan

1.Safety Plant goals and objectives

On Target/Completed	Overdue
Training operators in multiple areas	Ergonomics at the BM (2011 Priority)
	Crusher system for SST & BM (2011 Priority)
	Noise in TW KO & TW saws
	Repair water leaks in roof (2011 Priority)
	TW extractor platform (2011 Priority)

TS 214 HSE Objectives & MGT Plan

1.Occupational Health Plant goals and objectives

On Target/Completed	Overdue
HF training	
Incorporation of procedures into OHSAS 18001:2007	Communications – return to work
Employee assistance programme	Communications – Drug & alcohol
Employee wellbeing programme	
Communications – bullying & harassment	

Other priorities for 2011

1. Legislative Compliance –Compliance – Compliance
2. Introduction of HOS and manage its impact on staff - Staff moral – Stress across all levels of the organisation
3. Resolve IPPC licence renewal application - Compliance
4. SST capacity increase project
5. Finding solution to Chris Kiely / Stephen Cusack
6. Risk assessments: SST/Maintenance/Chemicals
7. REACH compliance
8. Compliance with disability regulations
9. Traffic management plans – Building Upgrade
10. Executive medicals – Return to Cork Bon Secure/Rowe practice

Enfo cement Category Summary

Organisation Name	
Case Number	

Fixed Attributes	Enforcement Category
Complexity	Mid
Location	Mid

Enforcement Category due to Fixed Attributes	C1

Sheet Reference	Enforcement Category
Complexity	Mid
Emissions	High
Location	Mid
Operator Management	High
Enforcement Record	Low

Enforcement Category Based Upon Above 7 Attributes	A3
FINAL ENFORCEMENT CATEGORY FOR YOUR FACILITY [1]	A3

Note[1]: If different from above, a default may have been applied.

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.11

REFERENCE YEAR	2010

1. FACILITY IDENTIFICATION

Parent Company Name	Honeywell International Technologies Limited
Facility Name	Honeywell International Technologies Limited
PRTR Identification Number	P0525
Licence Number	P0525-01

Waste or IPPC Classes of Activity

No.	**class_name**
3.4.2	###

Address 1	Unit 411
Address 2	Waterford Industrial Estate
Address 3	Cork Road
Address 4	Waterford
Country	Ireland
Coordinates of Location	-7.15465 52.2461
River Basin District	IESE
NACE Code	2442
Main Economic Activity	Aluminium production
AER Returns Contact Name	Amy Fahey
AER Returns Contact Email Address	Amy.Fahey@Honeywell.com
AER Returns Contact Position	Amy.Fahey@Honeywell.com
AER Returns Contact Telephone Number	051 301316
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	051 372644
Production Volume	0.0
Production Volume Units	
Number of Installations	1
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	**Activity Name**
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	No
Have you been granted an exemption ?	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 PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
237	**Volatile organic compounds (as TOC)**	C	OTH	FTIR gasmet analyser	56.68	56.68	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 delete 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 landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

Landfill: Honeywell International Technologies Limited

Please enter summary data on the quantities of methane flared and / or utilised	**T (Total) kg/Year**	**M/C/E**	**Method Used**		**Facility Total Capacity m3 per hour**	
			Method Code	**Designation or Description**		
Total estimated methane generation (as per site model)	0.0				N/A	
Methane flared	0.0				0.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	0.0				N/A	

4.2 RELEASES TO WATERS

Link to previous years emissions data

| PRTR# : P0525 | Facility Name : Honeywell International Technologies Limited | Filename : sulphate review.xls | Return Year : 2010 |

30/03/2011 14:28

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this only concerns Releases from your facility

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs				
POLLUTANT		METHOD			QUANTITY				
			Method Used		SE1	NA			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
06	Ammonia (NH3)	M	CRM	Mass emissions = Average	0.15	0.0	0.15	0.0	0.0
83	Fluorides (as total F)	M	CRM	Mass emissions = Average	0	0.0	0.0	0.0	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 delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs					
POLLUTANT		METHOD			QUANTITY					
			Method Used		SE1	NA	NA			
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
303	BOD	M	CRM	Mass emissions = Average mass emission*daily average flow rate	123.21	0.0	0.0	123.21	0.0	0.0
306	**COD**	M	CRM	Mass emissions = Average mass emission*daily average flow rate	196.8	0.0	0.0	196.8	0.0	0.0
240	Suspended Solids	M	CRM	Mass emissions = Average mass emission*daily average flow rate	73.59	0.0	0.0	73.59	0.0	0.0
343	Sulphate	M	CRM	Mass emissions = Average mass emission*daily average flow rate	542.67	0.0	0.0	542.67	0.0	0.0
347	Total heavy metals	M	CRM	Mass emissions = Average mass emission*daily average flow rate	0.1	0.0	0.0	0.1	0.0	0.0
314	Fats, Oils and Greases	M	CRM	Mass emissions = Average mass emission*daily average flow rate	14.1	0.0	0.0	14.1	0.0	0.0
327	Nitrate (as N)	M	CRM	Mass emissions = Average mass emission*daily average flow rate	0.67	0.0	0.0	0.67	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE | PRTR# : P0525 | Facility Name : Honeywell International Technologies Limited | Filename : sulphate review.xls | Return Year : 2010 | 30/03/2011 14:28

Please enter all quantities on this sheet in Tonnes

11

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	19 12 12	No	1464.44	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11	R5	M	Weighed	Offsite in Ireland	Lagan Cement,PO487-05	Kinnegad,.,.,Meath,Ireland		
To Other Countries	10 10 07	Yes	901.48	casting cores and moulds which have undergone pouring, containing dangerous substances	D1	M	Weighed	Abroad	Veolia Environmental,W0050-02	Corrin,Fermoy,Cork,.,Ireland	Buhck Gmbh & Co Rappenberg,eg0019,Surdring 38,21465 Wentorf,.,.,Germany	Surdring 38,21465 Wentorf,0,0,Germany
Within the Country	10 03 16	No	36.31	skimming other than those mentioned in 10 03 15	R4	M	Weighed	Offsite in Ireland	Hegarty Metals,Waste Permit: WCP-LK-08-589-01	Ballysimon Road,Limerick,.,.,Ireland		
Within the Country	10 03 16	No	18.29	skimming other than those mentioned in 10 03 15	R4	M	Weighed	Onsite in Ireland	Milver metals,Waste Permit: BLS/343869/CB	Coronel Avenue,Rowleys Green Industrial Estate,Conventry,West Midlands,United Kingdom		
Within the Country	16 02 14	No	0.92	discarded equipment other than those mentioned in 16 02 09 to 16 02 13	R4	M	Weighed	Onsite in Ireland	KMK Metals,w0113/03	Cappincur Industrial Estate,Daingean Road,Tullamore,Offaly,Ireland		
Within the Country	20 01 35	Yes	0.2	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and and 20 01 23 containing hazardous components	R4	M	Weighed	Offsite in Ireland	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	immark ,233-1,Site No 14A1 ,Greenogue Business Park ,Rathcoole , Dublin ,Ireland	Site No 14A1 ,Greenogue Business Park ,Rathcoole , Dublin ,Ireland
Within the Country	**20 03 01**	**No**	219.43	mixed municipal waste	D1	M	Weighed	Offsite in Ireland	Greenstar,EPA 177-3	Carrignard,Six Cross Roads Business Park,Waterford,.,Ireland		
Within the Country	20 01 08	No	82.36	biodegradable kitchen and canteen waste	R10	M	Weighed	Offsite in Ireland	Greenstar,EPA 177-3	Carrignard,Six Cross Roads Business Park,Waterford,.,Ireland		
Within the Country	20 01 38	No	65.12	wood other than that mentioned in 20 01 37	R10	M	Weighed	Offsite in Ireland	Greenstar,EPA 177-3	Carrignard,Six Cross Roads Business Park,Waterford,.,Ireland		
Within the Country	15 01 01	No	8.5	paper and cardboard packaging	R10	M	Weighed	Offsite in Ireland	ReHab Recycling,WCP/KK/145(A)/05 & Waste collecion Permit 08/04 (	Monaghan Road,Cork,.,.,Ireland		
Within the Country	20 01 10	No	31.46	clothes	R3	M	Weighed	Offsite in Ireland	Greenstar,EPA 177-3	Carrignard,Six Cross Roads Business Park,Waterford,.,Ireland		
Within the Country	20 01 01	No	16.46	paper and cardboard	R3	M	Weighed	Offsite in Ireland	Greenstar,EPA 177-3	Carrignard,Six Cross Roads Business Park,Waterford,.,Ireland		
Within the Country	18 01 03	Yes	0.007	wastes whose collection and disposal is subject to special requirements in order to prevent infection	D9	M	Weighed	Offsite in Ireland	Veolia Environmental,W0050-02	Corrin,Fermoy,Cork,.,Ireland	SRCL,55-2,Beech Wood Road,Dublin,.,.,Ireland	Beech Wood Road,Dublin,.,.,Ireland
Within the Country	20 01 21	Yes	0.109	fluorescent tubes and other mercury-containing waste	R5	M	Weighed	Offsite in Ireland	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	Irish Lamps,Cork KE 08 004 01,Woodstock Estate,Kilkenny Road,Kildare,.,Ireland	Woodstock Estate,Kilkenny Road,Kildare,.,Ireland
Within the Country	16 03 05	Yes	63.67	organic wastes containing dangerous substances	R2	M	Weighed	Offsite in Ireland	Veolia Environmental,W0050-02	Corrin,Fermoy,Cork,.,Ireland	Veolia Environmental,WOO50-02,Fermoy ,Cork,.,.,Ireland	Fermoy ,Cork,.,.,Ireland
Within the Country	07 05 13	Yes	0.01	solid wastes containing dangerous substances	D10	M	Weighed	Offsite in Ireland	Veolia Environmental,W0050-02	Corrin,Fermoy,Cork,.,Ireland	Veolia Environmental,WOO50-02,Fermoy ,Cork,.,.,Ireland	Fermoy ,Cork,.,.,Ireland

						Method Used						
Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	M/C/E	Method Used	Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
To Other Countries	13 02 05	Yes	0.01	mineral-based non-chlorinated engine, gear and lubricating oils	D10	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	13 08 99	Yes	0.202	wastes not otherwise specified	D9	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	15 02 02	Yes	10.0	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	D10	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	16 05 04	Yes	0.056	gases in pressure containers (including halons) containing dangerous substances	D10	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	16 05 07	Yes	0.224	discarded inorganic chemicals consisting of or containing dangerous substances	D15	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	16 05 08	Yes	4.32	discarded organic chemicals consisting of or containing dangerous substances	D10	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	08 01 11	Yes	0.075	waste paint and varnish containing organic solvents or other dangerous substances	D10	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	14 06 03	Yes	0.058	other solvents and solvent mixtures	D10	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
To Other Countries	07 07 04	Yes	0.864	other organic solvents, washing liquids and mother liquors	D10	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	ATM (Afvalstoffen Terminal Moerdijk BV),389167,Westring 360,44579 Castrop-rauxel,.,.,Germany	Westring 360,44579 Castrop-rauxel,.,.,Germany
To Other Countries	15 01 10	Yes	0.76	packaging containing residues of or contaminated by dangerous substances	R4	M	Weighed	Abroad	Indaver Ireland,EPA 36-2	Tolka Quay,Dublin,.,.,Ireland	AVG Abfall Verwertungs Gesellschaft mbh,107ZEB002,Borsigstr 2,d22113,Hamburg,.,Germany	Borsigstr 2,d22113,Hamburg,.,Germany
Within the Country	17 01 07	No	10.52	mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	R5	M	Weighed	Offsite in Ireland	Greenstar,EPA 177-3	Carrignard,Six Cross Roads Business Park,Waterford,.,Ireland		
To Other Countries	10 10 08	No	1069.3	casting cores and moulds which have undergone pouring, other than those mentioned in 10 10 07	D9	M	Weighed	Abroad	Billfinger Berger,109ZEB072	Hamburg,.,.,.,Germany		

* Select a row by double-clicking the Description of Waste then click the delete button

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					

Link to previous years waste data
Link to previous years waste summary data & percentage change

SHANNON AQUATIC TOXICITY LABORATORY

ENTERPRISE IRELAND

TOXICOLOGICAL ANALYSIS REPORT

Form No.: ToxF035-1 Ver 2.1

TEST RESULTS

Customer: Honeywell

Customer sample description: Sample ID: SE-1, 25-26.01.10

Tox. Ref. No.: 10T005

Test Date: 09.02.10 – *Tisbe battagliai*
26.01.10 – *Vibrio fischeri*

Test Parameter	Test Results: Concentration % vol./vol.	Test Results: Toxic Units	95% Confidence Limits % vol./vol.	Method of Calculation
48 h LC_{50} to *Tisbe battagliai*	5.2	19.2	n/a	Spearman - Karber
5 min EC_{50} to *Vibrio fischeri*	14.8	6.8	14.3-15.2	Microtox
15 min EC_{50} to *Vibrio fischeri*	21.1	4.7	20.3-21.9	Microtox

Comments:

48 h LC_{50} to *Tisbe battagliai*

48 h LC_{50} is mean of two results: 5.0 vol./vol. and 5.3% vol./vol.

5,15 min EC_{50} to *Vibrio fischeri*

Vibrio test report is presented on the next page.

Test Method(s): (see Appendix on back of page 4)
Method 3: *Tisbe battagliai*
Method 2: *Vibrio fischeri*

SHANNON AQUATIC TOXICITY LABORATORY

ENTERPRISE IRELAND

TOXICOLOGICAL ANALYSIS REPORT

Form No.: ToxF035-1 Ver 2.3

TEST RESULTS

Customer: Honeywell

Customer sample description: Sample of SE-1, 12.10.10

Tox. Ref. No.: 10T119

Test Date: 21.10.10 – *Tisbe battagliai*
20.10.10 – *Vibrio fischeri*

Test Parameter	Test Results: Concentration % vol./vol.	Test Results: Toxic Units	95% Confidence Limits % vol./vol.	Method of Calculation
48 h LC_{50} to *Tisbe battagliai*	2.1	47.6	1.8-2.6	Trimmed Spearman-Karber
15 min EC_{50} to *Vibrio fischeri*	9.3	10.8	8.7-9.9	microtox
30 min EC_{50} to *Vibrio fischeri*	15.4	6.5	14.2-16.6	microtox

Comments:

48 h LC_{50} to *Tisbe battagliai*

100% mortality occurred at 10% vol./vol.
85% mortality occurred at 3.2% vol./vol.
No mortality occurred at 1.0% vol./vol.

15,30 min EC_{50} to *Vibrio fischeri*

Vibrio test report is presented on the next page.

Test Method(s): (see Appendix on back of page 4)
Method 3: *Tisbe battagliai*
Method 2: *Vibrio fischeri*

Enterprise Environmental
Unit 1D
M4 Interchange Park
Celbridge
Co Kildare
Business Registration No. 321939

Enterprise Environmental

"a specialist environmental monitoring service"

Contact: Ph: 01 6279935, Mob: 087 6488690, Fax: 01 6279935, Email: josephmcnamee@eircom.net

CONFIDENTIAL REPORT

This report relates only to the sample(s) tested.

Client:

Honeywell Transportation Ireland Ltd
Unit 411, Industrial Estate
Cork Road
Waterford

Title:

Chemical analysis of 1 trade effluent sample.

Attn: Amy Fahey

Job Ref. D007

Report by: Joe McNamee, MSc

Joe McNamee

Date Sample Received: 26th Jan 2010

Purchase Order No.: 4200052549

Copies to:

Date Reported: 5th February 2010

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Client: **Honeywell Transportation Ireland Ltd**
Unit 411, Industrial Estate
Cork Road
Waterford

Contact: **Amy Fahey**

Analytical results of 1 sample collected by Enterprise Environmental for chemical analysis.

Laboratory Reference			**D007**
Parameter	Units	Method	
pH		EE-1	7.7
Biochemical Oxygen Demand (ATU)	mg/l	EE-2	178
Chemical Oxygen Demand	mg/l	EE-3	503
Suspended Solids	mg/l	EE-4	22
Test Sample Reference	Honeywell Transportation Ireland Ltd, Trade effluent, 24 h flow proportional composite sample at SE1, 25th to 26th of Jan 2010 (collected at 09.00h on the 26th Jan 2010)		

Notes:
ATU = Allylthiourea added to inhibit nitrification
< = Less than

Methods:
EE-1 = pH probe, HMSO, Methods for the Examination of Waters and Associated Materials
EE-2 = 5 Day BOD, 2nd Ed. HMSO, Methods for the Examination of Waters and Associated Materials
EE-3 = Spectrophotometry (Hach/Lange)
EE-4 = Gravimetric, APHA, Standard Methods for the Examination of Water and Wastewater, 21st Ed

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CONFIDENTIAL REPORT

This report relates only to the sample(s) tested.

Client:

Honeywell Transportation Ireland Ltd
Unit 411, Industrial Estate
Cork Road
Waterford

Title:

Chemical analysis of 1 trade effluent sample.

Attn: Amy Fahey

Job Ref. D103

Report by: Joe McNamee, MSc

Joe McNamee

Date Sample Received: 12th Oct 2010

Purchase Order No.: 4200074031

Copies to:

Date Reported: 20th October 2010

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7. *The laws of Ireland shall apply.*

Client: **Honeywell Transportation Ireland Ltd**
Unit 411, Industrial Estate
Cork Road
Waterford

Contact: **Amy Fahey**

Analytical results of 1 sample collected by Enterprise Environmental for chemical analysis.

Laboratory Reference			**D103**
Parameter	Units	Method	
pH		EE-1	7.5
Biochemical Oxygen Demand (ATU)	mg/l	EE-2	448
Chemical Oxygen Demand	mg/l	EE-3	1140
Suspended Solids	mg/l	EE-4	65
Test Sample Reference	Honeywell Transportation Ireland Ltd, Trade effluent, flow proportional composite sample at SE1, 11th to 12th of Oct 2010 (collected at 09.00h on the 12th Oct 2010)*		

Notes:

ATU = Allylthiourea added to inhibit nitrification
< = Less than
* = There was insufficient composite sample collected by the automatic sampler so an additional grab sample was collected to make up the sample.

Methods:

EE-1 = pH probe, HMSO, Methods for the Examination of Waters and Associated Materials
EE-2 = 5 Day BOD, 2nd Ed. HMSO, Methods for the Examination of Waters and Associated Materials
EE-3 = Spectrophotometry (Hach/Lange)
EE-4 = Gravimetric, APHA, Standard Methods for the Examination of Water and Wastewater, 21st Ed

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CONFIDENTIAL REPORT

This report relates only to the sample(s) tested.

Client:

Honeywell Transportation Ireland Ltd
Unit 411, Industrial Estate
Cork Road
Waterford

Title:

Respirometry Test - Inhibition of oxygen consumption by activated sludge.
(IPPC Licence Reg. No P0525-01)

Attn: Amy Fahey

Job Ref. D007 Resp

Report by: Joe McNamee, MSc

Joe McNamee

Date Sample Received: 26th Jan 2010

Purchase Order No.: 4200052549

Copies to:

Date Reported: 8th February 2010

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6. ***Enterprise Environmental will not release any information received from or provided to the client in relation to this report except as may be required by law or as specified by the client.***
7. ***The laws of Ireland shall apply.***

Introduction

Enterprise Environmental was requested by Honeywell Transportation Ireland Ltd to carry out Respirometry testing on a sample of trade effluent arising from their factory located at Unit 411, Industrial Estate, Cork Road, Waterford. The company have been issued with an Integrated Pollution Prevention & Control Licence **(Register No. P0525-01)** by the Environmental Protection Agency which permits the discharge their trade effluent to the local authority foul sewer. The sewer discharges to a newly built Waterford City Wastewater Treatment Plant where it receives full biological treatment in admixture with domestic sewage before discharge to the Suir Estuary. This treatment plant is a Design Build and Operate (DBO) plant and is currently being commissioned.

A sample of trade effluent was collected by Enterprise Environmental on the 26th of January and retained for tested using an International Organisation for Standardisation test method (EN ISO 8192:2007). This ISO test specifies a method for assessing the inhibitory effect of a test material or wastewater on the oxygen consumption (respiration rate) of activated sludge micro-organisms. It provides information on inhibitory or stimulatory effects after short term exposure (up to 180 minutes) of the test sample on the activated sludge micro-organisms. The test is intended to represent conditions in a biological wastewater treatment plant and was carried out on the sample using activated sludge from Osberstown (Naas, Co Kildare) municipal wastewater treatment plant. This plant is regularly used for Respirometry testing purposes and is known to be working well and producing a good quality, nitrified final effluent.

The factory was in normal production with all business units (i.e. Compressor Wheel, Machine Cell & Turbine Wheel) operating on the 25th and 26th of January 2010 (the time of sampling). This is the normal rate of production and there was no unusual processing taking place on these dates. The production rate for each business unit is presented below:

Compressor Wheel (CW) – 125,000
Turbine Wheel (TW) – 70,000
Machine Cell (MC) – 102,500

Test Principle

In the presence of easily biodegradable substances, activated sludge consumes oxygen at a higher rate than in their absence, depending on, among other factors, the concentration of micro-organisms present. The addition of a toxic concentration of a test material will result in a decrease in the oxygen consumption rate. The test uses a volumetric Respirometer to continually measure and record the oxygen consumption rate (respiration rate) of the activated sludge at a fixed mixed liquor suspended solids concentration. The sludge is fed with a non toxic, biodegradable substrate (control) and the oxygen consumption rate is compared to sludge fed with the control substrate **plus the test sample**. In the event that the oxygen consumption rate of the test is lower than the control this indicates biological inhibition/toxicity. The percent inhibition of the oxygen consumption is calculated after a stipulated time (180 minutes) by comparing the oxygen consumption rate of the **control** sample (OECD synthetic sewage)[(1)] with the oxygen consumption rate of the sample containing **test** material. This test is repeated for a range of test sample concentrations to enable an inhibition curve to be calculated.

The sensitivity of the activated sludge can be checked using a reference substance, 3,5-dichlorophenol. This substance has an EC_{50} toxicity value in the range of **2 to 25 mg/l** when tested against a nitrifying municipal activated sludge and a value of **5 to 40 mg/l** when tested against a non nitrifying sludge. When the same sludge source is regularly used its sensitivity only needs to be checked intermittently and when a different source is used its sensitivity should be checked for each series of tests where possible.

[(1)] <u>OECD synthetic sewage</u> Standard synthetic sewage as defined by the Organisation for Economic Co-Operation and Development made up at 100 fold strength. Its composition is:

Peptone	***16g***
Meat extract	***11 g***
Urea	***3 g***
Sodium chloride	***0.7 g***
Calcium chloride dihydrate	***0.4 g***
Magnesium sulphate heptahydrate	***0.2 g***
Dipotassium hydrogen phosphate	***2.8 g***
Water	***to 1000 ml***

Test Method

The test was carried out in accordance with EN ISO 8192:2007. The only deviation from the test method involved the use of an automatic volumetric respirometer to continually measure and record the oxygen consumption rate instead of a one off reading using a dissolved oxygen meter. A state of the art Arthur Bench Respirometer was used. This utilises a 1 litre sample chamber and an air uplift column to provide aeration and mixing which simulates the aeration basin of a full scale activated sludge treatment plant.

Test Conditions

Test Sample:	Honeywell Transportation Ireland Ltd, Trade effluent, 24 h flow proportional composite sample at SE1, 25th to 26th of Jan 2010 (collected at 09.00h on the 26th of Jan)
Activated Sludge Source:	Osberstown Municipal sludge collected on the 26/01/10
Pre-treatment of sludge:	Allowed settle for approx 30 minutes and the supernatant decanted to increase the MLSS concentration. Aerated at 22 ^oC until used in the test. The sludge was screened for nitrification and found to be nitrifying strongly.
pH of Sludge:	6.9
pH of test sample:	7.7
Suspended Solids concentration of Activated Sludge in test chamber:	1500 mg/l
Test Duration:	180 minutes
Test Temperature:	22 ^oC
Test Date:	27th January 2010

<u>Definitions</u>

EC_{50} The effective concentration (0 to 100 % v/v or mg/l) of the test sample giving a calculated or interpolated inhibition of oxygen consumption of 50 % as compared to a blank control.

Toxic Unit. An alternative means of expressing effluent toxicity (0 to 100 % v/v only) as a function of the undiluted sample. This is known as the Toxic Unit and is defined as 100/ EC50.

Inhibition Threshold. The effective concentration (0 to 100 % v/v or mg/l) of the test sample giving a calculated or interpolated inhibition of oxygen consumption of zero as compared to a blank control.

Results

<u>Sludge Sensitivity Reference Test</u> ***(Osberstown activated sludge of the 26th Jan 2010)***

This test assesses the suitability of the activated sludge for the EN ISO8192:2007 test. The 180 min EC_{50} toxicity value of 3,5-dichlorophenol should be within the range of 2 to 25 mg/l (Nitrifying sludge).

Reference Substance Used: 3,5-dichlorophenol.

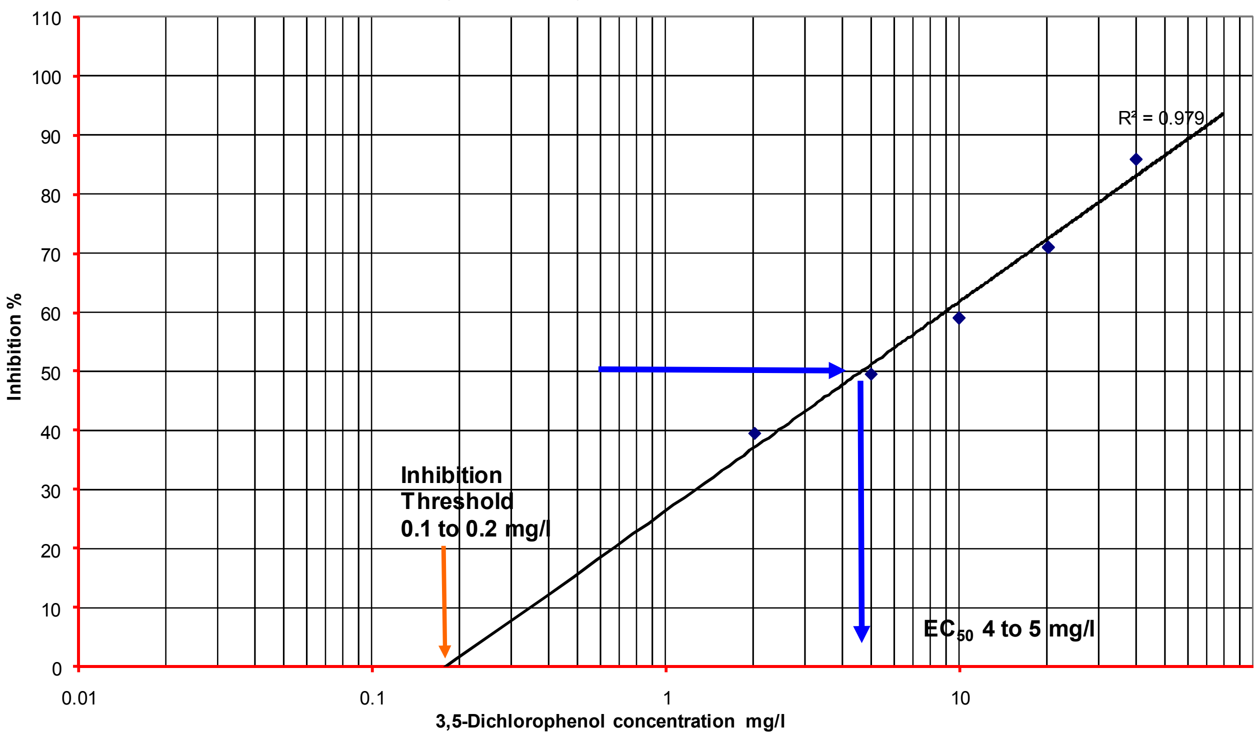
Date tested: 27th Jan 2010.

<u>Result of Sludge Sensitivity Test:</u>

180 min EC_{50} toxicity value: 4 to 5 mg/l (see inhibition Chart No. 1)

As this value was within the normal range (2 to 25 mg/l) for nitrifying municipal activated sludge the sludge was suitable for testing purposes

<u>Chart 1. Test for Inhibition of Oxygen Consumption by Activated Sludge</u>
<u>Test Method Reference: *ISO 8192:2007. 180 minute test*.</u>
<u>Sludge Sensitivity Test: Osberstown A/S of 26/01/10</u>



Sample Test

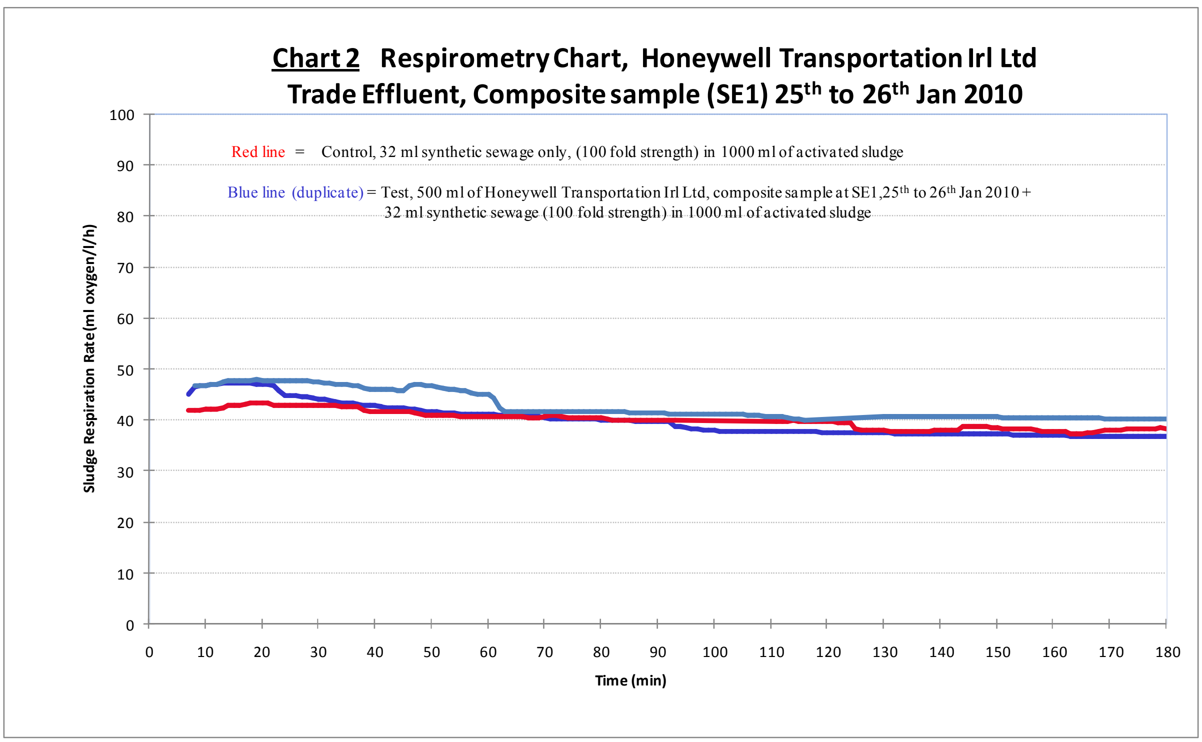
(Honeywell Transportation Ireland Ltd, Trade effluent,24 h flow proportional composite sample at SE1, 25th to 26th of Jan 2010, collected at 09.00h on the 26th of Jan)

The sample was tested in duplicate at a sample concentration of 50 % v/v (500 ml of test sample made up to 1 litre with activated sludge). **No inhibition** was found after 180 minutes.

The respiration response for the Control and Test sample (in duplicate) are presented in Chart 2. The response of the control and test are very similar indication no biological toxicity/inhibition due to the presence of the test sample.

Result of Sample Test:

EC_{50} toxicity value (180 minute) :	**Greater than 50 % concentration v/v**
Toxic Unit value (180 minute) :	**Less than 2 TU**
Inhibition Threshold (180 minute) :	**Greater than 50 % concentration v/v**



Summary.

The Respirometry results indicate that the Honeywell trade effluent sample tested caused no acute toxicity/inhibition to activated sludge from a municipal wastewater treatment plant that is known to be working well and producing a good quality nitrified final effluent. Based on these results (inhibition threshold of greater than 50 % v/v) the trade effluent from Honeywell should not cause acute toxicity/inhibition to Waterford City Wastewater Treatment Plant at a concentration of up to 50 % volume/volume concentration in admixture with domestic sewage.