Swords Laboratories

P0014-04

Annual Environmental Report for 2009

RESPONSIBLE CARE

Date: 31-March-2010

1 Introduction

This report is the Annual Environmental Report for **2009** for Swords Laboratories, Watery Lane, Swords, Co. Dublin as required by IPPC Licence P0014-04**.** It has been prepared following the format laid down in the EPA's Guidance Note for 'Annual Environmental Report'. All changes to the **'AER for 2008'** are highlighted in bold. Swords Laboratories is part of the Bristol-Myers Squibb Company and specialises in the manufacture of bulk pharmaceutical intermediates and products including oncology, cardiovascular and anti-viral drugs.

Activities on site include: manufacturing, manufacturing technology, quality control and environmental laboratories, warehousing, maintenance workshops, wastewater treatment, tank farms, administration facilities, a Thermal Oxidiser and a Solvent Recovery plant. Approximately **390** people are employed full time at Swords Laboratories.

The General Manager and the Environmental, Health and Safety Director, have established a site Environmental Health and Safety Policy (page 3). The policy is posted at a number of locations around the site. **During 2009, a shared EHS Ireland department was formed comprising Environmental, Health and Safety personnel for both BMS Swords Laboratories & BMS Cruiserath – the department employs 18 people and replaces the separate EHS departments.** The organisational chart is attached (page 4). Swords Laboratories was awarded ISO 14001 on January 7th, 1998, by the National Standards Authority of Ireland and re-accredited to ISO 14001:2004 in November 2007 by SGS Ireland. (Page 5).

Policy Statement

Bristol-Myers Squibb is fully committed to the operation of its facilities to the highest safety and environmental standards. Swords Laboratories, Watery Lane, as a bulk pharmaceutical manufacturer and a lower tier site under the scope of the Major Accident Hazard Regulations, fully supports and adheres to that policy. Swords Laboratories is committed to continuous improvement of environmental, health and safety management systems and performance via the following policy:

- Conducting its activities and operations in accordance with all applicable legal requirements and with other requirements to which Swords Laboratories subscribes and which relate to the company's environmental aspects. Identification of all significant aspects on site.

- Operating the facility to achieve high standards of major hazard control to avoid the potential to cause major accidents to its employees, members of the public, contractors, visitors and the environment.

- Pre-assessing the possible environmental and safety impacts of all modifications and new development of all activities, products, processes and services.

- By acknowledging that the following hazards and risks are present in the workplace:- noise, chemicals, dust, manual handling, transport traffic, slips, trips and falls, hazards from mechanical and electrical equipment, confined space, repetitive strain injury, working at heights and fire. Our aim is to reduce these risks.

- Promoting continuous improvement by setting and reviewing environmental and safety objectives and targets, in line with the BMS 2010 Sustainability goals.

- Providing training to improve environmental and safety awareness among employees and contractors to ensure understanding of the significance and responsibility in protecting the local environment.

- Preventing pollution, reducing waste and the consumption of resources, committing to cleaner technology, recovery and recycling, as opposed to disposal where feasible, through the use of the BMS green chemistry programme.

- Conducting regular site audits and reviews of environmental and safety systems in place in order to monitor their effectiveness. Conducting regular departmental and site safety meetings to promote safety accountability within departments ultimately enhancing a safety culture throughout the company.

- Making available copies of the EHS policy and additional information concerning activities that affect health, safety and the environment to all persons working for or on behalf of the company, including employees, contractors, visitors, members of the public and statutory bodies.

- Reviewing this policy statement at appropriate intervals to ensure that the controls, procedures and management practices described within it continue to reflect current best practice and are harmonious and in keeping with BMS and general pharmaceutical industry standards.

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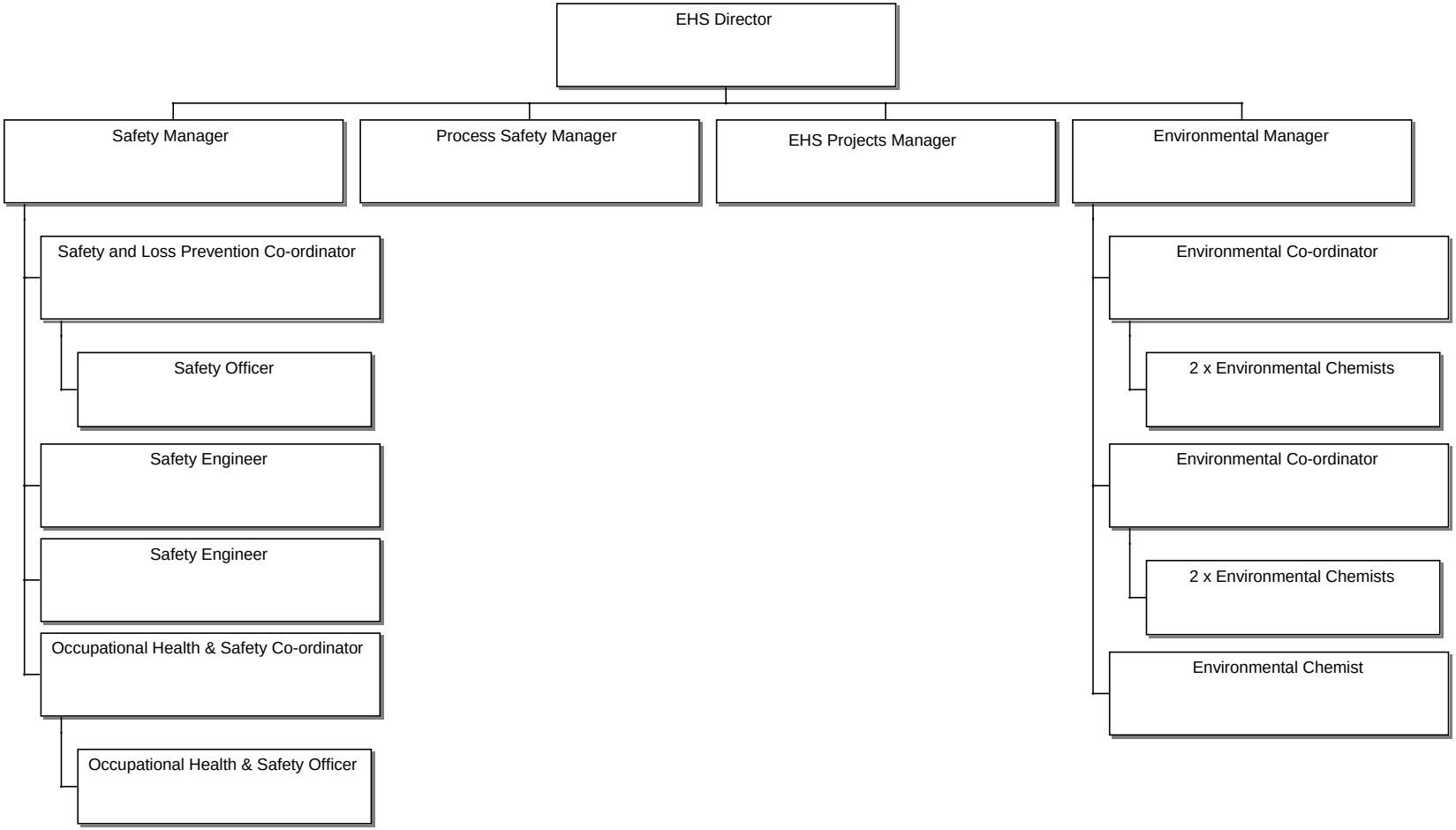
EHS Ireland Chart March 2009



ISO 14001 cert

Certificate GB04/63347

The management system of

Swords Laboratories

Division of Bristol Myers Squibb,
Watery Lane, Swords, Ireland

has been assessed and certified as meeting the requirements of

ISO 14001:2004

For the following activities

Manufacture Bulk Pharmaceutical Intermediates and Activities.

This certificate is valid from 17 November 2007 until 17 November 2010
Issue 3. Certified since 17 November 2004

Authorised by

SGS United Kingdom Ltd Systems & Services Certification
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2 Summary Information

The summary information presented here covers the reporting period January to December **2009.**

2.1 Self – Monitoring Data

2.1.1 Emissions to Sewer

The aqueous wastewaters generated from the manufacture of bulk pharmaceutical intermediates and products are treated in the on-site wastewater treatment plant (WWTP) before discharge to the sewer. Full monitoring results may be found in Appendix **A and summary emissions to sewer found in the PRTR worksheets in Appendix G**.

Summary Information for Emissions to Sewer 2009

Parameter	No. of Samples Taken	Mass Emission 2009	Mass Emission 2008	Licensed Mass Emission
Flow (m^3)	365	**148,176**	137,083	182,500
pH	Continuous	**-**	-	6-10
Temperature	Daily	**25°C (max)**	24 °C (max)	42°C (max)
BOD (kg)	**18**	**25,149**	18,348	54,750
COD (kg)	**40**	**88,572**	85,390	365,000
Suspended Solids (kg)	**337**	**21,768**	30,271	73,000
Sulphates (kg)	**48**	**20,102**	27,011	136,875
Zinc (kg)	**13**	**5.937**	15.2	219
Fats, oils, grease (kg)	**12**	**1,482**	909.5	21,900
Ortho-phosphate (as P) (kg)	**22**	**2,832**	1,687	21,900
Fluoride (as F) (kg)	**21**	**77.92**	26.3	n/a
Chromium (as Cr) (kg)	**13**	**0.378**	0.4	109.5
Copper (as Cu) (kg)	**13**	**5.371**	6.9	109.5
Lead (as Pb) (kg)	**13**	**0.206**	0.1	36.5
Nickel (as Ni) (kg)	**13**	**0.623**	0.8	109.5

Quarterly sampling of the Final Effluent for Toxicity testing commenced in September 2007. **The 2009** test results are below:

Sample Date & Type: 24-hr composite	**04-Mar-09**	**03-Jun-09**	**02-Sept-09**	**02-Dec-09**
Toxicity Freshwater Algae 48h EC_{50} to *Daphnia Magna*	2.3 TU	17.2 TU	< 1 TU	2.7 TU
Toxicity Activated Sludge (ISO 8192)	< 2 TU	< 2 TU	< 2 TU	< 2 TU

Details of non-compliances with regard to emissions to sewer can be seen in the table below. All non-compliances were notified to the Agency and Fingal County Council in accordance with Condition 12.2 of the licence.

Summary of Emissions to Sewer Non- Compliances 2009

Date of Occurrence	**Non-Compliance**	**Corrective & Preventative Actions**
04-Feb-09	BOD: 376 mg/l	An external consultant was hired to review the performance of the WWTP, in particular with regard to BOD reduction. A number of recommendations were made, and this work was later superseded by investigation into exceedences in March & April 2009.
06-Feb-08	BOD: 375 mg/l	
03-Mar-09	COD: 2,500 mg/l SS: 412 mg/l	
04-Mar-09	BOD: 472 mg/l	
18-Mar-09	COD: 2,580 mg/l SS: 456 mg/l	The cause is high COD loading on the WWTP – the source of which was ultimately thought to relate to discharge of a spillage tank to the WWTP. The frequency of testing of the spillage tanks has been increased and any samples with a COD over a set limit are diverted to mixed waste tanks for off-site disposal. Plans to hard pipe the spillage tanks to mixed waste are on hold pending review of results over a longer period following introduction of a valved camlock system for hoses at the tankfarm to reduce solvent losses to the spillage tanks. The failed poly dosing pump was changed – the poly had shut off on high level – automation adjustments were made on Saturday, 28th March A NONC was issued by the Agency for exceeding the Orthophosphate concentration in the Final Effluent – the site result was 17.3 mg/l – external analysis was undertaken over a number of months & site analysis has now been replaced by external analysis. See also below.
20-Mar-09	SS: 508 mg/l	
21-Mar-09	COD: 1,560 mg/l, SS: 432 mg/l	
22-Mar-09	COD: 2,160 mg/l, SS: 464 mg/l	
23-Mar-09	COD: 1,540 mg/l, SS: 472 mg/l	
24-Mar-09	SS: 472 mg/l	
25-Mar-09	SS: 576 mg/l, COD: 1,580 mg/l	
26-Mar-09	SS: 460 mg/l, BOD: 426 mg/l, EPA orthophosphate: 173 mg/l	
27-Mar-09	SS: 476 mg/l	
29-Mar-09	SS: 404 mg/l COD: 2,100 mg/l	
30-Mar-09	COD: 2,500 mg/l	
01-Apr-09	SS: 460 mg/l	
02-Apr-09	SS: 420 mg/l COD: 1,660 mg/l BOD: **796*** mg/l	

Date of Occurrence	Non-Compliance	Corrective & Preventative Actions
06-Apr-09	SS: 464 mg/l	Poly failed to DAF unit
29-Jul-09	SS: 436 mg/l	Poly unit tripped due to blown electrical relay - replaced
01-Aug-09	SS: **550** * mg/l	Blocked outlet valve on small clarifier - overloaded DAF - valve replaced
06-Aug-09	SS: **416** *mg/l	Neat Claritech drum emptied overnight so DAF wasn't getting Poly - dosing rates checked & tank filled at end of each shift
27-Oct-09	o-Phosphate: 111 mg/l	Exceedence of ortho-Phosphate concentration in Final Effluent – CAPAs are ongoing, wastestreams containing high concentrations of orthophosphate have been identified & works have commenced to divert from the WWTP or treat in situ.
04-Nov-09	o-Phosphate 148 mg/l	

Note: * indicates that these values have been updated since their initial reporting.

2.1.2 Emissions to Atmosphere

The total number of samples taken from the Thermal Oxidiser is calculated as **15,925;** this includes the sum of the half-hourly CEM samples and the grab samples during CEM-downtime & periods of TO downtime. A summary of TO downtime is attached in Appendix **B**. Summary details of emissions to air can be found in the PRTR worksheets in Appendix **G.**

Summary Information for Emissions to Atmosphere from Thermal Oxidiser 2009

Parameter	No. of Samples Taken	Mass Emissions (kg) 2009	Mass Emissions (kg) 2008	*Licensed Mass Emissions (kg)*
Hydrogen Chloride	Continuous	**135.08**	104.66	*5,256*
Total Organic Carbon	Continuous	**0.57**	0.56	*3,504*
SO_x	Continuous	**0.57**	471.26	*n/a*
NO_x	Continuous	**1397.74**	910.62	*n/a*
CO	Continuous	**0.57**	92.35	*n/a*
Particulates	4	**669.83**	1,1687.55	*5,256*
Hydrogen Fluoride	4	**< 6.92**	8.03	*700.8*
Hydrogen Bromide	4	**< 6.92**	26.79	*n/a*
Dioxins (TEQ)	1	**4.06×10^{-4}**	$<1.107 \times 10^{-3}$	*1.752×10^{-3}*

n/a – not applicable

Any non-compliant continuous emissions monitoring results were notified to the EPA at the time.

With regard to Condition 4.1.1 of the IPPC licence:

- No 24 hour mean value exceeded the emission limit value;
- **>99.87 % of** all 30-minute mean values taken continuously over 200**9** did not exceed 1.2 times the emission limit value (**0.233 % exceeded the actual emission limit value);**
- The 30-minute mean value exceeded twice the emission limit value **on 6 occasions – these were all notified at the time of occurrence.**

CEM printouts for periods of 30 minute ELV exceedences are attached in Appendix B. **Air monitoring was carried out during TO downtime in January and September 2009. Results of those and samples taken from the stack during TO CEMs failures are attached in Appendix B.**

Summary of Emissions to Air Non- Compliances 2009

Date of occurrence & notification	Time	Details	Cause & CAPA
30-Jan-09 Notified: 02-Feb-09	22.30	HCl: 95.56 mg/m^3	Significant works undertaken during 2009 to address HCl issues include: Installation of auto-breathing vents on P8 condensers; Caustic dosing to quench tower & scrubber optimised; Work instruction issued for TO operators on action to take at specified HCl concentrations; Plant DCS linked to HCl measurements with alarms to indicate elevated concentrations in the control room for improved visibility; Increased review of glycol operations and automation associated with provision of cooling to condensers; Regular meetings to review progress & processing operations contributing to the increased emission levels; Relocated TO scrubber pH probe to improve reactivity to pH variations in the scrubber.
05-Feb-09 Notified: 05-Feb-09	05.00, 05.30 06.00	HCl: 66.46 mg/m^3, 93.38 mg/m^3 & 60.73 mg/m^3	
07-Aug-09 Notified: 07-Aug-09	06.30	HCl: 63.25 mg/m^3	
04-Sep-09 Notified: 08-Sep-09	14.00	HCl: 68.91 mg/m^3	

2.1.3 Emissions to Water

Surface water from processing areas on site is directed to the WWTP to minimise the potential for accidental contamination of the nearby Ward River. Areas of the site having little risk of contamination (e.g. roof drainage from non-manufacturing buildings, paved areas / roads, etc.) pass through the site surface water drains to the surface water tank. The contents of the tank are discharged either to the Ward River if clean or to the WWTP if contaminated based on the analysis of

a grab sample. In the event that any of the trigger levels are reached in the SW Tank sample an investigation is undertaken, details are outlined in Appendix C.

Surface water also leaves the site via five surface water outfalls from areas with no potential for contamination (car parks, etc.). The surface water outfalls are monitored weekly and results **are attached in Appendix C.**

2.1.4 Ambient Monitoring

2.1.4.1 Groundwater

18 groundwater monitoring boreholes are installed on site – 5 bedrock wells & 13 shallow wells. Monitoring was carried out in **March, June, September & December 2009 and results are attached (Appendix D).**

A proposal for investigation and assessment of contaminated groundwater was submitted in November 2007 to the Agency in accordance with the requirements for CLIARP detailed in section 10 of the IPPC Licence. Discussions were ongoing during 2008 and approval was received in February 2009. **The investigation report was submitted in February 2010.**

The following is the progress on the tankfarm remediation project:

P2 Tank farm **All remaining underground tanks in back-filled vaults were removed during 2009. Only 2 single skinned tanks remain underground – these are in open vaults with level detectors & are checked weekly similar to all bunds onsite. The tank farm upgrade project is complete. Results for samples taken bimonthly from the Underground Tank Vaults are attached in Appendix D.**

2.1.4.2 River Water

The Ward River runs alongside the eastern boundary of the site. It is monitored upstream and downstream of the plant on a weekly basis for traditionals, and monthly for solvents. Results are attached in **Appendix D.**

2.1.5 Environmental Incidents and Complaints 2009

The following is a summary of the Environmental incidents notified to the Agency as required by Condition 4.1.

Date	Incident	Authorities contacted	Corrective Action
18-Feb-09	Failure of CEMS due to software issue	EPA	Ultimately sourced to low sample flow. This was identified during calibration and was rectified by the service engineer.
02-Mar-09	Night-time noise levels in January & February were over the limit.	EPA	Ongoing works at cooling tower & longterm plan to build acoustic wall around new FWR tanks. Also agreed with Agency during site audit that consultant should confirm the dominant noise source at the monitoring location - see Appendix F.
11-May-09	Failure of CEMS due to circuit board	EPA	Circuit board replaced.
13-May-09	Loss of RS 45 from CH 501 & R22 loss from warehouse cold room chiller	EPA	Programme implemented to remove refrigerant gas from chillers when out of service for significant time. Failed cold room chiller was replaced.
08-Sep-09	Failure of TO CEMs - instrument stuck in maintenance mode	EPA	Password made available to all instrumentation technicians.
06-Oct-09	Misclassification of waste material from Micro lab	EPA	Further training provided to engineering group – Contractor waste SOP & Asbestos control programme & drawing updated.
19-Oct-09	Failure of CEMS October 15th	EPA	Caused by communication error - ABB service updated to include database repair solution.

Summary of Notification of Non-Compliances 2009

Date	Reference	NONC
17-Feb-09	P0014-04/nc09pk (reported AER 2008)	TO HCl exceedences, TO Particulates & Final Effluent SS during Nov & Dec 2008 & Feb 2009.
06-May-09	P0014-04/nc10-1PK	Exceedences notified on Feb 18, March 4, 10, 19, 20, 23, 25, 27 & 30 & April 2, 6 & 15
06-May-09	P0014-04/nc11ec	Drum storage & labelling observed during inspection 8th April - non compliance with Condition 8.8
28-Jul-09	P0014-04/NC12PK	Exceedence of orthophosphate in Final effluent in sample 26th March

2.1.5.1 Summary of Complaints

There were a total of **5** off-site complaints received in **2009,** summarised in the table below. **Details of complaints received in 2009 can be found in Appendix E.**

Year	**2009**	2008
Total Number of Complaints	**5**	3
Odour	**1**	0
Noise	**4**	3
Miscellaneous	**0**	0

3 Waste Management

Full details of waste shipped off-site in 2009 can be found in **Appendix G.**

4 Agency Monitoring and Enforcement

4.1.1 Aqueous Emissions Sampling

Agency staff took samples of the final effluent discharge to sewer **during 2009.** Split samples were taken by Swords Laboratories and results are **below.**

Agency Final Effluent Sampling 2009

	Final Effluent Limit	**13-Jan-09**		**26-Mar-09**		**16-Jun-09**		**14-Sep-09**	
		Site	**EPA**	**Site**	**EPA**	**Site**	**EPA**	**Site**	**EPA**
BOD (mg/l)	**200**	6	3	**427**	**351**	2	3	1	3
Cadmium (ug/l)	**ns**	<0.3	nm	nm	nm	nm	nm	nm	nm
Chromium (ug/l)	**500**	2	6	nm	47	nm	14	nm	5
COD (mg/l)	**1500**	44	47	1280	**1655**	41	48	100	34
Copper (ug/l)	**500**	10	6	nm	14	nm	15	nm	19
Fats/Oil/Grease (mg/l)	**100**	nm	<10	nm	26	nm	<10	nm	<10
Fluoride (mg/l)	**ns**	0.2	nm	<0.1	nm	0.16	nm	<0.1	nm
Lead (ug/l)	**100**	1	nm	nm	4	nm	<1	nm	<1
Nickel (ug/l)	**500**	<2	nm	nm	8	nm	3	nm	3
Nitrates as N (mg/l)	**ns**	<0.5	nm	1.1	nm	0.1	nm	0.1	nm
Ortho Phosphate as P (mg/l)	**100**	4.3	3.41	17.4	**171.3**	<0.5	27	9.9	12.9
pH	**6 - 10**	7.30	8.1	7.25	7.7	7.15	8.2	6.21	6
SS (mg/l)	**400**	8	<10	**460**	**445**	18	<10	130	34
Sulphates (mg/l)	**750**	82	81.4	280	226.2	104	nm	251	218
Temp. (°C)	**Max 42**	20	nm	18	nm	22	nm	21	nm
Zinc (ug/l)	**1000**	100	52	nm	240	nm	33	nm	314
Chloroform (ug/l)	**ns**	nm	0.8	nm	nm	nm	nm	nm	1

No other solvents were detected above the Method Detection limit. nm: not measured

ns: not specified

4.1.2 Atmospheric Emissions Sampling

4.1.2.1 Thermal Oxidiser Monitoring 25/05/09

Euro Environmental visited the site on behalf of the EPA on 25th of May 2009 to sample the TO stack for compounds listed below.

Substance	Result	Limit mg/m^3
TA Luft Organics	<LOD	n/a
HCl	2.6mg/m^3	30
HF	0.1mg/m^3	4
TOC	0.1 mg/m^3	20

4.1.2.2 Thermal Oxidiser Monitoring 15th to 17th Sep 2009

Catalyst Environmental visited the site on behalf of the EPA on the 15th, 16th & 17th of September 2009 to sample the TO stack for the compounds listed below.

Compound	Result	Limit ng/m^3
Dioxins & Furans Run 1 15th September	0.142 ng/m^3	*0.1 ng/m^3*
Run 2 16th September	0.034 ng/m^3	*0.1 ng/m^3*
Run 3 17th September	0.027 ng/m^3	*0.1 ng/m^3*
16th September 2009		
Total Particulate Matter	5.1 mg/m^3	*30 mg/m^3*
HCl	1.4 mg/m^3	*30 mg/m^3*
HF	<0.26 mg/m^3	*4 mg/m^3*
TOC	1.9 mg/m^3	*20 mg/m^3*

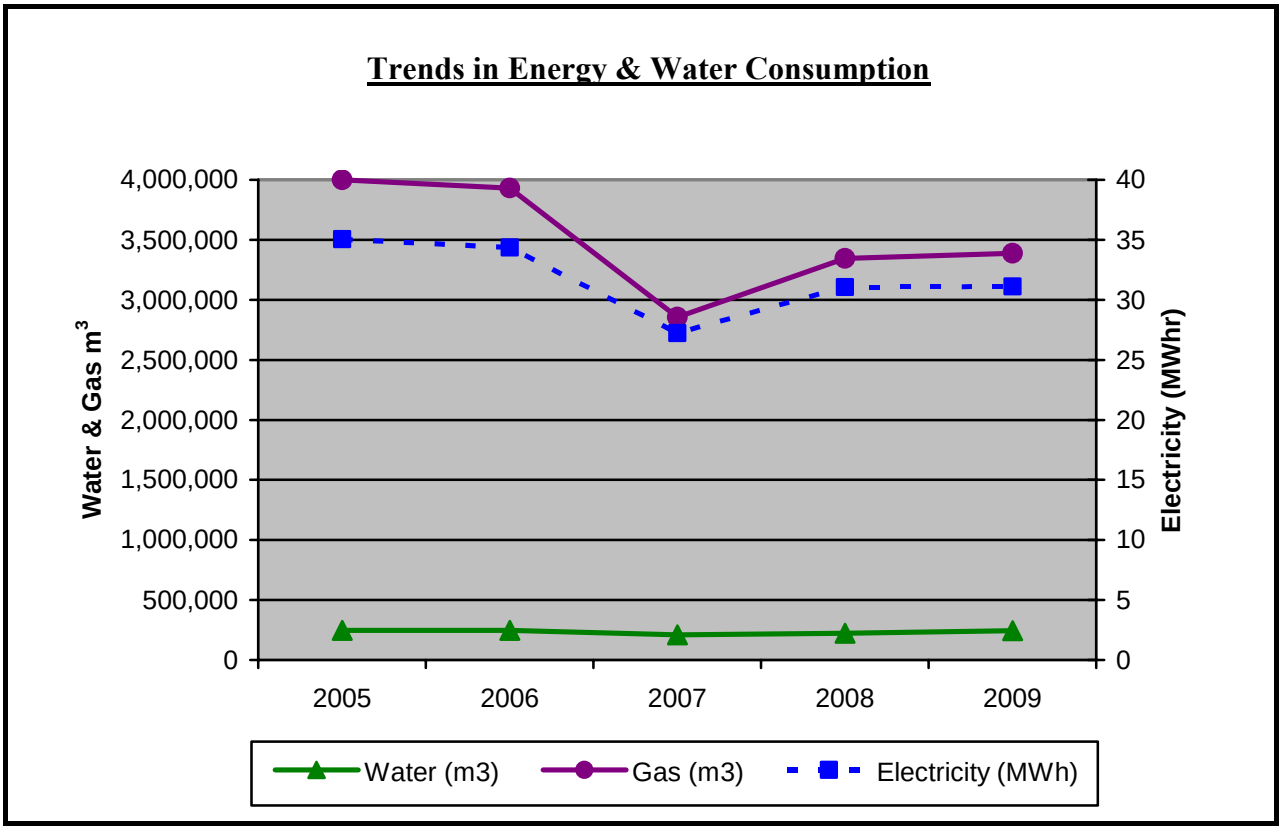
4.1.3 Agency Site Audits

On April 8th, Emer Cooney & Patrick Kenny carried out a site audit. The findings were 1 notification of non-compliance and a number of observations. Follow up action was outlined in our response of May 26th.

4.2 Energy and Water Consumption

4.2.1 Summary of Energy & Water Consumption

Fuel	2009	2008	2007
Electricity (MWhr)	**31.11**	31.05	27.23
Natural Gas (m^3)	**3,388,950**	3,345,877	2,854,817
City Water supply (m^3)	**244,405**	223,569	210,800



5 Management of the Activity

5.1 Schedule of Objective & Targets

5.1.1 The following Environmental Management Programme was proposed for 2009.

The following outlines the current status of the Environmental Management Programme (EMP) put in place to achieve the site's Objectives and Targets. This version of the EMP is an update to the AER document submitted to the Agency in March **2009**, updates are highlighted in bold.

Licence Objectives	Licensee Targets	Status 2010
Process Modification to improve yields, eliminate / reduce wastes or use alternative less hazardous materials.	**Continue MT group's process improvements projects.**	**Product I: Telescoped process demonstrated increased process efficiency & energy saving in 2009.** **Products H & J: Backwashes of aqueous streams demonstrated at lab scale to increase yields & reduce emissions to WWTP.** **Product U: Optimised number of Carbon filter treatments resulting in use of less filters and increased yield.**
Improvement in treatment / abatement systems to reduce emissions.	**1. Implement MT recommendations regarding condensers if TO quench modifications prove unsuccessful.** **2. Reduce number of EPA NONCs by 25%.** **3. Reduce IPPC licence exceedences from WWTP by 50%.** **4. Reduce reportable HCl exceedences from TO by 20%.** **5. Review venting of 100 m^3 tanks in SR.** **6. Maintain low odour complaints from WWTP.**	**1. Study has been put on hold because a second caustic dosing system was added to the quench. Autovents on key condensers in P8 were fitted. The quench dosing on the TO was further improved by optimising feed forward control and the location of the pH probe in the scrubber.** **2. Achieved reduction of 73%** **3. Increased by 50% on 2008 number.** **4. Reduced by 60%** **5. Second engineering review completed in order to arrive at a simpler solution. The new target completion date is Q1 2010.** **6. 1 odour complaint received 2009 – source not found on site.**
Use of alternative treatment / abatement systems.	**1. Install new boiler as a preventative measure.** **2. Engineering study for cryogenic system complete. Investigate feasibility** **3. Investigate refurbishment of the old boiler**	**1. New boiler was installed Q1 2009.** **2. On hold subject to capital investment.** **3. Old boiler could not be refurbished – disposed 2009**
Recovery, reuse, recycling of waste material both on-site and off-site.	**1. Reduce hazardous waste sent for treatment / disposal by 50% by 2010 (using baseline year of 2001)** **2. Maintain non hazardous waste disposal figures in line with 2008 figures.**	**1. At end 2009, 48% reduction in disposal of hazardous waste off-site based on 2001.** **2. Achieved: non-hazardous waste disposal figures were 83% of 2008 volume.**
Reduction of VOC emissions to air	**1. Implement Fugitive Emissions monitoring programme.** **2. Achieve TO downtime of 1% during 2009.** **3. Venting arrangements to be reviewed for 100 m3 tanks.** **4. Reduce reportable HCl exceedences from TO by 20%.**	**1. EHS GC failed during 2009 so monitoring rescheduled to 2010.** **2. TO Downtime of 1.63% due to PLC card & programming issues.** **3. Please see earlier target.** **4. Please see earlier target.**

Licence Objectives	Licensee Targets	Status 2010
Savings in energy and material usage	**1. Implement actions proposed for the site's 9 identified significant energy aspects.** **2. Reduce use of electricity/gas/diesel oil by 10% by 2010, using a base year of 2001.** **3. Reduce water usage by 10% by 2010 using a base year of 2001.** **4. Reduce greenhouse gases by 10% by 2010 using a base year of 2001.**	**1. Work is ongoing – IS 393 superseded by works to attain ISO 16001 certification.** **2. Overall reduction of 13% electricity & gas use over 2001.** **3. Water use reduced by 17% of 2001 volume.** **4. GHG reduction of 23% of 2001 volume.**
Annual Noise Reduction	**Continue Noise Reduction Programme until licence limit for night-time at boundary monitoring location is met.**	**Complete – site found to be compliant - off-site sources dominate night-time noise levels.**
Upgrade P2 tank farm.	**Complete Phase II in 2009.**	**Completed 2009.**
Contaminated Land Investigation, Assessment & Remediation Plan (CLIARP)	**Complete CLIARP requirements within timeframe specified in licence.**	**CLIARP report submitted on February 12th 2010 for approval. Remediation Plan due to be submitted by 13-August 2010.**

The following is the Environmental Management Programme proposed for 2010

Licence Objectives	Licensee Targets 2010
Process Modification to improve yields, eliminate / reduce wastes or use alternative less hazardous materials.	**Continue MT group's process improvements projects.**
Improvement in treatment / abatement systems to reduce emissions.	**1. Review operation of condensers in production plants if increased dosing to the quench in the TO is unsuccessful.** **2. EPA non compliance notifications: Reduce by 33% the number of non-compliances issued by the EPA (max of 2) using 2009 as base year.** **3. Exceedences of the IPPC licence: Reduce by 65% the number of IPPC licence exceedences associated with the WWTP (max of 12) using 2009 as base year.** **4. TO HCl IPPC licence exceedence: Reduce by 60% the number of reportable HCl exceedences (>60mg/m^3) (max of 3) from the TO.** **5. Review venting on 100m^3 tanks in solvent recovery** **6. Reduce no. of complaints received by 50% (max of 2) using 2009 as base year.** 7. **Reduce no. of incidents notifiable to the EPA by 50% (max of 3) using 2009 as base year.**
Use of alternative treatment / abatement systems.	**1. Revisit monitoring of DCM loading to TO.**
Recovery, reuse, recycling of waste material both on-site and off-site.	**1. Reduce hazardous waste sent for treatment / disposal by 50% by 2010 (using baseline year of 2001)** **2. Reduce non hazardous waste disposal figures by 20% of 2009 volume.** **3. Investigate use of dedicated re-usable drums for wet-cake instead of fibre kegs.** **4. Investigate opportunities for increased solvent recovery on site.**
Reduction of VOC emissions to air	**1. Continue Fugitive Emissions monitoring programme.** **2. Achieve TO downtime of ≤ 1% during 2009.** **3. Remaining 100 m^3 tank to be vented to TO during 2010.** **4. Reduce reportable HCl exceedences from TO by 20%.**
Savings in energy and material usage.	**1. Achieve ISO 16001 accreditation.** **2. Reduce use of electricity/gas/diesel oil by 10% by 2010, using a base year of 2001.** **3. Reduce water usage by 10% by 2010 using a base year of 2001.** **4. Reduce greenhouse gases by 10% by 2010 using a base year of 2001.**
Contaminated Land Investigation, Assessment & Remediation Plan (CLIARP)	**Complete CLIARP requirements within timeframe specified in licence.**

6 Pollutant Release and Transfer Register:

6.1 Report for 2009 & Proposal for 2010

The printed copy of AER Returns Worksheet 2009 can be found in **Appendix G.** For 2010 it is proposed to monitor the same substances as 2009.

7 Licence – Specific Reports

7.1 Noise

Monthly noise monitoring was carried out day-time and night-time at the nearest neighbour boundary **during 2009** in order to measure compliance with limits set out in the IPPC licence. Results are detailed in **Appendix F**. In addition, a detailed night-time noise-survey is carried out annually to identify dominant sources of noise, **details of which are in Appendix F.**

A number of pieces of equipment were identified as requiring noise abatement during **2009**. Details of noise reduction works completed are attached **in Appendix F.**

7.2 Bund, Sump and Drain Inspection and Testing

Corrosion testing of underground tanks is carried out every three years as part of the tank integrity-testing programme – testing was completed on 9 tanks during 2009**, all tanks were found to be acceptable to specification with the exception of two that will require a shorter inspection period and will be inspected again by the end of 2010, as recommended by the inspection engineers.**

Integrity testing was completed on 2 process sumps in 2009 – both passed.

CCTV surveying of all Process, Foul and Surface Water drains is carried out on an ongoing basis, with each system surveyed every three years as required. Only one line running from P2 to P5 was surveyed to confirm the effectiveness of repair work completed in one section on 2008.

Additional piping repairs were made in 2009 on a pipe running through the Swords Laboratories site which belongs to Arch chemicals. This was organised and executed by Arch chemicals.

Bund integrity testing is carried out on a phased routine on a three yearly basis. Integrity testing was completed on 14 bunds– all of which passed. 9 vaults were visually inspected in

2009 4 of which need minor repairs. In addition, a large amount of repair work was completed on the floor surfaces and floor – wall seals in a number of areas.

7.3 Progress made in relation to the CLIARP

Following submission of the proposed investigation and assessment on CLIARP to the Agency on October 8th 2007, conditional approval was received in July 2008. A meeting was held in October 2008 to clarify a number of points and a revised proposal was submitted in November 2008. Further approval was granted by the Agency in February 2009 and works **commenced in Q1 2009 and were completed with the report submitted in February 2010.**

7.4 Residuals Management Plan & ELRA Statement

The revised risk matrix can be found below – this indicates that only low-level risks remain which are under ongoing monitoring & management. Four new hazards were added during the 2009 review to address issues raised during the CLIARP assessment and following a Corporate EHS Audit.

Risk Matrix – Current Risk Status March-10

Occurrence							
	V. High	**5**					
	High	**4**					
	Medium	**3**	4, 5, 31	2, 6, 9, 14, 15, 21, 24	***33 (new)***	29	
	Low	**2**		3, 8, 12, 22, 25, ***35 (new)***	16, ***32 (new)***, ***34 (new)***	18	
	V. Low	**1**			1, 7, 13, 17, 23, 26	27, 30	
			Trivial	**Minor**	**Moderate**	**Major**	**Massive**
			1	**2**	**3**	**4**	**5**
			Severity				

Bristol-Myers Squibb Co., our parent and an unlimited liability company, will act as guarantor for any future environmental liabilities of Swords Laboratories. BMS maintains a Global

remediation fund for ongoing remediation required at sites during their operation. In addition, BMS manages ARO's (Asset Retirement Obligations) - reserves designed to accumulate over their lifespan, so that adequate funds are available at the time the asset replacement is required. These are currently in place for the Swords site tankfarms and WWTP and have a current estimated value of $400,000. These combined measures, in conjunction with the programme proposed for a known closure, will fund remediation of Environmental Liabilities.

7.5 Solvent Management Plan

A Solvent Management Plan was compiled by the Clean Technology Centre and can be found in **Appendix H**

8 Achievements 2009

- **Continuing recycling of IPA Mother Liquor in P3 resulting in both raw materials and energy savings;**
- **Off-site recovery of a solvent previously sent for disposal - for re-use on-site;**
- **Works are continuing in order to gain accreditation to an Energy Management Standard;**
- **By using GGBS / Ecocem concrete mix in the Fire protection project, reduced resulting CO_2 emissions by approximately 18 Tonnes compared to traditional concrete.**

Appendix A

Emissions to Sewer

Effluent Data																	
Date	Flow (m3/Day)	BOD (mg/l)	COD (mg/l)	TOC (mg/l)	SS (mg/l)	Temp. (oC)	pH	Sulphates (mg/l)	Nitrates as N (mg/l)	Ortho Phosphate (mg/l)	Fluoride (mg/l)	Zinc (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)
01-Jan-09	325.4						7.55										
02-Jan-09	297.9				56	20	7.60										
03-Jan-09	249.1				16	20	7.60										
04-Jan-09	205.7				8	18	7.60										
05-Jan-09	199.7				4	19	7.55										
06-Jan-09	318.3				28	15	7.50										
07-Jan-09	389.4	14	76	25	0	14	7.40	155	0.8	3.6	0.6	0.06	0.0001	0.001	0.01	0.001	0.002
08-Jan-09	346.2	6	63	21	0	14	7.35	137	1.0	6.1	0.5						
09-Jan-09	305.5				68	15	7.40										
10-Jan-09	259.7				4	14	7.35										
11-Jan-09	241.4				4	13	7.30										
12-Jan-09	274.3				0	16	7.25										
13-Jan-09	288.9	6	44	15	8	20	7.30	82	< 0.50	4.3	0.2	0.05	< 0.0003	< 0.002	0.01	0.001	< 0.002
14-Jan-09	255.0				24	17	7.45										
15-Jan-09	243.9				80	17	7.50										
16-Jan-09	272.9				4	15	7.35										
17-Jan-09	345.8				24	14	7.05										
18-Jan-09	365.1				36	14	6.80										
19-Jan-09	380.4				44	14	6.65										
20-Jan-09	475.3				60	20	6.50										
21-Jan-09	485.0				110	14	6.45										
22-Jan-09	410.6				0	17	6.60										
23-Jan-09	336.2				40	17	6.75										
24-Jan-09	353.0				47	10	6.85										
25-Jan-09	453.7				36	12	6.85										
26-Jan-09	484.4				20	20	6.80										
27-Jan-09	434.8				76	17	7.01										
28-Jan-09	402.0				28	16	7.20										
29-Jan-09	373.7				8	17	7.20										
30-Jan-09	456.3				100	17	7.20										
31-Jan-09	517.3				32	17	7.20										
01-Feb-09	433.3				80	13	7.25										
02-Feb-09	397.4				84	14	7.30										
03-Feb-09	502.9				88	15	7.30										
04-Feb-09	595.1	**376**	1070	357	144	16	7.25	86	0.2	20.6	<0 .10	0.05	< 0.0003	< 0.002	0.02	0.001	0.002
05-Feb-09	573.1				92	16	7.05										
06-Feb-09	503.9	**375**	1040	347	204	12	6.90	128	0.3	24.3	< 0.10						
07-Feb-09	501.5				164	19	6.95										
08-Feb-09	496.8				64	21	7.05										
09-Feb-09	496.7				196	16	7.10										
10-Feb-09	484.6				164	12	7.05										
11-Feb-09	317.5				116	18	7.00										
12-Feb-09	330.6				84	19	7.15										
13-Feb-09	453.8				192	16	7.35										
14-Feb-09	473.1				308	16	7.40										
15-Feb-09	468.8				392	17	7.40										
16-Feb-09	436.4				380	18	7.30										
17-Feb-09	422.5				192	17	7.20										
18-Feb-09	503.5				192	18	7.20										
19-Feb-09	531.6				248	17	7.10										
20-Feb-09	489.7				368	16	6.90										
21-Feb-09	447.7				304	17	6.75										
22-Feb-09	406.8				320	17	6.96										
23-Feb-09	392.0				212	19	7.30										
24-Feb-09	367.0				124	20	7.30										
25-Feb-09	355.1				220	20	7.20										
26-Feb-09	311.0				244	18	7.25										
27-Feb-09	304.4		1040	347	272	17	7.15										
28-Feb-09	337.2				364	15	7.15										

Effluent Data																	
Date	Flow (m3/Day)	BOD (mg/l)	COD (mg/l)	TOC (mg/l)	SS (mg/l)	Temp. (oC)	pH	Sulphates (mg/l)	Nitrates as N (mg/l)	Ortho Phosphate (mg/l)	Fluoride (mg/l)	Zinc (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)
01-Mar-09	425.7				336	17	7.25										
02-Mar-09	443.7				216	16	7.46										
03-Mar-09	462.7		**2500**	833	**412**	18	7.60										
04-Mar-09	484.7	**472**	1500	500	364	19	7.45	174	0.1	16.7	< 0.10	0.06	< 0.0003	0.003	0.03	0.002	0.0
05-Mar-09	504.5				284	19	7.25										
06-Mar-09	551.5				344	15	6.90										
07-Mar-09	513.2				256	16	6.60										
08-Mar-09	484.5				344	13	6.55										
09-Mar-09	498.6				372	16	6.60										
10-Mar-09	477.7				336	16	6.65										
11-Mar-09	457.7				368	18	6.90										
12-Mar-09	470.2				292	17	7.10										
13-Mar-09	408.0				284	20	7.15										
14-Mar-09	411.7				160	23	7.20										
15-Mar-09	454.6				116	21	7.20										
16-Mar-09	418.1				332	21	7.25										
17-Mar-09	382.6				176	25	7.30										
18-Mar-09	373.2		**2580**	860	**456**	18	7.40										
19-Mar-09	331.5		1140	380	372	21	7.60		0.5								
20-Mar-09	317.4		1320	440	**508**	19	7.65										
21-Mar-09	386.3		**1560**	520	**432**	17	7.40										
22-Mar-09	363.3		**2160**	720	**464**	18	7.30										
23-Mar-09	302.5		**1540**	513	**472**	17	7.45		0.6								
24-Mar-09	280.2		1220	407	**472**	17	7.40										
25-Mar-09	369.8		**1580**	527	**576**	18	7.25										
26-Mar-09	407.6	**427**	1280	427	**460**	18	7.25	280	1.1	17.4	< 0.10						
27-Mar-09	418.2		1240	413	**476**	21	7.30										
28-Mar-09	455.2		1240	413	220	15	7.35										
29-Mar-09	428.2		**2100**	700	**404**	16	7.40										
30-Mar-09	451.5		**2500**	833	228	20	7.40										
31-Mar-09	458.9		1500	500	276	24	7.44										
01-Apr-09	423.8		1100	367	**460**	23	7.45										
02-Apr-09	481.8	**796**	**1660**	553	**420**	18	7.40	249	0.4	16.3	< 0.10	0.05	< 0.0003	0.004	0.013	0.006	0.008
03-Apr-09	508.4		1200	400	356	17	7.40										
04-Apr-09	486.1		1260	420	348	17	7.40										
05-Apr-09	444.6		840	280	272	19	7.45										
06-Apr-09	411.1		840	280	**464**	18	7.55		0.3								
07-Apr-09	536.7		790	263	248	17	7.79										
08-Apr-09	499.2				380	15	7.81										
09-Apr-09	380.2				224	18	7.55		0.4								
10-Apr-09	379.1				200	19	7.50										
11-Apr-09	423.5				176	16	7.50										
12-Apr-09	420.3				164	17	7.50										
13-Apr-09	445.6				172	18	7.50										
14-Apr-09	483.4				200	18	7.45										
15-Apr-09	499.4				20	20	7.40										
16-Apr-09	531.6				176	18	7.31		0.3								
17-Apr-09	549.7				196	16	7.20										
18-Apr-09	446.9				72	16	7.25										
19-Apr-09	370.8				32	18	7.30										
20-Apr-09	408.3				60	21	7.21										
21-Apr-09	357.0				72	18	7.24										
22-Apr-09	338.6				220	22	7.45										
23-Apr-09	418.5				256	20	7.45										
24-Apr-09	394.4				160	20	7.45										
25-Apr-09	405.6				124	18	7.45										
26-Apr-09	473.9				204	18	7.49										
27-Apr-09	463.7				244	17	7.51										
28-Apr-09	463.0				240	18	7.40		0.4								
29-Apr-09	371.9				320	18	7.40										
30-Apr-09	425.7				224	18	7.40		0.2								

Effluent Data																	
Date	Flow (m3/Day)	BOD (mg/l)	COD (mg/l)	TOC (mg/l)	SS (mg/l)	Temp. (oC)	pH	Sulphates (mg/l)	Nitrates as N (mg/l)	Ortho Phosphate (mg/l)	Fluoride (mg/l)	Zinc (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)
01-May-09	518.4				44	17	7.35										
02-May-09	501.2				132	17	7.25										
03-May-09	543.8				72	18	7.20										
04-May-09	528.9				64	17	7.06										
05-May-09	484.1				27	19	6.90										
06-May-09	501.1	18	230	77	44	19	6.95	114	0.4	8.9	< 0.10	0.0176	<0.00025	0.00423	0.019	<0.0005	0.00691
07-May-09	475.2				106	18	6.95										
08-May-09	463.4				118	17	6.71										
09-May-09	484.8				46	19	6.45										
10-May-09	429.4				102	19	6.54										
11-May-09	391.4				108	19	6.70										
12-May-09	370.6				146	19	6.70										
13-May-09	401.4				176	19	6.61										
14-May-09	477.0	28	240	80	166	19	6.55	57	0.5	3.5	<0.50						
15-May-09	549.4				170	18	6.69										
16-May-09	552.2				58	18	6.80										
17-May-09	542.6				120	22	6.85										
18-May-09	523.2				84	19	6.95										
19-May-09	537.5				24	22	6.86										
20-May-09	575.3				106	18	6.56										
21-May-09	480.8				112	17	6.54										
22-May-09	356.1				88	21	6.61		< 0.5								
23-May-09	385.5				70	19	6.36										
24-May-09	450.9				26	19	6.20										
25-May-09	437.7				56	21	6.43										
26-May-09	476.7				56	18	6.70										
27-May-09	499.9				52	19	6.56										
28-May-09	500.9				66	19	6.40										
29-May-09	469.5				52	19	6.40										
30-May-09	456.4				72	19	6.49										
31-May-09	501.9				60	18	6.60										
01-Jun-09	475.6				56	20	6.65										
02-Jun-09	342.5				80	22	6.75										
03-Jun-09	271.2	175	440	147	100	22	6.75	165	0.5	0.5	<0.5	0.03	< 0.0003	< 0.002	0.01	0.001	0.003
04-Jun-09	275.7				128	20	6.65										
05-Jun-09	309.0				94	20	6.69										
06-Jun-09	338.5				62	19	6.80										
07-Jun-09	439.6				76	18	6.75										
08-Jun-09	533.1				94	21	6.70										
09-Jun-09	468.1				162	23	6.98										
10-Jun-09	392.1				68	17	7.25										
11-Jun-09	391.3				66	18	7.15										
12-Jun-09	391.4				66	19	7.05										
13-Jun-09	356.9				44	20	7.09										
14-Jun-09	364.0				30	20	7.20										
15-Jun-09	352.0				71	19	7.15										
16-Jun-09	309.6	2	41	14	18	22	7.15	104	0.1	< 0.50	0.16						
17-Jun-09	251.9				70	20	7.34										
18-Jun-09	303.7				12	18	7.41										
19-Jun-09	375.0				1	15	7.11										
20-Jun-09	360.3				20	20	6.85										
21-Jun-09	327.0				37	18	6.75										
22-Jun-09	247.9				20	19	6.75										
23-Jun-09	237.2				34	22	6.75										
24-Jun-09	276.6				50	21	6.94										
25-Jun-09	292.3				54	20	7.15										
26-Jun-09	335.1				78	21	7.05										
27-Jun-09	424.8				80	21	7.00										
28-Jun-09	512.2				92	20	7.09										
29-Jun-09	478.8				132	21	7.20										
30-Jun-09	430.0				6	20	7.20										

Effluent Data																	
Date	Flow (m3/Day)	BOD (mg/l)	COD (mg/l)	TOC (mg/l)	SS (mg/l)	Temp. (oC)	pH	Sulphates (mg/l)	Nitrates as N (mg/l)	Ortho Phosphate (mg/l)	Fluoride (mg/l)	Zinc (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)
01-Jul-09	406.6	13	410	137	112	21	7.06	86	0.5	18.7	< 0.10	0.06	< 0.0002	0.004	0.18	< 0.0005	0.01
02-Jul-09	450.8				130	24	6.81										
03-Jul-09	517.4				44	23	6.65										
04-Jul-09	475.3				28	21	6.60										
05-Jul-09	401.6				36	21	6.69										
06-Jul-09	378.5				44	21	6.85										
07-Jul-09	468.9				118	21	7.09										
08-Jul-09	514.0				4	22	7.39										
09-Jul-09	402.6				105	22	7.55										
10-Jul-09	313.2				214	21	7.60										
11-Jul-09	341.2				176	21	7.60										
12-Jul-09	450.0				162	20	7.60										
13-Jul-09	480.8				190	21	7.60										
14-Jul-09	429.5				298	20	7.51										
15-Jul-09	441.9				294	20	7.35										
16-Jul-09	407.8				296	21	7.25										
17-Jul-09	351.3				292	22	7.15										
18-Jul-09	365.5				266	22	7.10										
19-Jul-09	384.3				262	19	7.10										
20-Jul-09	409.9				228	21	7.10										
21-Jul-09	359.0				238	20	7.19										
22-Jul-09	433.8				228	21	7.21										
23-Jul-09	567.7				250	20	7.15										
24-Jul-09	519.1				352	22	7.20										
25-Jul-09	487.0				220	18	7.20										
26-Jul-09	474.1				190	20	7.15										
27-Jul-09	414.0				294	22	7.15										
28-Jul-09	439.6				354	23	7.20										
29-Jul-09	475.2				**436**	23	7.11										
30-Jul-09	433.6				314	19	6.91										
31-Jul-09	445.0				154	21	6.80										
01-Aug-09	482.7				**550**	21	6.75										
02-Aug-09	455.2				260	21	6.70										
03-Aug-09	436.3				174	21	6.79										
04-Aug-09	465.3				324	22	6.90										
05-Aug-09	507.5	41	1260	420	360	21	6.85	182	0.6	17.5	< 0.10	0.022	< 0.0003	0.003	0.024	0.001	0.004
06-Aug-09	552.6				**416**	21	6.75										
07-Aug-09	569.6				284	22	6.61										
08-Aug-09	561.3				286	22	6.73										
09-Aug-09	568.6				397	21	7.00										
10-Aug-09	543.2				258	22	6.91										
11-Aug-09	525.8				296	21	6.99										
12-Aug-09	525.6				202	21	7.20										
13-Aug-09	508.6				194	21	7.20										
14-Aug-09	512.3				166	21	7.15										
15-Aug-09	513.6				132	20	7.10										
16-Aug-09	513.6				180	20	7.10										
17-Aug-09	511.5				108	22	7.09										
18-Aug-09	273.3				138	20	7.18										
19-Aug-09	395.3				150	21	7.25										
20-Aug-09	569.3				140	21	7.30										
21-Aug-09	534.9				112	20	7.30										
22-Aug-09	458.9				84	21	7.16										
23-Aug-09	390.6				100	21	7.09										
24-Aug-09	338.7				62	20	7.20										
25-Aug-09	342.6				74	19	7.20										
26-Aug-09	333.8				74	20	7.20										
27-Aug-09	338.9				76	20	7.15										
28-Aug-09	357.3				70	19	7.15										
29-Aug-09	342.1				132	20	7.29										
30-Aug-09	341.9				58	22	7.35										
31-Aug-09	349.9				134	21	7.39										

Effluent Data

Date	Flow (m3/Day)	BOD (mg/l)	COD (mg/l)	TOC (mg/l)	SS (mg/l)	Temp. (oC)	pH	Sulphates (mg/l)	Nitrates as N (mg/l)	Ortho Phosphate (mg/l)	Fluoride (mg/l)	Zinc (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)
01-Sep-09	299.4				82	20	7.50										
02-Sep-09	276.4	35	170	57	78	21	7.41	122	0.3	16.2	< 0.10	0.03	< 0.0003	< 0.002	0.01	0.001	< 0.002
03-Sep-09	368.9				100	18	7.63										
04-Sep-09	410.9				162	19	8.09										
05-Sep-09	394.3				158	20	7.92										
06-Sep-09	352.7				176	21	7.51										
07-Sep-09	372.7				84	21	7.40										
08-Sep-09	433.4				66	22	7.54										
09-Sep-09	483.3				38	20	7.61										
10-Sep-09	513.5				50	20	7.41										
11-Sep-09	461.9				72	19	7.30										
12-Sep-09	476.4				116	19	7.21										
13-Sep-09	437.6				100	15	6.77										
14-Sep-09	351.5	1	100	33	130	21	6.21	251	0.10	9.90	< 0.10						
15-Sep-09	365.1				154	20	6.23										
16-Sep-09	412.7				140	19	6.45										
17-Sep-09	414.3				124	18	6.63										
18-Sep-09	382.1				46	17	7.13										
19-Sep-09	351.1				46	19	7.26										
20-Sep-09	313.6				82	23	7.05										
21-Sep-09	318.6				56	22	6.95										
22-Sep-09	338.7				102	23	6.95										
23-Sep-09	353.0				94	18	7.00										
24-Sep-09	353.6				68	16	7.00										
25-Sep-09	416.1				70	17	6.91										
26-Sep-09	434.9				36	20	6.80										
27-Sep-09	393.5				170	21	6.89										
28-Sep-09	365.6				30	19	7.00	112	0.30	3.70	0.31						
29-Sep-09	337.2				50	19	7.14										
30-Sep-09	327.1				20	19	7.35										
01-Oct-09	332.6				12	21	7.45										
02-Oct-09	361.2				30	18	7.36										
03-Oct-09	438.6				40	20	7.29										
04-Oct-09	479.2				144	19	7.35										
05-Oct-09	458.3				32	20	7.25										
06-Oct-09	501.9				20	19	7.11										
07-Oct-09	542.2	53	108	36	16	19	7.19	89	< 0.50	2.0	0.44	0.03	< 0.0003	< 0.002	0.006	< 0.001	< 0.002
08-Oct-09	474.2				36	19	7.26										
09-Oct-09	460.1				34	19	7.05										
10-Oct-09	482.9				22	19	6.86										
11-Oct-09	427.2				24	20	6.51										
12-Oct-09	345.2				44	18	6.30	162	< 0.50	0.2	0.13						
13-Oct-09	315.5				70	18	6.44										
14-Oct-09	305.6				96	19	6.97										
15-Oct-09	333.0				114	20	7.31										
16-Oct-09	322.3				110	21	7.25										
17-Oct-09	271.3				92	21	7.30										
18-Oct-09	296.9				190	20	7.35										
19-Oct-09	312.8				98	20	7.40										
20-Oct-09	304.7				128	17	7.54										
21-Oct-09	358.3				192	19	7.79										
22-Oct-09	415.8				292	19	7.81										
23-Oct-09	401.1				180	19	7.65										
24-Oct-09	381.7				88	20	7.55										
25-Oct-09	456.8				94	20	7.55										
26-Oct-09	554.1				108	20	7.65										
27-Oct-09	518.2				222	20	7.75	50	0.10	**111.4**	< 0.10						
28-Oct-09	404.3				284	20	7.75										
29-Oct-09	299.9				332	19	7.75										
30-Oct-09	322.0				236	19	7.80										
31-Oct-09	414.8				260	20	7.70										

Effluent Data																	
Date	Flow (m3/Day)	BOD (mg/l)	COD (mg/l)	TOC (mg/l)	SS (mg/l)	Temp. (oC)	pH	Sulphates (mg/l)	Nitrates as N (mg/l)	Ortho Phosphate (mg/l)	Fluoride (mg/l)	Zinc (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)
01-Nov-09	431.4				280	19	7.55										
02-Nov-09	398.5				212	20	7.50										
03-Nov-09	445.6				140	18	7.55										
04-Nov-09	396.2	8	520	173	124	17	7.60	81.9	0.2	**148.0**	6.04	0.037	< 0.0003	< 0.002	0.013	0.001	0.002
05-Nov-09	287.7				76	20	7.65										
06-Nov-09	299.3				130	17	7.70										
07-Nov-09	326.3				104	16	7.70										
08-Nov-09	344.7				110	17	7.70										
09-Nov-09	376.9				128	15	7.65										
10-Nov-09	365.8				92	19	7.55										
11-Nov-09	334.6				80	16	7.45										
12-Nov-09	341.1				72	17	7.50										
13-Nov-09	353.9				62	18	7.60										
14-Nov-09	395.4				194	19	7.60										
15-Nov-09	365.1				114	16	7.65										
16-Nov-09	278.3				64	19	7.70										
17-Nov-09	295.5	4	53	18	0	17	7.80	62.8	0.9	8.5	1.1						
18-Nov-09	259.7				0	16	8.15										
19-Nov-09	257.5				34	18	8.20										
20-Nov-09	351.8				52	18	8.00										
21-Nov-09	373.0				62	21	8.06										
22-Nov-09	351.9				30	20	8.13										
23-Nov-09	390.4				52	17	8.24										
24-Nov-09	378.4				38	18	8.30										
25-Nov-09	321.7				44	15	8.30										
26-Nov-09	344.6				44	14	8.15										
27-Nov-09	402.5				44	14	8.00										
28-Nov-09	448.9				6	15	8.00										
29-Nov-09	463.3				20	14	8.00										
30-Nov-09	512.9				34	14	8.15										
01-Dec-09	497.4				162	16	8.81										
02-Dec-09	436.7	91	260	87	116	17	9.30	75.9	0.1	3.4	1.37	0.0458	<0.0025	<0.002	0.0852	0.00087	<0.002
03-Dec-09	422.3				92	15	8.74										
04-Dec-09	481.1				82	15	8.05										
05-Dec-09	513.3				70	17	7.85										
06-Dec-09	432.7				62	16	7.70										
07-Dec-09	326.7				52	17	7.65										
08-Dec-09	364.3				64	16	7.63										
09-Dec-09	421.5				46	17	7.60										
10-Dec-09	412.5				12	12	7.75										
11-Dec-09	348.9				4	15	7.85										
12-Dec-09	362.9				30	17	7.70										
13-Dec-09	355.8				28	11	7.70										
14-Dec-09	292.7				31	9	7.80										
15-Dec-09	291.7				22	13	7.60										
16-Dec-09	293.9				34	15	7.35										
17-Dec-09	292.9				30	17	7.30										
18-Dec-09	279.4				30	16	7.30										
19-Dec-09	345.3				54	17	7.25										
20-Dec-09	398.1				8	14	7.20										
21-Dec-09	367.2				25	10	7.15										
22-Dec-09	374.5				35	5	7.10										
23-Dec-09	344.0				26	11	7.10										
24-Dec-09	281.8						7.15										
25-Dec-09	254.3						7.25										
26-Dec-09	252.0						7.30										
27-Dec-09	260.5						7.40										
28-Dec-09	255.5						7.45										
29-Dec-09	240.0						7.40										
30-Dec-09	231.6						7.40										
31-Dec-09	240.1						7.40										

		Effluent (Calculated)													
Date	Fats / Oil / Grease (mg/l)	B.O.D. (kg/Day)	C.O.D. (kg/Day)	S.S. (kg/Day)	Sulphates (kg/Day)	Nitrates as N (kg/Day)	Ortho Phosphate (kg/Day)	Fluoride (kg/Day)	Zinc (kg/Day)	Cadmium (kg/Day)	Chromium (kg/Day)	Copper (kg/Day)	Lead (kg/Day)	Nickel (kg/Day)	Fats / Oil / Grease (kg/Day)
01-Jan-09		0.00													
02-Jan-09		0.00		16.68											
03-Jan-09		0.00		3.99											
04-Jan-09		0.00		1.65											
05-Jan-09		0.00		0.80											
06-Jan-09		0.00		8.91											
07-Jan-09	< 10	5.45	29.59	0.00	60.35	0.31	1.40	0.22	0.0234	0.0000	0.0003	0.0051	0.0002	0.0009	3.8936
08-Jan-09		2.08	21.81	0.00	47.43	0.35	2.11	0.17							
09-Jan-09		0.00		20.77											
10-Jan-09		0.00		1.04											
11-Jan-09		0.00		0.97											
12-Jan-09		0.00		0.00											
13-Jan-09		1.73	12.71	2.31	23.69	0.14	1.24	0.06	0.0144	0.0001	0.0006	0.0029	0.0002	0.0006	
14-Jan-09		0.00		6.12											
15-Jan-09		0.00		19.51											
16-Jan-09		0.00		1.09											
17-Jan-09		0.00		8.30											
18-Jan-09		0.00		13.14											
19-Jan-09		0.00		16.74											
20-Jan-09		0.00		28.52											
21-Jan-09		0.00		53.35											
22-Jan-09		0.00		0.00											
23-Jan-09		0.00		13.45											
24-Jan-09		0.00		16.59											
25-Jan-09		0.00		16.33											
26-Jan-09		0.00		9.69											
27-Jan-09		0.00		33.04											
28-Jan-09		0.00		11.26											
29-Jan-09		0.00		2.99											
30-Jan-09		0.00		45.63											
31-Jan-09		0.00		16.55											
01-Feb-09		0.00		34.66											
02-Feb-09		0.00		33.38											
03-Feb-09		0.00		44.26											
04-Feb-09	< 10	**223.77**	636.80	85.70	51.18	0.12	12.26	0.06	0.0298	0.0002	0.0012	0.0119	0.0006	0.0012	5.9514
05-Feb-09		0.00		52.72											
06-Feb-09		**188.98**	524.10	102.80	64.50	0.15	12.25	0.05							
07-Feb-09		0.00		82.25											
08-Feb-09		0.00		31.80											
09-Feb-09		0.00		97.36											
10-Feb-09		0.00		79.48											
11-Feb-09		0.00		36.83											
12-Feb-09		0.00		27.77											
13-Feb-09		0.00		87.13											
14-Feb-09		0.00		145.71											
15-Feb-09		0.00		183.77											
16-Feb-09		0.00		165.82											
17-Feb-09		0.00		81.11											
18-Feb-09		0.00		96.68											
19-Feb-09		0.00		131.85											
20-Feb-09		0.00		180.19											
21-Feb-09		0.00		136.11											
22-Feb-09		0.00		130.19											
23-Feb-09		0.00		83.11											
24-Feb-09		0.00		45.50											
25-Feb-09		0.00		78.13											
26-Feb-09		0.00		75.88											
27-Feb-09		0.00	316.57	82.80											
28-Feb-09		0.00		122.75											

		Effluent (Calculated)													
Date	Fats / Oil / Grease (mg/l)	B.O.D. (kg/Day)	C.O.D. (kg/Day)	S.S. (kg/Day)	Sulphates (kg/Day)	Nitrates as N (kg/Day)	Ortho Phosphate (kg/Day)	Fluoride (kg/Day)	Zinc (kg/Day)	Cadmium (kg/Day)	Chromium (kg/Day)	Copper (kg/Day)	Lead (kg/Day)	Nickel (kg/Day)	Fats / Oil / Grease (kg/Day)
01-Mar-09		0.00		143.04											
02-Mar-09		0.00		95.84											
03-Mar-09		0.00	**1156.87**	190.65											
04-Mar-09	< 10	**228.76**	727.00	176.42	84.33	0.05	8.09	0.05	0.0291	0.0001	0.0015	0.0145	0.0010	0.0019	4.8467
05-Mar-09		0.00		143.29											
06-Mar-09		0.00		189.71											
07-Mar-09		0.00		131.38											
08-Mar-09		0.00		166.67											
09-Mar-09		0.00		185.48											
10-Mar-09		0.00		160.51											
11-Mar-09		0.00		168.45											
12-Mar-09		0.00		137.29											
13-Mar-09		0.00		115.86											
14-Mar-09		0.00		65.87											
15-Mar-09		0.00		52.73											
16-Mar-09		0.00		138.82											
17-Mar-09		0.00		67.34											
18-Mar-09		0.00	**962.78**	170.17											
19-Mar-09		0.00	377.88	123.31		0.17									
20-Mar-09		0.00	418.91	161.22											
21-Mar-09		0.00	602.58	166.87											
22-Mar-09		0.00	784.63	168.55											
23-Mar-09		0.00	465.78	142.76		0.18									
24-Mar-09		0.00	341.89	132.27											
25-Mar-09		0.00	584.31	213.02											
26-Mar-09		**174.05**	521.73	187.50	114.13	0.45	7.09	0.04							
27-Mar-09		0.00	518.57	199.06											
28-Mar-09		0.00	564.41	100.14											
29-Mar-09		0.00	899.29	173.01											
30-Mar-09		0.00	**1128.67**	102.94											
31-Mar-09		0.00	688.36	126.66											
01-Apr-09		0.00	466.22	194.97											
02-Apr-09	< 10	**383.55**	799.86	202.37	119.98	0.19	7.85	0.05	0.0241	0.0001	0.0019	0.0063	0.0029	0.0039	4.8184
03-Apr-09		0.00	610.05	180.98											
04-Apr-09		0.00	612.52	169.17											
05-Apr-09		0.00	373.50	120.94											
06-Apr-09		0.00	345.35	190.77		0.12									
07-Apr-09		0.00	423.98	133.10											
08-Apr-09		0.00		189.69											
09-Apr-09		0.00		85.17		0.15									
10-Apr-09		0.00		75.83											
11-Apr-09		0.00		74.54											
12-Apr-09		0.00		68.93											
13-Apr-09		0.00		76.65											
14-Apr-09		0.00		96.68											
15-Apr-09		0.00		9.99											
16-Apr-09		0.00		93.57		0.16									
17-Apr-09		0.00		107.75											
18-Apr-09		0.00		32.18											
19-Apr-09		0.00		11.86											
20-Apr-09		0.00		24.50											
21-Apr-09		0.00		25.71											
22-Apr-09		0.00		74.49											
23-Apr-09		0.00		107.13											
24-Apr-09		0.00		63.10											
25-Apr-09		0.00		50.30											
26-Apr-09		0.00		96.67											
27-Apr-09		0.00		113.14											
28-Apr-09		0.00		111.13		0.19									
29-Apr-09		0.00		119.00											
30-Apr-09		0.00		95.36		0.09									

		Effluent (Calculated)													
Date	Fats / Oil / Grease (mg/l)	B.O.D. (kg/Day)	C.O.D. (kg/Day)	S.S. (kg/Day)	Sulphates (kg/Day)	Nitrates as N (kg/Day)	Ortho Phosphate (kg/Day)	Fluoride (kg/Day)	Zinc (kg/Day)	Cadmium (kg/Day)	Chromium (kg/Day)	Copper (kg/Day)	Lead (kg/Day)	Nickel (kg/Day)	Fats / Oil / Grease (kg/Day)
01-May-09		0.00		22.81											
02-May-09		0.00		66.16											
03-May-09		0.00		39.15											
04-May-09		0.00		33.85											
05-May-09		0.00		13.07											
06-May-09	< 10	9.02	115.25	22.05	57.12	0.20	4.46	0.05	0.0088	0.0001	0.0021	0.0095	0.0003	0.0035	5.0109
07-May-09		0.00		50.38											
08-May-09		0.00		54.69											
09-May-09		0.00		22.30											
10-May-09		0.00		43.80											
11-May-09		0.00		42.27											
12-May-09		0.00		54.10											
13-May-09		0.00		70.65											
14-May-09		13.36	114.48	79.18	27.19	0.24	1.67	0.24							
15-May-09		0.00		93.40											
16-May-09		0.00		32.03											
17-May-09		0.00		65.12											
18-May-09		0.00		43.95											
19-May-09		0.00		12.90											
20-May-09		0.00		60.98											
21-May-09		0.00		53.85											
22-May-09		0.00		31.34		0.18									
23-May-09		0.00		26.99											
24-May-09		0.00		11.72											
25-May-09		0.00		24.51											
26-May-09		0.00		26.69											
27-May-09		0.00		25.99											
28-May-09		0.00		33.06											
29-May-09		0.00		24.41											
30-May-09		0.00		32.86											
31-May-09		0.00		30.12											
01-Jun-09		0.00		26.64											
02-Jun-09		0.00		27.40											
03-Jun-09	< 10	47.46	119.33	27.12	44.75	0.14	0.14	0.14	0.0092	0.0001	0.0005	0.0030	0.0003	0.0008	2.7120
04-Jun-09		0.00		35.29											
05-Jun-09		0.00		29.04											
06-Jun-09		0.00		20.99											
07-Jun-09		0.00		33.41											
08-Jun-09		0.00		50.12											
09-Jun-09		0.00		75.83											
10-Jun-09		0.00		26.66											
11-Jun-09		0.00		25.82											
12-Jun-09		0.00		25.83											
13-Jun-09		0.00		15.70											
14-Jun-09		0.00		10.92											
15-Jun-09		0.00		24.99											
16-Jun-09		0.62	12.69	5.57	32.20	0.03	0.15	0.05							
17-Jun-09		0.00		17.63											
18-Jun-09		0.00		3.64											
19-Jun-09		0.00		0.37											
20-Jun-09		0.00		7.21											
21-Jun-09		0.00		12.10											
22-Jun-09		0.00		4.96											
23-Jun-09		0.00		8.07											
24-Jun-09		0.00		13.83											
25-Jun-09		0.00		15.79											
26-Jun-09		0.00		26.14											
27-Jun-09		0.00		33.98											
28-Jun-09		0.00		47.12											
29-Jun-09		0.00		63.20											
30-Jun-09		0.00		2.58											

		Effluent (Calculated)													
Date	Fats / Oil / Grease (mg/l)	B.O.D. (kg/Day)	C.O.D. (kg/Day)	S.S. (kg/Day)	Sulphates (kg/Day)	Nitrates as N (kg/Day)	Ortho Phosphate (kg/Day)	Fluoride (kg/Day)	Zinc (kg/Day)	Cadmium (kg/Day)	Chromium (kg/Day)	Copper (kg/Day)	Lead (kg/Day)	Nickel (kg/Day)	Fats / Oil / Grease (kg/Day)
01-Jul-09	< 10	5.29	166.72	45.54	34.97	0.20	7.60	0.04	0.0232	0.0001	0.0016	0.0732	0.0002	0.0045	4.0663
02-Jul-09		0.00		58.60											
03-Jul-09		0.00		22.77											
04-Jul-09		0.00		13.31											
05-Jul-09		0.00		14.46											
06-Jul-09		0.00		16.65											
07-Jul-09		0.00		55.33											
08-Jul-09		0.00		2.06											
09-Jul-09		0.00		42.27											
10-Jul-09		0.00		67.02											
11-Jul-09		0.00		60.06											
12-Jul-09		0.00		72.91											
13-Jul-09		0.00		91.35											
14-Jul-09		0.00		127.99											
15-Jul-09		0.00		129.93											
16-Jul-09		0.00		120.71											
17-Jul-09		0.00		102.59											
18-Jul-09		0.00		97.23											
19-Jul-09		0.00		100.70											
20-Jul-09		0.00		93.45											
21-Jul-09		0.00		85.44											
22-Jul-09		0.00		98.91											
23-Jul-09		0.00		141.92											
24-Jul-09		0.00		182.71											
25-Jul-09		0.00		107.14											
26-Jul-09		0.00		90.08											
27-Jul-09		0.00		121.73											
28-Jul-09		0.00		155.62											
29-Jul-09		0.00		207.18											
30-Jul-09		0.00		136.15											
31-Jul-09		0.00		68.53											
01-Aug-09		0.00		**265.49**											
02-Aug-09		0.00		118.35											
03-Aug-09		0.00		75.92											
04-Aug-09		0.00		150.75											
05-Aug-09	< 10	20.81	639.48	182.71	92.37	0.30	8.88	0.05	0.0112	0.0002	0.0015	0.0122	0.0005	0.0022	5.0753
06-Aug-09		0.00		229.90											
07-Aug-09		0.00		161.77											
08-Aug-09		0.00		160.53											
09-Aug-09		0.00		225.75											
10-Aug-09		0.00		140.15											
11-Aug-09		0.00		155.63											
12-Aug-09		0.00		106.17											
13-Aug-09		0.00		98.68											
14-Aug-09		0.00		85.05											
15-Aug-09		0.00		67.80											
16-Aug-09		0.00		92.45											
17-Aug-09		0.00		55.25											
18-Aug-09		0.00		37.71											
19-Aug-09		0.00		59.30											
20-Aug-09		0.00		79.70											
21-Aug-09		0.00		59.91											
22-Aug-09		0.00		38.55											
23-Aug-09		0.00		39.06											
24-Aug-09		0.00		21.00											
25-Aug-09		0.00		25.35											
26-Aug-09		0.00		24.70											
27-Aug-09		0.00		25.75											
28-Aug-09		0.00		25.01											
29-Aug-09		0.00		45.15											
30-Aug-09		0.00		19.83											
31-Aug-09		0.00		46.89											

		Effluent (Calculated)													
Date	Fats / Oil / Grease (mg/l)	B.O.D. (kg/Day)	C.O.D. (kg/Day)	S.S. (kg/Day)	Sulphates (kg/Day)	Nitrates as N (kg/Day)	Ortho Phosphate (kg/Day)	Fluoride (kg/Day)	Zinc (kg/Day)	Cadmium (kg/Day)	Chromium (kg/Day)	Copper (kg/Day)	Lead (kg/Day)	Nickel (kg/Day)	Fats / Oil / Grease (kg/Day)
01-Sep-09		0.00		24.55											
02-Sep-09	< 10	9.67	46.99	21.56	33.72	0.08	4.48	0.03	0.0075	0.0001	0.0006	0.0036	0.0003	0.0006	2.7643
03-Sep-09		0.00		36.89											
04-Sep-09		0.00		66.56											
05-Sep-09		0.00		62.29											
06-Sep-09		0.00		62.07											
07-Sep-09		0.00		31.31											
08-Sep-09		0.00		28.61											
09-Sep-09		0.00		18.36											
10-Sep-09		0.00		25.67											
11-Sep-09		0.00		33.26											
12-Sep-09		0.00		55.27											
13-Sep-09		0.00		43.76											
14-Sep-09		0.35	35.15	45.70	88.23	0.04	3.48	0.04							
15-Sep-09		0.00		56.23											
16-Sep-09		0.00		57.78											
17-Sep-09		0.00		51.37											
18-Sep-09		0.00		17.58											
19-Sep-09		0.00		16.15											
20-Sep-09		0.00		25.71											
21-Sep-09		0.00		17.84											
22-Sep-09		0.00		34.54											
23-Sep-09		0.00		33.18											
24-Sep-09		0.00		24.05											
25-Sep-09		0.00		29.13											
26-Sep-09		0.00		15.66											
27-Sep-09		0.00		66.89											
28-Sep-09		0.00		10.97	40.95	0.11	1.35	0.11							
29-Sep-09		0.00		16.86											
30-Sep-09		0.00		6.54											
01-Oct-09		0.00		3.99											
02-Oct-09		0.00		10.84											
03-Oct-09		0.00		17.54											
04-Oct-09		0.00		69.01											
05-Oct-09		0.00		14.67											
06-Oct-09		0.00		10.04											
07-Oct-09	< 10	28.73	58.55	8.67	48.25	0.27	1.08	0.24	0.0163	0.0002	0.0011	0.0033	0.0005	0.0011	5.4217
08-Oct-09		0.00		17.07											
09-Oct-09		0.00		15.64											
10-Oct-09		0.00		10.62											
11-Oct-09		0.00		10.25											
12-Oct-09		0.00		15.19	55.93	0.17	0.07	0.04							
13-Oct-09		0.00		22.09											
14-Oct-09		0.00		29.34											
15-Oct-09		0.00		37.96											
16-Oct-09		0.00		35.45											
17-Oct-09		0.00		24.96											
18-Oct-09		0.00		56.42											
19-Oct-09		0.00		30.65											
20-Oct-09		0.00		39.00											
21-Oct-09		0.00		68.79											
22-Oct-09		0.00		121.40											
23-Oct-09		0.00		72.19											
24-Oct-09		0.00		33.59											
25-Oct-09		0.00		42.94											
26-Oct-09		0.00		59.85											
27-Oct-09		0.00		115.04	25.91	0.05	57.71	0.05							
28-Oct-09		0.00		114.83											
29-Oct-09		0.00		99.57											
30-Oct-09		0.00		75.98											
31-Oct-09		0.00		107.84											

		Effluent (Calculated)													
Date	Fats / Oil / Grease (mg/l)	B.O.D. (kg/Day)	C.O.D. (kg/Day)	S.S. (kg/Day)	Sulphates (kg/Day)	Nitrates as N (kg/Day)	Ortho Phosphate (kg/Day)	Fluoride (kg/Day)	Zinc (kg/Day)	Cadmium (kg/Day)	Chromium (kg/Day)	Copper (kg/Day)	Lead (kg/Day)	Nickel (kg/Day)	Fats / Oil / Grease (kg/Day)
01-Nov-09		0.00		120.80											
02-Nov-09		0.00		84.49											
03-Nov-09		0.00		62.39											
04-Nov-09	< 10	3.17	206.03	49.13	32.45	0.08	58.64	2.39	0.0145	0.0001	0.0008	0.0051	0.0004	0.0008	3.9621
05-Nov-09		0.00		21.86											
06-Nov-09		0.00		38.90											
07-Nov-09		0.00		33.93											
08-Nov-09		0.00		37.92											
09-Nov-09		0.00		48.24											
10-Nov-09		0.00		33.66											
11-Nov-09		0.00		26.77											
12-Nov-09		0.00		24.56											
13-Nov-09		0.00		21.94											
14-Nov-09		0.00		76.70											
15-Nov-09		0.00		41.62											
16-Nov-09		0.00		17.81											
17-Nov-09		1.18	15.66	0.00	18.56	0.27	2.51	0.33							
18-Nov-09		0.00		0.00											
19-Nov-09		0.00		8.75											
20-Nov-09		0.00		18.30											
21-Nov-09		0.00		23.13											
22-Nov-09		0.00		10.56											
23-Nov-09		0.00		20.30											
24-Nov-09		0.00		14.38											
25-Nov-09		0.00		14.15											
26-Nov-09		0.00		15.16											
27-Nov-09		0.00		17.71											
28-Nov-09		0.00		2.69											
29-Nov-09		0.00		9.27											
30-Nov-09		0.00		17.44											
01-Dec-09		0.00		80.58											
02-Dec-09	<10	39.74	113.55	50.66	33.15	0.04	1.48	0.60	0.0200	0.0011	0.0009	0.0372	0.0004	0.0009	4.3673
03-Dec-09		0.00		38.85											
04-Dec-09		0.00		39.45											
05-Dec-09		0.00		35.93											
06-Dec-09		0.00		26.83											
07-Dec-09		0.00		16.99											
08-Dec-09		0.00		23.32											
09-Dec-09		0.00		19.39											
10-Dec-09		0.00		4.95											
11-Dec-09		0.00		1.40											
12-Dec-09		0.00		10.89											
13-Dec-09		0.00		9.96											
14-Dec-09		0.00		9.07											
15-Dec-09		0.00		6.42											
16-Dec-09		0.00		9.99											
17-Dec-09		0.00		8.79											
18-Dec-09		0.00		8.38											
19-Dec-09		0.00		18.65											
20-Dec-09		0.00		3.18											
21-Dec-09		0.00		9.18											
22-Dec-09		0.00		13.11											
23-Dec-09		0.00		8.94											
24-Dec-09		0.00													
25-Dec-09		0.00													
26-Dec-09		0.00													
27-Dec-09		0.00													
28-Dec-09		0.00													
29-Dec-09		0.00													
30-Dec-09		0.00													
31-Dec-09		0.00													

Waste Sludge From the On-site Waste Water Treatment Plant **2009**

	Quarterly Metals (mg/kg) dry											Biannual VOC (ug/kg)				
Date	Aluminium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc	Organic Matter	Water Content	Acetone	Carbon Disulfide	DCM	2-Butanone	Toluene
04.03.09	14,000	< 8.84	< 70.70	< 70.70	1,870	< 17.70	108	< 70.70	631	80.43%	96.46%					
03.06.09	21,900	< 8.59	< 68.70	< 68.70	3,350	< 17.20	151	< 68.70	1,200	73.37%	96.86%	2,100	120	39	200	120
02.09.09	11,000	< 9.52	< 76.20	< 76.20	1,300	< 19.00	107	< 76.20	437	68.16%	97.36%					
02.12.09	9,360	< 14.60	< 116	< 116	3,190	< 29.1	218	< 116	833	72.70%	98.63%	250	-	180	-	-

No other solvents were detected above MDL

		Results (mg/litre)						
Date of sample	Date analysed	Chemex Report Project No	Acetone	DCM	MTBE	Chloroform	Methanol	i-Propanol
07.01.09	09.01.09	VOAEFFJAN	0.22	0.002	0.002	0.002		
04.02.09	13.02.09	VOAEFFFEB	110.0	2.0				18.6
04.03.09	06.03.09	VOAEFFMAR	50.0					8.7
02.04.09	21.04.09	VOAEFFAPR	170.0	6.4				150.0
06.05.09	13.05.09	VOAEFFMAY						
03.06.09	11.06.09	VOAEFFJUN	62.0	9.5			2.2	26.1
01.07.09	16.07.09	VOAEFFJUL						
05.08.09	17.08.09	VOAEFFAUG						
02.09.09	04.09.09	VOAEFFSEP		**3.5**			**13.3**	
07.10.09	15.10.09	VOAEFFOCT	**7.9**	**8.9**			**12.4**	**1.2**
04.11.09	16.11.09	VOAEFFNOV				1.0		
02.12.09	17.12.09	VOAEFFDEC		**1.3**				

In the EPA inspection in April 2009 – the Agency requested that a trigger level be set for VOC concentration in the Final Effluent. That trigger level was set at 1 mg/l in July 2009 and the investigations into results in excess of that level are outlined below.

Summary:

September 2009 – Trigger exceeded for DCM & Methanol:

P4 were processing using Methanol so sample required from scrubber for analysis. All other streams discharged to waste tanks. DCM use in P3 & P8 may have contributed to elevated DCM concentration.

October 2009 - Trigger exceeded for Acetone, DCM, Methanol & IPA:

DCM washing in Solvent Recovery however, timing of batch does not tie in with samples

Request sample from P8 scrubber for solvent analysis – analysis found Acetone at 3,800 mg/l & DCM at 19 mg/l.

December 2009 – Trigger exceeded for DCM:

Possibly residual DCM from Reyataz processing in P8 – finished mid November.

Monthly task force meetings are now held to discuss upcoming processing, identify streams that require further testing / alternative disposal & to re-iterate issues caused in WWTP by solvent over-loading.

Appendix B

Emissions to Air

Thermal Oxidiser Downtime summary

Date	Downtime	Duration min	Cause
22-Jan-09	16.25-17.57	92	n/d
23-Jan-09	13.47 - 14.11	24	n/d
10-Feb-09	18.10 - 21.57	227	Power loss to site
11-Feb-09	13.37 - 15.42	125	Planned shutdown to remove blockage on quench recirculation line
26-Feb-09	14.04 - 16.16, 16.57 - 19.20	275	Power loss to site
26-Apr-09	18.31 - 19.08	37	Blocked strainer on scrubber o/flow line to quench
26-Apr-09	21.45 - 00.53	188	
25-May-09	05.39 - 08.04	144	Steam leak in boiler house caused site evacuation including compressed air and shutdown the TO
25-May-09	14.51 - 17.22	200	Attributed to blockage in scrubber packing. Appears to be linked to when ABB shut down analyser for 6-monthly calibration.
09-Jul-09	9.50 - 10.56	66	Blocked strainer on scrubber overflow line to quench. This was due to high DCM activity during night shift hence large caustic dosing.
27-Jul-09	15.48 - 18.47 & 19.14 - 19.31 & 19.52 - 21.44	180	To change flame arrestor on pump
24-Aug-09	16.35 - 23.53	438	Quench pump failure
08-Sep-09	11.27 - 11.59	22	To investigate scrubber pH probe
10-Sep-09	13.06 - 13.20, 14.40 - 14.55	29	Replacing flame arrestors stream 1 Control valve failed on stream 3- fix by instrumentation caused a restart
11-Sep-09	14.35 - 15.09	32	Electrically isolating a boiler recirculation pump/ programming scrubber caustic dosing
12-Sep-09	06.55 - 7.09	14	Stream 3 Fan shutdown
26-Sep to 30-Sep-09	13.34 - 01.43 30th	5349	Safety PLC Card to be replaced: Issues on programming when restarted
08-Oct-09	10.51 - 11.58	67	While electrically isolating de-aerator recirculation pump
15-Oct-09	14.21 - 16.15	113	Air compressor failure
27-Oct-09	11.36 - 12.40	64	FAL03013 Low flow rate alarm on Flue gas from Boiler line
18-Nov-09	00.07 - 01.31	84	Boiler recirculation strainer blocked: low flow shut down TO: strainer cleared and immediate restart
26-Nov-09	11.12 - 12.28	76	Installing New card for vent header PLC
07-Dec-09	13.06 - 14.07	61	tbc
	Number of hours:	131.78	Overall: 1.63%

T.O. Downtime Stack Monitoring Results

Date	08.01.09						
Vent	P4 Stack Vent A2-6						
Process & Step	Methanol Cleaning of RE 405, RE 401B, RE 404, FDR 040018 Pre-rinsing of plant equipment with THF, no heating or cooling occurred.						
Flue Gas Temperature	14.3°C						
	Sample Time (min)	**Volume of Air (m^3)**	**Conc (mg/spl)**	**Emission (mg/Nm^3)**	**IPPCL Limit (mg/Nm^3)**	**Emission (kg/hr)**	**IPPCL Limit (kg/hr)**
Toluene	30	0.061080	0.031	0.482	100	0.00024	2.0

Date	09.01.09						
Vent	P5 stack Vent A2-2						
Process & Step	BMS-233101-01 On reaction RE-05-54-504 Holding slurry RE-05-53-503 Isolation CE-501 Holding M/L TK514 Holding IPA/DIW Wash TK513						
Flue Gas Temperature	12.8°C						
	Sample Time (min)	**Volume of Air (m^3)**	**Conc (mg/spl)**	**Emission (mg/Nm^3)**	**IPPCL Limit (mg/Nm^3)**	**Emission (kg/hr)**	**IPPCL Limit (kg/hr)**
IPA	30	0.06108	0.074	1.157	150	0.006	3.0
Toluene	30	0.06108	2.100	32.842	100	0.164	2.0
Benzene	30	0.06108	0.009	0.142	1	0.001	2.5 g/h
MIBK	30	0.06108	0.562	8.789	150	0.044	3.0
THF	30	0.06108	0.002	0.031	100	0.000	2.0
Hexane	30	0.06108	0.348	5.442	150	0.027	3.0
Heptane	30	0.06108	1.192	18.642	150	0.093	3.0
Ethylacetate	30	0.06108	0.028	0.438	150	0.002	3.0

Benzene is not used on site – this result is thought to be due to lab contamination.

Date	12.01.09						
Vent	P5 Stack Vent A2-2						
Process & Step	BMS-233101-01 Charging crudes RE-05-54-504 Cool-down RE-05-53-503						
Flue Gas Temperature	12.8°C						
	Sample Time (min)	**Volume of Air (m^3)**	**Conc (mg/spl)**	**Emission (mg/Nm^3)**	**IPPCL Limit (mg/Nm^3)**	**Emission (kg/hr)**	**IPPCL Limit (kg/hr)**
IPA	30	0.061080	0.034	0.532	150	0.003	3.0
Toluene	30	0.061080	0.283	4.426	100	0.022	2.0
Benzene	30	0.061080	0.014	0.219	1	0.001	2.5 g/hr

Benzene is not used on site – this result is thought to be due to lab contamination.

Date	13.01.09						
Vent	P3 Stack Vent A2-7						
Process & Step	SR 47436 RE-04 dissolving crudes RE-03 holding slurry at 10 degrees						
Flue Gas Temperature	17.5°C						
	Sample Time (min)	**Volume of Air (m^3)**	**Conc (mg/spl)**	**Emission (mg/Nm^3)**	**IPPCL Limit (mg/Nm^3)**	**Emission (kg/hr)**	**IPPCL Limit (kg/hr)**
Toluene	30	0.007620	0.031	3.823	100	0.011	2.0

Date		13.01.09					
Vent		P9 Stack Vent A2-4					
Process & Step		Pre-rinsing for SRC Kinase - Cold Butanol rinse					
Flue Gas Temperature		13.2°C					
	Sample Time (min)	**Volume of Air (m^3)**	**Conc (mg/spl)**	**Emission (mg/Nm^3)**	**IPPCL Limit (mg/Nm^3)**	**Emission (kg/hr)**	**IPPCL Limit (kg/hr)**
Toluene	30	0.007620	0.031	3.881	100	0.221	2.0

T.O. shutdown on 25th – 30th Sept 2009. Monitoring was carried out in all the plants in production at the time with the exception of P9 (BMS 200475-01 – only water distillations were ongoing). All solvent, HCl & SO_2 results were below their respective detection limits.

Stack monitoring for VOCs using Charcoal tube and analysis by GC - limit of detection is 2 µg/sample
Stack monitoring for SO_2 using Gastec Pump and indicator tubes - limit of detection is 2 ppm
Stack monitoring for HCl using Gastec Pump and indicator tubes - limit of detection is 1 ppm

T.O. CEMS Downtime monitoring results

One period of T.O. CEMS downtime above 24 hours occurred during 2009.
9th, 10th &11th May 2009: All solvent, combustion gases, HCl & SO_2 results were below their respective detection limits.

Stack monitoring for VOCs using Charcoal tube and analysis by GC - limit of detection is 2 µg/sample
Stack monitoring for HCl using Gastec Pump and indicator tubes - limit of detection is 1 ppm
Stack monitoring for SO_2, NO_x & CO was carried out using a combustion gas analyser model Land Lancom III.

SGLT2 reduction vent emissions monitoring results

As required by our notification approval, Ref. P0014-04 rfi01ap.doc, emissions monitoring was carried during a mock batch of SGLT2 in P3. As per notification, the measured emissions were significantly lower than the calculated emission rates.

Date		29.09.09					
Vent		P3 Stack Vent A2-7					
Process & Step		SGLT2/ DAPA mock batch					
Flue Gas Temperature		16°C					
	Sample Time (min)	Volume of Air (m^3)	Conc (mg/spl) <	Emission (mg/Nm^3) <	IPPCL Limit (mg/Nm3)	Emission (kg/hr) <	IPPCL Limit (kg/hr)
Acetone	30	0.006993	0.002	0.270	100	0.001	2
Acetonitrile			0.002	0.270	100	0.001	2

CEM Printouts for Periods of 30-minute ELV Exceedence

Date	Time	HCl mg/m³
21-Jan-09	00:00	0.75
21-Jan-09	00:30	0.42
21-Jan-09	01:00	1.04
21-Jan-09	01:30	0.38
21-Jan-09	02:00	0.78
21-Jan-09	02:30	0.65
21-Jan-09	03:00	0.52
21-Jan-09	03:30	0.07
21-Jan-09	04:00	0
21-Jan-09	04:30	0.3
21-Jan-09	05:00	0.26
21-Jan-09	05:30	**36.53**
21-Jan-09	06:00	20.49
21-Jan-09	06:30	14.68
21-Jan-09	07:00	**42.28**
21-Jan-09	07:30	3.21
21-Jan-09	08:00	3.19
21-Jan-09	08:30	4.83
21-Jan-09	09:00	2.92
21-Jan-09	09:30	3.07
21-Jan-09	10:00	3.19
21-Jan-09	10:30	2.83
21-Jan-09	11:00	2.57
21-Jan-09	11:30	1.05
21-Jan-09	12:00	1.17
21-Jan-09	12:30	1.32
21-Jan-09	13:00	1.42
21-Jan-09	13:30	1.32
21-Jan-09	14:00	1.12
21-Jan-09	14:30	0.61
21-Jan-09	15:00	0.31
21-Jan-09	15:30	0.45
21-Jan-09	16:00	0.58
21-Jan-09	16:30	0.41
21-Jan-09	17:00	0.26
21-Jan-09	17:30	0.09
21-Jan-09	18:00	0
21-Jan-09	18:30	0.11
21-Jan-09	19:00	0
21-Jan-09	19:30	0
21-Jan-09	20:00	0
21-Jan-09	20:30	0
21-Jan-09	21:00	1.84
21-Jan-09	21:30	0
21-Jan-09	22:00	0
21-Jan-09	22:30	0
21-Jan-09	23:00	0
21-Jan-09	23:30	0
22-Jan-09	00:00	0
Average		**3.27**

Date	Time	HCl mg/m³
24-Jan-09	00:00	0
24-Jan-09	00:30	0
24-Jan-09	01:00	0
24-Jan-09	01:30	0
24-Jan-09	02:00	0
24-Jan-09	02:30	0
24-Jan-09	03:00	0
24-Jan-09	03:30	0
24-Jan-09	04:00	0
24-Jan-09	04:30	0
24-Jan-09	05:00	0
24-Jan-09	05:30	0
24-Jan-09	06:00	0
24-Jan-09	06:30	0
24-Jan-09	07:00	0
24-Jan-09	07:30	0
24-Jan-09	08:00	0
24-Jan-09	08:30	0
24-Jan-09	09:00	0
24-Jan-09	09:30	0
24-Jan-09	10:00	0
24-Jan-09	10:30	0
24-Jan-09	11:00	0
24-Jan-09	11:30	0
24-Jan-09	12:00	0
24-Jan-09	12:30	0
24-Jan-09	13:00	0
24-Jan-09	13:30	0
24-Jan-09	14:00	0
24-Jan-09	14:30	0
24-Jan-09	15:00	0
24-Jan-09	15:30	0
24-Jan-09	16:00	0
24-Jan-09	16:30	0
24-Jan-09	17:00	0
24-Jan-09	17:30	0
24-Jan-09	18:00	0
24-Jan-09	18:30	0.4
24-Jan-09	19:00	23.84
24-Jan-09	19:30	**33.78**
24-Jan-09	20:00	26.67
24-Jan-09	20:30	22.16
24-Jan-09	21:00	25.56
24-Jan-09	21:30	20.5
24-Jan-09	22:00	18.12
24-Jan-09	22:30	20.25
24-Jan-09	23:00	16.57
24-Jan-09	23:30	10.11
25-Jan-09	00:00	3.99
Average		**4.53**

Date	Time	HCl mg/m³
30-Jan-09	00:00	0
30-Jan-09	00:30	0
30-Jan-09	01:00	0
30-Jan-09	01:30	0
30-Jan-09	02:00	0
30-Jan-09	02:30	0
30-Jan-09	03:00	0
30-Jan-09	03:30	0
30-Jan-09	04:00	0
30-Jan-09	04:30	0
30-Jan-09	05:00	0
30-Jan-09	05:30	0
30-Jan-09	06:00	0
30-Jan-09	06:30	0
30-Jan-09	07:00	0
30-Jan-09	07:30	0
30-Jan-09	08:00	0.13
30-Jan-09	08:30	0
30-Jan-09	09:00	0
30-Jan-09	09:30	0
30-Jan-09	10:00	0
30-Jan-09	10:30	0
30-Jan-09	11:00	0
30-Jan-09	11:30	0
30-Jan-09	12:00	0
30-Jan-09	12:30	0
30-Jan-09	13:00	0
30-Jan-09	13:30	0
30-Jan-09	14:00	0
30-Jan-09	14:30	0
30-Jan-09	15:00	0
30-Jan-09	15:30	0
30-Jan-09	16:00	0
30-Jan-09	16:30	0
30-Jan-09	17:00	0
30-Jan-09	17:30	0
30-Jan-09	18:00	0
30-Jan-09	18:30	0
30-Jan-09	19:00	0
30-Jan-09	19:30	7.88
30-Jan-09	20:00	1.51
30-Jan-09	20:30	1.4
30-Jan-09	21:00	2.05
30-Jan-09	21:30	2.68
30-Jan-09	22:00	**30.34**
30-Jan-09	22:30	**95.56**
30-Jan-09	23:00	25.04
30-Jan-09	23:30	8.44
31-Jan-09	00:00	3.49
Average		**3.64**

CEM Printouts for Periods of 30-minute ELV Exceedence

Date	Time	HCl mg/m³
30-Jan-09	00:00	0
30-Jan-09	00:30	0
30-Jan-09	01:00	0
30-Jan-09	01:30	0
30-Jan-09	02:00	0
30-Jan-09	02:30	0
30-Jan-09	03:00	0
30-Jan-09	03:30	0
30-Jan-09	04:00	0
30-Jan-09	04:30	0
30-Jan-09	05:00	0
30-Jan-09	05:30	0
30-Jan-09	06:00	0
30-Jan-09	06:30	0
30-Jan-09	07:00	0
30-Jan-09	07:30	0
30-Jan-09	08:00	0.13
30-Jan-09	08:30	0
30-Jan-09	09:00	0
30-Jan-09	09:30	0
30-Jan-09	10:00	0
30-Jan-09	10:30	0
30-Jan-09	11:00	0
30-Jan-09	11:30	0
30-Jan-09	12:00	0
30-Jan-09	12:30	0
30-Jan-09	13:00	0
30-Jan-09	13:30	0
30-Jan-09	14:00	0
30-Jan-09	14:30	0
30-Jan-09	15:00	0
30-Jan-09	15:30	0
30-Jan-09	16:00	0
30-Jan-09	16:30	0
30-Jan-09	17:00	0
30-Jan-09	17:30	0
30-Jan-09	18:00	0
30-Jan-09	18:30	0
30-Jan-09	19:00	0
30-Jan-09	19:30	7.88
30-Jan-09	20:00	1.51
30-Jan-09	20:30	1.4
30-Jan-09	21:00	2.05
30-Jan-09	21:30	2.68
30-Jan-09	22:00	**30.34**
30-Jan-09	22:30	**95.56**
30-Jan-09	23:00	25.04
30-Jan-09	23:30	8.44
31-Jan-09	00:00	3.49
Average		**3.64**

Date	Time	HCl mg/m³
03-Feb-09	00:00	0
03-Feb-09	00:30	0
03-Feb-09	01:00	0
03-Feb-09	01:30	0
03-Feb-09	02:00	0
03-Feb-09	02:30	0
03-Feb-09	03:00	0
03-Feb-09	03:30	0
03-Feb-09	04:00	0
03-Feb-09	04:30	0
03-Feb-09	05:00	0
03-Feb-09	05:30	0
03-Feb-09	06:00	0
03-Feb-09	06:30	0.08
03-Feb-09	07:00	0.26
03-Feb-09	07:30	0.14
03-Feb-09	08:00	0
03-Feb-09	08:30	0
03-Feb-09	09:00	0
03-Feb-09	09:30	0.48
03-Feb-09	10:00	0.13
03-Feb-09	10:30	3.78
03-Feb-09	11:00	8.88
03-Feb-09	11:30	2.5
03-Feb-09	12:00	14.96
03-Feb-09	12:30	**34.97**
03-Feb-09	13:00	**33.1**
03-Feb-09	13:30	22.19
03-Feb-09	14:00	**30.12**
03-Feb-09	14:30	29.07
03-Feb-09	15:00	**36.29**
03-Feb-09	15:30	**46.81**
03-Feb-09	16:00	**58.12**
03-Feb-09	16:30	10.8
03-Feb-09	17:00	7.94
03-Feb-09	17:30	2.83
03-Feb-09	18:00	1.82
03-Feb-09	18:30	3.12
03-Feb-09	19:00	4.28
03-Feb-09	19:30	7.4
03-Feb-09	20:00	7.1
03-Feb-09	20:30	2.68
03-Feb-09	21:00	0.85
03-Feb-09	21:30	0.4
03-Feb-09	22:00	0.1
03-Feb-09	22:30	0.09
03-Feb-09	23:00	0
03-Feb-09	23:30	0.11
04-Feb-09	00:00	0.33
Average		**7.59**

Date	Time	HCl mg/m³
05-Feb-09	00:00	0
05-Feb-09	00:30	0
05-Feb-09	01:00	0.09
05-Feb-09	01:30	0.1
05-Feb-09	02:00	0.01
05-Feb-09	02:30	2.83
05-Feb-09	03:00	1.37
05-Feb-09	03:30	1.97
05-Feb-09	04:00	9.47
05-Feb-09	04:30	21.61
05-Feb-09	05:00	**66.46**
05-Feb-09	05:30	**93.38**
05-Feb-09	06:00	**60.73**
05-Feb-09	06:30	15.52
05-Feb-09	07:00	11.38
05-Feb-09	07:30	5.61
05-Feb-09	08:00	3.13
05-Feb-09	08:30	14.6
05-Feb-09	09:00	26.15
05-Feb-09	09:30	5.9
05-Feb-09	10:00	1.04
05-Feb-09	10:30	0.4
05-Feb-09	11:00	0
05-Feb-09	11:30	0.84
05-Feb-09	12:00	0.67
05-Feb-09	12:30	1.1
05-Feb-09	13:00	0.99
05-Feb-09	13:30	2.66
05-Feb-09	14:00	3.1
05-Feb-09	14:30	1.23
05-Feb-09	15:00	1
05-Feb-09	15:30	1.79
05-Feb-09	16:00	1.96
05-Feb-09	16:30	2.22
05-Feb-09	17:00	1.01
05-Feb-09	17:30	0.85
05-Feb-09	18:00	2.9
05-Feb-09	18:30	1.74
05-Feb-09	19:00	1.03
05-Feb-09	19:30	1.23
05-Feb-09	20:00	0.9
05-Feb-09	20:30	1.92
05-Feb-09	21:00	0.68
05-Feb-09	21:30	1
05-Feb-09	22:00	0.97
05-Feb-09	22:30	1.91
05-Feb-09	23:00	0.49
05-Feb-09	23:30	2.36
06-Feb-09	00:00	1.82
Average		**9.11**

CEM Printouts for Periods of 30-minute ELV Exceedence

Date	Time	HCl mg/m³
26-Apr-09	00:00	1.95
26-Apr-09	00:30	4.47
26-Apr-09	01:00	15.25
26-Apr-09	01:30	10.83
26-Apr-09	02:00	5.82
26-Apr-09	02:30	7
26-Apr-09	03:00	7.88
26-Apr-09	03:30	6.72
26-Apr-09	04:00	8.09
26-Apr-09	04:30	7.28
26-Apr-09	05:00	6.82
26-Apr-09	05:30	6.66
26-Apr-09	06:00	7.72
26-Apr-09	06:30	9.27
26-Apr-09	07:00	11.32
26-Apr-09	07:30	8.97
26-Apr-09	08:00	6.46
26-Apr-09	08:30	7.02
26-Apr-09	09:00	4.87
26-Apr-09	09:30	5.02
26-Apr-09	10:00	4.43
26-Apr-09	10:30	5.13
26-Apr-09	11:00	6.18
26-Apr-09	11:30	7.44
26-Apr-09	12:00	7.27
26-Apr-09	12:30	7.41
26-Apr-09	13:00	5.07
26-Apr-09	13:30	5.13
26-Apr-09	14:00	6.28
26-Apr-09	14:30	6.67
26-Apr-09	15:00	7.57
26-Apr-09	15:30	7.6
26-Apr-09	16:00	6.45
26-Apr-09	16:30	6.51
26-Apr-09	17:00	6.31
26-Apr-09	17:30	4.85
26-Apr-09	18:00	4.31
26-Apr-09	18:30	4.16
26-Apr-09	19:00	0
26-Apr-09	19:30	10.9
26-Apr-09	20:00	**43.29**
26-Apr-09	20:30	26.44
26-Apr-09	21:00	13.66
26-Apr-09	21:30	11.77
26-Apr-09	22:00	9.25
26-Apr-09	22:30	0
26-Apr-09	23:00	0
26-Apr-09	23:30	2
27-Apr-09	00:00	0
Average		**7.66**

Date	Time	HCl mg/m³
21-Jul-09	00:00	3.68
21-Jul-09	00:30	4.62
21-Jul-09	01:00	3.21
21-Jul-09	01:30	0.2
21-Jul-09	02:00	0.2
21-Jul-09	02:30	0.66
21-Jul-09	03:00	1.01
21-Jul-09	03:30	1
21-Jul-09	04:00	1.24
21-Jul-09	04:30	0.49
21-Jul-09	05:00	0
21-Jul-09	05:30	0
21-Jul-09	06:00	0.73
21-Jul-09	06:30	0.8
21-Jul-09	07:00	0.64
21-Jul-09	07:30	0
21-Jul-09	08:00	0
21-Jul-09	08:30	0
21-Jul-09	09:00	0
21-Jul-09	09:30	0.08
21-Jul-09	10:00	0.12
21-Jul-09	10:30	0.16
21-Jul-09	11:00	0.23
21-Jul-09	11:30	0.31
21-Jul-09	12:00	1.53
21-Jul-09	12:30	4.99
21-Jul-09	13:00	**30.74**
21-Jul-09	13:30	8.18
21-Jul-09	14:00	1.46
21-Jul-09	14:30	2.09
21-Jul-09	15:00	2.79
21-Jul-09	15:30	2.64
21-Jul-09	16:00	0.1
21-Jul-09	16:30	4.6
21-Jul-09	17:00	0.94
21-Jul-09	17:30	0.91
21-Jul-09	18:00	1.58
21-Jul-09	18:30	0.89
21-Jul-09	19:00	0.07
21-Jul-09	19:30	0
21-Jul-09	20:00	0.66
21-Jul-09	20:30	0
21-Jul-09	21:00	0.19
21-Jul-09	21:30	0.91
21-Jul-09	22:00	0.88
21-Jul-09	22:30	0.67
21-Jul-09	23:00	1.5
21-Jul-09	23:30	2.32
22-Jul-09	00:00	2.44
Average		**1.89**

Date	Time	HCl mg/m³
24-Jul-09	00:00	0.33
24-Jul-09	00:30	1.04
24-Jul-09	01:00	3.4
24-Jul-09	01:30	0.59
24-Jul-09	02:00	0.55
24-Jul-09	02:30	0.48
24-Jul-09	03:00	0.13
24-Jul-09	03:30	1.97
24-Jul-09	04:00	21.52
24-Jul-09	04:30	**40.37**
24-Jul-09	05:00	21.55
24-Jul-09	05:30	4.18
24-Jul-09	06:00	4
24-Jul-09	06:30	2.52
24-Jul-09	07:00	0
24-Jul-09	07:30	0
24-Jul-09	08:00	0
24-Jul-09	08:30	0
24-Jul-09	09:00	0.2
24-Jul-09	09:30	0
24-Jul-09	10:00	0
24-Jul-09	10:30	0
24-Jul-09	11:00	11.28
24-Jul-09	11:30	3.98
24-Jul-09	12:00	1.58
24-Jul-09	12:30	0
24-Jul-09	13:00	0.36
24-Jul-09	13:30	0
24-Jul-09	14:00	0
24-Jul-09	14:30	1.46
24-Jul-09	15:00	0.46
24-Jul-09	15:30	0
24-Jul-09	16:00	0.08
24-Jul-09	16:30	0.54
24-Jul-09	17:00	0.09
24-Jul-09	17:30	0
24-Jul-09	18:00	0
24-Jul-09	18:30	0.16
24-Jul-09	19:00	0
24-Jul-09	19:30	0
24-Jul-09	20:00	0
24-Jul-09	20:30	0
24-Jul-09	21:00	0.13
24-Jul-09	21:30	0
24-Jul-09	22:00	0.37
24-Jul-09	22:30	0
24-Jul-09	23:00	0
24-Jul-09	23:30	0
25-Jul-09	00:00	0.39
Average		**2.52**

CEM Printouts for Periods of 30-minute ELV Exceedence

Date	Time	HCl mg/m³
29-Jul-09	00:00	0
29-Jul-09	00:30	0
29-Jul-09	01:00	0
29-Jul-09	01:30	0.16
29-Jul-09	02:00	0.58
29-Jul-09	02:30	0.02
29-Jul-09	03:00	0
29-Jul-09	03:30	0
29-Jul-09	04:00	0
29-Jul-09	04:30	0
29-Jul-09	05:00	0
29-Jul-09	05:30	0
29-Jul-09	06:00	0
29-Jul-09	06:30	0
29-Jul-09	07:00	0
29-Jul-09	07:30	2.67
29-Jul-09	08:00	**58.14**
29-Jul-09	08:30	8.77
29-Jul-09	09:00	3.52
29-Jul-09	09:30	1.07
29-Jul-09	10:00	0
29-Jul-09	10:30	0.52
29-Jul-09	11:00	0
29-Jul-09	11:30	0.07
29-Jul-09	12:00	0.22
29-Jul-09	12:30	0
29-Jul-09	13:00	0.41
29-Jul-09	13:30	0
29-Jul-09	14:00	0.12
29-Jul-09	14:30	0
29-Jul-09	15:00	2.7
29-Jul-09	15:30	0.05
29-Jul-09	16:00	0.44
29-Jul-09	16:30	0.02
29-Jul-09	17:00	0
29-Jul-09	17:30	0.19
29-Jul-09	18:00	0.23
29-Jul-09	18:30	0.22
29-Jul-09	19:00	0.56
29-Jul-09	19:30	0
29-Jul-09	20:00	0.38
29-Jul-09	20:30	0
29-Jul-09	21:00	0.25
29-Jul-09	21:30	0
29-Jul-09	22:00	0
29-Jul-09	22:30	0.26
29-Jul-09	23:00	0.61
29-Jul-09	23:30	0
30-Jul-09	00:00	0
Average		**1.68**

Date	Time	HCl mg/m³
07-Aug-09	00:00	6.08
07-Aug-09	00:30	5.4
07-Aug-09	01:00	6.65
07-Aug-09	01:30	5.87
07-Aug-09	02:00	10.71
07-Aug-09	02:30	9.04
07-Aug-09	03:00	19.15
07-Aug-09	03:30	9.25
07-Aug-09	04:00	8.33
07-Aug-09	04:30	6.85
07-Aug-09	05:00	12.06
07-Aug-09	05:30	7.15
07-Aug-09	06:00	19.39
07-Aug-09	06:30	**63.25**
07-Aug-09	07:00	**31.59**
07-Aug-09	07:30	18.95
07-Aug-09	08:00	13.12
07-Aug-09	08:30	15.92
07-Aug-09	09:00	8.71
07-Aug-09	09:30	10.92
07-Aug-09	10:00	8.71
07-Aug-09	10:30	7.55
07-Aug-09	11:00	7.5
07-Aug-09	11:30	5.62
07-Aug-09	12:00	**39.55**
07-Aug-09	12:30	**33.58**
07-Aug-09	13:00	3.99
07-Aug-09	13:30	2.07
07-Aug-09	14:00	1.68
07-Aug-09	14:30	1.18
07-Aug-09	15:00	0.8
07-Aug-09	15:30	0.92
07-Aug-09	16:00	0.55
07-Aug-09	16:30	0.26
07-Aug-09	17:00	0.14
07-Aug-09	17:30	0.06
07-Aug-09	18:00	0.07
07-Aug-09	18:30	0.16
07-Aug-09	19:00	0.32
07-Aug-09	19:30	0.5
07-Aug-09	20:00	0.2
07-Aug-09	20:30	1.29
07-Aug-09	21:00	0.81
07-Aug-09	21:30	1.66
07-Aug-09	22:00	2.71
07-Aug-09	22:30	3.2
07-Aug-09	23:00	8.03
07-Aug-09	23:30	7.1
08-Aug-09	00:00	6.28
Average		**8.88**

Date	Time	HCl mg/m³
08-Aug-09	00:00	6.28
08-Aug-09	00:30	5.59
08-Aug-09	01:00	5.65
08-Aug-09	01:30	13.01
08-Aug-09	02:00	9.46
08-Aug-09	02:30	8.64
08-Aug-09	03:00	9.38
08-Aug-09	03:30	7.63
08-Aug-09	04:00	9.76
08-Aug-09	04:30	14.77
08-Aug-09	05:00	6.17
08-Aug-09	05:30	7.11
08-Aug-09	06:00	5.22
08-Aug-09	06:30	4.02
08-Aug-09	07:00	3.73
08-Aug-09	07:30	3.43
08-Aug-09	08:00	3
08-Aug-09	08:30	4.7
08-Aug-09	09:00	3.23
08-Aug-09	09:30	3.12
08-Aug-09	10:00	2.91
08-Aug-09	10:30	7.79
08-Aug-09	11:00	7.49
08-Aug-09	11:30	5.56
08-Aug-09	12:00	8.69
08-Aug-09	12:30	5.91
08-Aug-09	13:00	5.22
08-Aug-09	13:30	5.22
08-Aug-09	14:00	14.86
08-Aug-09	14:30	10.04
08-Aug-09	15:00	7.81
08-Aug-09	15:30	7.05
08-Aug-09	16:00	7.85
08-Aug-09	16:30	11.64
08-Aug-09	17:00	7.58
08-Aug-09	17:30	**53.96**
08-Aug-09	18:00	**32.4**
08-Aug-09	18:30	14.4
08-Aug-09	19:00	8.91
08-Aug-09	19:30	11.98
08-Aug-09	20:00	29.73
08-Aug-09	20:30	7.61
08-Aug-09	21:00	1.8
08-Aug-09	21:30	1.09
08-Aug-09	22:00	0.83
08-Aug-09	22:30	0.63
08-Aug-09	23:00	0.45
08-Aug-09	23:30	0.34
09-Aug-09	00:00	0.23
Average		**8.45**

CEM Printouts for Periods of 30-minute ELV Exceedence

Date	Time	HCl mg/m³
10-Aug-09	00:00	4.8
10-Aug-09	00:30	3.42
10-Aug-09	01:00	2.85
10-Aug-09	01:30	7.3
10-Aug-09	02:00	11.3
10-Aug-09	02:30	6.63
10-Aug-09	03:00	4.55
10-Aug-09	03:30	3.89
10-Aug-09	04:00	3.1
10-Aug-09	04:30	2.47
10-Aug-09	05:00	2.1
10-Aug-09	05:30	2.02
10-Aug-09	06:00	1.89
10-Aug-09	06:30	2.35
10-Aug-09	07:00	2.31
10-Aug-09	07:30	1.95
10-Aug-09	08:00	2.89
10-Aug-09	08:30	3.04
10-Aug-09	09:00	2.04
10-Aug-09	09:30	2.92
10-Aug-09	10:00	3.87
10-Aug-09	10:30	2.26
10-Aug-09	11:00	4.63
10-Aug-09	11:30	2.79
10-Aug-09	12:00	2.34
10-Aug-09	12:30	3.19
10-Aug-09	13:00	2.67
10-Aug-09	13:30	2.76
10-Aug-09	14:00	3.1
10-Aug-09	14:30	2.44
10-Aug-09	15:00	7.44
10-Aug-09	15:30	9.43
10-Aug-09	16:00	**46.08**
10-Aug-09	16:30	**48.32**
10-Aug-09	17:00	22.45
10-Aug-09	17:30	17.4
10-Aug-09	18:00	10.46
10-Aug-09	18:30	2.93
10-Aug-09	19:00	2.46
10-Aug-09	19:30	5.7
10-Aug-09	20:00	8.66
10-Aug-09	20:30	3.12
10-Aug-09	21:00	0.84
10-Aug-09	21:30	0.85
10-Aug-09	22:00	2.11
10-Aug-09	22:30	2.85
10-Aug-09	23:00	6.26
10-Aug-09	23:30	4.46
11-Aug-09	00:00	0.78
Average		**6.25**

Date	Time	HCl mg/m³
11-Aug-09	00:00	0.78
11-Aug-09	00:30	0.27
11-Aug-09	01:00	2.87
11-Aug-09	01:30	1.07
11-Aug-09	02:00	3.17
11-Aug-09	02:30	0.64
11-Aug-09	03:00	0
11-Aug-09	03:30	0.01
11-Aug-09	04:00	0.25
11-Aug-09	04:30	0.47
11-Aug-09	05:00	0.01
11-Aug-09	05:30	0.58
11-Aug-09	06:00	1.28
11-Aug-09	06:30	1.51
11-Aug-09	07:00	1.75
11-Aug-09	07:30	13.7
11-Aug-09	08:00	**30.94**
11-Aug-09	08:30	19.68
11-Aug-09	09:00	6.26
11-Aug-09	09:30	10.86
11-Aug-09	10:00	4.84
11-Aug-09	10:30	3.51
11-Aug-09	11:00	3.69
11-Aug-09	11:30	1.87
11-Aug-09	12:00	1.7
11-Aug-09	12:30	1.06
11-Aug-09	13:00	1.32
11-Aug-09	13:30	1.97
11-Aug-09	14:00	2.98
11-Aug-09	14:30	4.61
11-Aug-09	15:00	17.58
11-Aug-09	15:30	5.52
11-Aug-09	16:00	3.26
11-Aug-09	16:30	3.43
11-Aug-09	17:00	3.17
11-Aug-09	17:30	5.29
11-Aug-09	18:00	10.96
11-Aug-09	18:30	10.26
11-Aug-09	19:00	2
11-Aug-09	19:30	2.39
11-Aug-09	20:00	6.36
11-Aug-09	20:30	7
11-Aug-09	21:00	5.35
11-Aug-09	21:30	4.08
11-Aug-09	22:00	3.9
11-Aug-09	22:30	1.15
11-Aug-09	23:00	1.1
11-Aug-09	23:30	6.07
12-Aug-09	00:00	2.14
Average		**4.59**

Date	Time	HCl mg/m³
13-Aug-09	00:00	25.19
13-Aug-09	00:30	10.63
13-Aug-09	01:00	10.22
13-Aug-09	01:30	6.42
13-Aug-09	02:00	4.98
13-Aug-09	02:30	4.29
13-Aug-09	03:00	4.59
13-Aug-09	03:30	14.55
13-Aug-09	04:00	10.11
13-Aug-09	04:30	14.09
13-Aug-09	05:00	8.56
13-Aug-09	05:30	7.99
13-Aug-09	06:00	7.86
13-Aug-09	06:30	8.79
13-Aug-09	07:00	16.57
13-Aug-09	07:30	20.48
13-Aug-09	08:00	10.51
13-Aug-09	08:30	11
13-Aug-09	09:00	9.4
13-Aug-09	09:30	9.96
13-Aug-09	10:00	15.02
13-Aug-09	10:30	9.61
13-Aug-09	11:00	22.91
13-Aug-09	11:30	15.3
13-Aug-09	12:00	10.35
13-Aug-09	12:30	11.47
13-Aug-09	13:00	10.49
13-Aug-09	13:30	10.49
13-Aug-09	14:00	13.22
13-Aug-09	14:30	20.69
13-Aug-09	15:00	**30.4**
13-Aug-09	15:30	24.23
13-Aug-09	16:00	28.87
13-Aug-09	16:30	20.3
13-Aug-09	17:00	13.65
13-Aug-09	17:30	17.21
13-Aug-09	18:00	16.07
13-Aug-09	18:30	15.79
13-Aug-09	19:00	14.02
13-Aug-09	19:30	12.29
13-Aug-09	20:00	12.87
13-Aug-09	20:30	13.58
13-Aug-09	21:00	11.4
13-Aug-09	21:30	9.53
13-Aug-09	22:00	8.27
13-Aug-09	22:30	7.49
13-Aug-09	23:00	6.85
13-Aug-09	23:30	6.96
14-Aug-09	00:00	6.95
Average		**12.91**

CEM Printouts for Periods of 30-minute ELV Exceedence

Date	Time	HCl mg/m³
25-Aug-09	00:00	1.57
25-Aug-09	00:30	2.03
25-Aug-09	01:00	4.98
25-Aug-09	01:30	8.49
25-Aug-09	02:00	8.91
25-Aug-09	02:30	15.38
25-Aug-09	03:00	14.2
25-Aug-09	03:30	17.19
25-Aug-09	04:00	16.65
25-Aug-09	04:30	14.2
25-Aug-09	05:00	12.56
25-Aug-09	05:30	11.64
25-Aug-09	06:00	11.09
25-Aug-09	06:30	10.67
25-Aug-09	07:00	9.06
25-Aug-09	07:30	8.15
25-Aug-09	08:00	6.26
25-Aug-09	08:30	10.25
25-Aug-09	09:00	8.52
25-Aug-09	09:30	8.73
25-Aug-09	10:00	8.91
25-Aug-09	10:30	8.59
25-Aug-09	11:00	11.92
25-Aug-09	11:30	15.6
25-Aug-09	12:00	12.06
25-Aug-09	12:30	12.94
25-Aug-09	13:00	12.19
25-Aug-09	13:30	11.27
25-Aug-09	14:00	17.05
25-Aug-09	14:30	**35.6**
25-Aug-09	15:00	**35.75**
25-Aug-09	15:30	18.81
25-Aug-09	16:00	15.26
25-Aug-09	16:30	13.63
25-Aug-09	17:00	12.93
25-Aug-09	17:30	12.29
25-Aug-09	18:00	12.56
25-Aug-09	18:30	16.53
25-Aug-09	19:00	14.24
25-Aug-09	19:30	12.97
25-Aug-09	20:00	10.39
25-Aug-09	20:30	15.15
25-Aug-09	21:00	10.31
25-Aug-09	21:30	10.35
25-Aug-09	22:00	11.1
25-Aug-09	22:30	10.64
25-Aug-09	23:00	8.63
25-Aug-09	23:30	10.7
26-Aug-09	00:00	7.23
Average		**12.37**

Date	Time	HCl mg/m³
03-Sep-09	00:00	12.49
03-Sep-09	00:30	11.18
03-Sep-09	01:00	12.55
03-Sep-09	01:30	11.6
03-Sep-09	02:00	11.62
03-Sep-09	02:30	11.49
03-Sep-09	03:00	10.8
03-Sep-09	03:30	11.53
03-Sep-09	04:00	9.09
03-Sep-09	04:30	9.8
03-Sep-09	05:00	10.18
03-Sep-09	05:30	10.33
03-Sep-09	06:00	11.67
03-Sep-09	06:30	11.57
03-Sep-09	07:00	9.34
03-Sep-09	07:30	18.59
03-Sep-09	08:00	7.94
03-Sep-09	08:30	15.49
03-Sep-09	09:00	10.92
03-Sep-09	09:30	12.01
03-Sep-09	10:00	11.4
03-Sep-09	10:30	11.84
03-Sep-09	11:00	14.77
03-Sep-09	11:30	20.74
03-Sep-09	12:00	16.64
03-Sep-09	12:30	13.71
03-Sep-09	13:00	9.9
03-Sep-09	13:30	10.22
03-Sep-09	14:00	13.77
03-Sep-09	14:30	15.22
03-Sep-09	15:00	**37.33**
03-Sep-09	15:30	19.21
03-Sep-09	16:00	12.17
03-Sep-09	16:30	11.53
03-Sep-09	17:00	10.94
03-Sep-09	17:30	14.59
03-Sep-09	18:00	16.2
03-Sep-09	18:30	21.18
03-Sep-09	19:00	20.01
03-Sep-09	19:30	15.92
03-Sep-09	20:00	12.38
03-Sep-09	20:30	26.23
03-Sep-09	21:00	14.69
03-Sep-09	21:30	18.07
03-Sep-09	22:00	15.52
03-Sep-09	22:30	14.68
03-Sep-09	23:00	13.7
03-Sep-09	23:30	10.51
04-Sep-09	00:00	9.27
Average		**13.93**

Date	Time	HCl mg/m³
04-Sep-09	00:00	9.27
04-Sep-09	00:30	9.26
04-Sep-09	01:00	10.34
04-Sep-09	01:30	9.61
04-Sep-09	02:00	12.28
04-Sep-09	02:30	11.29
04-Sep-09	03:00	13.2
04-Sep-09	03:30	10.31
04-Sep-09	04:00	25.05
04-Sep-09	04:30	12.22
04-Sep-09	05:00	11.04
04-Sep-09	05:30	10.16
04-Sep-09	06:00	10.07
04-Sep-09	06:30	11.59
04-Sep-09	07:00	11.02
04-Sep-09	07:30	9.83
04-Sep-09	08:00	7.47
04-Sep-09	08:30	19.55
04-Sep-09	09:00	11.29
04-Sep-09	09:30	11.87
04-Sep-09	10:00	11.53
04-Sep-09	10:30	9.79
04-Sep-09	11:00	10.82
04-Sep-09	11:30	12.06
04-Sep-09	12:00	11.87
04-Sep-09	12:30	10.58
04-Sep-09	13:00	9.06
04-Sep-09	13:30	9.47
04-Sep-09	14:00	**68.91**
04-Sep-09	14:30	25.13
04-Sep-09	15:00	13.65
04-Sep-09	15:30	13.62
04-Sep-09	16:00	13.27
04-Sep-09	16:30	15.36
04-Sep-09	17:00	14.66
04-Sep-09	17:30	12.53
04-Sep-09	18:00	10.57
04-Sep-09	18:30	13.96
04-Sep-09	19:00	11.44
04-Sep-09	19:30	10.64
04-Sep-09	20:00	10.5
04-Sep-09	20:30	18.21
04-Sep-09	21:00	9.32
04-Sep-09	21:30	8.46
04-Sep-09	22:00	10.13
04-Sep-09	22:30	8.92
04-Sep-09	23:00	8.85
04-Sep-09	23:30	6.89
05-Sep-09	00:00	5.67
Average		**12.91**

CEM Printouts for Periods of 30-minute ELV Exceedence

Date	Time	HCl mg/m³
08-Sep-09	00:00	8.83
08-Sep-09	00:30	8.75
08-Sep-09	01:00	7.97
08-Sep-09	01:30	7.29
08-Sep-09	02:00	8.07
08-Sep-09	02:30	17.11
08-Sep-09	03:00	14.94
08-Sep-09	03:30	18.15
08-Sep-09	04:00	24.21
08-Sep-09	04:30	20.85
08-Sep-09	05:00	16.64
08-Sep-09	05:30	16.87
08-Sep-09	06:00	28.53
08-Sep-09	06:30	24.58
08-Sep-09	07:00	22.1
08-Sep-09	07:30	20.83
08-Sep-09	08:00	16.05
08-Sep-09	08:30	**33.47**
08-Sep-09	09:00	13.5
08-Sep-09	09:30	7.32
08-Sep-09	10:00	6.17
08-Sep-09	10:30	5.84
08-Sep-09	11:00	4.73
08-Sep-09	11:30	4.71
08-Sep-09	12:00	5.42
08-Sep-09	12:30	6.57
08-Sep-09	13:00	4.68
08-Sep-09	13:30	4
08-Sep-09	14:00	3.7
08-Sep-09	14:30	3.53
08-Sep-09	15:00	3.57
08-Sep-09	15:30	3.79
08-Sep-09	16:00	6.77
08-Sep-09	16:30	8.73
08-Sep-09	17:00	5.53
08-Sep-09	17:30	5.46
08-Sep-09	18:00	7.12
08-Sep-09	18:30	6.05
08-Sep-09	19:00	4.98
08-Sep-09	19:30	4.24
08-Sep-09	20:00	3.04
08-Sep-09	20:30	13.43
08-Sep-09	21:00	4.37
08-Sep-09	21:30	3.5
08-Sep-09	22:00	3.34
08-Sep-09	22:30	3.63
08-Sep-09	23:00	7.69
08-Sep-09	23:30	12.79
09-Sep-09	00:00	9.71
Average		**10.27**

Date	Time	HCl mg/m³
17-Oct-09	00:00	18.66
17-Oct-09	00:30	15.57
17-Oct-09	01:00	13.1
17-Oct-09	01:30	12.63
17-Oct-09	02:00	13.7
17-Oct-09	02:30	12.48
17-Oct-09	03:00	10.75
17-Oct-09	03:30	10.16
17-Oct-09	04:00	9.9
17-Oct-09	04:30	9.86
17-Oct-09	05:00	9.6
17-Oct-09	05:30	9.41
17-Oct-09	06:00	8.73
17-Oct-09	06:30	8.25
17-Oct-09	07:00	8.19
17-Oct-09	07:30	9.05
17-Oct-09	08:00	**31.49**
17-Oct-09	08:30	17.25
17-Oct-09	09:00	10.75
17-Oct-09	09:30	10.01
17-Oct-09	10:00	9.35
17-Oct-09	10:30	10.1
17-Oct-09	11:00	9.63
17-Oct-09	11:30	17.68
17-Oct-09	12:00	23.32
17-Oct-09	12:30	11.55
17-Oct-09	13:00	10.25
17-Oct-09	13:30	10.66
17-Oct-09	14:00	11.01
17-Oct-09	14:30	10.41
17-Oct-09	15:00	23.77
17-Oct-09	15:30	12.74
17-Oct-09	16:00	9.57
17-Oct-09	16:30	25.34
17-Oct-09	17:00	**34.82**
17-Oct-09	17:30	14.53
17-Oct-09	18:00	9.88
17-Oct-09	18:30	10.47
17-Oct-09	19:00	11.41
17-Oct-09	19:30	14.07
17-Oct-09	20:00	16.16
17-Oct-09	20:30	**58.81**
17-Oct-09	21:00	15.92
17-Oct-09	21:30	**37.96**
17-Oct-09	22:00	23.66
17-Oct-09	22:30	10.74
17-Oct-09	23:00	9.66
17-Oct-09	23:30	14.22
18-Oct-09	00:00	25.02
Average		**15.35**

Date	Time	HCl mg/m³
26-Oct-09	00:00	0.08
26-Oct-09	00:30	0.18
26-Oct-09	01:00	0.8
26-Oct-09	01:30	0.58
26-Oct-09	02:00	4.35
26-Oct-09	02:30	16.27
26-Oct-09	03:00	6.9
26-Oct-09	03:30	1.85
26-Oct-09	04:00	0.88
26-Oct-09	04:30	0.6
26-Oct-09	05:00	0.47
26-Oct-09	05:30	0.47
26-Oct-09	06:00	0.42
26-Oct-09	06:30	1.13
26-Oct-09	07:00	4.74
26-Oct-09	07:30	2.06
26-Oct-09	08:00	1.01
26-Oct-09	08:30	1.46
26-Oct-09	09:00	1
26-Oct-09	09:30	1
26-Oct-09	10:00	1.05
26-Oct-09	10:30	5.8
26-Oct-09	11:00	6.19
26-Oct-09	11:30	9.24
26-Oct-09	12:00	10.13
26-Oct-09	12:30	8
26-Oct-09	13:00	3.2
26-Oct-09	13:30	**41.37**
26-Oct-09	14:00	6.24
26-Oct-09	14:30	11.49
26-Oct-09	15:00	12.67
26-Oct-09	15:30	13.61
26-Oct-09	16:00	12.91
26-Oct-09	16:30	13.38
26-Oct-09	17:00	13.02
26-Oct-09	17:30	16.16
26-Oct-09	18:00	17.47
26-Oct-09	18:30	11.75
26-Oct-09	19:00	10.93
26-Oct-09	19:30	21.15
26-Oct-09	20:00	13.58
26-Oct-09	20:30	12.05
26-Oct-09	21:00	11.66
26-Oct-09	21:30	5.31
26-Oct-09	22:00	7.49
26-Oct-09	22:30	3.95
26-Oct-09	23:00	4
26-Oct-09	23:30	4.34
27-Oct-09	00:00	2.94
Average		**7.29**

Appendix C

Emissions to Surface Water

Surface Water Tank Results

Date	pH	COD (mg/l)	Total Ammonia (mg/l)	Surface Water Visual Inspection	Surface Water Comments	Vol discharged %
14-Jan-09	7.41	81	0.09	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	80.00
18-Jan-09	7.74	27	0.29	Sample slightly cloudy, colourless, odourless, with little visible solids.	Discharged to river.	85.00
20-Jan-09	7.73	17	0.16	Sample cloudy, colourless, odourless, with little visible solids.	Discharged to river.	93.00
22-Jan-09					Discharged to WWTP(water needed)	50.00
27-Jan-09	7.69	0	0.25	Sample cloudy, colourless, odourless, with little visible solids.	Discharged to river.	79.00
01-Feb-09	7.81	1	0.65	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	77.00
03-Feb-09	7.95	9	0.38	Sample slightly cloudy, colourless, odourless, with little visible solids.	Discharged to river.	88.00
04-Feb-09	7.59	27	0.04	Sample cloudy, colourless, odourless, with little visible solids.	Discharged to river.	84.00
06-Feb-09	7.26	12	0.28	Sample slightly cloudy, colourless, odourless, with little visible solids.	Discharged to river.	87.00
10-Feb-09	7.82	17	0.39	Sample slightly cloudy, colourless, odourless, with little visible solids.	Discharged to river.	99.00
15-Feb-09	7.59	33	0.14	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	71.00
19-Feb-09	7.30	> 100		Sample clear, colourless, slight solvent odour, with little visible solids.	Discharged to WWTP.	56.00
21-Feb-09					Discharged to WWTP.	50.00
01-Mar-09	7.70	40	0.24	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	71.00
04-Mar-09	7.69	39	0.62	Sample cloudy, colourless, odourless, with little visble solids.	Discharged to river.	69.00
08-Mar-09	7.32				Discharged to WWTP.	61.00
13-Mar-09	7.37				Discharged to WWTP.	35.00
15-Mar-09	8.65				Discharged to WWTP due to green colour	90.00
20-Mar-09	8.03				Discharged to WWTP due to green colour	57.00
25-Mar-09					Discharged to WWTP due to green colour	50.00
30-Mar-09	7.97				Discharged to WWTP due to green colour	62.00
05-Apr-09	7.83	35	0.19	Sample clear, colourless, odourless, with little visible solids(green surface)	Discharged to river.	49.00
07-Apr-09	7.76	17	0.01	Sample slightly cloudy, colourless, odourless, with little visble solids.	Discharged to river.	59.00
11-Apr-09	7.86	0	0.01	Sample slightly cloudy, colourless, odourless, with little visble solids.	Discharged to river.	48.00
15-Apr-09	7.71	10	0.06	Sample slightly cloudy, colourless, odourless, with some floating particles.	Discharged to river.	77.00
17-Apr-09	7.35	17	0.09	Sample cloudy, colourless, slight stagnant odour, with small floating particles.	Discharged to river.	82.00
23-Apr-09		108			Discharged to WWTP.	68.00
27-Apr-09	7.61	0	0.11	Sample slightly cloudy, colourless, odourless, with little visible solids.	Discharged to river.	83.00
30-Apr-09	7.86	7	0.02	Sample slightly cloudy, colourless, odourless, with little visible solids.	Discharged to river.	62.00
03-May-09					Discharged to WWTP - on auto- in error.	40.00
06-May-09					Discharged to WWTP - on auto- in error.	24.00
12-May-09	8.18	30	0.13	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	69.00
15-May-09	7.83	33	0.14	Sample cloudy, colourless, odourless, with little visble solids.	Discharged to river.	92.00
17-May-09	7.52	28	0.26	Sample clear, colourless, odourless, with little visble solids.	Discharged to river.	100.00
19-May-09	7.72	28	0.20	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	76.00
21-May-09	7.76	14	0.12	Sample cloudy, colourless, odourless, with little visble solids.	Discharged to river.	81.00
26-May-09	7.75	9	0.50	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	71.00
01-Jun-09	8.63	31	0.003	Sample clear, pale straw colour, odourless, with some dark solids.	Discharged to river.	63.00
07-Jun-09		22			Discharged to WWTP (water needed).	53.00
11-Jun-09	8.29	21	0.08	Sample cloudy, straw colour, odourless, little visible solids.	Discharged to river.	67.00
16-Jun-09					Discharged to WWTP (water needed)	44.00
17-Jun-09	7.42	12	0.18	Sample slightly cloudy, greenish tint, odourless, with little visible solids.	Discharged to river.	71.00
20-Jun-09	7.73	28	0.33	Sample very slightly cloudy, colourless, odourless, with little visible solids.	Discharged to river.	48.00
30-Jun-09	8.54	23	0.20	Sample slightly cloudy, straw coloured, odourless, with little visible solids.	Discharged to river.	68.00
02-Jul-09	7.81	22	0.11	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	83.00
07-Jul-09	7.24	32	0.09	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	97.00
13-Jul-09	8.67	20	0.01	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	71.00
14-Jul-09	7.72	11	0.001	Sample clear, colourless, odourless, with little visible solids.	Discharged to river.	84.00
19-Jul-09		>100			Discharged to WWTP.	62.00
21-Jul-09		>100			Discharged to WWTP.	32.00
24-Jul-09	7.32	33	0.02	Sample cloudy, pale straw colour, slight stagnant odour, little visible solids.	Discharged to river.	88.00
28-Jul-09	7.42	153			Discharged to WWTP.	62.00
02-Aug-09		102			Discharged to WWTP.	78.00
03-Aug-09					Discharged to WWTP/ on auto	
04-Aug-09					Discharged to WWTP/ on auto	
05-Aug-09					Discharged to WWTP/ on auto	
06-Aug-09					Discharged to WWTP/ on auto	
07-Aug-09					Discharged to WWTP/ on auto	
08-Aug-09					Discharged to WWTP/ on auto	
09-Aug-09					Discharged to WWTP/ on auto	
10-Aug-09					Discharged to WWTP/ on auto	
11-Aug-09					Discharged to WWTP/ on auto	
12-Aug-09					Discharged to WWTP/ on auto	
13-Aug-09					Discharged to WWTP/ on auto	
14-Aug-09					Discharged to WWTP/ on auto	
15-Aug-09					Discharged to WWTP/ on auto	
16-Aug-09					Discharged to WWTP/ on auto	
17-Aug-09					Discharged to WWTP/ on auto	
18-Aug-09					Discharged to WWTP/ on auto	
19-Aug-09					Discharged to WWTP/ on auto	
20-Aug-09					Discharged to WWTP/ on auto	
03-Sep-09	8.47	9	0.009	Sample clear, pale straw colour, odourless, with little visible solids.	Discharged to river.	73.00
15-Sep-09					Discharged to WWTP - high solids due to pumping from Fire main excavation.	59.00
19-Sep-09					Discharged to WWTP - high solids due to pumping from Fire main excavation.	38.00
13-Oct-09	7.66	22	0.904	Sample clear, colourless, odourless with little visible solids.	Discharged to river.	55.00
25-Oct-09	7.13	45	0.13	Sample slightly cloudy, green tint, odourless, with little visible solids.	Discharged to river.	24.00
05-Nov-09		> 150			Discharged to WWTP.	80.00
12-Nov-09	7.58	8	0.11	Sample clear, colourless, odourless with little visible solids.	Discharged to river.	64.00
17-Nov-09					Discharged to WWTP (tank being cleaned).	55.00
18-Nov-09					Discharged to WWTP.	31.00
27-Nov-09	7.59	8	0.04	Sample clear, pale straw colour, odourless with little visible solids.	Discharged to river.	46.00
29-Nov-09	7.26	9	0.06	Sample clear, colourless, odourless with little visible solids	Discharged to river.	71.00
09-Dec-09	7.60	8	0.04	Sample clear, pale straw colour, stagnant odour with little visible solids.	Discharged to river.	36.00

Surface Water Outfall Monitoring					
Date	**Location**	**pH**	**COD (mg/l)**	**BOD (mg/l)**	**Visual Inspection**
02-Jan-09	**SW2 Gate**	7.41			Clear, Colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.30			Clear Colourless
	SW5 P4/P5	7.37			Clear, colourless, dark sediment
	SW6 MT Lab				Dry
	SW7 WWTP	7.07			Clear, Slightly yellow coloured, v little dark sediment
07-Jan-09	**SW2 Gate**	8.03	6	3	Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.30	5	3	Clear, Colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
13-Jan-09	**SW2 Gate**	8.07			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.98			Clear, colourless
	SW5 P4/P5	7.97			Clear, colourless
	SW6 MT Lab				Dry
	SW7 WWTP	7.55			Clear, slightly yellow coloured, very little brown sediment
22-Jan-09	**SW2 Gate**	7.85			Clear, colourless, dark sediment
	SW3 Smoking Area	7.98			Clear, colourless
	SW4 New Admin				Dry
	SW5 P4/P5	7.88			Clear, colourless
	SW6 MT Lab	7.85			Clear, colourless
	SW7 WWTP	7.09			Clear, colourless, dark sediment
29-Jan-09	**SW2 Gate**	7.93			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	8.03			Clear, colourless
	SW5 P4/P5	8.15			Clear, colourless
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
03-Feb-09	**SW2 Gate**	7.87	12	7	Clear, colourless, small amount of sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	8.00	1	4	Clear, colourless
	SW5 P4/P5	7.80	4	5	Clear, colourless, dark sediment
	SW6 MT Lab	7.67	8	6	Clear, colourless, dark sediment
	SW7 WWTP	7.61	11	14	Clear, colourless, dark sediment
11-Feb-09	**SW2 Gate**	7.81			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.89			Clear, colourless
	SW5 P4/P5	7.94			Clear, colourless
	SW6 MT Lab				Dry
	SW7 WWTP	7.30			Clear, colourless, dark sediment
18-Feb-09	**SW2 Gate**	7.93			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.91			Clear, colourless
	SW5 P4/P5	7.96			Clear, colourless
	SW6 MT Lab				Dry
	SW7 WWTP	7.13			Cloudy, brownish, dark sediment
25-Feb-09	**SW2 Gate**	8.25			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	8.00			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP	7.26			Clear, brownish, dark sediment
04-Mar-09	**SW2 Gate**	7.95	11	2	Clear, colourless, greenish sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	8.03	14	2	Clear, colourless
	SW5 P4/P5	7.70	153	12	Cloudy, trace syltherm on top, sediment
	SW6 MT Lab				Dry
	SW7 WWTP	7.40	33	7	Cloudy, dark sediment
12-Mar-09	**SW2 Gate**	8.10			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.99			Clear, colourless
	SW5 P4/P5	7.65			Clear, colourless, dark brown sediment
	SW6 MT Lab				Dry
	SW7 WWTP	7.54			Clear, colourless, dark brown sediment
19-Mar-09	**SW2 Gate**	8.13			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.92			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP	7.20			Clear, colourless, dark sediment
26-Mar-09	**SW2 Gate**	8.10			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.98			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP	7.60			Cloudy and rusty coloured, dark sediments

Date	Location	pH	COD (mg/l)	BOD (mg/l)	Visual Inspection
02-Apr-09	SW2 Gate				Dry
	SW3 Smoking Area				Dry
	SW4 New Admin	7.56	12	3	Clear. Colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP	7.14	*1100	30	Very cloudy, rusty coloured, dark sediments. *High COD thought to be due to analytical error - sample may have been shaken, next COD measured on 17th April was 0 mg/l.
08-Apr-09	SW2 Gate	8.08			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.88			Clear, colourless
	SW5 P4/P5	7.49			Cloudy, colourless, dark sediment
	SW6 MT Lab				Dry
	SW7 WWTP	7.63			Cloudy, brownish, lots of sediments
17-Apr-09	SW2 Gate	7.91	1		Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.80	2		Clear, colourless, dark sediment
	SW5 P4/P5	7.72	5		Clear, colourless
	SW6 MT Lab				Dry
	SW7 WWTP	7.69	0		Clear, colourless, dark sediment
23-Apr-09	SW2 Gate	7.91			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.62			Clear, colourless
	SW5 P4/P5	7.65			Little cloudy, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
29-Apr-09	SW2 Gate	7.78			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.85			Clear, colourless
	SW5 P4/P5	7.45			Clear, colourless
	SW6 MT Lab	7.57			Cloudy, dark sediment
	SW7 WWTP	7.30			Cloudy, milky white, dark sediment
06-May-09	SW2 Gate	8.07	14		Clear, colourless, very small amount of sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.86	17		Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP	7.01	2		Dark, cloudy, dark sediments
14-May-09	SW2 Gate	7.92			Clear, colourless
	SW3 Smoking Area				Dry
	SW4 New Admin	7.56			Clear, colourless
	SW5 P4/P5	7.62			Clear, colourless
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
20-May-09	SW2 Gate	7.75	86	18	Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	8.02	14	3	Clear, colourless
	SW5 P4/P5	7.36	57	10	Clear, colourless, dark sediment
	SW6 MT Lab	7.30	34	13	Clear, colourless
	SW7 WWTP	7.76	72	19	Clear, colourless
27-May-09	SW2 Gate	8.03			Clear, colourless
	SW3 Smoking Area				Dry
	SW4 New Admin	8.01			Cloudy, dark sediments
	SW5 P4/P5				Dry
	SW6 MT Lab	7.70			Clear, colourless, dark sediments
	SW7 WWTP				Dry
03-Jun-09	SW2 Gate				Dry
	SW3 Smoking Area				Dry
	SW4 New Admin	7.58	19	9	Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
11-Jun-09	SW2 Gate	8.01			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.79			Clear, colourless
	SW5 P4/P5	7.78			Clear, colourless, dark sediment
	SW6 MT Lab	7.83			Clear, colourless, dark sediment
	SW7 WWTP	7.47			Clear, colourless, dark sediment
17-Jun-09	SW2 Gate	7.56			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.60			Clear, colourless, dark sediment
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
25-Jun-09	SW2 Gate	8.07			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.79			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry

Date	Location	pH	COD (mg/l)	BOD (mg/l)	Visual Inspection
01-Jul-09	SW2 Gate	7.75	53	29	Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.68	27	9	Clear, colourless
	SW5 P4/P5	7.19	22	13	Clear, colourless, dark sediment
	SW6 MT Lab				Dry
	SW7 WWTP	7.98	68	31	Cloudy, brown, dark deposits
10-Jul-09	SW2 Gate	7.93			Clear, colourless, dark sediment
	SW3 Smoking Area				Dry
	SW4 New Admin	7.71			Clear, colourless
	SW5 P4/P5	7.66			Cloudy, brown
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
16-Jul-09	SW2 Gate	7.71			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.79			Clear, colourless
	SW5 P4/P5	7.52			Clear, colourless, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
23-Jul-09	SW2 Gate	7.92			Clear, colourless
	SW3 Smoking Area				Dry
	SW4 New Admin	7.94			Clear, colourless
	SW5 P4/P5	7.28			Clear, colourless, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
04-Aug-09	SW2 Gate	7.78			Clear, colourless
	SW3 Smoking Area				Dry
	SW4 New Admin	7.96			Clear, colourless
	SW5 P4/P5	8.04			Clear, colourless
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
05-Aug-09	SW2 Gate	8.05	31	4	Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.86	2	7	Clear, colourless
	SW5 P4/P5	7.77	13	2	Clear, colourless, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
12-Aug-09	SW2 Gate	7.82			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.92			Clear, colourless
	SW5 P4/P5	7.78			Clear, colourless, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
20-Aug-09	SW2 Gate	7.82			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.96			Clear, colourless
	SW5 P4/P5	7.75			Clear, colourless
	SW6 MT Lab	8.00			Clear, colourless
	SW7 WWTP	7.83			Clear, colourless, white coloured
27-Aug-09	SW2 Gate	8.00			Clear, colourless, dark deposits
	SW3 Smoking Area				Dry
	SW4 New Admin	8.03			Clear, colourless
	SW5 P4/P5	7.95			Clear, colourless, dark deposits
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
02-Sep-09	SW2 Gate	7.94	10	10	Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.96	10	6	Clear, colurless
	SW5 P4/P5	7.50	10	27	A little cloudy, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
10-Sep-09	SW2 Gate	7.96	18		Clear, colourless, dark sediments
	SW3 Smoking Area				Not accesible
	SW4 New Admin	8.00	17		Clear, pale straw coloured, beown solids
	SW5 P4/P5	7.54	20		Clear, colourless, brown solids
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
16-Sep-09	SW2 Gate	7.69			Clear, colourless, brown sediments
	SW3 Smoking Area	7.70			Clear, colourless, trace floating particles
	SW4 New Admin	7.89			Clear, colourless
	SW5 P4/P5	7.31			Cloudy, grey coloured, very silty
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
24-Sep-09	SW2 Gate	7.92			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	8.08			Clear, colourless
	SW5 P4/P5	7.95			Clear, colourless, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry

Date	Location	pH	COD (mg/l)	BOD (mg/l)	Visual Inspection
02-Oct-09	SW2 Gate	8.03			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	8.20			Clear, colourless
	SW5 P4/P5	8.42			Clear, colourless, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
07-Oct-09	SW2 Gate	8.00	3	2	Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.90	0	4	Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
16-Oct-09	SW2 Gate	7.98			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	8.05			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
23-Oct-09	SW2 Gate	7.81			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.92			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
28-Oct-09	SW2 Gate	7.88			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.91			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
06-Nov-09	SW2 Gate	7.69			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.88			Clear, colourless
	SW5 P4/P5	7.55			Clear, colourless
	SW6 MT Lab	7.68			Clear, colourless
	SW7 WWTP				Dry
12-Nov-09	SW2 Gate	7.76			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.91			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
20-Nov-09	SW2 Gate	7.81			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.90			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
26-Nov-09	SW2 Gate	7.89	0	5	Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	8.00	0	4	Clear, colourless
	SW5 P4/P5	7.89	51	7	Clear, colourless, dark sediments
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
02-Dec-09	SW2 Gate	7.76	7	6	Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.91	5	4	Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
09-Dec-09	SW2 Gate	7.85			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.94			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab	7.91			Clear, colourless
	SW7 WWTP				Dry
17-Dec-09	SW2 Gate	7.65			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.83			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry
21-Dec-09	SW2 Gate	7.79			Clear, colourless, dark sediments
	SW3 Smoking Area				Dry
	SW4 New Admin	7.83			Clear, colourless
	SW5 P4/P5				Dry
	SW6 MT Lab				Dry
	SW7 WWTP				Dry

SW Trigger Level Investigations

Date	Location of contamination	Results
19-Feb-09 & 21-Feb-09	SW 1 (SW Tank)	COD > 150 mg/l One of the samples gullies showed an elevated concentration of COD (120mg/l) It is believed that this was because at the moment of the sampling the area around the gully was being washed. Five other gullies in areas draining to SW Tank were sampled showing low COD values. It was not possible to determine the origin of the contamination. The contents of the tank were discharged to the WWTP.
04- Mar-09	SW 5 (P4/P7)	COD = 153mg/l Investigations led to check for spillages all around the area including P4/P7 roof, there were no trace of spillages. The origin of the contamination was undetermined. However, this outfall is permanently diverted to the WWTP.
15-Mar-09 – 30-Mar-09	SW 1 (SW Tank)	Green Colour in water. All the gullies were inspected and none showed green colour. The origin could be a strong proliferation of algae in the tank. The contents of the tank were discharged to the WWTP. The drains were cleaned out the following week.
02-Apr-09	SW 7 (WWTP)	COD = 1,100mg/l It is believed that the high COD is due to a high content of mud in the drain and the sample may have been shaken. Drains in the WWTP were cleaned out.
23-Apr-09	SW 1 (SW Tank)	COD = 108mg/l A gully next to the Contractor's Compound showed a similar concentration of COD. Corrective action: The affected section of the drain was cleaned out & the contents of the tank were discharged to the WWTP.
17-Jul-09 – 21-Jul-09	SW 1 (SW Tank)	COD = 134mg/l. It was not possible to determine the origin of the contamination. The contents of the tank were discharged to the WWTP. The next test on the SW Tank on July 24th detected a COD of 33 mg/l
28-Jul-09	SW 1 (SW Tank)	COD = 153mg/l 28th Jul. It was not possible to determine the origin of the contamination. The contents of the tank were discharged to the WWTP.
02-Aug-09	SW1 (SW tank)	COD > 100mg/l 6th Aug. It was not possible to determine the origin of the contamination. The subsequent test on the SW Tank showed a COD of 9 mg/l
02-Nov-09	SW 1 (SW Tank)	COD > 150mg/l High COD was found in a water sump that collects water from the west side of the plant. The contents of the tank were pumped to the WWTP on the 5th. An investigation is currently on-going.

Appendix D

Ambient Monitoring

Receiving water - Ward River Monitoring

		02-Jan-09	03-Feb-09	04-Mar-09	02-Apr-09	06-May-09	03-Jun-09	01-Jul-09	05-Aug-09	02-Sep-09	02-Oct-09	06-Nov-09	02-Dec-09
Upstream	pH	7.6	7.96	8.2	8.5	8.25	8.35	8.27	8.24	8.3	8.43	7.86	8.06
	Conductivity (uS/cm)	825	359	838	841	794	869	693	849	729	910	706	757
	COD (mg/L)	7	26	14	10	17	21	11	16	5	10	16	9
	BOD (mg/L)		6	6	14		8	5	3	12			4
Downstream	pH	7.96	7.82	8.32	8.55	8.24	8.39	8.21	8.26	8.31	8.44	7.96	8.1
	Conductivity (uS/cm)	794	341	802	861	795	868	695	800	731	908	695	761
	COD (mg/L)	4	32	14	9	9	25	0	15	8	11	14	9
	BOD (mg/L)		7	2	2		9	6	2	12			5

		07-Jan-09	11-Feb-09	12-Mar-09	08-Apr-09	14-May-09	11-Jun-09	10-Jul-09	12-Aug-09	10-Sep-09	07-Oct-09	13-Nov-09	09-Dec-09
Upstream	pH	7.53	8.16	8.35	8.45	8.24	8.27	8.32	8.24	8.17	8.08	7.89	8.07
	Conductivity (uS/cm)	881	820	844	764	747	845	879	1162	824	862	623	687
	COD (mg/L)	0	11	23	4	15	12	18	13	23	10	19	8
	BOD (mg/L)	4									4		
Downstream	pH	7.92	8.29	8.34	8.39	8.25	8.41	8.35	8.26	8.12	8.07	7.99	8.09
	Conductivity (uS/cm)	883	821	843	763	744	844	876	815	824	865	611	675
	COD (mg/L)	4	12	28	0	13	11	15	11	20	9	20	10
	BOD (mg/L)	5									4		

		13-Jan-09	18-Feb-09	19-Mar-09	17-Apr-09	20-May-09	17-Jun-09	16-Jul-09	20-Aug-09	16-Sep-09	16-Oct-09	20-Nov-09	17-Dec-09
Upstream	pH	8.3	8.14	8.24	8.14	8.11	8.4	8.19	7.94	8.43	8.35	8.5	8.1
	Conductivity (uS/cm)	835	857	814	764	737	841	772	582	771	796	806	663
	COD (mg/L)	20	5	22	0	24	19	4	12	11	16	25	10
	BOD (mg/L)					11							
Downstream	pH	8.32	8.27	8.34	8.24	8.12	8.37	8.22	8.01	8.38	8.37	8.3	8.09
	Conductivity (uS/cm)	836	858	843	774	733	841	777	578	774	792	810	657
	COD (mg/L)	21	8	23	0	19	5	4	10	8	12	28	11
	BOD (mg/L)					12							

		22-Jan-09	25-Feb-09	26-Mar-09	23-Apr-09	27-May-09	25-Jun-09	23-Jul-09	27-Aug-09	25-Sep-09	23-Oct-09	26-Nov-09	21-Dec-09
Upstream	pH	8.17	8.2	8.3	8.31	8.3	8.55	8.15	8.36	8.17	8.01	8.2	8.11
	Conductivity (uS/cm)	749	866	839	796	902	834	813	814	853	734	573	823
	COD (mg/L)	11	14	14	5	17	11	15	8	12	28	1	0
	BOD (mg/L)											3	
Downstream	pH	8.22	8.32	8.32	8.31	8.33	8.55	8.17	8.4	8.18	8.05	8.17	8.1
	Conductivity (uS/cm)	754	856	855	801	896	830	820	876	857	737	565	819
	COD (mg/L)	12	12	12	6	4	7	15	10	8	29	2	0
	BOD (mg/L)											4	

		29-Jan-09			29-Apr-09			29-Jul-09			28-Oct-09		
Upstream	pH	8.3			8.24			7.96			8.19		
	Conductivity (uS/cm)	828			734			729			810		
	COD (mg/L)	0			0			0					
	BOD (mg/L)												
Downstream	pH	8.35			8.3			7.96			8.22		
	Conductivity (uS/cm)	831			708			659			806		
	COD (mg/L)	5			0			0					
	BOD (mg/L)												

		Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09
Upstream	Acetone (µg/L)												18
	Methylene Chloride(µg/L)			< 2			< 2				< 2		
Downstream	Acetone (µg/L)												< 10
	Methylene Chloride(µg/L)			55			2				3		

None of the other analytes in the Volatile Organics, Semi-volatile organics or solvents used in processes were detected above the Method Detection limit.

Groundwater Monitoring

Q1 2009

26-Mar-09	pH	Ammonia, ppm	COD, mg/l	Chloride, mg/l	Conductivity, uS/cm	Fluoride, mg/l	Nitrate(N), mg/l	Nitrite, mg/l	Kjeldahl Nitrogen, ppm	Total Nitrogen (mg/l)
EPA IGV	***6.5 - 9.5***	***0.15***	***nc***	***30***	***1000***	***1.0***	***25***	***0.1***	***nc***	***nc***
Borehole ID										
GW 1	8.10	**0.16**	24.5	10.7	711	0.42	0.18	**0.33**	<1	<1
GW 2	7.52	0.08	nd	**133**	**1021**	0.18	0.09	**0.16**	<1	<1
GW 3	7.74	0.07	nd	**89**	677	0.15	0.12	**0.32**	<1	<1
GW 4	7.27	**0.48**	nd	**60**	746	0.33	0.06	**0.23**	<1	<1
GW 5	6.94	**3.53**	102.0	**241**	**1876**	0.11	<0.5	**0.40**	8.0	8.4
GW 6	8.35	**0.17**	14.4	8	249	0.03	2.96	**0.26**	4.0	7.2
GW7A	7.16	**11.90**	216.0	**592**	**2873**	0.26	<0.5	**0.17**	17.0	17.2
GW7B	7.55	**13.40**	55.2	**497**	**2404**	0.13	<0.5	**0.47**	14.0	14.5
GW7C	6.66	**10.80**	49.4	**583**	**2616**	<0.10	0.53	**0.53**	12.0	13.1
GW7D	7.23	**6.03**	104.0	**824**	**2804**	0.11	<0.5	**0.15**	7.0	7.2
GW7D Dup01	7.23	**5.56**	110.0	**787**	**2804**	0.23	0.53	**0.29**	7.0	7.8
GW9	7.29	**0.17**	12.5	**179**	**1537**	0.33	1.44	**1.52**	49.0	50.8
GW10	7.30	**0.95**	nd	22	**975**	0.07	3.29	**0.67**	4.0	8.0
GW11	8.87	**0.16**	21.1	21	661	0.63	1.35	**0.36**	4.0	5.7
GW12	8.46	**5.35**	58.3	**294**	**1568**	**2.53**	0.65	**0.55**	35.0	35.7
GW13	8.37	**3.22**	242.0	**390**	**2182**	**6.87**	0.33	**1.16**	35.0	36.2
GW14	7.91	**0.17**	18.3	**217**	**1358**	0.69	0.06	**0.12**	<1	<1
GW15	7.58	**0.80**	21.7	88	**2031**	**1.33**	<0.5	**2.06**	110.0	112.0
GW16	7.69	**0.21**	nd	58	**1064**	0.63	<0.5	**1.77**	22.0	23.8

Q2 2009

10-Jun-09	pH	Ammonia, ppm	COD, mg/l	Chloride, mg/l	Conductivity, uS/cm	Fluoride, mg/l	Nitrate, mg/l	Nitrite, mg/l	Kjeldahl Nitrogen, ppm	Total Nitrogen (mg/l)
EPA IGV (mg/l)	***6.5 - 9.5***	***0.15***	***nc***	***30***	***1000***	***1.0***	***25***	***0.1***	***nc***	
Borehole ID										***nc***
1	7.17	0.010	20	23	**1092**	0.52	0.200	**0.121**	15.16	15.48
2	7.95	0.010	0	**103**	821	0.12	0.100	0.024	4.81	4.94
3	7.67	**0.389**	0	**85**	874	0.02	0.200	0.023	3.27	3.49
4	7.62	**0.193**	0	**70**	**1965**	0.20	0.100	0.060	16.17	16.33
5	7.10	**6.600**	59	**270**	285	0.11	0.100	0.080	20.63	20.81
6	**9.75**	**0.191**	0	8	**2920**	<0.10	2.800	0.084	35.11	37.99
7A	6.73	**2.670**	160	**460**	**4020**	**1.21**	0.100	0.089	149.058	149.25
7B	6.76	**97.090**	100	**780**	**5800**	0.16	0.100	**0.154**	62.24	62.50
7C	7.10	**86.700**	76	**1380**	**2730**	<0.10	0.100	0.052	72.07	72.22
7D	7.00	**9.880**	11	**580**	**1366**	0.11	0.000	0.017	21.69	21.71
9	7.24	0.015	8	**260**	**1098**	0.22	0.700	0.035	15.02	15.75
10	7.02	0.012	0	24	477	<0.10	2.100	0.036	14.43	16.57
11	8.17	**0.012**	0	16	**1455**	0.17	0.900	0.017	13.13	14.05
12	8.40	**9.460**	9	**370**	**1713**	0.17	0.500	0.097	35.06	35.65
13	8.00	**8.130**	21	**370**	**3260**	0.30	0.000	0.069	27.7992	27.87
14	8.05	0.023	10	**550**	**2500**	**1.75**	0.300	0.056	17.3706	17.73
15	7.74	0.022	22	**250**	783	1.07	0.400	0.01	15.6702	16.08
16	7.62	0.015	2	**59**	921	0.43	0.800	0.023	19.305	20.13

Q3 2009

20-Sep-09	pH	Ammonia, ppm	COD, mg/l	Chloride, mg/l	Conductivity, uS/cm	Fluoride, mg/l	Nitrate, mg/l	Nitrite, mg/l	Kjeldahl Nitrogen, ppm	Total Nitrogen (mg/l)
EPA IGV (mg/l)	***6.5 - 9.5***	***0.15***	***nc***	***30***	***1000***	***1***	***25***	***0.1***	***nc***	
Borehole ID										
1										
2	7.54	0.070	0	**72**	443	0.21	0.200	0.023	0.85	1.07
3	7.15	0.009	0	**59**	732	0.19	0.400	0.020	0.28	0.70
4	7.07	0.042	0	**54**	671	0.29	0.300	0.026	0.24	0.57
5	7.01	**13.46**	43	**153**	**1342**	0.08	0.400	0.048	1.50	1.95
6	7.80	0.018	4	7	237	<0.10	2.500	**0.131**	0.33	2.96
7A	6.79	**3011**	130	**330**	**2600**	0.72	0.100	0.077	10463.23	10463.41
7B	6.73	**2500**	29	**300**	**2290**	0.98	0.000	0.055	10488.78	10488.83
7C	6.81	**265**	49	**760**	**2760**	<0.10	<0.5	0.017	8720.40	8720.92
7D	6.80	**109**	45	**930**	**3320**	0.13	1.100	0.025	6485.08	6486.20
9	7.31	0.010	0	**79**	837	0.29	2.400	0.027	1.10	3.52
10										
11	8.49	0.003	0	8	418	0.19	0.500	0.026	0.80	1.33
12	7.41	**108**	11	**970**	**3080**	0.13	<0.5	0.013	6.38	6.90
13	**11.05**	0.018	0	**35**	734	<0.10	1.200	**1.26**	1.28	3.74
14	7.56	0.002	0	**193**	**1564**	0.49	0.100	0.02	0.41	0.53
15	7.30	0.002	20	**146**	**1640**	0.9	0.200	0.021	0.59	0.81
16	7.30	0.002	0	**65**	649	0.44	0.300	0.018	0.35	0.67

Q4 2009

02-Dec-09	pH	Ammonia, ppm	COD, mg/l	Chloride, mg/l	Conductivity, uS/cm	Fluoride, mg/l	Nitrate, mg/l	Nitrite, mg/l	Kjeldahl Nitrogen, ppm	Total Nitrogen (mg/l)
EPA IGV (mg/l)	***6.5 - 9.5***	***0.15***	***nc***	***30***	***1000***	***1***	***25***	***0.1***	***nc***	***nc***
Borehole ID										
1										
2	**10.11**	**0.545**	6	**37**	252	0.15	<0.5	0.075	2.10	2.18
3	7.94	**0.317**	6	**61**	453	0.23	<0.5	0.025	1.86	1.88
4	7.33	**0.388**	5	**45**	510	0.21	0.100	0.025	1.56	1.68
5	7.40	**0.659**	43	**48**	310	0.19	1.500	0.023	6.21	7.74
6	9.08	**0.200**	4	12	157	0.00	0.300	0.017	3.36	3.68
7A	7.01	**2.328**	150	**305**	**1739**	**1.26**	<0.5	0.089	52.88	52.97
7B	6.85	**2.432**	50	**314**	**1806**	0.00	<0.5	0.048	65.66	65.71
7C	6.85	**2.629**	51	**572**	**2310**	0.12	<0.5	**0.137**	18.09	18.22
7D	6.96	**2.454**	29	**506**	**2140**	0.20	<0.5	0.027	9.83	9.86
9	7.93	**0.167**	3	**33**	319	0.70	0.700	0.026	0.58	1.31
10										
11	7.89	0.111	5	23	306	0.05	<0.5	0.059	0.64	0.70
12	7.83	**2.012**	25	**912**	**2570**	0.17	<0.5	0.019	9.51	9.53
13	**11.18**	0.140	3	27	521	0.21	1.000	***0.217***	0.64	1.86
14	8.50	0.114	7	**61**	497	0.39	0.500	0.032	0.25	0.79
15	7.90	0.012	32	**98**	**1240**	**1.50**	<0.5	0.032	0.52	0.55
16	7.62	0.012	2	**56**	486	0.34	<0.5	0.028	0.35	0.37

GW 1 & 10 were unavailable Qs 3 & 4 due to Firewater tanks constuction in that area.

Groundwater Monitoring

		GW 1	GW 1	GW 1	GW 1	GW 2	GW 2	GW 2	GW 2	GW 3	GW 3	GW 3	GW 3	GW 4	GW 4	GW 4	GW 4
	EPA IGV	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1-Chlorobutane																	
4-Methyl-2-pentanone																	
Acetone							18	11				69					
Benzene	1																
Bromoform																	
Carbon disulfide																	
Diethyl ether										3	4	5	4	6	10	6	5
Ethyl benzene	10																
m&p-Xylene	10																
Methylene chloride								3									
o-Xylene	10																
Tert-methyl-butyl ether							2			3	3	5	6	35	40	23	18
Tetrahydrofuran																	
Toluene	10																
Non targeted																	
2-Chloropyridine																	
Cyclohexane																	
SVOCs																	
2,4-Dimethylphenol		16															
2-Methylnaphthalene		2															
Acenaphthene		2		not sampled													
Acetophenone		1															
Benzyl Alcohol			62									68					
Bis (2-Ethylhexyl) Phthalate							8										
Chrysene						4											
Fluorene																	
m/p-Cresol		48															
Naphthalene		8															
O-Cresol		62															
Solvents used in processes		mg/l	mg/l			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Acetonitrile																	
TEA																	
Isopropanol																	
Ethyl Acetate																	
Methanol																	
n-Butanol																	
Ethanol												31.7					
i-Butanol																	
DMF																	

None of the other analytes in the Volatile Organics, Semi-volatile organics or solvents used in processes were detected above the Method Detection limit.

Groundwater Monitoring

		GW 5	GW 5	GW 5	GW 5	GW 6	GW 6	GW 6	GW 6	GW 7A	GW 7A	GW 7A	GW 7A	GW 7B	GW 7B	GW 7B	GW 7B
	EPA IGV	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1-Chlorobutane																	
4-Methyl-2-pentanone													790				
Acetone											2700		9400				
Benzene	1		120												460		
Bromoform			490														
Carbon disulfide																	
Diethyl ether																	
Ethyl benzene	10	990	600											77	1800	240	33
m&p-Xylene	10	7700	7600	3800								110		340	10000	1900	260
Methylene chloride								4					6000				
o-Xylene	10	490		250										28			
Tert-methyl-butyl ether					3							42		33	690		38
Tetrahydrofuran					41							2700	5400	2400	6400	3600	3000
Toluene	10	11000	9100	370						31000	34000		6100				
Non targeted																	
2-Chloropyridine																	
Cyclohexane																270	
SVOCs																	
2,4-Dimethylphenol		51	25	29						3	2				18		2
2-Methylnaphthalene																	
Acenaphthene		2	2	1													
Acetophenone		5	3	2						2	2				4		
Benzyl Alcohol										8	10			2	5		
Bis (2-Ethylhexyl) Phthalate																	
Chrysene																	
Fluorene		0.8															
m/p-Cresol		36	14	3						110	150	2	42		11		
Naphthalene																	
O-Cresol		47	21	9						77	88		41		15		
Solvents used in processes		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Acetonitrile			1.8							7.4	137	165	18.1		38.5		
TEA																	
Isopropanol													10.1				
Ethyl Acetate																	
Methanol								1									
n-Butanol																	
Ethanol																	
i-Butanol																	
DMF				14.2											7.5		

None of the other analytes in the Volatile Organics, Semi-volatile organics or solvents used in processes were detected above the Method Detection limit.

Groundwater Monitoring

		GW 7C	GW 7C	GW 7C	GW 7C	GW 7D	GW 7D Duplicate	GW 7D	GW 7D	GW 7D	GW 9	GW 9	GW 9	GW 9	GW 10	GW 10	GW 10	GW 10
	EPA IGV	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q12009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1-Chlorobutane																		
4-Methyl-2-pentanone						1100												
Acetone																		
Benzene	1																	
Bromoform																		
Carbon disulfide																		
Diethyl ether																		
Ethyl benzene	10					110												
m&p-Xylene	10	200	260	110		640	360	320										
Methylene chloride										96								
o-Xylene	10					150												
Tert-methyl-butyl ether		87	93	470	27			100	83	62								
Tetrahydrofuran		3500	3300	4100	630	7300	6700	5900	1600	1500								
Toluene	10	140				9300	1300	6000										
Non targeted																		
2-Chloropyridine																		
Cyclohexane																		
SVOCs																		
2,4-Dimethylphenol		4				16	16	23										
2-Methylnaphthalene						2	2	2	1									
Acenaphthene						2	2	2	2								not sampled	
Acetophenone		3				1	1											
Benzyl Alcohol		2				4												
Bis (2-Ethylhexyl) Phthalate																		
Chrysene																		
Fluorene																		
m/p-Cresol						46	48	64	6									
Naphthalene						8	8		6									
O-Cresol						77	62	110	12									
Solvents used in processes		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		
Acetonitrile			2.5			0.9		2.5	4									
TEA				1.35														
Isopropanol																		
Ethyl Acetate				0.3					5									
Methanol																		
n-Butanol																		
Ethanol																		
i-Butanol					0.5													
DMF			2.8					2.2										

None of the other analytes in the Volatile Organics, Semi-volatile organics or solvents used in processes were detected above the Method Detection limit.

Groundwater Monitoring

		GW 11	GW 11	GW 11	GW 11	GW 12	GW 12	GW 12	GW 12	GW13	GW13	GW13	GW13	GW14	GW14	GW14	GW14
	EPA IGV	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1-Chlorobutane									3								
4-Methyl-2-pentanone																	
Acetone						1500	140		33	2500							
Benzene	1																
Bromoform																	
Carbon disulfide															1		
Diethyl ether																	
Ethyl benzene	10																
m&p-Xylene	10																
Methylene chloride						4300				17000		6	6	2	3		
o-Xylene	10																
Tert-methyl-butyl ether									3								
Tetrahydrofuran						1400	1500	950	530	5600	4500						
Toluene	10														1		
Non targeted																	
2-Chloropyridine														240			
Cyclohexane																	
SVOCs																	
2,4-Dimethylphenol																	
2-Methylnaphthalene																	
Acenaphthene																	
Acetophenone																	
Benzyl Alcohol																	
Bis (2-Ethylhexyl) Phthalate																	
Chrysene																	
Fluorene																	
m/p-Cresol																	
Naphthalene																	
O-Cresol																	
Solvents used in processes		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Acetonitrile						1.7				11.1							
TEA																	
Isopropanol																	
Ethyl Acetate																	
Methanol												1.2					
n-Butanol																	
Ethanol																	
i-Butanol																	
DMF																	

None of the other analytes in the Volatile Organics, Semi-volatile organics or solvents used in processes were detected above the Method Detection limit.

Groundwater Monitoring

		GW15	GW15	GW15	GW15	GW16	GW16	GW16	GW16
	EPA IGV	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2009	Q2 2009	Q3 2009	Q4 2009
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1-Chlorobutane									
4-Methyl-2-pentanone									
Acetone									
Benzene	1								
Bromoform									
Carbon disulfide									
Diethyl ether									
Ethyl benzene	10								
m&p-Xylene	10								
Methylene chloride		2							
o-Xylene	10								
Tert-methyl-butyl ether		8	3	2					
Tetrahydrofuran									
Toluene	10								
Non targeted									
2-Chloropyridine		48							
Cyclohexane									
SVOCs									
2,4-Dimethylphenol									
2-Methylnaphthalene									
Acenaphthene									
Acetophenone									
Benzyl Alcohol									
Bis (2-Ethylhexyl) Phthalate		6							
Chrysene									
Fluorene									
m/p-Cresol									
Naphthalene									
O-Cresol									
Solvents used in processes		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Acetonitrile									
TEA									
Isopropanol									
Ethyl Acetate									
Methanol									
n-Butanol									
Ethanol									
i-Butanol									
DMF									

None of the other analytes in the Volatile Organics, Semi-volatile organics or solvents used in processes were detected above the Method Detection limit.

Underground Tank Vault Monitoring

Feb-09	Vault 23	Vault 26	Vault 27	Vault 28	Vault 29	Vault 32	Vault 36	Vault 23
								resampled 16/02
COD mg/l	**5,000**	**1,000**	**5,500**	**1,100**	**2,000**	**800**	**1,000**	**1,100**
	% v/v	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**	**% v/v**
Acetone	0.15				0.03			
ACN	0.17							
DCM	2.45				0.1			
DMF					0.01			
EtOAc	0.26	Not measured	nd	nd		Not measured	Not measured	Not measured
Ethanol	0.03							
IPA	0.14				0.02			
Methanol	0.21				0.02			
NMPO	0.03				<0.01			
Toluene	0.1							
	3.5	0	0	0	0.2	0	0	0

Only vaults 23, 26, 27, 28, 29, 32 & 36 now contain tanks

Vaults were inacessible in April 2009 due to ongoing P2 tankfarm project works.

May-09	Vault 26	Vault 36
COD mg/l	**1,370**	**3,000**

Only vaults 26 & 36 now contain tanks and are now monitored weekly with site bunds.

Jun-09	Vault 020	Vault 021	Vault 022	Vault 023	Vault 26	Vault 36
COD mg/l	**109**	**170**	**110**	**133**	**Empty**	**Empty**
	Not sent for solvent analysis					

Only vaults 26 & 36 now contain tanks and are monitored weekly with site bunds.
Vaults 020, 021, 022 & 023 contain double skinned tanks so are technically, no longer vaults

Appendix E

Complaints Summary

P0014-04 AER 2009

Complaints 2009

Date received: 12-Jan-09

Mr. Peter Gorman contacted the EPA to complain about the number of fire alarm activations over the previous week. Details of all the evacuations were given to the EPA who subsequently contacted Peter Gorman. He was happy with the explanation and was subsequently added to the neighbour's information text alert list.

Date received: 14-Feb-09

Mr. Noel Hogan contacted the site on a Saturday regarding a burst of steam that was heard that morning & the following morning & Sunday and it had started to deteriorate. It was determined that maintenance had done some work on the old P7 chiller - it had been in use over the weekend and may have been the source. The noise wasn't heard again until Sat 28th around noon – the settings were adjusted on Monday March 2nd and no further issues were noted.

Date received: 15-Apr-09

Mr. Jim Byrne rang regarding a strong solvent & sewage odour observed near the site WWTP around 6.15 - 6.30 on the 14th - it had also been observed in Fingallians all day - all records checked - no issues detected on site – Fingal County Council were at that time experiencing odour issues & had posted that information on their website. In the absence of a source on-site, the extraction rate from the site WWTP was increased as a precaution.

Date received: 24-Jun-09

Mr. Willie Ennis rang at 9.20 Wednesday morning regarding a noise from the site, when I rang back at 12.30 he said it had gone – it was thought to be from a significant compressed air leak at the P8 chiller observed during Tuesday's walkthrough for which repair work was completed Wednesday morning.

Date received: 09-Aug-09

Mr. Noel Hogan rang regarding a hissing / steam noise and a pump noise observed the previous day and night. The sources were found to be a broken airline at P7 which was fixed that morning and a noisy pump at P4 which was switched off that morning.

Appendix F

Noise

Noise monitoring

Night-time noise limit breaches were reported to the Agency for January & February 2009. During the site audit in April the area was visited with the inspectors to demonstrate the level of noise being measured from off-site sources – mainly road traffic & intermittent flights. The planned noise attenuation which would be provided by the Firewater Tanks was discussed and it was also agreed that monthly noise monitoring is not required, it was planned to undertake an external noise survey to identify the dominant noise sources at the monitoring location – please see discussion below. Further non-compliant results were measured during the year but were not reported as works were ongoing on the Firewater & Noise remediation project.

AWN Consulting were commissioned to conduct a noise survey in December 2009 in accordance with section 6.18 of our IPPC Licence and ISO 1996-1: 2007: Acoustics – Description and measurement of environmental noise. The results show that the measured noise levels at the survey location are within both the day and night time EPA noise criteria.

Noise reduction proposal

In the 2008 annual noise survey the P8 cooling towers were identified as the primary contributor to the overall noise detected at the boundary. The main remediational action proposed was to extend the wall surrounding the cooling towers by several meters in height to reduce their impact on the boundary. This was not progressed following installation of a noise mitigation wall around the new Fire Water tanks.

In November 2009 two new Fire Water Tanks and a noise mitigation wall were installed in between the P8 cooling towers and the boundary next to the closest neighbour location.

The Annual Survey was carried out after the installation of these and it has demonstrated the effectiveness of the actions taken, see attached AWN noise survey report.

As a consequence we have moved the frequency of our noise testing from monthly to annual as required in the Licence.

Noise measurement of the newly installed equipment and daily patrols are undertaken to monitor compliance.

Further noise mitigation works have extended the acoustic wall parallel along the northern boundary to the car park.

Summary of Day and night time Nearest Neighbour Boundary Measurements – January 2009 to December 2009

Month	Day time Leq, dB(A)	Day time IPPC limit, dB(A)	Night time Leq, dB(A)	Night time IPPC limit, dB(A)
January	54.2	55	**51.1**	45
February	51.6	55	**47**	45
March	52.1	55	**49**	45
April	52.6*	55	**48.4**	45
May	53.9	55	**51**	45
June	50.7*	55	**46.9**	45
July	54	55	**48**	45
August	**55.3****	55	44.5	45
September	53.8	55	**46.8**	45
October	53.8	55	**46.3**	45
November	53.3	55	**45.9**	45
December	*See AWN survey report	55	*See AWN survey report	45

*Not paused.

**Loudly singing birds were present at the time of the survey.

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ANNUAL INTEGRATED POLLUTION PREVENTION CONTROL NOISE SURVEY 2009

Technical Report Prepared For

Swords Laboratories
Watery Lane
Swords
Co. Dublin

Technical Report Prepared By

Dr Stephen Smyth BA BAI MIEI MIOA

Our Reference

SS/09/4982NR01

Date Of Issue

8 December 2009

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EXECUTIVE SUMMARY

The Swords Laboratories facility in Swords, Co. Dublin operates under an IPPC Licence issued by the Environmental Protection Agency. Annual noise monitoring is required to demonstrate compliance with the appropriate noise limits detailed in the license.

An environmental noise survey has been carried out at the nearest noise sensitive location to the Swords Laboratories facility. The primary contributor to the noise climate is road traffic movements along nearby roads, however, plant noise from Swords Laboratories was audible during all measurement periods.

Review of the measured noise levels has demonstrated that emissions from the Swords Laboratories facility are within the relevant EPA noise criterion of 55dB $L_{Aeq.15min}$ and 45dB $L_{Aeq,15min}$ respectively.

It is therefore concluded that the facility is in compliance with the relevant sections of its IPPC license.

Report Prepared By:

DR STEPHEN SMYTH
Acoustic Consultant

Report Checked By:

DAMIAN KELLY
Principal Acoustic Consultant

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1.0 INTRODUCTION

AWN Consulting Limited has been commissioned to conduct a noise survey at the Swords Laboratories facility in Swords in order to assess compliance with the relevant IPPC Licence issued by the Environmental Protection Agency (EPA).

The criteria for assessment in relation to noise are outlined in Schedule 4 of the IPPC License[1]. These criteria are as follows:

B.4 Noise Emissions

Daytime dB(A) L_{Aeq} (15 minutes)	*Night-time dB(A) L_{Aeq} (15 minutes)*
55 Note 1	*45* Note 1,2

Note 1: *There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.*

Note 2: *A tolerance of 2dB(A) shall apply to this limit value until 1st January 2009. After this date, the tolerance shall cease to apply.*

2.0 SURVEY DETAILS

An environmental noise survey was conducted in order to identify the main noise sources audible at the survey location. The survey was conducted in general accordance with ISO 1996-1: 2007: *Acoustics – Description, assessment and measurement of environmental noise* and commentary made in accordance with the EPA *Environmental Noise Survey Guidance Document.* Specific details are set out below.

2.1 Choice of Measurement Location

Noise Level measurements were conducted at the monitoring location on the site boundary with the nearest neighbour as shown on Figure 1.

2.2 Survey Periods

Measurements were conducted over the course of a two of survey periods as follows:

- 12:45hrs to 14:15hrs on 2 December 2009;
- 23:00hrs to 23:59hrs on 2 December 2009 and 00:00hrs to 01:30hrs on 3 December 2009.

The facility was operating under normal conditions throughout each of the survey periods.

The weather throughout the survey periods was dry and very light winds of less than 1m/s. During the night time survey periods, the weather was also dry but with no significant wind.

2.3 Personnel and Instrumentation

[1] EPA Licence Register Number P0014-04

Stephen Smyth (AWN) conducted the noise level measurements during all survey periods.

The measurements were performed using a Brüel & Kjær Type 2260 Investigator Sound Level Meter. Before and after the survey the measurement apparatus was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

2.4 Procedure

Consecutive 15-minute samples were carried out at the boundary location. During the survey period, components of the audible noise were identified and associated with particular plant items by comparing the noise heard at the boundary with that heard close to plant items.

2.5 Measurement Parameters

The survey results are presented in terms of the following three parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing.

All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

3.0 NOISE SURVEY RESULTS

The results of measurements taken at Location 1 are summarised in Table 1.

Period	Time (hrs)	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
		L_{Aeq}	L_{A10}	L_{A90}
Daytime	13:38 – 13:53	55	58	52
	12:45 – 13:00	55	58	51
	13:00 – 13:15	55	57	49
	13:15 – 13:30	54	57	47
	13:30 – 13:45	55	57	47
	13:45 – 14:00	56	59	53
	14:00 – 14:15	53	53	53
Night-time	23:00 – 23:15	49	53	43
	23:15 – 23:30	50	54	44
	23:30 – 23:45	48	51	43
	23:45 – 00:00	48	50	43
	00:00 – 00:15	48	51	43
	00:15 – 00:30	47	50	43
	00:30 – 00:45	47	49	43
	00:45 – 01:00	45	46	42
	01:00 – 01:15	45	46	42
	01:15 – 01:30	43	44	42

Table 1 Summary of measured noise levels

The daytime noise environment at this location was dominated by road traffic movements on Watery Lane. Occasional aircraft movements and birdsong were also noted. Plant noise from the Swords Laboratories facility was just audible during most survey periods. The dominant contributor to plant noise levels audible at this location were a pump associated with the P8 tank farm near the recycling centre and the P8 cooling towers. In addition, there were several vehicle movements noted to and from the contactors compound within Swords Laboratories. During the second to last survey period, one of the contractors vehicles was left idling nearby. Measured ambient noise levels were in the range 54 to 56dB L_{Aeq}. Measured background noise levels were in the range 47 to 53dB L_{A90}.

The night-time noise environment was affected by intermittent road traffic movements on Watery Lane. In addition, continuous plant noise was clearly audible from the Swords Laboratories facility. The plant items within Swords Laboratories contributing to the overall noise environment were identified as the P8 cooling tower pumps and a degree of noise from the new water storage tanks near the perimeter. Measured ambient noise levels were in the range 43 to 50dB L_{Aeq}. Measured background noise levels were in the range 42 to 44dB L_{A90}.

No tonal or impact noise sources were noted during either survey period.

The one-third octave spectra for each measurement period are tabulated in Appendix A.

4.0 ANALYSIS OF SURVEY RESULTS

Table 2 below compares the measured survey results with the relevant EPA license criterion.

Period	Time (hrs)	Measured Noise Level, dB $L_{Aeq,15min}$	EPA Criterion, dB $L_{Aeq,15min}$	Within EPA Criterion
Daytime	13:38 – 13:53	55	55	Yes
	12:45 – 13:00	55		Yes
	13:00 – 13:15	55		Yes
	13:15 – 13:30	54		Yes
	13:30 – 13:45	55		Yes
	13:45 – 14:00	56		See Comment
	14:00 – 14:15	53		Yes
Night-time	23:00 – 23:15	49	45	See Comment
	23:15 – 23:30	50		See Comment
	23:30 – 23:45	48		See Comment
	23:45 – 00:00	48		See Comment
	00:00 – 00:15	48		See Comment
	00:15 – 00:30	47		See Comment
	00:30 – 00:45	47		See Comment
	00:45 – 01:00	45		Yes
	01:00 – 01:15	45		Yes
	01:15 – 01:30	43		Yes

Table 2 Comparison of measured noise levels with EPA Criterion

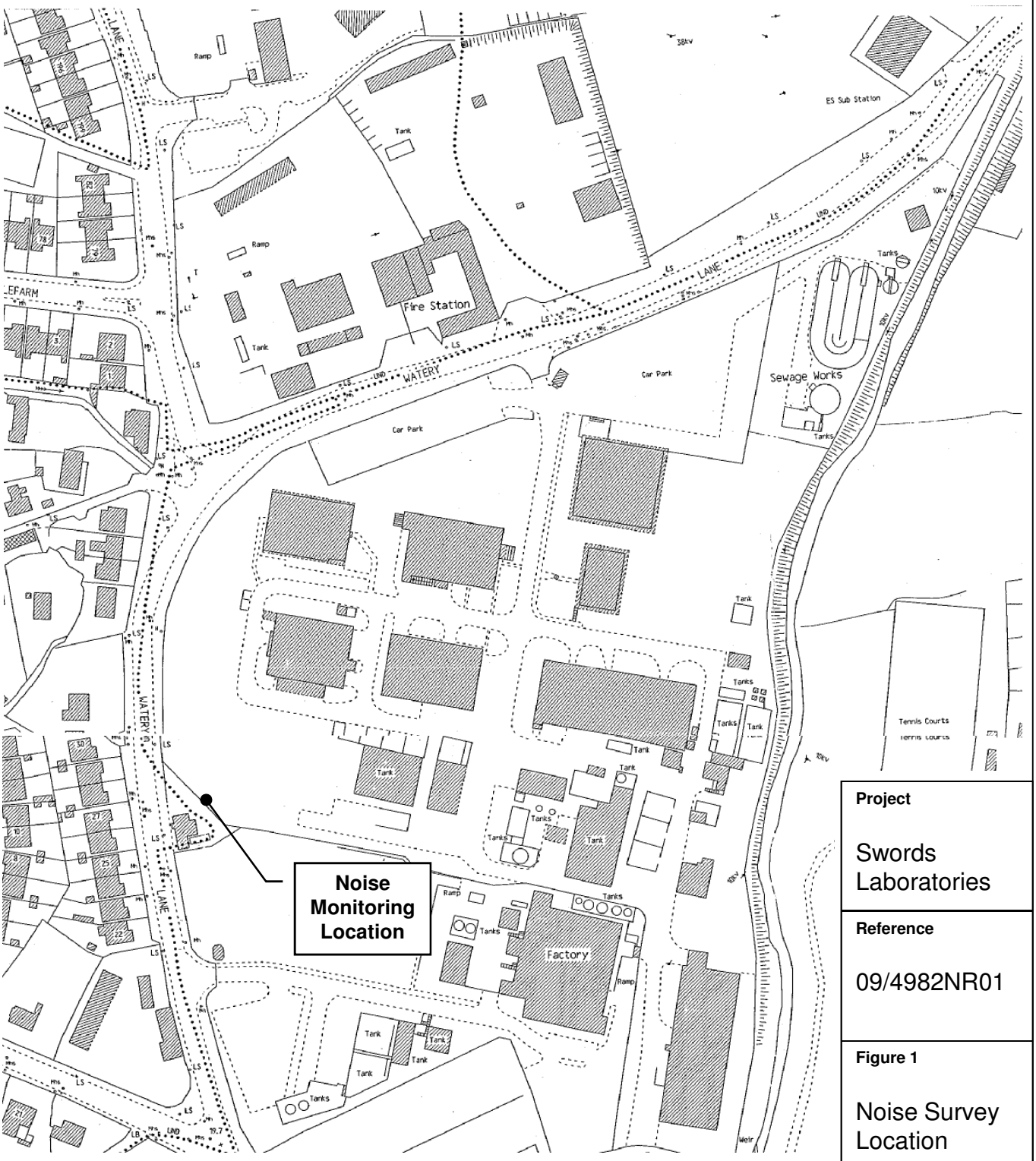
During the daytime the measured noise levels are equal to or within the daytime EPA noise criterion of 55dB $L_{Aeq,15min}$ for the majority of periods. The one period where this criterion was exceeded was due to a contractor's vehicle idling nearby and is not considered to be representative of the noise levels due to normal activity within Swords Laboratories.

During the early part of the night-time survey period the measured $L_{Aeq,15min}$ noise levels are above the EPA criterion of 45dB $L_{Aeq,15min}$. This is due to the fact that intermittent road traffic noise on Watery Lane was dominating the ambient noise environment. However, during the later part of the night-time period, when road traffic on Watery Lane was less frequent, the measured $L_{Aeq,15min}$ noise levels are equal to or less than the EPA criterion of 45dB $L_{Aeq,15min}$. In addition, it was noted that all plant noise audible from Swords Laboratories at the survey location was continuous in nature with no tone or impact sounds.

Taking the above into consideration it is considered that the noise emissions from the Swords Laboratories facility are within both the day and night-time criterion as specified by the EPA.

5.0 CONCLUSIONS

The measured noise levels at the survey location are within both the day and night EPA noise criteria. It is therefore considered that the Swords Laboratories facility is operating within the bounds of its EPA license.



Project

Swords Laboratories

Reference

09/4982NR01

Figure 1

Noise Survey Location

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The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17
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APPENDIX A

Noise Measurement 1/3 Octave Data (Leq)

Period	Frequency Hz 1/3 Octaves (dB re. 2x10-5 Pa)																											
	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25 k	1.6k	2k	2.5k	3.15 k	4k	5k	6.3k	8k	10k	12.5 k
12:45 – 13:00	58	59	57	62	62	61	62	62	58	55	51	47	45	45	45	44	44	45	47	47	46	44	42	43	40	39	37	36	32
13:00 – 13:15	61	60	59	61	62	60	62	61	58	53	50	47	45	45	45	44	44	45	47	47	46	44	41	40	39	37	35	35	29
13:15 – 13:30	61	61	58	58	60	59	60	60	57	53	50	47	44	44	44	43	44	44	46	47	45	43	40	38	36	35	33	35	27
13:30 – 13:45	60	59	58	60	61	63	71	64	60	56	52	48	45	45	44	43	44	44	46	47	45	43	41	40	37	35	33	35	30
13:45 – 14:00	62	61	60	64	64	63	77	67	63	61	54	48	46	46	45	44	45	46	47	48	47	45	43	42	39	36	34	35	28
14:00 – 14:15	57	64	60	59	69	60	62	59	54	53	52	46	43	43	44	42	42	42	44	46	45	42	40	38	36	34	32	34	27
23:00 – 23:15	20	20	20	20	20	20	20	27	29	31	28	29	29	32	35	35	35	38	40	42	41	39	36	34	32	31	30	29	24
23:15 – 23:30	20	20	20	20	20	20	20	28	32	34	33	31	29	31	33	34	34	37	40	43	42	40	37	35	33	31	30	28	24
23:30 – 23:45	20	20	20	20	20	20	20	20	26	31	25	26	25	28	30	31	31	33	33	34	34	33	31	31	30	29	28	27	20
23:45 – 00:00	20	20	20	20	20	20	20	28	35	31	29	28	29	30	32	33	33	36	38	41	40	38	36	33	32	30	29	28	20
00:00 – 00:15	20	20	20	20	20	20	20	20	26	29	31	33	30	30	33	35	36	37	38	40	39	37	35	33	32	31	29	28	20
00:15 – 00:30	20	20	20	20	20	20	20	20	26	29	25	26	27	29	31	33	34	36	39	41	39	37	35	33	32	30	29	28	20
00:30 – 00:45	20	20	20	20	20	20	20	20	26	29	24	26	27	29	31	32	33	35	38	40	39	37	35	33	32	30	29	28	20
00:45 – 01:00	20	20	20	20	20	20	20	24	27	29	24	26	27	29	31	33	34	36	38	39	38	37	35	33	32	30	29	28	20
01:00 – 01:15	20	20	20	20	20	20	20	20	26	29	20	25	26	28	31	32	32	34	36	37	35	34	33	32	31	30	29	27	20
01:15 – 01:30	20	20	20	20	20	20	20	20	26	29	20	25	26	28	30	32	32	33	35	36	34	33	32	31	30	29	28	27	20
01:30 – 01:45	20	20	20	20	20	20	20	30	28	29	25	27	28	31	32	33	35	37	40	42	40	38	36	34	32	30	29	27	20
01:45 – 02:00	20	20	20	20	20	20	20	20	26	29	20	26	27	29	31	33	33	34	36	37	36	35	33	32	31	30	29	27	20
02:00 – 02:15	20	20	20	20	20	20	20	20	25	28	20	23	26	28	29	32	31	32	33	32	32	31	31	31	32	30	29	29	24

Appendix G

AER Returns Worksheets

Environmental Protection Agency

AER Returns Worksheet

Version 1.1.10

REFERENCE YEAR	2009

1. FACILITY IDENTIFICATION

Parent Company Name	Swords Laboratories
Facility Name	Swords Laboratories
PRTR Identification Number	P0014
Licence Number	P0014-04

Waste or IPPC Classes of Activity

No.	class_name
5.6	The manufacture of pesticides, pharmaceuticals or veterinary products and their intermediates, not included in paragraphs 5.12 to 5.17.
11.1	##
5.16	The use of a chemical or biological process for the production of basic pharmaceutical products.

Address 1	Watery Lane
Address 2	Swords
Address 3	County Dublin
Address 4	
Country	Ireland
Coordinates of Location	-6.22187 53.462
River Basin District	IEEA
NACE Code	2110
Main Economic Activity	Manufacture of basic pharmaceutical products
AER Returns Contact Name	Muirin Gowen
AER Returns Contact Email Address	muirin.gowen@bms.com
AER Returns Contact Position	Environmental Co-ordinator
AER Returns Contact Telephone Number	01-8139000
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	01-8139153
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General
4(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	Yes
Have you been granted an exemption ?	No
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	Manufacturing of pharmaceutical products.
Is the reduction scheme compliance route being used ?	No

4.1 RELEASES TO AIR

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR																
POLLUTANT			METHOD											QUANTITY		
			Method Used		A2-1	A2-2	A2-3	A2-4	A2-6	A2-7	A2-8	Not applicable				
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5	Emission Point 6	Emission Point 7	Emission Point 8	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
80	Chlorine and inorganic compounds (as HCl)	M	EN 1911-1 to 3: 2003		135.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	135.08	0.0	0.0	
08	Nitrogen oxides (NOx/NO2)	M	EN 14792:2005		1397.74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1397.74	0.0	0.0	
07	Non-methane volatile organic compounds (NMVOC)	C	ALT	USEPA Tanks4 software	1.554	787.8	1158.08	192.78	355.77	393.74	24.61	0.0	5357.334	0.0	2443.0	
47	**PCDD + PCDF (dioxins + furans)(as Teq)**	M	EN 1948-1 to 3:2003		0.000406	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000406	0.0	0.0	
11	Sulphur oxides (SOx/SO2)	M	EN 13649:2001		0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.57	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														
POLLUTANT			METHOD									QUANTITY		
			Method Used		A2-1	A2-3	A2-4	A2-6	A2-7	A2-8				
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5	Emission Point 6	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
02	Carbon monoxide (CO)	M	EN 15058:2004		0.57	0.0	0.0	0.0	0.0	0.0	0.57	0.0	0.0	
35	Dichloromethane (DCM)	C	OTH	USEPA TANKS4 software	0.997	415.46	178.39	33.07	95.65	0.0	1595.567	0.0	872.0	
84	Fluorine and inorganic compounds (as HF)	M	ALT	Based on USEPA 26A	6.92	0.0	0.0	0.0	0.0	0.0	6.92	0.0	0.0	
01	Methane (CH4)	C	OTH	Conversion factor for natural gas burned - from BMS corporate reporting requirements	125.39	0.0	0.0	0.0	0.0	0.0	125.39	0.0	0.0	
73	Toluene	C	OTH	Estimated process emissions	0.007	0.0	0.1	0.0	0.0	19.73	26.911	0.0	7.074	

* 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															
POLLUTANT			METHOD										QUANTITY		
			Method Used		A2-1	A2-2	A2-3	A2-4	A2-6	A2-7	A2-8				
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5	Emission Point 6	Emission Point 7	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
214	Hydrogen bromide	M	ALT	Based on USEPA 26A	6.92	0.0	0.0	0.0	0.0	0.0	0.0	6.92	0.0	0.0	
323	Methanol	C	OTH	USEPA TANKS4 software	0.157	0.0	29.31	13.28	13.96	0.0	0.0	195.707	0.0	139.0	
330	Organic solvents	C	OTH	USEPA TANKS4 software	1.554	787.8	1158.08	192.78	355.77	393.74	24.61	5357.334	0.0	2443.0	
351	Total Organic Carbon (as C)	M	ALT	FID	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.57	0.0	0.0	
244	Total Particulates	M	ALT	Based on BS 13284	669.83	0.0	0.0	0.0	0.0	0.0	0.0	669.83	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: Swords Laboratories

Please enter summary data on the quantities of methane flared and / or utilised	**T (Total) kg/Year**	**M/C/E**	**Method Used: Method Code**	**Method Used: Designation or Description**	**Facility Total Capacity m3 per hour**	
Total estimated methane generation (as pe 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 Sectio A above)	0.0				N/A	

4.3 RELEASES TO WASTEWATER OR SEWER

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER

POLLUTANT		METHOD			QUANTITY			
			Method Used		SE-1			
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
18	Cadmium and compounds (as Cd)	M	ALT	Derived from US EPA Methods SW 846-6020 and 1631B	0.039	0.039	0.0	0.0
19	Chromium and compounds (as Cr)	M	ALT	Derived from US EPA Methods SW 846-6020 and 1631B	0.378	0.378	0.0	0.0
20	Copper and compounds (as Cu)	M	ALT	Derived from US EPA Methods SW 846-6020 and 1631B	5.371	5.371	0.0	0.0
35	Dichloromethane (DCM)	M	ALT	Derived from US EPA Methods 624 and 8260B	376.21	376.21	0.0	0.0
83	Fluorides (as total F)	M	ALT	Photometric test	77.92	77.92	0.0	0.0
23	Lead and compounds (as Pb)	M	ALT	Derived from US EPA Methods SW 846-6020 and 1631B	0.206	0.206	0.0	0.0
22	Nickel and compounds (as Ni)	M	ALT	Derived from US EPA Methods SW 846-6020 and 1631B	0.623	0.623	0.0	0.0
07	Non-methane volatile organic compounds (NMVOC)	M	ALT	Total of solvents measured by method derived from US EPA Methods 624 and 8260B	8375.4	8375.4	0.0	0.0
76	Total organic carbon (TOC) (as total C or COD/3)	C	COD/3		29524.0	29524.0	0.0	0.0
24	Zinc and compounds (as Zn)	M	ALT	Derived from US EPA Methods SW 846-6020 and 1631B	5.937	5.937	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

POLLUTANT		METHOD			QUANTITY			
			Method Used		SE-1			
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
303	BOD	M	BS EN 1899-1:1998		25149.0	25149.0	0.0	0.0
306	COD	M	ALT	Photometric test	88572.0	88572.0	0.0	0.0
314	**Fats, Oils and Greases**	M	ALT	Hexane extraction and gravimetry	1482.0	1482.0	0.0	0.0
323	Methanol	M	ALT	Derived from US EPA Methods 624 and 8260B	329.41	329.41	0.0	0.0
327	Nitrate (as N)	M	ALT	Photometric test	60.87	60.87	0.0	0.0
330	Organic solvents	M	ALT	Total of solvents measured by method derived from US EPA Methods 624 and 8260B	8375.4	8375.4	0.0	0.0
343	Sulphate	M	ALT	Photometric test	20102.0	20102.0	0.0	0.0
240	Suspended Solids	M	BS EN 872:2005		21768.0	21768.0	0.0	0.0
347	Total heavy metals	M	ALT	Total of metals measured by method derived from US EPA methods SW 846-6020 and 1631B	4.3	4.3	0.0	0.0
332	Ortho-phosphate (as PO4)	M	ALT	Photometric test	8683.0	8683.0	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

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					
To Other Countries	06 01 01	Yes	0.43	Mixed waste acids	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	06 01 02	Yes	1.861	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	06 01 04	Yes	0.107	Waste acid	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	06 01 06	Yes	1.524	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	06 01 06	Yes	0.077	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	06 02 05	Yes	0.027	Lab smalls	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	06 04 04	Yes	0.03	Lab smalls	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	07 05 01	Yes	2.73	Water / Glycol waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	07 05 03	Yes	201.082	Aqueous Captopril waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	07 05 03	Yes	8.368	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	07 05 04	Yes	0.442	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	07 05 04	Yes	10.861	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	07 05 10	Yes	1.224	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp,3,Belgium

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					
To Other Countries	07 05 13	Yes	2.98	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	07 05 13	Yes	94.319	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp ,3,Belgium
To Other Countries	07 05 13	Yes	48.84	Contaminated pipework from P2 demolition	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Kommunekemi a/s,8-76-1-449-49-2005,Lindholmvej 3,.,Nyborg,5800,Denmark	Lindholmvej 3,.,Nyborg,5800,Denmark
To Other Countries	13 01 10	Yes	0.696	Waste oil / water mix	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp ,3,Belgium
To Other Countries	13 01 13	Yes	0.48	Spillage absorbent material contaminated with oil	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp ,3,Belgium
To Other Countries	13 03 07	Yes	1.283	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp ,3,Belgium
To Other Countries	13 03 10	Yes	2.141	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp ,3,Belgium
To Other Countries	15 01 10	Yes	8.613	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp ,3,Belgium
To Other Countries	15 01 10	Yes	1.825	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	15 02 02	Yes	8.709	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3, Belgium	Poldervlietweg,2030,Antwerp ,3,Belgium
To Other Countries	15 02 02	Yes	2.93	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	16 03 03	Yes	0.13	Unused catalyst for recovery	R8	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	BASF Italia Srl Divisione Catalizzatori,Decreto No 86,Via di Salone 245,.,Roma,131,Italy	Via di Salone 245,.,Roma,131,Italy
To Other Countries	16 05 04	Yes	21.902	Waste refrigerant gases	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Chemogas NV,D/PMVC/05F09/03933,Westvaartdijk,85,Grimbergen,1850,Belgium	Westvaartdijk,85,Grimbergen ,1850,Belgium
To Other Countries	16 05 04	Yes	0.004	Lab smalls	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany

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					
To Other Countries	16 05 06	Yes	0.16	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3,Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	16 05 06	Yes	0.104	Lab smalls	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	16 05 07	Yes	0.434	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3,Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	16 05 08	Yes	6.675	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
To Other Countries	16 05 08	Yes	4.427	Mixed packaged waste	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3,Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	16 08 07	Yes	5.08	Spent catalyst for recovery	R8	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	BASF Italia Srl Divisione Catalizzatori,Decreto No 86,Via di Salone 245,.,Roma,131,Italy	Via di Salone 245,.,Roma,131,Italy
To Other Countries	16 09 03	Yes	0.075	Waste peroxides	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Indaver NV,46003/233/M/1/CH/av,Poldervlietweg,2030,Antwerp,3,Belgium	Poldervlietweg,2030,Antwerp,3,Belgium
To Other Countries	16 09 04	Yes	0.019	Lab smalls	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany
Within the Country	17 05 03	Yes	443.48	Contaminated peagravel from P2 Tankfarm vaults	R10	M	Weighed	Offsite in Ireland	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Rilta Limited,W0192-02,Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland	Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland
Within the Country	17 05 03	Yes	11.82	Contaminated peagravel from P2 Tankfarm vaults	R13	M	Weighed	Offsite in Ireland	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Rilta Limited,W0192-02,Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland	Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland
Within the Country	18 01 03	Yes	0.6	Non-autoclaved waste	D9	M	Weighed	Offsite in Ireland	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Sterile Technologies,W0055-02,Beech Road Western Industrial Estate,420-430,Naas Road,Dublin 12,Ireland	Beech Road Western Industrial Estate,420-430,Naas Road,Dublin 12,Ireland
Within the Country	20 01 23	Yes	0.493	Mixed WEEE	R13	M	Weighed	Offsite in Ireland	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Rehab Recycling,WP 90868,Broomhill Road,Unit 77,Tallaght,Dublin 24,Ireland	Broomhill Road,Unit 77,Tallaght,Dublin 24,Ireland
To Other Countries	20 01 27	Yes	0.45	Waste paint containers	D10	M	Weighed	Abroad	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	AVG Abteilung IB ,IB 2234/AVG-GENB-2,Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany	Referat IB 22,Billstr. 84 ,Hamburg,D-20539 ,Germany

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	20 01 35	Yes	2.978	Mixed WEEE	R13	M	Weighed	Offsite in Ireland	Indaver Ireland,W0036-02	Tolka Quay Road,Dublin Port,Dublin,1,Ireland	Rehab Recycling,WP 90868,Broomhill Road,Unit 77,Tallaght,Dublin 24,Ireland	Broomhill Road,Unit 77,Tallaght,Dublin 24,Ireland
Within the Country	07 05 03	Yes	196.1	Bulk cytotoxic waste	D10	M	Weighed	Offsite in Ireland	BMS Cruiserath,P0052-02	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	BMS Cruiserath,P0052-02,Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland
Within the Country	07 05 03	Yes	2963.7	Bulk HCV waste	D10	M	Weighed	Offsite in Ireland	BMS Cruiserath,P0052-02	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	BMS Cruiserath,P0052-02,Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland
Within the Country	07 05 03	Yes	69.78	Bulk Acetone for recovery	R13	M	Weighed	Offsite in Ireland	BMS Cruiserath,P0052-02	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	BMS Cruiserath,P0052-02,Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland
Within the Country	07 05 04	Yes	94.88	Bulk HCV waste	D10	M	Weighed	Offsite in Ireland	BMS Cruiserath,P0052-02	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	BMS Cruiserath,P0052-02,Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland
Within the Country	07 05 04	Yes	67.28	Bulk IPA for recovery	R2	M	Weighed	Offsite in Ireland	BMS Cruiserath,P0052-02	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	BMS Cruiserath,P0052-02,Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland
Within the Country	07 05 12	No	2104.01	Waste biological sludge from site WWTP	D8	M	Weighed	Offsite in Ireland	Dublin City County Council WWTP Ringsend,.	Ringsend,.,.,Dublin 4,Ireland		
Within the Country	06 01 06	Yes	2.4	Waste acids	D15	M	Weighed	Offsite in Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Ellesmere Port,BS5193IE,Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom	Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom
To Other Countries	06 02 05	Yes	6.15	Mixed packaged waste	D10	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services plc (Cleanaway Ltd.),WD 100/316,Red Scar Industrial Estate PRESTON,Units D4 and 5,Lancashire,.,United Kingdom	Red Scar Industrial Estate PRESTON,Units D4 and 5,Lancashire,.,United Kingdom
To Other Countries	07 05 04	Yes	2.61	Waste reagent cylinders	D10	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Sava GmbH and Co. KG,10HRO03002,Ostertweute,1,Brunsbuttel,25541,Sweden	Ostertweute,1,Brunsbuttel,25541,Sweden
Within the Country	07 05 04	Yes	0.58	Syltherm and Glycol waste	R13	M	Weighed	Offsite in Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02,Corrin,.,Fermoy,County Cork,Ireland	Corrin,.,Fermoy,County Cork,Ireland
Within the Country	07 05 04	Yes	0.02	Waste reagent - DAR	D15	M	Weighed	Offsite in Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02,Corrin,.,Fermoy,County Cork,Ireland	Corrin,.,Fermoy,County Cork,Ireland
To Other Countries	07 05 13	Yes	6.72	Mixed packaged waste	D10	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Ellesmere Port,BS5193IE,Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom	Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom

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	**15 01 02**	**No**	0.78	Scrubber packing material	D15	M	Weighed	Offsite in Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland		
To Other Countries	15 01 10	Yes	2.34	Waste empty drums	D10	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Ellesmere Port,BS5193IE,Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom	Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom
To Other Countries	15 02 02	Yes	0.53	Mixed packaged waste	D10	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Ellesmere Port,BS5193IE,Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom	Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom
Within the Country	16 05 07	Yes	0.06	Lab smalls	D15	M	Weighed	Offsite in Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Ellesmere Port,BS5193IE,Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom	Bridges Road Ellesmere Port,.,South Wirral,CH65 4EQ,United Kingdom
Within the Country	07 05 01	Yes	20.44	Waste Ethylene Glycol	D15	M	Weighed	Offsite in Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services Technical Solutions Ltd.,W0050-02,Corrin,.,Fermoy,County Cork,Ireland	Corrin,.,Fermoy,County Cork,Ireland
To Other Countries	07 05 03	Yes	380.1	DCM for recovery	R2	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services plc (Cleanaway Ltd.),WD 100/316,Red Scar Industrial Estate PRESTON,Units D4 and 5,Lancashire,.,United Kingdom	Red Scar Industrial Estate PRESTON,Units D4 and 5,Lancashire,.,United Kingdom
To Other Countries	07 05 04	Yes	80.84	Acetonitrile - recovered for return to site	R2	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services plc,BS5410IG,Veolia ES garston,.,Liverpool,.,United Kingdom	Veolia ES garston,.,Liverpool,.,United Kingdom
To Other Countries	07 05 04	Yes	68.9	Acetonitrile - recovered for return to site	R2	M	Weighed	Abroad	Veolia Environmental Services Technical Solutions Ltd.,W0050-02	Corrin,.,Fermoy,County Cork,Ireland	Veolia Environmental Services plc (Cleanaway Ltd.),WD 100/316,Red Scar Industrial Estate PRESTON,Units D4 and 5,Lancashire,.,United Kingdom	Red Scar Industrial Estate PRESTON,Units D4 and 5,Lancashire,.,United Kingdom
Within the Country	15 01 10	Yes	10.91	Empty drums & IBCs	R5	M	Weighed	Offsite in Ireland	Rilta Limited,W0192-02	Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland	Rilta Limited,W0192-02,Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland	Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland
Within the Country	20 01 21	Yes	1.28	Waste lamps for recycling	R5	M	Weighed	Offsite in Ireland	Irish lamp recycling,02/2000B	Woodstock Industrial Estate Kilkenny Road,.,Athy,County Kildare,Ireland	Irish lamp recycling,02/2000B,Woodstock Industrial Estate Kilkenny Road,.,Athy,County Kildare,Ireland	Woodstock Industrial Estate Kilkenny Road,.,Athy,County Kildare,Ireland
Within the Country	18 01 03	Yes	0.024	Medical waste from Occupational Health Department	D9	M	Weighed	Offsite in Ireland	Sterile Technologies,W0055-02	Beech Road Western Industrial Estate,420-430,Naas Road,Dublin 12,Ireland	Sterile Technologies,W0055-02	Beech Road Western Industrial Estate,420-430,Naas Road,Dublin 12,Ireland

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	18 01 03	Yes	0.6	Non-autoclaved waste	D9	M	Weighed	Offsite in Ireland	Eco Safe Systems Ltd,W0054-02	Allied Industrial Estate Kylemore Road,Unit 1 A,Ballyfermot,Dublin 10,Ireland	Eco Safe Systems Ltd,W0054-02,Allied Industrial Estate Kylemore Road,Unit 1 A,Ballyfermot,Dublin 10,Ireland	Allied Industrial Estate Kylemore Road,Unit 1 A,Ballyfermot,Dublin 10,Ireland
Within the Country	07 05 03	Yes	83.96	Bulk HCV waste - stored by Cruiserath for trials 2010	D15	M	Weighed	Offsite in Ireland	BMS Cruiserath,P0052-02	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	BMS Cruiserath,P0052-02,Cruiserath Road,.,Mulhuddart,County Dublin,Ireland	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland
Within the Country	17 04 05	No	137.291	Metal waste from P2 DAR	R4	M	Weighed	Onsite in Ireland	Hammond Lane Metal Co. Ltd,WP 98107	Pigeon House Road,.,Ringsend,Dublin 4,Ireland		
Within the Country	17 04 11	No	4.5	Waste cables from P2 DAR	R4	M	Weighed	Onsite in Ireland	Hammond Lane Metal Co. Ltd,WP 98107	Pigeon House Road,.,Ringsend,Dublin 4,Ireland		
Within the Country	17 05 04	No	10846.66	Waste excavated soil & stones from Firewater project	D1	M	Weighed	Offsite in Ireland	Fingal County Council Balleally Landfill,W0009-04	Balleally,.,Lusk,Co. Dublin,Ireland		
Within the Country	17 01 01	No	4.8	Concrete from Firewater project	D1	M	Weighed	Offsite in Ireland	Fingal County Council Balleally Landfill,W0009-04	Balleally,.,Lusk,Co. Dublin,Ireland		
Within the Country	17 03 02	No	276.99	Tarmac from Firewater project	D1	M	Weighed	Offsite in Ireland	Fingal County Council Balleally Landfill,W0009-04	Balleally,.,Lusk,Co. Dublin,Ireland		
Within the Country	17 06 05	Yes	0.64	Drainage pipe from Firewater project	D13	M	Weighed	Offsite in Ireland	Rilta Limited,W0192-02	Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland	Rilta Limited,W0192-02,Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland	Greenogue Business Park,Block 402,Rathcoole,County Dublin,Ireland
Within the Country	17 05 04	No	637.4	Soil & Gravel from Firemains project	D1	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,.,Ballycoolin,Dublin 11,Ireland		
Within the Country	17 01 01	No	50.16	Concrete from Firemains project	R11	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,.,Ballycoolin,Dublin 11,Ireland		
Within the Country	17 03 02	No	46.08	Tarmac from Firemains project	D1	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,.,Ballycoolin,Dublin 11,Ireland		
Within the Country	17 04 05	No	16.7	Tanks from P2 Tankfarm DAR	R4	M	Weighed	Offsite in Ireland	Hammond Lane Metal Co. Ltd,WP 98107	Pigeon House Road,.,Ringsend,Dublin 4,Ireland		
Within the Country	15 01 01	No	14.12	Cardboard packaging	R5	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,.,Ballycoolin,Dublin 11,Ireland		
Within the Country	15 01 06	No	1.47	Mixed packaging	R5	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,.,Ballycoolin,Dublin 11,Ireland		
Within the Country	17 01 07	No	44.45	C&D waste	R5	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,.,Ballycoolin,Dublin 11,Ireland		
Within the Country	17 05 04	No	10.05	C&D waste	D1	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,.,Ballycoolin,Dublin 11,Ireland		

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	17 05 04	No	105.17	C&D waste	R5	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	17 08 02	No	3.29	C&D waste	D1	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	19 12 12	No	41.72	C&I dry mixed waste	D1	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	20 01 08	No	5.77	Composted kitchen waste	R3	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	20 01 38	No	74.93	Wood	R3	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	20 01 40	No	97.37	Metal	R4	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	20 03 01	No	37.93	Mixed municipal waste	D1	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	20 03 07	No	51.01	C&I dry mixed waste	D1	M	Weighed	Offsite in Ireland	Greenstar Recycling Holdings Ltd,W0183-01	Millennium Business Park Grange ,,,Ballycoolin,Dublin 11,Ireland		
Within the Country	20 01 02	No	2.78	Glass	R5	M	Weighed	Offsite in Ireland	Rehab Recycling,WP 90868	Broomhill Road,Unit 77,Tallaght,Dublin 24,Ireland		
Within the Country	20 01 01	No	13.52	Paper	R5	M	Weighed	Offsite in Ireland	Rehab Recycling,WP 90868	Broomhill Road,Unit 77,Tallaght,Dublin 24,Ireland		
Within the Country	07 05 12	No	4461.52	Waste biological sludge from WWTP	R3	M	Weighed	Offsite in Ireland	BMS Cruiserath,P0052-02	Cruiserath Road,.,Mulhuddart,County Dublin,Ireland		
Within the Country	07 05 04	Yes	61.272	IPA recovered on site	R2	M	Volume Calculation	Onsite in Ireland	Swords Laboratories,P0014-04,Watery Lane,.,Swords,County Dublin,Ireland	Watery Lane,.,Swords,County Dublin,Ireland	Swords Laboratories,P0014-04,Watery Lane,.,Swords,County Dublin,Ireland	Watery Lane,.,Swords,County Dublin,Ireland
Within the Country	07 05 04	Yes	386.89	Acetone recovered on site	R2	M	Volume Calculation	Onsite in Ireland	Swords Laboratories,P0014-04	Watery Lane,.,Swords,County Dublin,Ireland	Swords Laboratories,P0014-04,Watery Lane,.,Swords,County Dublin,Ireland	Watery Lane,.,Swords,County Dublin,Ireland
Within the Country	07 05 03	Yes	382.04	DCM recovered on site	R2	M	Volume Calculation	Onsite in Ireland	Swords Laboratories,P0014-04	Watery Lane,.,Swords,County Dublin,Ireland	Swords Laboratories,P0014-04,Watery Lane,.,Swords,County Dublin,Ireland	Watery Lane,.,Swords,County Dublin,Ireland

* Select a row by double-clicking the Description of Waste then click the delete button

Appendix H

Solvent Management Plan

P0014-04 AER 2009

Solvent Management Plan 2009

for Swords Laboratories

Clean Technology Centre
Melbourne Business Park
Model Farm Road
Cork

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2 Description of the Solvent Management Plan

3 Results and Comments

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Appendix 1 Overall Solvent Management Plan Results

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1 INTRODUCTION

The Clean Technology Centre has carried out a solvent mass balance at Swords Laboratories for the period January 2009 to December 2009. The overall results of the solvent management plan are given in Appendix 1.

Twelve solvents were included in the solvent mass balance, namely Acetone, Acetonitrile, Ethanol, Ethyl acetate, Isopropanol (IPA), Methanol, Methylene chloride (DCM), Methyl isobutyl ketone (MIBK) and Toluene. The solvents listed are stored in bulk and constitute the majority of solvents at the site in terms of usage.

An additional three solvents namely Heptanes, Butanol and Tetrahydrofuran (THF) are also stored in bulk in the facility. However these three solvents in total only account for < 2% of the total solvent throughput and are therefore not assessed further in this solvent management plan.

2 DESCRIPTION OF THE SOLVENT MANAGEMENT PLAN

A list of the terminology used in the Solvent Management Plan is given in Appendix 2. The following paragraphs describe the main terms used in the solvent management plan, and the sources of information for such terms.

Fresh Solvent Input

The input stream for the solvent mass balance consists of the sum of the individual goods receipts for each solvent and the virgin solvent change of inventory (COI) as recorded in the in-house solvent mass balance spreadsheet.

Recovered & Reused Solvent

The volumes of solvent recovered on-site are recorded and summarized in in-house spreadsheets. The recovery of the IPA mother liquor is now included within the total recovered solvent on-site. The difference between the inventory of the recovered solvent tanks at the start and end, together with the total recovered amount, gives solvent recovered and reused at the site.

Total Solvent Input or Usage

This figure is based on the sum of fresh solvent purchased and used, and solvent recovered and used.

Licensed Emissions to Air

Licensed emissions to air consist of the thermal oxidiser (TO) Vent 130 and 7 different vents (via scrubbers) when the TO is off-line.

Thermal Oxidiser (TO)

Emissions from the thermal oxidiser vent during operation have been calculated using the total kg of carbon emitted from the TO for the year, obtained through regular monitoring. This has been attributed to the various solvents in use in proportion to the throughput of each solvent at the site.

Licensed Emissions when TO is Off-line

When the thermal oxidiser is off-line, process emissions are vented through a number of licensed vents. The operation of processes, particularly those involving DCM is minimized, during periods when the TO is not operational. Emissions from these vents when the TO is down have been calculated based on TO downtime memos submitted by all plant managers. These memos detail the processes and unit operations that were being performed during such downtime. Engineering estimates of emissions associated with such processes undertaken during the TO downtime have been calculated.

Fugitive Emissions to Air

Fugitive emission sources at Swords Laboratories are from the tank farm (apart from a number of tanks which are connected to the TO), building vents not connected to the TO, waste water treatment plant emissions through the biofilter, and any components external to production buildings.

Tank Farm Emissions to Air

The number and type of solvent storage tanks in the P8, P2 and Solvent Recovery tank farms has changed substantially in recent years. Solvent storage tanks consist of tanks containing fresh solvent, tanks containing recovered solvent, and tanks containing waste for either disposal or on-site/off-site recovery. The majority of these tanks are underground storage tanks.

Up to 2007 there were 33 storage tanks at the site containing solvent or solvent-related waste. All of these tanks vented to atmosphere apart from TK8 [fresh DCM], and TK11 and T12 which were connected to the TO.

In mid 2008 seven of these underground tanks were removed and replaced with five vertical above ground tanks (TK15, TK16, TK17, TK18, TK19). These above ground tanks, which are painted white to minimise breathing losses, are all connected to the TO. In 2009 a number of the original underground tanks were removed and replaced with new tanks, which are connected to the TO.

Fugitive emissions were estimated using the USEPA software TANKS 4.0.9d. These emissions were scaled up based on tank throughputs and composition, which was obtained through waste analysis by Swords Laboratories.

For those tanks which are connected to the TO, an estimate of emissions to atmosphere was made for when the TO was off-line based on the total hours of TO downtime for the year.

Building Vents Not Connected to the TO

There are fugitive emissions associated with general building ventilation systems that are not connected to the TO. An estimate of such emissions was made using flow data for individual vents, information on whether such vents are connected to the TO or not, and relevant occupational solvent monitoring from recent years within the production buildings, where available. The emissions from this source are minimal in comparison to the other fugitive emission sources

WWTP Biofilter Emissions

Emissions to air from the wastewater treatment plant were directed to the TO throughout the year. These emissions were calculated using estimates of solvent stripped to air within the waste water treatment plant and the monitored solvent removal efficiency of the biofilter.

Components External to Production Buildings

For this mass balance no estimate has been made regarding process components such as flanges, pump seals, valve stems, etc. Previous monitoring at the site (within buildings and at the tank farm), as well as extensive monitoring in the Irish pharmachem industry has shown such emissions to be negligible. Emissions from such components within production buildings will be captured by building ventilation. Hence it is deemed that the only components of future relevance would be those on process lines external to production buildings. This would include lines between the tank farm and production buildings, as well as lines to and from the solvent recovery plant, components within the solvent recovery plant itself, and to a lesser extent, lines to the waste water treatment plant (dilute stream).

Summary of Air Emissions

Summary information on licensed and fugitive air emissions is as follows:

	Licensed Emissions			**Fugitive Emissions**			
	Emitted by TO during operation (kg)	Emitted during TO downtime (kg)	*TOTAL (kg)*	Building Ventilation not connected to TO (kg)	Storage Tanks not connected to TO (kg)	WWTP biofilter during TO downtime (kg)	*TOTAL (kg)*
Acetone	0.21	990	*990*	50	961	17.92	*1,029*
Acetonitrile	0.03	5.82	*6*		107	0.05	*107*
Ethyl Acetate	0.03	100	*100*	0	43	0	*43*
IPA	0.09	1,002	*1,002*	105	49	0.15	*154*
Methanol	0.16	57	*57*		139	0.23	*139*
DCM	1	747	*748*	132	730	10.19	*872*
MIBK	0.01	28	*28*	32	6	1.14	*39*
Toluene	0.01	20	*20*	0	7	0.07	*7*
Ethanol	0.02	3	*3*		14	0	*14*
Total	**1.56**	**2,953**	***2,954***	**319**	**2,056**	**29.75**	***2,404***

Solvent discharged to Sewer

Monitoring of effluent from the WWTP for specific solvents is carried out on a monthly basis. Total daily flows from the WWTP are recorded by a flowmeter. The total mass of solvent sent to sewer is calculated using these measured parameters.

Consumed

The consumed term consists of solvent biodegraded in the waste water treatment plant and solvent treated by the site's thermal oxidiser.

Solvent Biodegraded in the WWTP

Monitoring of the influent and effluent from the WWTP for specific solvents is carried out on a monthly basis. Total daily flows from the WWTP are recorded by a flow meter.

There are also a number of additions and spills to the WWTP, which are not captured by the monitoring of influent to the WWTP. For 2009 these additions composed of approximately 1600 litres of solvent waste. Compositions were obtained or inferred.

The balance tanks had an average residence time in 2009 of approximately 3.7 days. Analysis of influent to the waste water treatment plant is carried out on a monthly basis. Hence those additions which occurred outside the 3 days of a sampling period would not have been captured in the analysis. Such additions were included as an extra load. One spill comprising of approximately 800 litres of DCM was directed to the WWTP.

The difference between the solvent load in tonnes per year in the influent and the effluent from the WWTP gives the amount of solvent that is either biodegraded or is stripped to air from the WWTP. Under normal operation a certain amount of solvent in the influent will be stripped through agitation in the balance tanks or aeration within the carousel. This stripped solvent is collected and vented to the biofilter/TO. The fraction of solvent that is stripped and the fraction that is biodegraded in the WWTP were determined through the utilisation of a USEPA software programme, WATER8.

Solvent Treated by the TO

Solvent treated by the TO is made up of process emissions, building vents connected to the TO, emissions from the solvent recovery plant when operational, and vent emissions from a large number of tanks connected to the unit.

Estimates for process emissions treated by the TO consist of:

- Estimates of process emissions associated with distillations at the site. Estimates were calculated based on distillation hours per batch, batches per year, equipment in use, and engineering estimates of associated emissions. Engineering estimates or modeled emissions rather than actual measured emissions were used.
- Solvent from building vents treated by the TO was estimated based on which vents were connected, fan ratings, occupational solvent monitoring within the production buildings, where available, and the associated process durations.

- Solvent from the WWTP treated by the TO was estimated using the quantity of solvent stripped to air in the WWTP (see above) and subtracting the quantity of solvent emissions that passed directly through the biofilter during TO downtime.
- Solvent from solvent recovery plant operation treated by the TO was estimated based on the volumes recovered, typical batch size and duration, and engineering estimates of associated emissions. It was assumed that the solvent recovery plant was not operational during any of the TO shut downs.
- Solvent emissions from the solvent storage tanks treated by the TO was estimated based on emissions estimates for these tanks minus the emissions to air during TO downtime. The tanks that are connected to the TO are TK08 [fresh MC], TK 11 and TK12 in the P8 Tank Farm, TK15, TK16, TK17, TK18, TK19 in the Solvent Recovery Tank Farm and TK20, TK21, TK22, TK23 in the P2 Tank Farm.

For the SMB in 2004 and 2005, monitoring of the feed stream to the TO was carried out for a number of months. This was used as one method to estimate the solvent treated by the TO. However, due to persistent problems experienced with this sampling, this practice has been discontinued.

Waste Offsite

Waste off-site consists of solvent waste sent for disposal and a certain amount for recovery. The waste contractor provides summary data on the unit weight of each load with analysis per load undertaken by Swords Laboratories. Where the contents of a bulk tank are shipped in two separate tankers the bulk tank is analysed with the analysis applied to both tankers. The quantity of packaged waste is also recorded with solvent composition analysed on a regular basis.

Accumulation

Accumulation of solvent is the difference in the quantities of solvent between the start and end of the period of the solvent mass balance in waste tanks and drums, and in the recovered solvent tanks. The inclusion of this term differentiates between waste generated and that which has actually been shipped, and also differentiates between solvent recovered and actually reused.

3 MASS BALANCE RESULTS AND OBSERVATIONS

RESULTS – UNACCOUNTED SOLVENT

The quantity of unaccounted solvent in the mass balance is calculated using the following equation:

Unaccounted = Input fresh solvent – Output - Accumulation

The table gives a breakdown of unaccounted solvent for 2007 and for 2008 expressed as a percentage of total usage or throughput, for each solvent in use.

Solvent	% Unaccounted 2009	% Unaccounted 2008		Proportion of total solvent usage, 2009 (%)
Acetone	7.77 %	23.4 %		28.8 %
Acetonitrile	-1.9 %	13.9 %		3.68 %
Ethyl acetate	35.74 %	15 %		3.32 %
IPA	3.91 %	7.5 %		12.11 %
Methanol	10.25 %	28.6 %		13.19 %
DCM	-3 %	-2.4 %		31.66 %
MIBK	25.96 %	1.8 %		2.18 %
Toluene	-76.02 %	43.8 %		1.48 %
Ethanol (SD3A alcohol)	-15.25 %	Not previously stored in bulk		2.54 %

The overall unaccounted value for total bulk solvent usage onsite in 2009, is estimated to be 3.32% of total solvent usage, significantly reduced from a value of almost 13% in 2008. The 2009 value incorporates the additional solvent ethanol. However if this solvent is excluded the 2009 overall unaccounted value of 3.81 % is still significantly reduced from the 2008 value.

The positive unaccounted figures show that there is more solvent in the input than in the output streams, and the negative vice versa. Some of the unaccounted figures are high such as ethyl acetate, methanol and MIBK. The reason behind these high net positive unaccounted figures is mainly because either solvent treated by the TO is under estimated or the relevant composition of the waste is under-estimated. Additional comments are given under Observations below.

RESULTS – FUGITIVE EMISSIONS

For corporate reporting purposes fugitive emissions consists of emissions of solvent to air other than through the main waste gas stacks. Fugitive emissions results for the site are summarised in the following table expressed as a percentage of total usage or throughput.

Solvent	Fugitive emissions to air (tonnes)	Fugitive emissions to air (% of throughput or usage)
Acetone	1.03	0.07 %
Acetonitrile	0.11	0.06 %
Ethyl acetate	0.04	0.02 %
IPA	0.15	0.02 %
Methanol	0.14	0.02 %
DCM	0.87	0.05 %
MIBK	0.04	0.03 %
Toluene	0.007	0.01 %
Ethanol	0.014	0.01 %
Total	**2.4**	**0.047 %** of Total Throughput or Usage

OBSERVATIONS

Emissions to air

Total emissions to air in 2009 are reduced from 2008 levels. Comparison between emissions in 2008 and 2009 is best undertaken by expressing the total emissions in terms of overall solvent usage or throughput. The following table compares 2007 and 2008 emissions to air expressed in terms of throughput.

Solvent	Emissions to air, % of total solvent throughput 2009	Emissions to air, % of total solvent throughput 2008
Acetone	0.14%	0.26%
Acetonitrile	0.06%	0.01%
Ethyl acetate	0.08%	0.10%
IPA	0.18%	0.04%
Methanol	0.03%	0.12%
DCM	0.11%	0.13%
MIBK	0.06%	0.24%
Toluene	0.03%	0.07%
Ethanol	0.01%	

It can be seen that the emissions to air per tonne throughput for acetone, Methylene chloride, ethyl acetate, methanol, MIBK and toluene are reduced compared to 2008 values. The combined usage of these solvents accounts for roughly 80% of total solvent usage onsite.
A number of observations, which can explain the changes in actual total emissions, are outlined below:

- The emissions from the TO during operation have been reduced as can be seen by the reduced carbon emissions (from 0.48 kg to 0.45 kg).
- The licensed emissions have decreased for acetone, methanol, MIBK, toluene.
- The increase in actual emissions to air of Methylene chloride and isopropyl alcohol is primarily due to increased process emissions during TO downtimes. For the majority of processes, processing was halted but a limited number of processes had to continue due to being at critical steps in the process. Monitoring takes place when processing continues during TO downtime to ensure the licence limits are not exceeded.
- The fugitive emissions to air have decreased for the main solvents used onsite; acetone, IPA, Methylene chloride, MIBK and toluene.
- The continuous improvement of the solvent tank farms in recent years has resulted in the significant reduction of fugitive emissions from the site. These improvements include the replacement of tanks, painting of tank shells and connection of vents to the TO. The connection of the recovered DCM storage tank (TK41) to the TO in early 2010, will further reduce fugitive emissions from the site in the future.

Unaccounted solvent

The percentage unaccounted solvent in the SMP is poor for a number of the solvents – namely methanol, toluene, ethyl acetate, MIBK and ethanol. Excluding methanol, these solvents only account, in total for roughly 10% of the total solvent usage onsite. Therefore a high unaccounted value for these solvents would not be critical in the overall accuracy of the SMP. Possible reasons for these unaccounted values are given below:

- ***Methanol:***
  Though the unaccounted value for methanol at 10% is poor, it is reduced from a value of 27% in 2008. This shows an improvement in the tracking of the solvent in 2009. The unaccounted quantity of this solvent is likely to be attributable to an underestimation of the quantity of solvent consumed onsite in the TO or WWTP.
- ***Toluene***
  The unaccounted value for toluene is primarily down to the over-estimation of the waste solvent being sent offsite for treatment.
- ***Ethyl acetate:***
  The unaccounted value for at 35.74% is increased from a value of 15% in 2008. This is primarily down to the under-estimation of the waste solvent sent off-site for treatment. This can be seen by the fact that though the overall solvent usage onsite increased by over 50%, the quantity of solvent sent for treatment only increased by 22%.
- ***MIBK:***
  The unaccounted value for at 25.96% has increased from a value of 1.8% in 2008. This is primarily down to the under-estimation of the waste solvent sent off-site for

treatment. This can be seen by the fact that though the overall solvent usage onsite increased by over 71%, the quantity of solvent sent for treatment only increased by 29%.

- ***Ethanol***
  Ethanol is tracked for the first time in this SMP, as it is now stored and used in bulk in the facility. The unaccounted value for ethanol at -15.25% is relatively good, considering this is the first year of tracking. The over-estimation is due to the over-estimation of the waste solvent being sent offsite for treatment.

TO Downtime Memo System

The memo system for TO downtimes provides a more exact picture as to what is actually occurring within a production building during the shutdown period and hence should lead to a more accurate emissions estimation.

The memo template, which was adopted in 2004 has resulted in a more organized identification system of those processes which are of concern in the estimation of emissions during TO downtimes.

In 2007 the memo downtime format was revised to incorporate a column detailing the exact time span that the operation was actually in progress during the TO shutdown. This has been found to be of benefit in estimating the emissions associated with processes which only operated for a short period in an extended TO shutdown. Previously for extended TO downtime each plant manager was contacted directly to determine the actual period of processing. This process delayed the estimation process and also entailed a number of man hours work. Further to this, where the plant manager could not determine the actual length of time, due to the lapse in time, the emissions were based on the entire shutdown period. This resulted in significant over-estimation of the solvent treated by the TO. In order to ensure the accuracy of emissions during the TO downtime it is essential that the plant managers detail the actual time of the downtime applicable to the process steps.

In 2008 the TO downtime memos were further improved to detail the quantity of solvent involved in the process step.

Monitoring in Water Treatment Plant Influent and Effluent

The monitoring for certain solvents, particularly those included in the SMB, in the influent and effluent to/from the waste water treatment plant commenced in November 2004. This monitoring allows for more accurate fugitive emissions from the WWTP and final emissions to sewer to be determined.

4 SOLVENT MASS BALANCE RECOMMENDATIONS

Recommendations have been divided into those that would reduce emissions from the site and those that would improve the accuracy of the solvent mass balance.

The following would help reduce the level of emissions from the site:

- A large number of solvent storage tanks are now either connected to the TO or painted white to minimise fugitive emissions from the tank. The connection of the recovered Methylene chloride (TK41) to the TO, in early 2010, will result in further reductions of fugitive emissions in future Solvent Management Plans.

  There are a limited number of tanks with large turnovers that may be painted or connected to the TO in future years, where feasible, to minimise fugitive emissions to air. However those tanks, which contribute the largest quantity of breathing and working losses, are at this point connected to the TO.

The following measures would improve the accuracy of the solvent mass balance:

- TO feed measurement
- Continued use of TO downtime memo system incorporating time element for longer shutdowns.
- Review of other tanks for inclusion in tank emissions estimation.
- Distillations Estimates
- Process Emissions Estimates
- Reassessment of the analysis procedure of the solvent waste tanks.

TO Feed Measurement

The most accurate method to determine the quantity of solvent being treated or consumed by the thermal oxidiser is to sample and monitor the feed stream. The feed stream should be sampled over a range of periods to determine the average vent header composition. Further to this the recording of what processes were being undertaken at the time of monitoring in the different production plants will improve the overall solvent estimation. A number of sampling campaigns have been undertaken in previous years with a limited number of campaigns undertaken in 2006. However this sampling and monitoring program has been discontinued due to problems with the monitoring and analysis equipment.

Depending on the future improvement of the monitoring probe and measurement techniques it is recommended that the feasibility of reintroducing this programme be looked at.

TO Downtime Memos

The implementation of the revised TO Downtime Memo, incorporating the actual batch processing time has been found to be of benefit in estimating accurately the quantity of solvent emitted to atmosphere during the TO shutdown. However there have been instances where it is felt that the actual process time is not being accurately recorded. For those

downtimes over one hour, where processing is continued, it is suggested that the TO memos include detailed information on the process steps undertaken.

The EPA TO bypass programme requires the licensee to determine if TO downtimes are significant. Since December 2008, Swords Laboratories is required where a downtime is over one hour processing time, to halt processing (which is generally undertaken) unless monitoring can show that the emissions will not exceed stack limits set in the IPPC licence if continued. Process step data also indicates that emission limits would not be exceeded if continued during TO bypass periods.

Other Tank Emissions

All storage tanks should be assessed for their inclusion in the estimation of fugitive emissions to air, particularly those tanks used for the storage of waste. The site should be reviewed for such other tanks and included if likely to be relevant/significant.

Distillations Estimates

There are many assumptions inherent in the method used to calculate solvent treated by the TO. Such assumptions include saturated air, estimates for air flow rates and the identification of the vessels used. CTC believe that the volume treated by the TO may be over-estimated for a number of solvents. CTC would recommend the development of an alternative method.

Alternatively an assessment of the process, vent header and TO set up as to whether the controlling mechanism is mass transfer (diffusivities) or thermodynamics (saturated air) could be carried out.

A possible alternative method involves the accurate measurement of the solvent added to the vessel and the solvent collected in the receiving vessel, for a number of distillations. The difference is then the amount sent to the TO via a vent header and can be used to develop a factor which can be applied to the number of distillations per year.

Process Emissions Estimates

With regard to the downtime process emissions estimation it is suggested that monitoring of individual equipment vents could be undertaken for particular process steps. Those process steps, for high production products, which are believed to contribute large quantities of VOCs to the vent header e.g. drying and centrifugation operations under vacuum, should first be assessed. A number of these monitoring steps could be undertaken each quarter with a database of emission estimates built up over time.

Alternatively where monitoring of the individual steps is not feasible and the current estimation system is continued, it is recommended that the efficiency of mitigation equipment e.g. scrubber be investigated and incorporated into the emission estimate.

Waste Solvent Tank Analysis

In the Pharmachem sector the solvent waste stream sent offsite for treatment is often the largest output stream in the input-output assessment of the Solvent Management Plan. Therefore in order to accurately estimate the solvent waste it is important to ensure that the analysis of the waste tankers is as accurate as possible. Each individual tank shipment should be appropriately sampled to ensure an adequate representation of the waste. Extra analysis of tanks prior to a change of purpose i.e. where the tank is used to store a different type of waste should be undertaken. The mixture of two significantly different waste streams may result in the over or under estimation of a particular solvent.

Appendix 1 Overall Solvent Mass Plan Results

	MASS BALANCE			Jan 2009 - Dec 2009			(tonnes)											
	FRESH SOLVENT				INPUT	CONSUM.			OUTPUT						ACCUM	UNACCOUNTED		
tonnes			Purchased		or													2008
			+	Recovered	USAGE	in		Total	Air -	Air -	To	recovered	waste	Lost to	Accum			% Unac
	Purchased	COI	COI	& Reused		WWTP	byTO	Consumed	Licensed	Fugitive	Sewer	off-site	generated	Product	on-site	Unacc	%Unacc	
Acetone	1167.029	-9.0	1,158	336	1,494	56	103	159	0.990	1.029	5	35	904	0	-62.84	116	7.77%	23.48%
Acetonitrile	181.8501	8.7	191	0	191	0.3	2	2	0.006	0.107	0	56	134	0	2.14	-4	-1.90%	13.88%
Ethyl Acetate	177.0566	-4.6	172	0	172	0.00	3	3	0.100	0.043	0	0	107	0	0.06	62	35.74%	15.02%
IPA	394.1191	-16.5	378	254	631	17.3	1	18	1.002	0.154	3	68	252	0	10.65	25	3.91%	7.53%
Methanol	676.538	7.6	684	0	684	69	5	74	0.057	0.139	0	4	534	0	2.03	70	10.25%	28.60%
MC	**1346.694**	**-45.1**	**1301.61**	**340.62**	**1642.24**	**34.14**	**393.55**	**427.69**	**0.748**	**0.872**	**0**	**410.11**	**559**	**0**	**-47.51**	**-49**	**-3.00%**	**-2.41%**
MIBK	89.46015	23.8	113.22	0.00	113.22	3.87	1.12	4.98	0.028	0.038	0	1.59	77	0	0.00	29.39	25.96%	1.80%
Toluene	65.80034	-12.2	53.61	23.41	77.02	0.35	0.37	0.72	0.020	0.007	0	0.81	87	0	23.43	-58.55	-76.02%	43.78%
Ethanol	122.9246	8.8	131.69	0.00	131.69	0	0	0.02	0.003	0.014	0	4.75	147	0	0.03	-20.08	-15.25%	
Total	**4,221**	**-39**	**4,183**	**953**	**5,136**	**180**	**509**	**690**	**3**	**2**	**8**	**580**	**2,801**	**0**	**-72**	**170**	**3.32%**	

Appendix 2: Terminology Used and its Relation to the Solvents Directive

Shorthand used in Solvent Management Plan	Description
Purchased + COI	Annual virgin solvent purchases plus the change in inventory (COI) of virgin solvent (tanks and drums) between the start and end of the year.
Recovered & Reused	Solvent recovered and reused on-site. Consists of actual recovered amounts and the change in inventory of recovered solvent.
Input or Usage	Throughput or usage of solvent in the production and pilot plants (corresponds to Gross Usage in current PER terminology)
Air - Licensed	Solvent lost to air through licensed emission points (TO and scrubbers).
To Sewer	The quantity of solvent discharged to sewer from the outflow of the waste water treatment plant.
Lost to Product	The quantity of any solvent present as a contaminant in the finished product. (Assumed zero).
Air - Fugitive	Solvent lost to air other than through licensed emission points. Includes tanks not connected to the TO, building vents not connected to the TO, the waste water treatment plant when the TO is off-line/not connected, and any components external to production buildings.
Consumed in WWTP & Consumed by TO	Solvent treated by the site's thermal oxidiser and biodegraded in the site's waste water treatment plant.
Waste generated	The quantity of solvent waste generated. Consists of solvent sent off-site for disposal and change in relevant waste tank inventories.
-	Not relevant to the site. Any solvent present in products will be as a contaminant only.
Recovered off-site	Solvent sent off-site for recovery and reuse in other applications (including use as a fuel).
-	Not relevant to the site.
Unaccounted	The difference between fresh solvent input and solvent output and accumulation. Illustrates the accuracy of the solvent mass balance.
Accumulation	Change in the quantity of solvent in the plant – namely the recovery plant tanks. Used in the unaccounted calculation.