CONTENTS

1. NOTIFICATION LETTER TO PLANNING AUTHORITY

Resubmit a notification letter to the planning authority with the necessary amendments, in accordance with Article 6 and 9 of the EPA (Licensing) Regulations 1994 to 2004.

This has been completed. A copy of that letter can be found in ***Attachment 1*** of this report.

2. UPDATE SITE DRAWING IDENTIFYING ALL EMISSION/MONITORING POINTS

Provide an updated site drawing (no larger than A3) clearly identifying and labelling all emission/monitoring points.

The updated site drawing can be found in ***Attachment 2*** of this report, and this now clearly identifies all emission points.

3. NATIONAL GRID REFERENCES FOR EMISSION/MONITORING POINTS

Provide the National Grid References (12 digit 6E, 6N) for each emission/monitoring point.

The National Grid References for each emission point are detailed on the site drawing in ***Attachment 2*** of this report.

4. LOCATION & CLASS OF OIL INTERCEPTORS

Identify the location and the class of each oil interceptor on the site of the installation.

There is one Class 2 oil/petrol interceptor in place on site. Its location is marked on the site drawing in ***Attachment 2*** of this report.

5. DETAILS OF HYDROGEN BROMIDE USE

Provide details of hydrogen bromide use on site. Include the information required to complete tables G.1(i) and G.1(ii) as relevant.

Tables G.1(i) and G.1(ii) have been completed for Hydrogen Bromide in addition to the Raw materials, Intermediates and Products documented in the site's IPC Licence Review Application and can be found in ***Attachment 3*** of this report.

6. TABULATED DATA FOR EMISSIONS TO ATMOSPHERE

Complete Tables F.1(i) and F.2(i) for emissions to atmosphere A2-1 and A2-2.

Section 12 of the P0552-01 Licence application has being updated using the Tables F.1(i) and F.2(i) as requested and these are contained ***Attachment 4*** of this report.

7. DETAILS OF INCINERATION PROCESS AS REQUIRED BY THE INCINERATION OF WASTE DIRECTIVE (2000/76/EC)

Submit details of the incineration process on-site in accordance with the requirements of the Incineration of Waste Directive (2000/76/EC); include details for the process when treating (i) liquid solvent waste and waste gases & (ii) waste gases only. Provide details in relation to Articles 4.(2),(3),(4 a, b & c),(5 a & b), Article 5.(1),(2),(3 a, b, & c), (4 a & b),(5), and Articles 6, 7, 8, 9, 10 and 11 of the Incineration of Waste Directive (2000/76/EC), as appropriate.

7.1 Article 4.2:

Without prejudice to Directive 96/61/EC, the application for a permit for an incineration or co-incineration plant to the competent authority shall include a description of the measures which are envisaged to guarantee that:

7.1.1 *(a) the plant is designed, equipped and will be operated in such a manner that the requirements of this Directive are taking into account the categories of waste to be incinerated;*

A description of the design and operation of the incinerator was included in the original IPC Licence Application for the site under Section 9.G - Incineration and Waste Handling. The relevant drawings and PFDs for the incinerator are Figures 9.76-9.84 of the original application. The following is a short summary of this description, including applicable amendments.

Incineration Plant Overview

Thermal treatment technology is used for the on-site disposal of the waste gases and liquids generated by the BMS Cruiserath facility. Some liquid solvent waste generated at the BMS Swords facility is also disposed of via the thermal treatment technology at the Cruiserath site. The wastes treated are as follows:

Gaseous

1. Nitrogen/organic vapour VOC (VOC rich) streams from the process equipment, solvent recovery and tank farm.
2. Air rich/organic vapour VOC (VOC lean) streams from the point extraction system (micro-polluted air).
3. Potentially odorous air exhausts containing trace organic components from the biological wastewater treatment plant.
4. Organic/water vapours from the wastewater stripper.

Liquid:

1. High calorific value (HCV) mainly organic liquids
2. Halogenated solvents
3. Low calorific value (LCV) aqueous streams that are unsuitable for biological wastewater treatment.

The incinerator is able to perform the duty resulting from peak VOC (gases), peak organic liquid waste and peak LCV flows all occurring simultaneously. The incinerator is capable of achieving the duty at a combustion temperature of >1100ºC, with a calculated average residence time of 7 seconds. The incinerator vents through a stack (emission point A2-1) which is continuously monitored for the following parameters: TOC, particulates, hydrogen chloride, SOx (as SO_2), NOx, carbon monoxide and ammonia.

Current Incinerator Operation

The incinerator treats liquids and gaseous wastes. It operates 24 hours a day, 7 days a week. The incinerator facility is comprised of the following sections and operations:

- Combustion Section

Thermal treatment of liquid and waste gases at >1100ºC in a vertical down fired refractory lined combustion and post-combustion chamber.

- Heat Recovery Section

Through water tube type boiler with three radiant sections, and a convection section. This is mechanically cleaned.

- Acid Gas and Halogen Removal System

This consists of a water injector throughout a Venturi scrubber followed by an absorption and neutralisation section.

- Particulate Removal

Based on a Wet Electrostatic Precipitator (WESP) to lower solid, mostly silica based, particulates content to less than 10 mg/Nm^3.

- DeNOx Unit

Based on a fixed bed catalytic reactor. The inlet temperature is controlled by an in-line burner. This is designed to reach the operating temperature for the nitrogen oxides reaction with ammonia. A steam heated flue gas pre-heater is installed up-stream of the in-line burner. The DeNOx catalyst will also destroy any potential dioxins, which may be present in the flue gases. Due to the operating temperature of the DeNOx unit there is no visible plume from stack A2-1.

- Incinerator Wastewater Treatment Plant

This plant treats aqueous wastes from the incinerator system to meet conditions for discharge to the municipal sewer. High levels of suspended solids and heavy metals are a characteristic of the feed water. The treatment process steps are: pH conditioning, flash mixing and flocculation, clarification, sand filtration, activated carbon filtration and sludge dewatering. Full details are provided in ***Attachment 4*** of the original IPC licence application.

Incinerator Back-up

The back-up for an incinerator shut-down is provided by the Cryogenic Unit for the gaseous VOC rich stream, and the Carbon Bed Adsorption Unit for the VOC lean stream. These units have a combined emission point (emission point A2-2).

In the event of an incinerator shutdown air from the wastewater treatment plant, will be vented directly to atmosphere as the emissions are not harmful. Organic/water vapour from the wastewater stripper is condensed in a low temperature vent condenser. The condensate is collected in one of the waste incinerator holding tanks for subsequent incineration. The stripper can be stopped during incinerator shut-downs or at any other time and its feed stored in storage tanks. Provision has been made for bulk storage of the aqueous and organic liquid wastes, which are segregated into Low Calorific Value (LCV), High Calorific Value (HCV), and halogenated waste.

7.1.2 ***(b) The heat generated during the incineration and co-incineration process is recovered as far as practicable e.g. through combined heat and power, the generating of process steam or district heating;***

The base steam supply for the site is produced from the Waste Heat Boiler associated with the incinerator. In addition two twin furnace package boilers are available to generate steam from natural gas to top up the base supply. The waste heat boiler is located immediately down-stream of the incinerator combustion chamber. It utilises the waste heat in the combustion gases to raise steam. The boiler generates an average of 12,600kg steam per hour) operating at up to 40 barg. The steam generation rate is relatively independent of the nature and volumes of the incinerator feeds as any fuel deficit is made up by natural gas. Steam pressure is reduced to site steam main pressure before adding it to the distribution main.

7.1.3 ***(c) The residues will be minimised in their amount and harmfulness and recycled where appropriate;***

(d) The disposal of the residues which cannot be prevented, reduced or recycled will be carried out in conformity with national and Community legislation.

Information on the minimisation, recycling and disposal of Incinerator Residues are covered in detail in Section 17A of the original IPC Licence Application. An update with additional information is provided in the following paragraphs.

Hazardous wastes

It is BMS policy to minimise the generation of all hazardous waste and to recycle, recover, reuse or dispose of waste in accordance with National, European Community & IPC requirements.

Wastewater treatment plant sludge (Incinerator Wastewater Treatment)

the sludge from the incinerator wastewater treatment plant is de-watered to >20% dry solids and disposed of in a licensed hazardous waste landfill by an approved contractor. Typically less than 25 tonnes of sludge is produced per annum.

Incinerator Ash

Residual Ash from the Combustion chamber and from the Waste heat boiler is generated in small quantities due to the limited amount of solids in the waste incinerated. Typically less than 2 tonnes of chamber ash and less than 5 tonnes of boiler ash are produced per annum. This is sent to an approved licensed facility for recycling. The ash consists of residual water and salts form the incineration process.

Incinerator Refractory Brick

Discarded refractory brick from maintenance work on the incinerator combustion chamber is disposed of in an approved hazardous waste landfill by an approved contractor.

A full list of approved waste contractors and copies of their relevant permits are retained on site and kept up to date.

7.2 Article 4.3:

The permit shall be granted only if the application shows that the proposed measurement techniques for emissions into the air comply with Annex III and, as regards water, comply with Annex III paragraphs 1 and 2.

The measurement techniques used to monitor atmospheric emissions are in accordance with Annex III of WID and monitoring of emissions to wastewater is in accordance with Section 1 & 2 of Annex III of WID.

Measurements are carried out representatively are under laminar flow conditions in the outlet streams. All automatic samplers on site meet international standards as do the calibration methods for these instruments. Analysis and testing carried out off site is undertaken by approved laboratories using accredited methods.

In summary all testing and monitoring of emissions to air from the BMS Cruiserath site are carried out in compliance with requirements of the site's IPC Licence No. P0552-01.

7.3 Article 4.4:

The permit granted by the competent authority for an incineration or co-incineration plant shall, in addition to complying with any applicable requirement laid down in Directives 91/271/EEC, 96/61/EC, 96/62/EC, 76/464/EEC and 1999/31/EC:

7.3.1 *(a) list explicitly the categories of waste which may be treated.*

The list shall use at least the categories of waste set up in the European Waste Catalogue (EWC), if possible, and contain information on the quantity of waste, where appropriate. EWC Code 07 05 01 for aqueous wastes is being requested as potentially suitable for incineration as per IPPC Licence Review Application. (Page 28).

Table 7.1: Waste (all Hazardous) for Incineration at Cruiserath Site – Quantities and EWC Codes

Waste material	EWC Code	Main source	Quantity Tonnes per annum		Final disposal
			2004	2005	
Organic solvents	07 05 03	Production operations Cruiserath	0	0	On-site incineration
Organic solvents	07 05 04	Production operations Cruiserath	78	800	On-site incineration
Aqueous Wastes	07 05 01*	Production operations Cruiserath	n/a	n/a	Cruiserath incineration
Organic solvents	07 05 03	Production operations Swords Laboratories	715	1381	Cruiserath incineration
Organic solvents	07 05 04	Production operations Swords Laboratories	914	677	Cruiserath incineration
Aqueous Wastes	07 05 01*	Production operations Swords Laboratories	n/a	n/a	Cruiserath incineration

7.3.2 *(b) include the total waste incinerating or co-incinerating capacity of the plant;*

Incinerator

The incinerator is sized for maximum flows of individual waste streams as follows:

High calorific value liquid from vendor)	-	810kg/hr (updated information
Low calorific value liquid	-	615kg/hr
Vent gases from production and tank farm	-	3000kg/hr
Vent gases as micro-polluted air	-	13600kg/hr
Vent gases from the wastewater treatment plant	-	20000kg/hr
Vent gases from wastewater stripper	-	500kg/hr

The flow of liquid waste into the incinerator from the waste liquid storage tanks is determined by set points which are manually set and then controlled by the Distributed Control System (DCS). The flow of waste gases into the incinerator is dependent on production activities and the current capacity of the incinerator to process waste gases exceeds the production of the gases by approximately 50%.

Incineration wastewater treatment plant

The incinerator wastewater treatment plant has been sized to meet the maximum output capacity of the incinerator plant. Currently the average hourly flow into and out of the Incinerator WWP is approximately 10-12m^3/hr.

Maximum Design flow-rate of Incinerator WWP - 16.5m^3/hr

Concentrations of main pollutants exiting the WWP

Total suspended solids	-	20 mg/l
Heavy metals	-	5 mg/l
Dioxins and Furans Toxic Equivalent Factor	-	0.5 ng/l

7.3.3 ***(c) Specify the sampling and measurement procedures used to satisfy the obligations imposed for periodic measurements of each air and water pollutants.***

Emissions to Air

The incinerator stack emissions are continuously monitored for TOC, particulates, HCl, SO_2, NO_x, carbon monoxide and ammonia (see Table 7.2 below).

The incinerator stack emissions are also monitored bi-annually for dioxins and quarterly for metals.

The cryogenic unit / Carbon bed adsorption unit is continuously monitored for TOC (see Table 7.3 below).

Emissions to Water

The flow rate of the incinerator WWTP emissions to sewer are continuously monitored (see Table 7.4 below). The emissions are also monitored quarterly for dioxins and metals.

In summary all testing and monitoring of incinerator-related emissions from the BMS Cruiserath site are carried out in compliance with requirements of the site's IPC Licence No. P0552-01.

TABLE 7.2 : EMISSIONS MONITORING AND SAMPLING POINTS - Air Emissions (1 table per monitoring point)

Emission Point Reference No. : A2 - 1 – Incinerator Main Stack

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique	Quality control used
TOC	Continuous	Readily available on side of stack	On-line analyser	Flame Ionisation Detector	Instrument Calibration
Particulates	Continuous	Readily available on side of stack	On-line analyser	Dust Concentration Meter	Instrument Calibration
Hydrogen Chloride	Continuous	Readily available on side of stack	On-line analyser	FTIR Spectrometer	Instrument Calibration
Sulphur Dioxide	Continuous	Readily available on side of stack	On-line analyser	FTIR Spectrometer	Instrument Calibration
NOx	Continuous	Readily available on side of stack	On-line analyser	FTIR Spectrometer	Instrument Calibration
Carbon Monoxide	Continuous	Readily available on side of stack	On-line analyser	FTIR Spectrometer	Instrument Calibration
Dioxins	Quarterly for 1st year, bi-annually thereafter	Readily available on side of stack	Grab sample	BS EN 1948	MCERT sampling team & Accredited Laboratory
Cd and Tl	Quarterly (Bi-monthly for first year of operation)	Readily available on side of stack	Grab sample	BS EN 14385	MCERT sampling team & Accredited Laboratory
Hg	Quarterly (Bi-monthly for first year of operation)	Readily available on side of stack	Grab sample	BS EN 14385	MCERT sampling team & Accredited Laboratory
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Sn	Quarterly (Bi-monthly for first year of operation)	Readily available on side of stack	Grab sample	BS EN 14385	MCERT sampling team & Accredited Laboratory
NH3 Ammonia	Continuous	Readily available on side of stack	On-line analyser	FTIR Spectrometer	Instrument Calibration

TABLE 7.3: EMISSIONS MONITORING AND SAMPLING POINTS - Air Emissions (1 table per monitoring point)					
Emission Point Reference No. : A2 - 2 Cryogenic Unit / Carbon bed adsorption system					
Parameter	**Monitoring frequency**	**Accessibility of Sampling Points**	**Sampling method**	**Analysis method/ technique**	**Quality control used**
TOC	Continuous	Readily available on side of stack	On-line analyser	Flame Ionisation Detector	Instrument Calibration

TABLE 7.4: EMISSIONS MONITORING AND SAMPLING POINTS - Emissions to Sewer (1 table per monitoring point)					
Emission references point No : W2 (SE – 2) – Incinerator WWTP					
Parameter	**Monitoring frequency**	**Accessibility of Sampling point**	**Sampling method**	**Analysis method / technique**	**Quality control**
Flow to sewer	Continuous	Discharge point from Incinerator WWTP	In-line sampler	On-line flowmeter with recorder	Instrument Calibration
Total Metals – Sb, Ar, Cr, Co, Cu, Mn, Ni, V & Sn.	Quarterly	Discharge point from Incinerator WWTP	Grab sample	IPC-MS	Accredited Laboratory
Dioxins	Quarterly	Discharge point from Incinerator WWTP	Grab sample	GC- MS	Accredited Laboratory

7.4 Article 4.5:

The permit granted by the competent authority to an incineration or co-incineration plant using hazardous waste shall in addition to paragraph 4:

7.4.1 *(a) List the quantities of the different categories of hazardous waste which may be treated;*

Previously covered under Section 7.3.1, relating to Article 4.4(a). All of the waste incinerated at the Cruiserath site is classified as hazardous waste.

7.4.2 *(b) specify the minimum and maximum mass flows of those hazardous wastes, their lowest and maximum calorific values and their maximum contents of pollutants, e.g. PCB, PCP, chlorine, fluorine, sulphur, heavy metals*

Table 7.5 (below) outlines the characteristics of the waste that is being incinerated in Cruiserath since August 2003. IPC Licence P0552-01 Schedule 3(IV) outlines the testing requirements for this hazardous waste streams. The results given are the maximum and/or minimum as required that have being recorded to date. These are not upper or lower limits for material that can be incinerated on site. The annual quantities are presented Table 7.1 above.

Table 7.5 Characteristics of Incinerated Waste

Waste	Monitoring Parameters of Hazardous Waste for Incineration							
	% Total Metals (max)	% Cadmium as Cd (max)	% Thallium as Tl (max)	% Mercury as Hg (max)	Calorific Value Joules / gram		% Halogens	
					Min.	Max.	Min.	Max.
Organic Solvents	$4.9x10^{-4}$	$7.0x10^{-6}$	$5.0x10^{-7}$	$2.1x10^{-5}$	0	48000	0.1	83.6

Note: % Total Metals – The sum of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Sn.

7.5 Article 5.1:

The operator of the incineration or co-incineration plant shall take all necessary precautions concerning the delivery and reception of waste in order to prevent or to limit as far as practicable negative effects on the environment, in particular the pollution of air, soil, surface water and groundwater as well as odours and noise, and direct risks to human health. These measures shall meet at least the requirements set out in paragraphs 3 and 4.

Section 13.A3 of the IPC licence application outlines the details of the precautions taken on site in relation to the delivery & storage of waste for incineration.
The site procedures for the delivery and reception of waste for incineration are documented in the site's Standard Operating Procedure C-TS-SOP-003 Waste Tanker Unloading and Disposal of Waste (see ***Attachment 5***). This outlines the procedures for weighing and sampling of the tanker as well as setting up tanker connections and route verification to the selected tank on the tank farm.

7.6 Article 5.2:

The operator shall determine the mass of each category of waste, if possible according to the EWC, prior to accepting the waste at the incineration or co-incineration plant.

The waste is weighed on the site weighbridge on entering the site to determine the exact weight of the hazardous waste received according to EWC code. The weight dockets are kept on file with the waste documentation and the weight entered on the certificate of destruction.

7.7 Article 5.3:

Prior to accepting hazardous waste at the incineration or coincineration plant, the operator shall have available information about the waste for the purpose of verifying, inter alia, compliance with the permit requirements specified in Article 4(5). This information shall cover:

All incoming shipments of waste received on site are from Swords Laboratories. Before the shipment occurs the storage on the tank farm is shut, mixed and sampled. All sampling is carried out in accordance with IPC Licence, No. P0552-01, Schedule 3 (iv). The analysis determines the suitability of the waste for incineration at Cruiserath or at another contractor incineration facility. This involves communication between the Technical Services departments at both facilities. If the analysis of the waste or another factor determines that the waste cannot come to Cruiserath for incineration then an alternative destination examined. This typically does not occur since the waste streams generated in Swords and Cruiserath for incineration are very consistent in terms of physical & chemical composition and calorific value. The hazardous waste is segregated into three categories for shipments to Cruiserath, High calorific value, low calorific value and halogenated waste.

The analysis is also used in the waste documentation (C1 Form) for the shipment.

7.8 Article 5.4:

Prior to accepting hazardous waste at the incineration or co-incineration plant, at least the following reception procedures shall be carried out by the operator:
(a) the checking of those documents required by Directive 91/689/EEC and, where applicable, those required by Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision, and control of shipments of waste within, into and out of the European Community (1) and by dangerous-goods transport regulations;

(b) the taking of representative samples, unless inappropriate, e.g. for infectious clinical waste, as far as possible before unloading, to verify conformity with the information provided for in paragraph 3 by carrying out controls and to enable the competent authorities to identify the nature of the wastes treated. These samples shall be kept for at least one month after the incineration.

On arrival on site the documentation associated with the waste shipment is checked by EHS & Technical Services (TS) staff before unloading is commenced. This is covered in procedures C-EHS-SOP-065 Monitoring of Hazardous Waste Shipments and C-TS-SOP-003 Waste Tanker Unloading and Disposal of Waste (see ***Attachment 5***). These procedures provide clear instructions on how the documentation is to be completed and recorded from receipt of waste to issuing of a Certificate of Destruction after incineration of the waste.

A representative sample each waste shipments is currently taken and analysis for CV, solvent composition, solids, halogens, water and metals undertaken as per the IPC licence P0552-01 Schedule 3(iv). The samples are retained for one month until after the Certificate of Destruction is issued.

7.9 Article 6.1:

Incineration plants shall be operated in order to achieve a level of incineration such that the slag and bottom ashes Total Organic Carbon (TOC) content is less than 3 % or their loss on ignition is less than 5 % of the dry weight of the material. If necessary appropriate techniques of waste pre-treatment shall be used.

Incineration plants shall be designed, equipped, built and operated in such a way that the gas resulting from the process is raised, after the last injection of combustion air, in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of 850 °C, as measured near the inner wall or at another representative point of the combustion chamber as authorised by the competent authority, for two seconds. If hazardous wastes with a content of more than 1 % of halogenated organic substances, expressed as chlorine, are incinerated, the temperature has to be raised to 1 100 °C for at least two seconds.

Each line of the incineration plant shall be equipped with at least one auxiliary burner. This burner must be switched on automatically when the temperature of the combustion gases after the last injection of combustion air falls below 850 °C or 1 100 °C as the case may be. It shall also be used during plant start-up and shut-down operations in order to ensure that the temperature of 850 °C or 1 100 °C as the case may be is maintained at all times during these operations and as long as unburned waste is in the combustion chamber.

During start-up and shut-down or when the temperature of the combustion gas falls below 850 °C or 1 100 °C as the case may be, the auxiliary burner shall not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil as defined in Article 1(1) of Council Directive 75/716/EEC, liquefied gas or natural gas.

Temperature Control

The temperature control of the incinerator chamber is controlled by the DCS. There are 3 temperature transmitters on the outlet duct of the combustion chamber that continuously monitor the temperature. The temperature is then feed back to a controller in the DCS which automatically adjusts the natural gas flow rate to maintain the required temperature. The natural gas enters the chamber via up to three main auxiliary burners.

Residence Time

Residence time has calculated under worst case (highest flow) design conditions to be 3.7 seconds. Typical residence times are approximately 7 seconds. This is calculated based on the volume of the chamber and the flow rates into the chamber.

Auxiliary Burners

There are 3 main auxiliary burners in the combustion chamber. A minimum of one auxiliary burner is continuously on with a supply of natural gas at all times. If for any reason, the natural gas supply to the auxiliary burner stops, the incinerator automatically goes into shutdown mode and stops all waste burning

7.10 Article 6.3:

Incineration and co-incineration plants shall have and operate an automatic system to prevent waste feed:

7.10.1 *(a) at start-up, until the temperature of 850 °C or 1 100 °C as the case may be or the temperature specified according to paragraph 4 has been reached;*

There is an automatic interlock in place on the Incinerator control system which prevents waste feed to the incinerator until a temperature of at least 1100°C has been reached in the combustion chamber.

The proposed temperature control philosophy for the proposed new operating modes is outlined in Sections 9 and 10 of this report.

7.10.2 *(b) whenever the temperature of 850 °C or 1 100 °C as the case may be or the temperature specified according to paragraph 4 is not maintained;*

Currently the operating temperature of the incinerator is maintained at >1100°C. If there is a decrease in temperature the control system automatically increases the feed rate of natural gas to the incinerator to maintain the temperature above 1100°C. If in the event that the temperature in the combustion chamber cannot be maintained above 1100°C the control system automatically shuts off the waste feed inlets. See Section 12 of this report describing measures taken under abnormal operating conditions.

A similar control philosophy for this condition will be developed and validated for the proposed new operating modes.

7.10.3 *(c) Whenever the continuous measurements required by this Directive show that any emission limit value is exceeded due to disturbances or failures of the purification devices.*

The purification devices on the incinerator consists of

a) Scrubber

b) Wet Electrostatic Precipitator

c) Denox / SCR unit

If there is a failure on any of the above key purification devices, the incinerator automatically shuts down all wastes to the incinerator. This is controlled by the burner management system.

The incinerator operation is further controlled through continuous supervision by the Technical Services Department technicians. The results of the oxygen and continuous emission monitoring are linked to alarms on the control system and are constantly monitored by the technicians.

Also the homogenous liquid waste feed and absence of solid waste contributes greatly to ensuring that there is minimal variation in emission levels.

7.11 Article 6.5:

Incineration and co-incineration plants shall be designed, equipped, built and operated in such a way as to prevent emissions into the air giving rise to significant ground-level air pollution; in particular, exhaust gases shall be discharged in a controlled fashion and in conformity with relevant Community air quality standards by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.

Based on air dispersion modelling results (see Original IPC Licence Application, Section A12.C4) it has been concluded that air emissions from the incinerator and the

site in general do not give rise to significant ground level concentrations of pollutant and that emissions from the site are in compliance with the relevant air quality standards.

The licensee requested an increase in the Daily Average emission limit value of NOx from the incinerator in the recent IPC Licence Review Application. Again additional air dispersion modelling has indicated that this increase would not give rise to significant ground level concentration of NOx and that the site would remain in compliance with relevant air quality standards (see Section E.2 of the original IPC Licence Review Application and Section 16 of this report).

7.12 Article 6.6:

Any heat generated by the incineration or the co-incineration process shall be recovered as far as practicable.
This requirement is previously discussed in Section 7.1.2 of this report, relating to Article 4.2(b) of the Directive.

7.13 Article 6.8:

The management of the incineration or the co-incineration plant shall be in the hands of a natural person who is competent to manage the plant.
The incineration plant at the BMS Cruiserath site is managed by the Technical Services Department which is headed by the Technical Services Director. For details on the competency and experience of the Technical Services Director see Section I, Page 44 of the IPC Licence Review Application.

7.14 Article 7.1:

The incinerator is designed, equipped, built and operated in such a way that the emission limit values set out in Annex V are not exceeded in the exhaust gas.

Air emissions from the incinerator are in compliance with the limits set out in Annex V of the Directive.

Currently the NOx emission limits for the incinerator set in the site's IPC Licence P0552-01 are significantly lower than the NOx limits outlined in Annex V. NOx emission limit values in Annex V are 400mg/m^3 for Daily Average Values and 400mg/m^3 for Half-hourly average values, while the P0552-01 licence sets limits for 100 and 200 mg/m^3 respectively.

As outlined in Section 7.12 above, the licensee has requested that the NOx limit be increased to 200 mg/m^3 for the Daily Average Values. (see Section E.2 of the IPC Licence Review Application and Section 16 of this report)

7.15 Article 7.3:

The results of the measurements made to verify compliance with the emission limit values are standardised with respect to the conditions laid down in Article 11 of the directive.

The results of all measurements taken to verify compliance with the emission limit values are standardised with respect to the condition in Article 11 of the Directive.

7.16 Article 8.1:

Waste water from the cleaning of exhaust gases discharged from an incineration or co-incineration plant shall be subject to a permit granted by the competent authorities.

IPC Licence P0552-01 currently imposes limits on the discharges from the incinerator WWTP in accordance with Article 8 of the directive. The incinerator has a dedicated incinerator WWTP to treat waste waters from the cleaning of exhaust gases

containing pollutants listed in Annex IV. These ELV's are divided between W2 (SE-1) and W1(SE-1) waste streams on the current P0552-01.

7.17 Article 8.2:

Discharges to the aquatic environment of waste water resulting from the cleaning of exhaust gases shall be limited as far as practicable, at least in accordance with the emission limit values set in Annex IV.

Discharges from the incinerator WWTP are in compliance with the emission limit values in Annex IV of the Directive.

7.18 Article 8.3:

Subject to a specific provision in the permit, the waste water from the cleaning of exhaust gases may be discharged to the aquatic environment after separate treatment on condition that:
(a) The requirements of relevant Community, national and local provisions are complied with in the form of emission limit values; and
(b) the mass concentrations of the polluting substances referred to in Annex IV do not exceed the emission limit values laid down therein.

Waste water from the incinerator WWTP is discharged into the public sewer, and not directly to the aquatic environment.

7.19 Article 8.4:

The emission limit values shall apply at the point where waste waters from the cleaning of exhaust gases containing the polluting substances referred to in Annex IV are discharged from the incineration or co-incineration plant.
Where the waste water from the cleaning of exhaust gases is treated on site collectively with other on-site sources of waste water, the operator shall take the measurements referred to in Article 11:
(a) On the waste water stream from the exhaust gas cleaning processes prior to its input into the collective waste water treatment plant;
(b) on the other waste water stream or streams prior to its or their input into the collective waste water treatment plant;
(c) At the point of final waste water discharge, after the treatment, from the incineration plant or co-incineration plant.
The operator shall take appropriate mass balance calculations in order to determine the emission levels in the final waste water discharge that can be attributed to the waste water arising from the cleaning of exhaust gases in order to check compliance with the emission limit values set out in Annex IV for the waste water stream from the exhaust gas cleaning process.
Under no circumstances shall dilution of waste water take place for the purpose of complying with the emission limit values set in Annex IV.

The Emission Limit Value's are applied to the point of exit of the wastewater from the incinerator WWTP as per Article 8.4. Under no circumstances does dilution take place for the purposes of complying with the ELV's.

7.20 Article 8.6:

The permit shall:
(a) establish emission limit values for the polluting substances referred to in Annex IV, in accordance with paragraph 2 and in order to meet the requirements referred to in paragraph 3(a);
(b) set operational control parameters for waste water at least for pH, temperature and flow.

The site's IPC Licence P0552-01 sets out the operational control parameters and emission limit values for the site's waste water as per Schedule 2(i) of the site's IPC Licence P0552-01.

7.21 Article 8.7:

Incineration and co-incineration plant sites, including associated storage areas for wastes, shall be designed and in such a way as to prevent the unauthorised and accidental release of any polluting substances into soil, surface water and groundwater in accordance with the provisions provided for in relevant Community legislation. Moreover, storage capacity shall be provided for contaminated rainwater run-off from the incineration or co-incineration plant site or for contaminated water arising from spillage or fire-fighting operations.
The storage capacity shall be adequate to ensure that such waters can be tested and treated before discharge where necessary.

Incinerator and waste storage areas are designed & constructed so as to prevent unauthorised or accidental release of polluting matter into soil, surface water and groundwater. Sufficient Storage capacity for contaminated rainwater run-off, spills or fire-fighting are be provided as outlined in Section 18 of the original IPC Licence Application.

7.22 Article 9:

Residues resulting from the operation of the incineration or coincineration plant shall be minimised in their amount and harmfulness. Residues shall be recycled, where appropriate, directly in the plant or outside in accordance with relevant Community legislation. Transport and intermediate storage of dry residues in the form of dust, such as boiler dust and dry residues from the treatment of combustion gases, shall take place in such a way as to prevent dispersal in the environment e.g. in closed containers.
Prior to determining the routes for the disposal or recycling of the residues from incineration and co-incineration plants, appropriate tests shall be carried out to establish the physical and chemical characteristics and the polluting potential of the different incineration residues. The analysis shall concern the total soluble fraction and heavy metals soluble fraction.

See Section 7.1.3 of this report relating to Article 4.2 (c) of the Directive on minimisation of residues.

BMS Cruiserath confirms that residues from the incinerator are transferred to closed containers for storage and transportation.

BMS Cruiserath confirms that appropriate tests were carried out to establish the physical and chemical characteristics and the polluting potential of the incineration residues prior to selecting a suitable recycling facility.

7.23 Article 10:

Control and monitoring
1. Measurement equipment shall be installed and techniques used in order to monitor the parameters, conditions and mass concentrations relevant to the incineration or co-incineration process.
2. The measurement requirements shall be laid down in the permit or in the conditions attached to the permit issued by the competent authority.
3. The appropriate installation and the functioning of the automated monitoring equipment for emissions into air and water shall be subject to control and to an annual surveillance test. Calibration has to be done by means of parallel measurements with the reference methods at least every three years.
4. The location of the sampling or measurement points shall be laid down by the competent authority.
5. Periodic measurements of the emissions into the air and water shall be carried out in accordance with Annex III, points 1 and 2.

The control equipment installed in the incinerator to monitor parameter, conditions and mass concentrations of the incineration process are outlined in **Tables F1(i) & F2(i) in *Attachment 4*.**

The emissions monitoring equipment installed and operational is equitable to BAT for the monitoring and recording of emission quality. It is serviced and calibrated bi-annually using reference standards and subject to at least annual parallel measurements by the Agency.

The location of the sampling & monitoring points are laid out by the Agency in the IPC Licence P0552-01 as illustrated on the drawing in ***Attachment 2.***

7.24 Article 11:

Measurement Requirements

With regard to the conditions and requirement of monitoring of the incineration process laid out in Article 11 of this directive, all the sections and sub-section of the articles have being reviewed against the current IPC licence P0552-01. This review concludes that current site incinerator emissions monitoring practices are in compliance with all article of the IPC licence P0552-01 and Article 11 of this directive.

8. MONITORING AND CONTROL OF HALOGENATED ORGANIC CONTENT OF WASTE STREAMS TO THE INCINERATOR

Give details of the proposed monitoring, control and recording of the halogenated organic content of the input gases to the incinerator. Demonstrate how you will ensure that the halogenated organic content of the input gases will not exceed 1%, when treating waste gases only.

Dichloromethane (DCM) is the only halogenated organic compound used in the processes on-site. In order to determine the approximate amount of DCM entering the incinerator in the waste gas stream the following measurements and calculations have been carried out.

The monitoring location is the waste VOC gas inlet to the incinerator at the point after the production, tank farm and solvent recovery waste VOC gas streams have mixed.

The peak mass flow rate for TOC in the waste VOC gas stream over a 3-week period in mid-2005 was found to be 63kg/hr.

Grab samples were taken from the same sampling location and tested off-site for DCM. DCM as a percentage of TOC was determined to be <50%. Therefore it is reasonable to assume under normal operation conditions that DCM is less than 50% of the TOC in the waste gas stream to the incinerator. However, in order to show worst case scenario it is assumed that the DCM as % of TOC is 100%.

Total gas flow in the waste VOC gas stream is measured continuously by a flow transmitter. The average mass flow is 1100kg/hr.

Micro polluted air from the local extraction production vent is also fed to the incinerator as a waste gas and its mass flow is measured by a flow transmitter. The average mass flow is 1100kg/hr.

Micro polluted air from the Biological Waste Water Treatment Plant containing organic matter is also fed to the incinerator. The mass flow from this source has been estimated at 10,000kg/hr based on design calculations.

Make-up air is introduced as an input prior to the combustion chamber, but this has been excluded from this calculation.

Based on the above data the amount of DCM (as Chlorine) as a percentage of the total waste gas flow into the incinerator has been calculated as follows:

Table 8.1 - Calculation of % Chlorine gas flow into the incinerator		
Calculation of DCM (as Chlorine) flow into the incinerator		
Max. measured flow of TOC in VOC gas input stream	63	kg/hr
DCM as a % of TOC	100	%
Total DCM	63	kg/hr
Total DCM expressed as Chlorine (DCM consists of 83.5% Chlorine)	**52.6**	**kg/hr**
Calculation of Waste Gas flow in the incinerator		
Total Waste Gas flow	**12,200**	**kg/hr**
DCM (as Chlorine) as a percentage of the total waste gas flow into the incinerator	**0.43**	**%**

Therefore the worst case scenario DCM content (as Chlorine) of the waste gas stream to the incinerator is estimated to be approximately 0.43% (by mass). This is significantly less than the 1% limit for incinerator operation at 850°C.

Proposal for further Monitoring

Prior to the implementation of separate operational modes for Thermal Oxidization of Wastes Gases and the Incinerator of liquids wastes, the Licensee shall prepare, a test method and monitoring programme to determine the percentage chlorine content of the vent header during normal manufacturing operations. This test will be conducted for an extended period initially to assess the percentage halogenated solvents present in gaseous waste feeds to the abatement systems during all site operations. Then subject to prior written agreement of the Agency, the vent header monitoring and additional stack emission monitoring will be undertaken to evaluate the operation as a Thermal oxidizer for gaseous waste only at >850^{o}C.

A report on the test programme, including test results, shall be submitted to the Agency on completion of the programme.

The incinerator shall not be operated outside the 1100^{o}C temperature without prior written agreement of the Agency.

9. PROPOSED MANAGEMENT AND OPERATIONAL CONTROLS IN RELATION TO CHANGEOVER OF INCINERATOR OPERATION FROM LIQUID AND GAS WASTE TO GAS WASTE ONLY, AND VICE VERSA

Provide details of the proposed management and operational controls in relation to the change over from the incineration of waste liquid solvents to the treatment of waste gases and the change over from the treatment of waste gases in the incinerator to the incineration of liquid waste solvents.

The permissive to burn wastes in the incinerator is currently automatically controlled by the Interlock and Burners Management System on the incinerator.

The interlock and burner management control logic on the incinerator detects the process inputs with independent sensors and activates interlocks on valves. Currently when a temperature of 1100ºC is detected by the burner management system, it automatically gives a permissive to the technician that the liquid and gaseous wastes valves can be opened. Below 1100ºC the liquid and gaseous valves are interlocked closed and cannot be opened if requested to do so.

This interlock and burner management logic will be updated, and subsequently re-commissioned, to automatically control the changeover from liquid to gases and vice versa with the new temperature set points as follows:

To change over from the incineration of liquid and gaseous waste to gaseous waste only, the technician will reduce the flow set point slowly on the liquid waste. Natural gas will automatically ramp up to maintain same temperature above 1100°C. The technician will then reduce the temperature set point in the chamber to 850°C. As soon as the temperature dips below 1100°C the liquid waste valves will be automatically interlocked by the Burner Management System so that it will not be possible to open the liquid waste valves to the incinerator while the temperature is below 1100°C. The gaseous wastes will continue to burn as the gaseous waste valves will not interlock unless temperature dips below 850°C.

To change over from the incineration of gaseous waste only to liquid and gaseous waste, the technicians will raise the temperature in the chamber to >1100°C. Only when the temperature is above 1100°C will the permissive be given to open the liquid waste valves. Until this temperature is reached the liquid waste valve will remain interlocked closed.

10. START-UP PROCEDURES AND CONTROLS FOR THE INCINERATOR IN BOTH OPERATING MODES

Provide details of the start-up procedure and controls in the case of disposal of waste liquid solvents, and the proposed start-up procedure and controls in relation to the treatment of waste gas streams in the incineration.

On start-up from cold the operator will have the option to start-up one of two modes of operation

1. Gaseous waste burning only or
2. Liquids and gaseous waste burning

10.1 Start-up of procedure and controls in relation to the treatment of waste gas streams only in the incinerator

Start up will be from the down stream end of the incinerator train forwards. First the scrubber systems will be made ready and correct liquor circulation will be established. The Wet Electrostatic Precipitator (WESP) unit will also be activated. The waste heat boiler and deNOx unit will be on standby. The incinerator will begin firing with natural gas, initially at a low rate to establish a flame and raise temperature in the combustion and post combustion chambers. The waste heat boiler will gradually be brought up to temperature by the clean combustion gases. Flows in the scrubbers will become established and the deNOx unit will begin treating the flue gases.

It is proposed that when a temperature of the chamber reaches 850°C, the burner management system will give a permissive to start to burn gaseous wastes. Below 850°C the gaseous waste valves will be interlocked closed and cannot be opened.

10.2 Start-up of procedure and controls in relation to the treatment of waste liquid and gas streams in the incinerator

The initial steps in the procedure for start-up of the incinerator controls in relation to the treatment of waste liquid and gas streams will be the same as those for waste gas only. If it is required to start burning liquid wastes, the operator will continue to ramp the chamber up to a temperature to >1100°C. Once 1100°C has been reached the permissive will be given by the burner management system to start the liquid wastes. Below 1100°C, the liquid valves will be interlocked closed and cannot be opened.

The burner management system will be updated, and subsequently re-commissioned, to automatically control the proposed amended start-up modes for the incinerator.

11. MEASURES AND CONTROLS IN RELATION TO CRYOGENIC UNIT OPERATION

Describe the measures and controls in place for the treatment of the waste gas stream in the event of incinerator shut-down. Provide details of the time taken to divert the emissions to alternative treatment. Provide details of the maximum emission and duration arising from a shutdown of the incinerator and provide an assessment of the impacts of this emission.

In the event of an incineration shut-down back-up is provided by the Cryogenic Condensation Unit. The system condenses the solvents in the waste gas streams prior to discharge thereby facilitating the continued operation of production processes in the event of an incinerator shut-down. Any liquid waste for incineration is stored on-site until the incinerator is restarted. See Section 12.A2.2 of the original IPC Licence Application for a full description of the Cryogenic Condensation Unit.

A few changes have been made to the operation of the Cryogenic Unit since the original IPC Licence Application was submitted. Firstly the unit has been in use on a continuous basis for up to eight weeks although it was originally envisaged that the unit would only be used for a maximum continuous period of three weeks.

Secondly a design modification was made to the unit in 2005, which BMS notified to the EPA on 12th July 2005. Two precondensers were installed up-stream of the original condensers. The precondenser system operates in a duty/standby mode. These precondensers increase the capacity of the system to remove solvent. This modification was necessary because the main condensers had been undersized and were blocking frequently. Since the installation of the precondenser, blockages on the main condensers have greatly reduced.

Controls in the event of an unplanned Incinerator Shutdown

When the incinerator is online the cryogenic system is generally in off mode. If the incinerator trips for any reason, manufacturing operations are automatically brought to a safe state via the DCS system and gaseous emissions cease. The Cryogenic Unit is cooled to operating its temperature. Only when the cryogenic operating temperature has been reached will manufacturing operations begin again.

Time taken to Divert to Cryogenic Unit after an Incinerator Shutdown

Data is available on divert times from September 2006 to present (see Table 11.1). The data indicates that the average divert time was 41 minutes.

The waste gas stream in line between the production exhaust header and the incinerator at the time of the emergency shut-down will be vented to atmosphere via the by-pass vent. The quantity and composition of this discharge depends on the manufacturing processes in operation at the time.

Data on divert times and corresponding mass emissions from the by-pass vent shows that there is no direct correlation between the divert duration and amount of gaseous waste emitted.

Assessment of impact of maximum by-pass emission

Schedule 1(i) of the site's IPC Licence P0552-01 specifies the 30-minute average emission limit value for gaseous and vapour organic substances expressed as TOC is 20-150mg/m3 and the maximum flow rate is 64,200m3/hr. This equates to a maximum mass emission of 1.3kg/hr to 9.8kg/hr of gaseous and vapour organic substances expressed as TOC.

The table below confirm the accuracy of the assessment made by BMS in January 2006, in support of the operational changes to the Cryogenic condenser. The average event lasts approximately 31 minutes and on average results in only a 2.2kg emission.

Table 11.1: Summary of Recorded bypasses from Incinerator to Cryogenic Unit

Date	Bypass Duration	Mass Emission	Cause
	Mins	Kg	
15-Dec 2006	15	0.21	High VH flows
06-Dec 2006	24	0.18	HCV filter changeover
04-Dec 2006	65	0.12	Lab fire panel fault
24-Nov 2006	2	4.4	High VH flows
21-Nov 2006	6	0.8	Temperature spike in Cryogenic Unit
13-Nov 2006	59	14.38[1]	Sol Recovery steam controller
02-Nov 2006	54	1.08	Incinerator tripped – unknown
31-Oct 2006	7	0.05	Low pressure in VH
29-Oct 2006	7	0.34	Low pressure in VH
29-Oct 2006	11	0.01	Low pressure in VH
19-Oct 2006	33	7.45	HCV filter changeover
16-Oct 2006	57	3.4	PLC usage
15-Oct 2006	14	2.58	Scrubber pump failure
05-Oct 2006	7	2.5	Low pressure in VH
27-Sep 2006	4	2.1	Low pressure in VH
21-Sep 2006	48	5.3	Lab fire panel fault
18-Sep 2006	137	not available	Electrical outage
11-Sep 2006	7	0.35	Low pressure in VH
Average	**31**	**2.2**	

[1] IPA only (TA LUFT Class III). This flow transmitter is now safety interlocked to prevent a recurrence.

Bristol-Myers Squibb would request that no conditions are imposed in relation to maximum start-up time of the cryogenic condenser, since this is an immaterial factor with respect to mass emissions. The events above clearly illustrate that there is no correlation between total mass emission and the bypass duration.

12. MEASURES AND CONTROLS UNDER ABNORMAL INCINERATOR OPERATING CONDITIONS

Describe the measures taken under abnormal operating conditions, including start-up, shutdown, leaks, malfunctions, breakdowns and momentary stoppages and by-pass of abatement systems. The response shall include information on the frequency of such conditions, the reasons for these occurrences and the measures taken to minimise and prevent such occurrences.

12.1 Introduction

Abnormal conditions on the incinerator are controlled by the Interlock and Burners Management System on the incinerator. The interlock and burner management logic is performed by a fail safe PLC which includes redundant CPU's and power supply. The incinerator and emissions are also continuously monitored 24/7 by skilled technicians.

12.2 Interlock System Architecture

The interlock and burner management logics detect the process inputs with independent sensors and will activate independent actuators. The system will initiate various levels of shutdown of the plant depending on what the abnormal condition is.

There are two main levels of shutdown (safety shutdown and environmental shutdown) on the incinerator as well as several lower levels to protect individual equipments. There are three levels of incinerator safety shutdown I-1, I-2 and I-5 and one level of incinerator environmental shutdown, I-3. The level of shut down which occurs depends on the type of abnormal operating condition detected by the control system. An I-5 level shutdown is the most complete shutdown which can occur.

12.3 Shut-Down Logic

12.3.1 Incinerator Safety trips (Levels I-1 and I-5)

a) Shutdown

If the control system detects one of the abnormal conditions listed below, it will put the incinerator into a safe hold by initiating an I-1 or I-5 trip and shutting down the following automatically:

- Shutdown of all waste streams into the incinerator (gaseous and liquid) (I-1/I-5)
- Shutdown of gas burners (pilot and main) in the incinerator chamber and open of emergency stack to prevent pressure build up in system (I-1/I-5)
- Shutdown of forced draft and induced draft fans and open of emergency stack to prevent pressure build up in system (I-5 only)

Table 12.1: Causes of Incinerator Safety Shutdowns

Types of Abnormal Conditions which initiate Incinerator Safety Trip Level Safety Trips	
- Instrument air failure	I-5
- Lack of flame at both main and pilot burners (3 burners out of 3)	I-1
- Low level at absorber column bottom	I-5
- Low pressure fire protection water line	I-5
- High pressure in combustion chamber	I-5
- Low pressure	I-5
- Low level in water supply for heat recovery steam generation	I-5
- Failure of both duty and standby PLCs	I-5
- Low pressure nitrogen header	I-1
- Low pressure on purge steam header	I-1
- External fire signal	I-5
- Auxiliary burners flame failure	I-1
- Low flow rate to quencher	I-1
- Shut-down of incinerator air fans	I-5
- Low combustion air pressure	I-1

b) Restart following an I-1, or I-5 trip

To restart the incinerator following an I-1, or I-5 trip, procedure C-TS-SOP-012 (start up following emergency shutdown) is followed. The automatic control system will interlock valves for the shutdown and cannot be reopened to the incinerator until of the trip initiators listed in Table 12.2 (below) are healthy again (i.e. the cause of the trip root has been resolved). Once the root trip issue has been addressed the sequence for restarting is to relight the gas burners followed and bring the incinerator back up to >1100°C before restarting waste streams. This is controlled by the control system and a permissive to restart waste streams will not be given until all requirements (e.g. chamber temperature >1100°C) have been met.

12.3.2 Incinerator Environmental Protection Trip (I-3)

a) Shutdown:

If the control system detects of the abnormal conditions listed below, it will put the incinerator into a safe hold automatically. It will shutdown all waste streams into the incinerator (gaseous and liquid). The liquid is held in storage tanks. The gaseous waste is diverted to back up systems. The main gas burners remain fired.

Table 12.2: Causes of Incinerator Environmental Shutdowns

Types of Abnormal Conditions which initiate the Environmental Protection Trip

- I-1 or I-5 Safety trips
- Low temperature in post combustion chamber outlet
- Low oxygen content in the flue gas
- Low flow rate of acid solution to Venturi
- Low flow rate of acid solution to acid scrubber
- Low flow rate of Basic solution to neutral scrubber
- Low flow rate of combustion air to auxiliary burner
- Low flow rate of secondary air to plenum chamber
- Emergency stack damper valve not closed
- High level in waste water neutral tank
- WESP failure

b) Restart following I-3 shutdown:
To reintroduce waste following an I-3 shutdown C-TS-SOP-012 (start up following emergency shutdown) is followed. The automatic control system will interlock waste valves so that they cannot be reopened to the incinerator until of the trip initiators listed in figure 2 are healthy again (i.e. the cause of the trip root has been resolved). Once the root issue has been addressed the sequence for bringing on waste is to start with the gaseous wastes and then proceed to the liquid wastes (as detailed in C-TS-SOP-012). The burners have remained fired during the I-3 shutdown, therefore the operating temperature has been maintained throughout the stoppage.

12.4 Measures and Controls under Abnormal Incinerator Operating Conditions for proposed new operating modes

Before introducing separate operating conditions for the liquid and gaseous wastes, and gaseous wastes only, the Safety and Environmental Protection trip logics will be fully reviewed and amended, in order to accommodate the revised operating modes and associated conditions. Any related changes to the Incinerator DCS will also therefore undergo a full HAZOP analysis prior to implementation.

12.5 ANALYSIS OF INCINERATOR TRIPS

This section covers the frequency of abnormal conditions, the reasons for these occurrences and measures taken to minimise such occurrences. It should be noted that in most cases below no emission occurred as the Cryogenic back up was online.

Figure 12.1: Incinerator trips per month in 2005 (frequency of abnormal conditions)

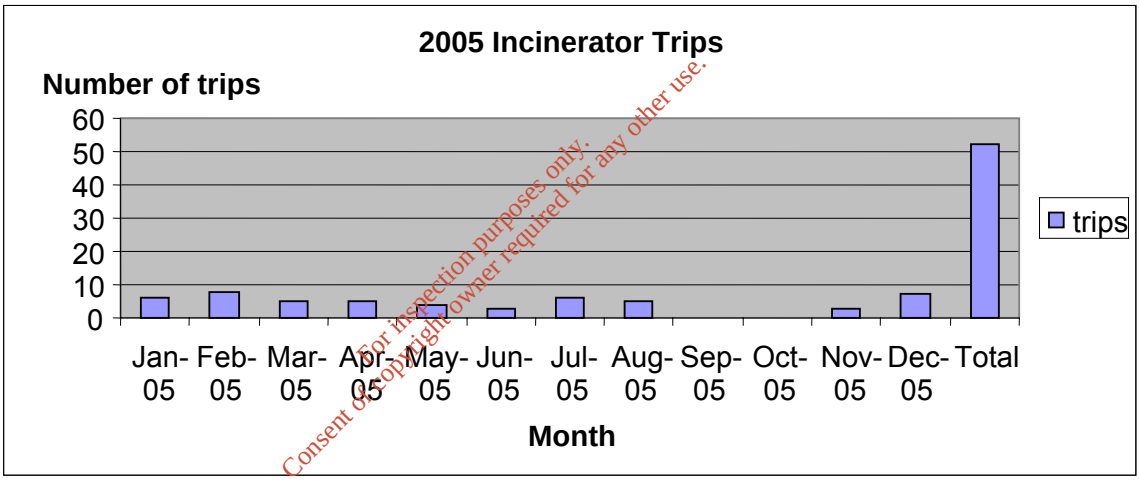

Figure 12.2: Incinerator trips per month in 2006 (frequency of abnormal conditions)

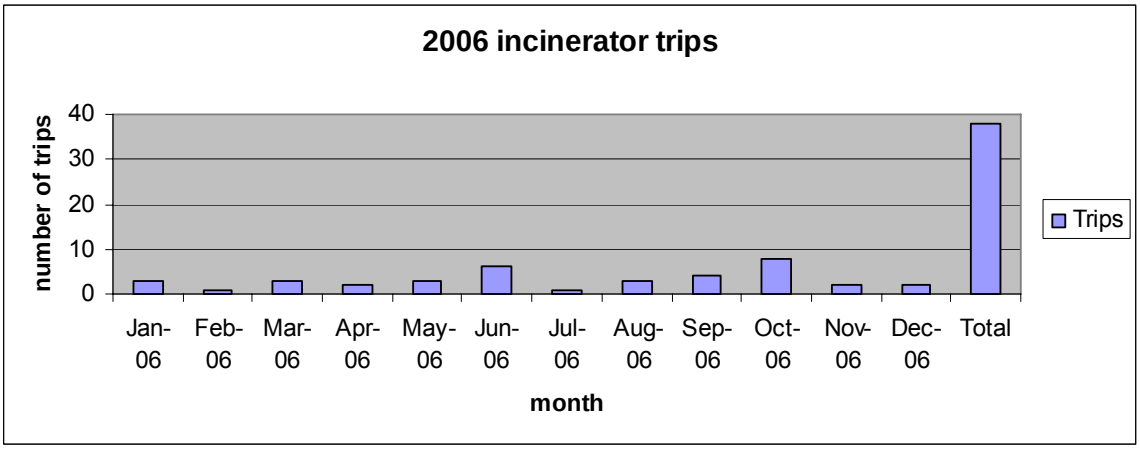

Table 12.3: Root causes of incinerator trips					
Year	**Utility Failure**	**Contractor Activity**	**Liquid Waste**	**Set Points**	**Equipment Failure**
2005	11	5	7	16	13
2006	8	5	4	12	9

The Total number of incinerator trios has been reduced by 27% in 2006 over 2005.

12.5.1 Classification of Root Causes

The causes of Incinerator trips, to date, have been classified into 5 broad categories which are further explained below:

Utility Failure (UF)

These trips are trips that result from insufficient nitrogen supply, loss of compressed air or power failures. These trips are all classified as Utility Failures and are all being addressed with appropriate actions in order to improve the overall reliability of Utility supply. In 2005 a Pressure Swing Absorption (PSA) Nitrogen Generation Skid to improve nitrogen supply at a cost of over €500,000. A number of issues related to the electrical supply to the area have also been resolved.

Having addressed the issues surrounding utility supply as described above, the risk of loss of utility supply leading to an incinerator trip is reduced.

Contractor Activity (CA):

This classification is used for any trips caused either by contractor activity, maintenance or abnormal operations (e.g. automation downloads) which, by virtue of their interaction with the Incinerator control system or equipment, caused accidental trips on the incinerator. Each of these instances has been investigated and the types of corrective actions put in place cover updating of procedures, contractor method statements or permitting controls with steps to ensure that the same accidental trip does not happen again.

Liquid Waste (LW):

Bringing Liquid Waste on and off line is an operation which needs to be completed in a very controlled manner as fluctuations in various control parameters can in turn cause a trip of the incinerator. The design up to November 2005 was to control the bringing on and off line of liquid waste manually. In November 2005 a €500,000 project was completed to fully automate this process. The automation of the liquid waste to the incinerator has resulted in significantly fewer trips as a result of bringing on liquid waste.

Set Points/Automation Control of Incinerator (SP)

This categorisation has been used to describe any incinerator trip caused by operational problems with the automated control on the Incinerator or the headers that feed it. It covers problems with parameter set points being set too high or too low or in the wrong range, and also covers instances where, e.g., the type of valve or motor drive originally installed did not provide the kind of control required. In each instance of these types of trips, the modifications that have been made as corrective

actions have undergone rigorous change control and assessment to ensure that there is no risk of the change causing a breach of the site's IPPC Licence conditions.

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Equipment Failures of Breakdowns (EF)

This category is used to describe any trip resulting from failure, mal-operation or breakdown of equipment directly or indirectly associated with the Incinerator or its control. In these instances the immediate corrective action has always been to fix or replace the equipment. In many instances, the need for increased inspection or maintenance frequency has been assessed and increased maintenance scheduled applied where appropriate. Again, it is anticipated that the number of Incinerator trips with this root cause will decrease significantly.

Many of the trips documented above occurred following a planned Incinerator shutdown and restart. Therefore since the warm standby mode of the Cryogenic Unit was introduced in August 2006 it is policy to maintain the cryogenic unit in cold standby following significant incinerator shutdowns, until the incinerator has reached steady state, so that it is immediately available should a trip occur.

12.6 Measures and Controls under Abnormal Cryogenic Unit Operating Conditions

12.6.1 Shutdown Logic

In the event of an abnormal operational conditions on the cryogenic the system, the bypass stack opens automatically and vents to atmosphere. All manufacturing operations are automatically interlocked to their "Safe Hold" position. The VOC fans also turn off automatically. The combined effect of this is to eliminate significant emissions when the bypass stack opens.

12.6.2 Start Up of Cryogenic Unit following an abnormal shutdown

Once the root cause of the shutdown has been addressed the system is checked to ensure that the set points and setting on the PLC are correct. The cryogenic unit is started up via the cryogenic PLC which automatically brings it through a series of phases that prepares the cryogenic unit for treating gases. The PLC will automatically bring on cooling liquid nitrogen to bring the cryogenic unit down to required temperature.

When the cryogenic unit reaches the required temperature the valve on the inlet vent gas line is manually opened to allow the vent gases into the system for treatment. This operation is control by procedure.

Also the carbon adsorption beds at the outlet from the cryogenic unit provide additional abatement protection.

12.7 Cryogenic Unit Trip Data and Root Causes

The cryogenic was running for a period of 8 weeks continuously in 2006. The total number of trips for this 8 week period was 13. Typical causes of the trips were as follows:

Table 12.4: Root causes of Cryogenic Unit trips

Incident Details	No. of trips for this cause	Actions
SP Set Points/Automation Control of cryogenic (SP)	7	Procedures updated
Blockages on lines between heat exchangers	6	Design review underway

13. PROPOSED HOURS OF OPERATION OF INCINERATOR UNDER DIFFERENT MODES

Quantify the proposed hours of operation of the incinerator under the different modes, treating (i) liquid solvent waste and waste gases, and (ii) waste gas only.

Liquid wastes will be disposed of on a batch basis. The following estimates of incinerator operating hours are based on 2006 waste volumes and 2007 projections:

1. Burning liquid waste and gaseous waste: 150 to 200 days/annum

2. Waste gas only: 165 to 215 days/annum

14. STORAGE ARRANGEMENTS FOR LIQUID WASTES

Provide details of the proposed storage arrangements for waste liquid solvents to be incinerated, including storage location, bunding arrangement, storage capacity and the average and maximum storage periods.

Three tanks are used for storing waste on site, two 200m^3 tanks and one 100m^3 tank. These tanks are designated 51.TK.101, 51.TK.102 and 51.TK.103 respectively and they are located in the on-site tank farm.

All overground bulk tanks including those used for liquid waste storage are situated within bunded areas which will drain to the WWTP. All bunds are lined with epoxy resins to minimise permeability. For more details see Section 18 of the original IPC Licence Application.

Based on 2005 and 2006 waste volumes and burn rates typical average storage time for liquid waste for incineration is 50 days. Maximum storage time is approximately 100 days.

15. JUSTIFICATION FOR PROPOSED INCREASE INCINERATOR NOX EMISSION LIMIT VALUE

Provide justification for the proposed increase to the NOx emission limit value from 100 to 200 mg/m3 for the on site incinerator.

BMS Cruiserath has requested an increase in the incinerator daily average NOx emission limit value from 100mg/m^3 to 200mg/m^3. Excessive volumes of ammonia are unnecessarily required to meet the current Emission limit values. The NOx ELV increase would result in an 18,000kg reduction in Ammonia consumption per annum. This represents an environmental benefit due to the reduced requirement for ammonia production and general decrease in raw material consumption.

The increase of the daily average NOx emission limit value to 200mg/m^3 would still only represent 50% of the daily average NOx emission limit value for incineration plants with a capacity of 6 tonnes/hour or less (400mg/m^3) which is documented in the Incineration of Waste Directive (2000/76/EC). In addition revised NOx air dispersion modelling for the BMS Cruiserath site indicates that the increased limit would have no significant adverse effect on ground level concentrations of NOx or cause exceedance of relevant air quality standards (see Section E.2 of the IPC Licence Review Application and Section 16 of this report, Confirmation of Air Dispersion Modelling Queries).

16. CONFIRMATIONS RELATING TO AIR DISPERSION MODELLING

In relation to the atmospheric air dispersion modelling report submitted:

(i) Confirm that the dispersion model relates to maximum emissions and includes all relevant emissions from the installation and appropriate background concentrations.

(ii) Provide a printout of the input files and output data for the atmospheric dispersion model. Electronic copies of the input and output files and a copy of the meteorological data used should also be submitted on diskette or CD.

16.1 Introduction

Air Dispersion Modelling was undertaken for the BMS Cruiserath site in October 2006 and was documented in the site's IPC Licence Review Application under Section E.2. The following sections of this report provide requested clarification on the details of the modelling. A summary from the consultants is provided in ***Attachment 6.***

16.2 Air dispersion modelling relates to maximum emissions

Air dispersion modelling was undertaken for the BMS Cruiserath site in relation to nitrogen dioxide and included the on-site boilers and incinerator.

The boiler emissions were modelled at the current IPC Licence limit of 300mg/m^3 for the operation of the boilers using Gas Oil. This represents the worst case scenario emission from the boilers as a lower NO_2 emission limit is applied to the operation of the boilers using Natural Gas.

The incinerator emissions were modelled at a NO_2 emission level of 200mg/m^3 because BMS Cruiserath are requesting an increase in the NO_2 emission limit from the incinerator to this level. The current NO_2 IPC Licence emission limit for the incinerator is 100mg/m^3. Therefore an emission level of 200mg/m^3 NO_2 from the incinerator represents the worst case scenario if the emission limit change was permitted.

16.3 Inclusion of all relevant emissions from the installation

Apart from the on-site boilers and incinerator there are no major equipment items emitting NO_2. There are three generators on site but these are standby equipment items and would only be used for emergency electricity generation in the event of a loss of power supply at the site. Therefore they do not contribute to air emissions from the site under normal operating conditions.

16.4 Inclusion of background NO_2 concentrations in air emissions assessment

The only available air monitoring data for the BMS Cruiserath site relates to a survey undertaken in April & May 2006 by AWN Consulting as part of an EIS for a proposed Finishing Facility at the site (currently not constructed). NO_2 was measured at four locations around the site over a 3-week period using passive diffusion tubes. The results obtained were in the range 19-25µg/m^3. These ambient NO_2 values include existing local traffic and industrial sources, including the BMS Cruiserath site and therefore were not included in the original assessment.

However when this ambient data is added to the modelled results for the site it represents a very conservative approach and the following results are obtained:

The NO_2 monitoring result for the 3-week period is added to the modelled annual average result, for comparison with the annual average AQS. The highest modelling result for NO_2 annual average ground level concentration was 3.3µg/m^3 and occurred in 2003. Added to the maximum ambient monitored value of 25µg/m^3 gives a conservative estimate of the overall annual average ground level NO_2 concentration of 28.3µg/m^3. The annual average NO_2 AQS value is 40µg/m^3. Therefore the conservative estimate of the overall annual average ground level NO_2 concentration is 70.8% of the AQS.

A conservative approach was also adopted in converting the ambient NO_2 concentration, which was monitored over a 3-week period, to an hourly average value. The multiplication factor used is 2 as advised in the UK Environment Agency IPPC H1 Guidance Note[1]. Therefore it is estimated that the maximum ambient hourly average NO_2 value in the vicinity of the site is 50µg/m^3. The highest modelling result for NO_2 99.8%ile hourly average ground level concentration was 80µg/m^3 and occurred in 2005. Added to the hourly average ambient monitored value of 50µg/m^3 gives a conservative estimate of the overall hourly average ground level NO_2 concentration of 130µg/m^3. The hourly average NO_2 AQS value is 200µg/m^3. Therefore the conservative estimate of the overall hourly average ground level NO_2 concentration is 65% of the AQS.

16.5 Requested Data Files

Printed copies of the input and output data files for the modelling runs of Scenario 1, using metrological data from 2001-2005, are to be found in ***Attachment 7*** of this report. A CD containing electronic copies of the input and output modelling files has also been included with this submission. A copy of the meteorological data could unfortunately not be included due to copyright issues.

[1] Environment Agency 2002, Horizontal Guidance Note IPPC H1 (ISBN 0 11 3101082)

17. FINANCIAL COMMITMENTS

Demonstrate that the applicant is in a position to meet any financial commitments or liabilities incurred by carrying on of the activities relating to this application. These commitments include compliance with the Integrated Pollution Prevention and Control (IPPC) licence (if issued) and its conditions and also the environmental liabilities concerned with the ceasing of activities pertaining to the application and the return of the site to a satisfactory condition.

Further confirmation that Swords Laboratories t/a Bristol-Myers Squibb Cruiserath is in a position to meet any financial commitments or liabilities incurred by carrying on of the activities relating to this application is provided in ***Attachment 8***

18. UPDATE NON-TECHNICAL SUMMARY

In addition to the above provide an updated non-technical summary to reflect the information provided above.

An update non-technical summary which reflects the information provided above is provided in ***Attachment 9***

ATTACHMENT 1

NOTIFICATION LETTER TO PLANNING AUTHORITY

ATTACHMENT 2.

UPDATED SITE DRAWING IDENTIFYING ALL EMISSION/MONITORING POINTS

ATTACHMENT 3.

DETAILS OF HYDROGEN BROMIDE USE

ATTACHMENT 4.

TABULATED DATA FOR EMISSIONS TO ATMOSPHERE

ATTACHMENT 5.

PROCEDURES FOR MONITORING OF HAZARDOUS WASTE SHIPMENTS AND WASTE TANKER UNLOADING AND DISPOSAL OF WASTE.

ATTACHMENT 6.

CONFIRMATIONS RELATING TO AIR DISPERSION MODELLING

ATTACHMENT 7.

METEOROLOGICAL DATA 2001 – 2005

ATTACHMENT 8

FINANCIAL COMMITMENTS

ATTACHMENT 9

UPDATED NON-TECHNICAL SUMMARY