

Appendix 6

Atmospheric Dispersion Modelling Assessment of Proposed Emissions from

**Enviroparks Hirwaun Ltd
Hirwaun Industrial Estate
Aberdare**

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Executive Summary

Enviroparks Hirwaun Ltd (Enviroparks) have commissioned a dispersion modelling assessment of the likely emissions to atmosphere from their proposed resource recovery and energy plant. The assessment has been prepared in support of a planning application and environmental impact assessment, and considers the likely regulated releases from the proposed site operations.

The proposed site will consist of a resource recovery and energy production facility, materials being segregated and recycled where possible, prior to the unrecyclable fraction undergoing various treatments to release oil and gases, which then fuel dedicated engines to release the energy potential. The potential releases from the engines have been modelled in this study, and have been assumed to discharge through 35 or 40 m stacks.

Where appropriate, results of the modelling exercise have been compared with the current Air Quality Objectives (AQO). Where no AQO is specified for a pollutant, the results have been compared to the relevant Environmental Assessment Level (EAL).

The results show that employing either a 35 m or a 40 m stack for the release points, maintains the ground level concentrations of all pollutants within the relevant assessment level. When assessing the percentage impact of the process contribution or the predicted environmental concentration, these cannot generally be considered to be insignificant, that is, less than 1 % of the long term assessment level.

Concentrations of pollutants at the local sensitive receptors remained well within the relevant assessment level.

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1. Introduction

Enviroparks Hirwaun Ltd (Enviroparks) propose to develop a site on the Hirwaun Industrial Estate in Hirwaun, Aberdare. The company plans to operate a resource recovery and energy production plant using the concept of integrated technologies to extract the full recyclable value from the incoming waste stream. The combination of technologies enables the residual fraction of material requiring disposal to be reduced to 2.5% of the original incoming resources.

The proposed development ensures maximum efficiency by sorting the feedstock materials that arrive at the site to extract recyclable materials, before preparing the feedstock for further processing. The site then employs five interlinked technologies to process the remaining material and recover energy resources.

The five main processing and energy production technologies are as follows:

- a 'Biomax' separator that extracts oil akin to a biodiesel from organic materials such as waste food, and other food industry products.
- anaerobic digestion, in which biomass material is placed in sealed vessels and warmed and stirred in the absence of oxygen. This process removes most pathogens and odour from the waste and provides a useful energy source in the form of methane gas and a clean water effluent.
- pyrolysis, in which solid organic materials are converted to a useful fuel gas under high temperatures and in the absence of oxygen.
- a plasma gasifier process in which any materials are converted to simple gases and an inert, glass-like solid material that can be used as an aggregate in construction.
- the liquid and gaseous fuels produced through these processes are then fed to a range of reciprocating engines to produce energy.

Some of the energy produced by the site will be used by a 'high energy user' – a manufacturing facility with high energy needs, occupying an industrial unit proposed in the northern part of the Enviroparks site.

Point source emissions to atmosphere will include three flue discharge points which are all located within a single chimney stack, and four emergency flares.

This report details the modelling work undertaken presents the findings of the study.

2. Principal Objectives and Scope of Work

The principal aim of the work undertaken was to determine the dispersion of air borne pollutants from the proposed Enviroparks site, in order to predict the environmental impact of the development on the surrounding area.

The only definitive means of quantifying the impact of process emissions on air quality and the surrounding area is to undertake a comprehensive programme of environmental monitoring around the site in question. As an alternative, atmospheric dispersion modelling provides a means of estimating the potential impacts of emissions with a reasonable degree of confidence, by modelling the dispersion of a plume exiting a chimney in relation to a number of key parameters. This enables the calculation of an estimated contribution to ground level pollutant concentrations arising from the release.

For the purpose of this study, the latest version of the UK Atmospheric Dispersion Modelling System was used (ADMS 4.1). The ADMS model is one of the leading atmospheric dispersion models available in the UK and can be used to assess ambient pollutant concentrations from a wide variety of emissions sources associated with an industrial installation.

3. Study Parameters

Details of the release points to be considered were supplied by the Enviroparks design team. Modelling a proposed site which is not yet built and operational enables full consideration to be given to the potential for dispersion, and thus enables the design of the chimney structure and process equipment to take the results of the modelling work into account. It does however also mean that all of the input data is calculated rather than being drawn from actual measured values, and some additional assumptions may also have to be made. Various stack heights were employed in the initial modelling runs to determine optimum dispersion of pollutants, although this report does not detail all of the modelling runs undertaken. Despite lower stack heights such as 30 m stacks not resulting in ground level concentrations which necessarily exceeded the assessment levels, the most suitable stack heights identified were determined to be 35 m and 40 m. As such data on the assessment results when modelling these two stack heights are provided in the remainder of this report.

Three processes at the site will discharge through flues which pass up the main site chimney stack. These exhausts are from the engines which are fuelled by the oil / tallow recovered from the biomax plant, the pyrolysis of cellulose fibre from the fuel preparation area, and the methane produced by the anaerobic digesters. The site currently proposes to install a tallow engine to utilise the oil from the biomax unit, however should market forces and environmental regulation change in the future, it may be more effective to send this material off site for third party use. At such time, the tallow engines can be decoupled and the flue may be used for the discharge of a gasifier exhaust. As the tallow engines and gasifier will not be operated simultaneously at the site, these processes have been modelled as one, with the worst case emissions assumed.

Although the site will include four flares, these have not been included in the modelling exercise. This is due to a number of reasons:

1. It has not been possible to predict the likely emissions from the flares, which are designed to operate only during the start up / shut down of the various engines or to control emergency releases. Once the site is fully operational, start up / shut down conditions are unlikely to occur on a regular basis, as the engines are designed to run for long, uninterrupted periods. As an energy producer, engine down time would effectively cost the company money, and hence efficient operation is a key performance indicator.
2. Due to the unknown, although preferably short operating periods of the flares, it would be unreasonable to model the releases as a standard point source which, in the case of this exercise have been modelled on a long term basis, that is 8760 hours per year.
3. Finally, flares are designed to auto-ignite as required. The site will employ enclosed flares which burn the gas within a vertical enclosure. Enclosed flares generally include combustion controls, and will be designed to provide an optimum residence time. The enclosures can also be insulated to reduce heat losses and therefore allow higher operational temperatures, and the systems will be designed specifically for the application. Coupled with the fact that the flares will only fire for short periods and the discharges from the engine exhausts have been assumed to fire continuously, when in reality they will only operate for between 50 % and 92 % of the time, it is considered reasonable to model the longer term and more easily predicted emissions from the engines, on a worst case basis, in lieu of estimating the unknown releases from the flares.

The process stacks planned for the site are therefore as follows:

Stack Reference	Process
A1	Tallow Engine / Gasifier Exhaust
A2	Fuel Preparation Area Pyrolyser
A3	Methane Engine Exhaust

3.1 Emission Parameters

The characteristics of the individual release points and the pollutant parameters to be modelled are presented in Tables 1 and 2.

Table 1 Emission Point Parameters, Enviroparks Hirwaun Ltd

Release Point	As Measured / Maximum Volumetric Flowrate (m ³ s ⁻¹)	Temperature (°C)	Height (m)	Diameter (m)	Grid Reference	
					X (m)	Y (m)
A1	14.3	120	35 / 40	1.1	293842	206806
A2	11.11	120	35 / 40	1.0	293844	206806
A3	8.34	120	35 / 40	0.8	293843	206807

The chosen pollutant parameters and discharge concentrations are representative of likely emissions from the stacks, with additional consideration to any likely regulatory limits which will be imposed on the discharges. As the FPA pyrolyser and the possible future gasifier will be fuelled from materials derived from waste, Enviroparks Hirwaun Ltd has chosen to restrict these emissions to the limits inferred by the Waste Incineration Regulations which transpose the Waste Incineration Directive (WID).

Table 2 Anticipated Emissions to Atmosphere, Enviroparks Hirwaun Ltd

Pollutant (All release concentrations are in g/s)	A1	A2	A3
NO _x	3.69	3.67	2.4
SO _x	0.65	0.55	0.37
CO	2.2	0.55	1.44
VOC	0.45	0.11	0.08
PM ₁₀	0.45	0.11	0.11
HCl	0.12	0.11	N/A
HF	0.012	0.011	N/A
Hg	0.0006	0.00055	N/A
Cd+Th	0.0006	0.00055	N/A
Sb+ As+ Pb+Cr+Co+Cu+Mn+Ni+V	0.006	0.0055	N/A
Dioxin	1.20E-09	1.10E-09	N/A

Emissions of oxides of sulphur (SO_x) are assumed to consist wholly of sulphur dioxide.

Where different pollutants are listed together, the emission stated is the total release of all of the specified pollutants. For example, 0.0006 grams per second of cadmium and thallium are released from A1 in total, not individually. Where the resultant concentrations of these pollutants are reported in Appendix 1, the concentration stated is the total pollutant level of the group, and not the pollutant concentration of any one of the substances.

Data for emissions of oxides of nitrogen has been provided. This has been input into the modelling exercise in a number of ways in order to determine the likely resultant concentrations of NO_x (NO and NO₂), and NO₂. As emissions of NO₂ are only ever a proportion of the total emissions of NO_x, an allowance for the NO₂ proportion of NO_x has to be made. The ADMS model includes a chemistry function which enables consideration of the percentage NO₂ in NO_x, and applies atmospheric chemistry to the releases to determine the likely resultant ground level concentrations. However the Environment Agency recommend that a more manual calculation is applied as follows:

Long term NO₂ (e.g. annual averaging period) = NO_x * 0.7 + background

Short term NO₂ (e.g. hourly averaging period) = NO_x * 0.35 + (background * 2)

As this method is understood to be the preferred modelling system of the Environment Agency, it has been applied to this modelling exercise. That said, a sensitivity analysis was also performed by running the automatic chemistry calculation of the ADMS system. The ADMS chemistry model resulted in lower predicted concentrations of NO_x and NO₂ from the process, and thus the results presented throughout the remainder of this report which are produced using the Environment Agency preferred method, can be considered to be the more conservative of the two potential assessment methods.

Background concentrations of pollution have been included within the assessment where these are available, and therefore the modelling results will depict the new ground level concentration of each pollutant, assuming the proposed development proceeds. By including a background concentration of pollution, existing facilities in the area are accounted for by the modelling exercise. Background data was sourced from both the Rhondda Cynon Taf Local Authority website, and provides recent information on local monitoring sites, and from the UK Air Quality Archive (www.airquality.co.uk)⁽¹⁾, which provides estimates of background levels of pollution across the country.

Table 3 Background Pollutant Concentrations Applied in the Enviroparks Study

Pollutant	Measured Data	Pollution Maps Data
NO _x as NO ₂ (µg m ⁻³)	10.11	
PM ₁₀ (µg m ⁻³)	22.48	
SO ₂ (µg m ⁻³)		2.79
CO (mg m ⁻³)		0.12

All data is presented as the annual average concentrations, with the exception of the background concentration of sulphur dioxide, represented as the 24 hour average.

Predicted data is taken from the Air Quality Archive Background Pollution Maps, with adjustment from base year data to 2008⁽¹⁾. The chosen data point for the data to be taken from is national grid reference 293500 206500, and is representative of the south western corner of the proposed Enviroparks site. Measured data is included where available and is taken from the Penderyn monitoring station, located approximately 2 km north north west of the proposed development site.

Where measured data is applied, this was compared with the predicted pollution maps data. Measured background concentrations of both NO_x (as NO₂) and PM₁₀ were higher than the background maps suggested, and thus the use of the measured data can be considered a robust approach.

3.2 Nearby Buildings and Structures

For processes which have a stack or stacks located on top of a building, or adjacent to a tall building, the effect of surrounding structures may need to be taken into account. As a general guide, building downwash problems (where emissions are caught in the turbulent wake of the wind blowing around a building), may occur if the stack height is less than 2.5 times the height of the building upon which it sits. Buildings which sit adjacent to stacks may need to be considered if they are within 5 stack heights of the point of release. It was therefore deemed necessary to include into the model, details of all of the main process buildings at the Enviroparks site as the emission points sit immediately adjacent the pyrolysis building. Building shapes must be simplified for incorporation into the ADMS model, and hence a series of shapes denote the site buildings. The data included in the model were obtained from the proposed site plans, and are presented in Table 4.

Table 4 Details of the Building Data Applied to the Enviroparks Study

Building	X (m)	Y (m)	Height (m)	Length / Diameter (m)	Width (m)	Angle (°)
Pyrolysis Building	293842	206770	11.5	36.9	60	114
Engine House	293898	206768	8.8	28.5	55	114
Fuel Preparation 1	293933	206717	14.2	36.9	133	114
Fuel Preparation 2	293835	206708	14.2	135	36.9	114
Biomax	293949	206875	11.4	36.9	65	90
High Energy User	293843	206893	14.2	170	52	90
Digestion Tank 1	293760	206800	15	20		
Digestion Tank 2	293784	206800	15	20		
Digestion Tank 3	293808	206800	15	20		
Gas Tank	293795	206775	14	17		

As the building of the neighbouring factory (Eden Industries) is located just within 5 stack heights of the discharge points, a sensitivity analysis was performed to confirm that the incorporation of this building into the model would not have any significant effects. As ADMS can only accept a maximum of 10 buildings, when running the sensitivity check the AD tanks were modelled as a single rectangular building in order that the Eden factory could be included. The results suggested negligible difference, although the results when modelling the Eden factory were marginally lower. Thus the original building schedule detailed in Table 4 was applied, and is considered to present a robust assessment, including the consideration of any effects of the three round AD tanks which have a potentially greater effect on dispersion due to their location, shape and height.

It should be noted that as the development is not yet built, some changes may occur between this initial design stage and eventual commissioning and operation. Where possible this assessment has attempted to provide a worst case assessment of the likely development and examples of this follow:

- It is still unclear what the final dimensions of the AD tanks will be, and at the time of writing, these are expected to be smaller both in diameter and height than has been included in the model. However as the dimensions included present a worst case, it is considered that the model should be relatively robust against any such changes, assuming that they are not significant.

- The plasma unit has been modelled as part of the fuel preparation building. This should present a worst case scenario as the unit is not actually contained within a building and is instead simply situated on a plinth to the side of the fuel preparation building. The more complex structure of the plasma unit would in all likelihood contribute to turbulence which could assist with better mixing of the plumes, and therefore, assuming the unit is incorporated within a building can be considered to represent a conservative assessment.
- The site also includes three large cooling fans located close to the plasma unit. These have not been included in the model as there was insufficient room in the building schedule, however as these would assist thermal lift, the resultant model is considered to present a conservative case.

3.3 Meteorological Data

One of the key factors affecting the dispersion characteristics of a plume is the height it can gain above the release point, as a result of momentum and buoyancy. The higher the plume rises, the greater the volume of the atmosphere in which it can disperse, and the lower the potential contribution to ground level concentrations of pollutants. This in turn results in a lower potential impact on the environment. Additionally, meteorological conditions affect the dispersion of a plume, and thus the ADMS model uses comprehensive met. data to determine the impact of the weather on emissions. As a minimum requirement for modelling plume dispersion, details of wind speed, direction, stability conditions and mixing height are required.

A total of five years worth of meteorological data has been employed in this modelling exercise. The data used was a combination of data from the St. Athan met. station, which is the nearest station to the site which has historically recorded data suitable for inclusion into the ADMS model, and wind speed and direction data from the Sennybridge met. station. Sennybridge is closer to the site, situated approximately 22 km north of the subject site, however until December 2006, it did not record adequate data for inclusion into the ADMS model, and thus the Met. Office confirm that the St. Athan / Sennybridge combination data is the most appropriate to be used for a site in this location. The latest five years of full data (2003 – 2007) have been applied to the modelling exercise.

3.4 Surface Roughness

For the purpose of running the ADMS model, it is necessary to assign a surface roughness figure to the area to be modelled. This describes the degree of ground turbulence caused by the passage of winds across surface structures. The degree of ground turbulence is much greater in urban areas than in rural areas due to the presence of tall buildings in urban areas increasing the level of turbulence. ADMS requires the selection of a surface roughness factor to be input into the model, according to defined criteria. For the purpose of this model, a surface roughness factor of 0.5 was chosen, characteristic of parkland or open suburbia.

3.5 Terrain Data

The use of terrain data was considered prior to running the model. Although the necessity of using detailed terrain data can generally be assessed using a screening model which utilises worst-case emission rates to undertake a simplified calculation, and subsequently assessing the results against the relevant air quality standards or environmental assessment levels, it was considered that due to the location of the site, which is situated in the shadow of the Penderyn reservoir embankment, terrain data would need to be incorporated. Thus digital data in the form of Landform Panorama tile SN80 was employed to provide details of the terrain local to the Enviroparks site.

3.6 Model Output Parameters

The ADMS 4 model calculates the likely contribution to ground level concentrations within a definable grid system, which is pre-determined by the user. For the purpose of this study a Cartesian co-ordinate grid system was chosen, to cover an area of 3 square km, with a point representing the emission points identified at the approximate centre of the grid. The Cartesian style grid has regular, pre-defined increments in both northerly and easterly directions from the specified bottom left corner of the grid, and ground level concentrations are specified at the intersections of these grid lines. Each grid modelled was based on a 60 x 60 point system, giving a total of 3,600 points (or intersections) across the grid. The use of the grid in this way aids the generation of pollutant contours. Additionally, in order to ensure the robustness of the modelling exercise, a finer grid was applied to one model. Once the results of the initial modelling were obtained and reviewed, the model was re-run using the year of met. data which had resulted in the majority of the highest concentrations at ground level (2007), whilst applying a grid of 10,000 grid points (100 x 100). The results obtained using different grids will always be different, as the model is reporting the concentration at different points within the study area. Often the results from a finer grid demonstrate an increase over a less refined grid. The results of this check model are included within Appendix 1, and demonstrate some variation on the results from the less defined grid, although when comparing results with the relevant environmental assessment levels, there was no significant difference. This suggests that in this instance, the less defined grid provided a suitable assessment of the dispersion of pollutants across the local area.

A selection of points have been included in the model to represent sensitive receptors in the area, and consideration of the requirements of the Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance LAQM TG(03), was made in choosing these receptors. This states that sensitive receptors should be those locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective, and provides examples of where an annual average objective may apply as the building facades of residential properties, schools, hospitals, libraries etc. Shorter term objectives would automatically apply where an annual objective applies.

Additionally, sensitive ecological receptors such as SSSIs have been included where these fall within the modelled grid. Therefore the sensitive receptors included in this study comprise:

Table 5 Sensitive Receptors Modelled in the Enviroparks Study

Receptor Name	Central Grid Reference	Approximate Location from Enviroparks Site
Castell Farm	X: 292930 Y: 206700	750 m west
Penderyn Reservoir	X: 293800 Y: 207010	50 m north
House at Penderyn Reservoir	X: 294100 Y: 207270	350 m north
Ty Newydd Hotel	X: 294600 X: 206940	550 m east
Eden Industries	X: 294020 Y: 206800	25 m east
Factory at the corner of Fifth Avenue	X: 294000 Y: 206500	100 m south
Cors Bryn-y-Gaer SSSI	X: 294500 Y: 206700	150 m east
Woodland Park 1 SSSI	X: 294600 Y: 207700	1,250 m north north east
Woodland Park 2 SSSI	X: 294800 Y: 207100	800 m east

It should be noted, that although only a selection of receptors have been chosen, such as key commercial or residential sites, or a single grid reference to represent a sensitive ecological area, the purpose of the Cartesian grid is to model the pollutant dispersion across a wider designated area, and thus other residential properties and the wider industrial estate are considered by the model within the gridded results. The concentration contour plots demonstrate the process contribution of pollutants to the local area.

The output for the model was set as long term, which provides a single concentration averaged over all of the lines of met. data, for each point, that is, providing an annual average concentration for each pollutant at each grid point or receptor. Pollutants were modelled over 15 minute, 1 hour, 8 hour or 24 hour averaging periods, in line with their respective air quality objectives, as presented in Table 6. Additionally, percentile concentrations were calculated to demonstrate the worst predicted contribution to ground level concentrations, minus any allowable exceedences. The 100th percentile concentration was also calculated for models applying the worst case emissions data, in order to determine the overall worst-case concentration for each averaging period. As these results represent the worst case contribution to background concentrations over a short term (the averaging period) they are higher than the worst case annual average, which is otherwise reported.

The introduction of the UK Air Quality Regulations in 2000 and its addendum in 2002⁽²⁾, coupled with the Air Quality Standards Regulations of 2007⁽³⁾, and the implementation of the Air Quality Strategy⁽⁴⁾ has placed a requirement on Local Authorities to manage the quality of ambient air within their jurisdiction. Air quality objectives exist for various pollutants, which indicate the maximum level of ambient pollution which can be experienced whilst protecting the health of the local population and working towards air quality standards. Those air quality objectives (AQOs) relating to the pollutants modelled in this study are presented in Table 6 below.

Table 6 UK Air Quality Objectives for Pollutants Modelled

Pollutant	Objective Concentration	Averaging Period	Date Objective Should be Met
Particulate (PM ₁₀) (Limit Value)	50 µg m ⁻³ not to be exceeded more than 35 times a year (90.4 percentile)	24 Hour Mean	31 st December 2004
Particulate (PM ₁₀) (Limit Value)	50 µg m ⁻³ not to be exceeded more than 7 times a year (98.08 percentile)	24 Hour Mean	31 st December 2010
Particulate (PM ₁₀) (Limit Value)	40 µg m ⁻³	Annual Mean	31 st December 2004
Nitrogen Dioxide (Limit Value)	200 µg m ⁻³ not to be exceeded more than 18 times a year (99.79 percentile)	1 Hour Mean	31 st December 2005
Nitrogen Dioxide (Limit Value)	40 µg m ⁻³	Annual Mean	31 st December 2005
Sulphur Dioxide (Limit Value)	266 µg m ⁻³ not to be exceeded more than 35 times a year (99.90 percentile)	15 Minute Mean	31 st December 2005
Sulphur Dioxide (Limit Value)	350 µg m ⁻³ not to be exceeded more than 24 times a year (99.73 percentile)	1 Hour Mean	31 st December 2004
Sulphur Dioxide (Limit Value)	125 µg m ⁻³ not to be exceeded more than 3 times a year (99.18 percentile)	24 Hour Mean	31 st December 2004
Carbon Monoxide (Limit Value)	10 mg m ⁻³	Running 8 Hour Mean	31 st December 2003
Lead (Limit Value)	0.5 µg m ⁻³	Annual Mean	31 st December 2004
Lead (Limit Value)	0.25 µg m ⁻³	Annual Mean	31 st December 2008
Arsenic (Target Value)	0.006 µg m ⁻³	Annual Mean	31 st December 2012
Cadmium (Target Value)	0.005 µg m ⁻³	Annual Mean	31 st December 2012
Nickel (Target Value)	0.020 µg m ⁻³	Annual Mean	31 st December 2012

Air Quality Standards are considered to be the relevant Environmental Quality Standards (EQS) when considering the protection of the environment as a whole and are used to define the upper bound concentration of a substance in the environment that is considered tolerable. For pollutants which do not have AQOs/EQSs set, the modelling results have been compared to Environmental Assessment Levels (EALs). EALs have been derived by the Environment Agency as provisional benchmarks for substances released to each environmental medium from a variety of published UK and international sources. These benchmarks are therefore relevant to the protection of the environment as a whole, rather than specifically for areas where people may be present in any number or for any defined period, and indeed some national objectives for the protection of vegetation and ecosystems which should be applied to sensitive ecological areas, are lower than those for the protection of human health.

The national objectives and environmental assessment levels for the pollutants considered in this study which do not have an AQO or EQS, are presented in Table 7 below:

Table 7 Relevant Assessment Levels for Other Pollutants Modelled

Limit Type	Pollutant	Concentration	Measured As
National Objective	Oxides of Nitrogen	30 $\mu\text{g m}^{-3}$	Annual Mean
National Objective	Sulphur Dioxide	20 $\mu\text{g m}^{-3}$	Annual Mean
EAL	Hydrogen Chloride	20 $\mu\text{g m}^{-3}$	Long Term
EAL	Hydrogen Fluoride	250 $\mu\text{g m}^{-3}$	Short Term
EAL	Thallium	1 $\mu\text{g m}^{-3}$	Long Term
EAL	Mercury	0.25 $\mu\text{g m}^{-3}$	Long Term
EAL	Antimony	5 $\mu\text{g m}^{-3}$	Long Term
EAL	Chromium	0.1 $\mu\text{g m}^{-3}$	Long Term
EAL	Cobalt	0.2 $\mu\text{g m}^{-3}$	Long Term
EAL	Copper	10 $\mu\text{g m}^{-3}$	Long Term
EAL	Manganese	1 $\mu\text{g m}^{-3}$	Long Term
EAL	Vanadium	5 $\mu\text{g m}^{-3}$	Long Term

3.7 Modelling Assumptions

Additionally to the parameters described in the sections above, some assumptions had to be made for the modelling study and these are listed below:

- All emissions are assumed to be continuous. In reality, the site will operate 24 hours, seven day per week, although operations may not necessarily be running constantly. For example, the tallow engines are expected to operate approximately 50 % of the time, and in reality the site will need to allow for scheduled and un-planned shut downs. Thus the model can be seen to represent a worst case as emissions are considered to occur on a 24 hour, daily basis.
- Emissions data has been provided by the design engineers and is considered to present a realistic worst case.
- The emissions applied to the model are considered to represent the likely regulated releases from the site.

4. Results and Discussion

Tabulated results are presented in Appendix 1 and consider the predicted ground level concentrations of pollutants. Where available (NO_x / NO_2 , SO_2 , PM_{10} and CO), the background concentration data was included in the model, and hence the overall result represents the Predicted Environmental Concentration (PEC), that is, the combined process contribution and background concentration. Where no background concentration was available for inclusion into the model, the results represent the contribution to ground level concentrations, or the 'Process Contribution' (PC).

An assessment of 'insignificance' can be made by comparing the process contribution, or the predicted environmental concentration (where available), to the relevant AQO or EAL. If the predicted concentration of a short term emission is less than 10 % of the relevant assessment level, the emission can be considered 'insignificant', and similarly if the predicted concentration of a long term emission is less than 1 % of the relevant assessment level. Each page of results contains tabulated data of the highest pollutant concentrations predicted by the model for each relevant averaging period. Additionally, the pollutant concentrations have been used to calculate the percentage contribution to the relevant assessment levels in order to consider whether or not the emissions can be considered insignificant.

The results demonstrate that all pollutant concentrations, including those which incorporate a background concentration, are within the Air Quality Objective, Environmental Quality Standard, National Objective or Environmental Assessment Level assigned to them. Pollutants remain within their respective assessment limit when considering any of the relevant averaging periods or the worst case hourly result where a shorter referencing period is relevant (100th percentile). Where groups of pollutants are modelled together, the results obtained represent the total concentration of the group of pollutants, and no further accurate assessment can be made of the likely concentration of each individual substance. The lowest assessment level of the pollutant group has been applied in the tables, and thus a direct comparison of the concentration with the assessment level is not appropriate, however the combined concentration of cadmium and thallium is below the assessment level, and the highest predicted concentration of arsenic is less than 4 times the combined assessment level of the nine grouped pollutants. Thus it is considered likely that the actual level of individual pollutants from these groups remains within the relevant assessment level.

When testing the results against the Environment Agency criteria for insignificance, some emissions can be considered as insignificant when considering the Process Contribution (PC) only. However when comparing the Predicted Environmental Concentration which incorporates the background concentration, none of the pollutants modelled are considered to be insignificant. It should be noted that when considering longer term averaging periods, the PC is often half or less than half of the PEC, indicating the proportion of the process contribution against the background levels.

Of particular concern to the Brecon Beacons National Park Authority, under which jurisdiction the northern part of the site falls, would be the potential impact of emissions of NO_x and SO_2 . The highest percentage contribution to an assessment level is that of oxides of nitrogen to the National Objective for the protection of vegetation and ecosystems. The National Objective for NO_x is 30 ug m^{-3} as an annual mean, and the PEC ranged from 19.5 to 23.7 ug m^{-3} . This equates to 65 – 69 % of the National Objective when modelling a 40 m stack. Modelling a 35 m stack resulted in a PEC of more than 75 % for each year of met. data applied. Annual average concentrations of SO_2 , which also has a National Objective for the protection of vegetation and ecosystems, ranged from 4.3 to almost 5 ug m^{-3} . Against a National Objective of 20 ug m^{-3} , this equates to 21 – 25 % of the limit when modelling a 40 m stack.

Of particular concern to the Rhondda Cynon Taf County Borough Council, within which jurisdiction the southern and eastern part of the site is located will be levels of nitrogen dioxide. The Local Authority has already identified a number of areas within the Borough which have been designated Air Quality Management Areas, and monitoring of NO₂ has been undertaken around the Hirwaun area historically and more recently in Penderyn. The two stack heights modelled demonstrate that the process contribution and the predicted environmental concentration of NO₂ are within the AQO. The 35 m stack is predicted to result in an annual average PEC of between 46 and 49 % of the AQO, whilst the 40 m stack reduces this to between 41.7 and 43.2 %. Shorter term results predict that the comparable hourly average PEC equates to between 52 and 55 % of the AQO when modelling a 35 m stack, and between 48 and 49 % with a 40 m stack.

Concentrations at all identified sensitive receptors were well below the assessment levels, and thus the potential impact on sensitive sites can be considered to be low.

5. Conclusions

Enviroparks Hirwaun Ltd have commissioned a dispersion modelling assessment of the likely releases from their proposed development on the Hirwaun Industrial Estate. The proposed development is a resource recycling and energy facility, whereby recovered or produced gases and oils will be fired into engines to release their energy potential. The emissions exhausted from these energy processes have been the focus of this study.

The results show that employing either a 35 m or a 40 m stack for the release points, maintains the ground level concentrations at below the relevant assessment levels. However when assessing the percentage impact of the process contribution or the predicted environmental concentration of pollutants, these cannot generally be considered insignificant, that is, less than 1 % of the long term assessment level.

Concentrations of pollutants at the local sensitive receptors remained well within the relevant assessment levels.

Although results from the modelling exercises employing two different stack heights suggest that a stack of either height will disperse satisfactorily and will retain ground level concentrations within the required limits, Enviroparks are conscious of the contribution that their emissions will potentially make to permissible concentrations at ground level. Thus, despite either stack height providing adequate dispersion of emissions, the company proposes to employ a 40 m stack on site in order to better disperse their emissions and promote lower contributions to pollutant levels. In proposing a 40 m stack height, Enviroparks believe that they are employing the best practicable option, and whilst the releases from the site could not be considered to be insignificant, it is believed that efforts to reduce the percentage contribution of emissions demonstrate that the Enviroparks proposal can be developed without excessive or unacceptable negative impact on the air quality of the local area, or to the detriment of potential future development on or around the estate.

6. References

1. Air Quality Archive Estimated UK Background Air Pollution Concentrations (<http://www.airquality.co.uk/archive/laqm/tools.php>).
2. Air Quality (Wales) Regulations SI 2000/1940
3. Air Quality Standards Regulations SI 2007/64
4. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1). July 2007. DEFRA. Crown Copyright. Published by TSO. ISBN 978 0 10 171692 5

APPENDIX 1

MODELLING RESULTS TABLES

Notes:

Within the tables all concentrations are detailed in $\mu\text{g m}^{-3}$, with the exception of concentrations of CO which are presented in mg m^{-3} in each table.

Grid references specified in the tables denote the location on the modelled grid, which predicted the maximum concentration of each pollutant.

The Insignificance Test tables compare all relevant concentrations to an assessment level, however the reporting period of the pollutant and limit concentrations may not be directly comparable. Where results and limits are directly comparable in the insignificance test tables, these are highlighted.

Gridded Results Summary Table
Presenting the Range of Predicted Environmental Concentrations
Alongside Details of the Relevant Assessment Limit: 35 and 40 m Stacks

Pollutant and Averaging Period	Limit	Concentration Range
Annual NOx ug m-3	30	19.5 - 23.69
Annual NO2 ug m-3	40	16.7 - 19.61
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	200	75.95 - 93.16
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	266	31.18 - 42
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	350	26.67 - 34.96
Annual SO2 ug m-3	20	4.3 - 4.96
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	125	11.9 - 15.13
8 Hour Running Average CO mg m-3	11.6	0.14 - 0.15
Annual PM10 ug m-3	40	23.11 - 23.38
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	50	24.3 - 25.33
Annual VOC ug m-3		0.6 - 0.86
Annual HCl ug m-3	20	0.21 - 0.31
Annual HF ug m-3		0.0211 - 0.0306
Annual Hg ug m-3	0.25	0.0011 - 0.0015
Annual Cd and Th ug m-3	0.005	0.0011 - 0.0015
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.006	0.01 - 0.02
Annual Dioxin ug m-3		2.11E-09 - 3.06E-09

Modelling Results: 2003 Met Data; 35 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294084.75	206974.58	22.36
Max Hourly NOx ug m-3	294033.91	206771.19	252.13
No of Points Hourly Concentration Exceeds the Annual Limit			1937.60
Annual NO2 ug m-3	294084.75	206974.58	18.69
No of Points Hourly Concentration Exceeds the Annual Limit			1336.19
Max Hourly NO2 ug m-3	294033.91	206771.19	104.95
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	293830.5	206669.48	84.70
15 Minute Average SO2 ug m-3	294084.75	206974.58	4.79
Max 15 Minute SO2 ug m-3	294033.91	206771.19	43.35
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	293830.5	206669.48	35.00
Annual SO2 ug m-3	294084.75	206974.58	4.75
Max Hourly SO2 ug m-3	294033.91	206771.19	41.47
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	293830.5	206669.48	30.55
24 Hour Average SO2 ug m-3	294084.75	206974.58	4.68
Max 24 Hourly SO2 ug m-3	293932.22	206669.48	19.19
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	293983.06	206720.34	13.46
8 Hour Running Average CO mg m-3	294084.75	206974.58	0.14
Maximum 8 Hour CO mg m-3	293932.22	206771.19	1.04
Annual PM10 ug m-3	294084.75	206974.58	23.30
Max Hourly PM10 ug m-3	294033.91	206771.19	38.21
24 Hour Average PM10 ug m-3	294084.75	206974.58	23.27
Max 24 Hourly PM10 ug m-3	293932.22	206669.48	29.27
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294084.75	206974.58	24.89
Annual VOC ug m-3	294084.75	206974.58	0.77
Max Hourly VOC ug m-3	294033.91	206771.19	14.82
Annual HCl ug m-3	294084.75	206974.58	0.28
Max Hourly HCl ug m-3	294033.91	206771.19	5.29
Annual HF ug m-3	294084.75	206974.58	0.0277
Max Hourly HF ug m-3	294033.91	206771.19	0.5288
Annual Hg ug m-3	294084.75	206974.58	0.0014
Max Hourly Hg ug m-3	294033.91	206771.19	0.0264
Annual Cd and Th ug m-3	294084.75	206974.58	0.0014
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0264
No of Points Hourly Concentration Exceeds the Annual Limit			1275.25
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294084.75	206974.58	0.0138
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.26
No of Points Hourly Concentration Exceeds the Annual Limit			2448.00
Annual Dioxin ug m-3	294084.75	206974.58	2.77E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	5.29E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	22.36	10.11	12.25	40.85	74.55
Annual NO2 ug m-3	18.69	10.11	8.58	21.45	46.72
Max Hourly NO2 ug m-3	104.95	20.22	84.73	42.37	52.48
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	84.70	20.22	64.48	32.24	42.35
15 Minute Average SO2 ug m-3	4.79	2.79	2.00	0.75	1.80
Max 15 Minute SO2 ug m-3	43.35	2.79	40.56	15.25	16.30
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	35.00	2.79	32.21	12.11	13.16
Annual SO2 ug m-3	4.75	2.79	1.96	0.56	1.36
Max Hourly SO2 ug m-3	41.47	2.79	38.68	11.05	11.85
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	30.55	2.79	27.76	7.93	8.73
24 Hour Average SO2 ug m-3	4.68	2.79	1.89	1.52	1.21
Max 24 Hourly SO2 ug m-3	19.19	2.79	16.40	13.12	10.50
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	13.46	2.79	10.67	8.54	6.83
8 Hour Running Average CO mg m-3	0.14	0.12	0.02	0.21	1.24
Maximum 8 Hour CO mg m-3	1.04	0.12	0.92	7.94	8.98
Annual PM10 ug m-3	23.30	22.48	0.82	2.04	58.24
Max Hourly PM10 ug m-3	38.21	22.48	15.73	39.34	95.54
24 Hour Average PM10 ug m-3	23.27	22.48	0.79	1.58	46.54
Max 24 Hourly PM10 ug m-3	29.27	22.48	6.79	13.58	58.54
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.89	22.48	2.41	4.82	49.78
Annual HCl ug m-3	0.28		0.28	1.38	
Max Hourly HCl ug m-3	5.29		5.29	0.66	
Max Hourly HF ug m-3	0.5288		0.53	0.21	
Annual Hg ug m-3	0.0014		0.00	0.55	
Max Hourly Hg ug m-3	0.0264		0.03	0.35	
Annual Cd and Th ug m-3	0.0014		0.00	27.65	
Max Hourly Cd and Th ug m-3	0.0264		0.03	1.76	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.0138		0.01	230.45	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.26		0.26	1.76	

Modelling Results: 2004 Met Data; 35 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294084.75	206974.58	23.68
Max Hourly NOx ug m-3	293881.34	206720.34	270.05
No of Points Hourly Concentration Exceeds the Annual Limit			2108.14
Annual NO2 ug m-3	294084.75	206974.58	19.61
No of Points Hourly Concentration Exceeds the Annual Limit			1398.87
Max Hourly NO2 ug m-3	293881.34	206720.34	111.22
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	293881.34	206720.34	89.55
15 Minute Average SO2 ug m-3	294084.75	206974.58	5.00
Max 15 Minute SO2 ug m-3	293881.34	206720.34	45.13
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	293881.34	206720.34	40.17
Annual SO2 ug m-3	294084.75	206974.58	4.96
Max Hourly SO2 ug m-3	293881.34	206720.34	44.24
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	293881.34	206720.34	32.23
24 Hour Average SO2 ug m-3	294084.75	206974.58	4.93
Max 24 Hourly SO2 ug m-3	293932.22	206669.48	19.88
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	293932.22	206669.48	14.37
8 Hour Running Average CO mg m-3	294084.75	206974.58	0.15
Maximum 8 Hour CO mg m-3	293881.34	206720.34	1.07
Annual PM10 ug m-3	294084.75	206974.58	23.38
Max Hourly PM10 ug m-3	293881.34	206720.34	39.08
24 Hour Average PM10 ug m-3	294084.75	206974.58	23.37
Max 24 Hourly PM10 ug m-3	293932.22	206669.48	29.43
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294084.75	206974.58	24.87
Annual VOC ug m-3	294084.75	206974.58	0.86
Max Hourly VOC ug m-3	293881.34	206720.34	15.61
Annual HCl ug m-3	294084.75	206974.58	0.31
Max Hourly HCl ug m-3	293881.34	206720.34	5.54
Annual HF ug m-3	294084.75	206974.58	0.0306
Max Hourly HF ug m-3	293881.34	206720.34	0.5542
Annual Hg ug m-3	294084.75	206974.58	0.0015
Max Hourly Hg ug m-3	293881.34	206720.34	0.0277
Annual Cd and Th ug m-3	294084.75	206974.58	0.0015
Max Hourly Cd and Th ug m-3	293881.34	206720.34	0.0277
No of Points Hourly Concentration Exceeds the Annual Limit			1344.49
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294084.75	206974.58	0.02
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	293881.34	206720.34	0.28
No of Points Hourly Concentration Exceeds the Annual Limit			2662.00
Annual Dioxin ug m-3	294084.75	206974.58	3.06E-09
Max Hourly Dioxin ug m-3	293881.34	206720.34	5.54E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	23.68	10.11	13.57	45.228	78.928
Annual NO2 ug m-3	19.61	10.11	9.50	23.74525	49.02025
Max Hourly NO2 ug m-3	111.22	20.22	91.00	45.5005	55.6105
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	89.55	20.22	69.33	34.6641	44.7741
15 Minute Average SO2 ug m-3	5.00	2.79	2.21	0.8315977	1.88046992
Max 15 Minute SO2 ug m-3	45.13	2.79	42.34	15.916692	16.9655639
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	40.17	2.79	37.38	14.053797	15.1026692
Annual SO2 ug m-3	4.96	2.79	2.17	0.6213914	1.41853429
Max Hourly SO2 ug m-3	44.24	2.79	41.45	11.843571	12.6407143
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	32.23	2.79	29.44	8.4126	9.20974286
24 Hour Average SO2 ug m-3	4.93	2.79	2.14	1.714632	1.3717056
Max 24 Hourly SO2 ug m-3	19.88	2.79	17.09	13.67432	10.939456
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	14.37	2.79	11.58	9.262	7.4096
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.231431	1.26591379
Maximum 8 Hour CO mg m-3	1.07	0.12	0.95	8.1477586	9.18224138
Annual PM10 ug m-3	23.38	22.48	0.90	2.261	58.461
Max Hourly PM10 ug m-3	39.08	22.48	16.60	41.50375	97.70375
24 Hour Average PM10 ug m-3	23.37	22.48	0.89	1.7816	46.7416
Max 24 Hourly PM10 ug m-3	29.43	22.48	6.95	13.8932	58.8532
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.87	22.48	2.39	4.7832	49.7432
Annual HCl ug m-3	0.31		0.31	1.52873	
Max Hourly HCl ug m-3	5.54		5.54	0.69269	
Max Hourly HF ug m-3	0.5542		0.55	0.2216608	
Annual Hg ug m-3	0.0015		0.00	0.61	
Max Hourly Hg ug m-3	0.0277		0.03	0.37	
Annual Cd and Th ug m-3	0.0015		0.00	30.5746	
Max Hourly Cd and Th ug m-3	0.0277		0.03	1.8471733	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.02		0.02	254.79	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.28		0.28	1.8471733	

Modelling Results: 2005 Met Data; 35 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294084.75	206822.03	22.80
Max Hourly NOx ug m-3	294033.91	206771.19	257.24
No of Points Hourly Concentration Exceeds the Annual Limit			1768.35
Annual NO2 ug m-3	294084.75	206822.03	19.00
No of Points Hourly Concentration Exceeds the Annual Limit			920.84
Max Hourly NO2 ug m-3	294033.91	206771.19	106.74
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	294033.91	206771.19	92.21
15 Minute Average SO2 ug m-3	294084.75	206822.03	4.85
Max 15 Minute SO2 ug m-3	294033.91	206771.19	43.70
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294033.91	206771.19	41.80
Annual SO2 ug m-3	294084.75	206822.03	4.82
Max Hourly SO2 ug m-3	294033.91	206771.19	42.38
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	294033.91	206771.19	34.96
24 Hour Average SO2 ug m-3	294084.75	206822.03	4.79
Max 24 Hourly SO2 ug m-3	293983.06	206771.19	18.89
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	294033.91	206771.19	13.84
8 Hour Running Average CO mg m-3	294084.75	206822.03	0.15
Maximum 8 Hour CO mg m-3	293728.81	206720.34	1.05
Annual PM10 ug m-3	294084.75	206822.03	23.32
Max Hourly PM10 ug m-3	294033.91	206771.19	38.87
24 Hour Average PM10 ug m-3	294135.59	206822.03	23.30
Max 24 Hourly PM10 ug m-3	293983.06	206771.19	28.96
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294084.75	206771.19	25.09
Annual VOC ug m-3	294084.75	206822.03	0.79
Max Hourly VOC ug m-3	294033.91	206771.19	15.53
Annual HCl ug m-3	294135.59	206822.03	0.28
Max Hourly HCl ug m-3	294033.91	206771.19	5.55
Annual HF ug m-3	294135.59	206822.03	0.0277
Max Hourly HF ug m-3	294033.91	206771.19	0.5551
Annual Hg ug m-3	294135.59	206822.03	0.0011
Max Hourly Hg ug m-3	294033.91	206771.19	0.0251
Annual Cd and Th ug m-3	294135.59	206822.03	0.0011
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0251
No of Points Hourly Concentration Exceeds the Annual Limit			865.54
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294135.59	206822.03	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.25
No of Points Hourly Concentration Exceeds the Annual Limit			2268.00
Annual Dioxin ug m-3	294135.59	206822.03	2.11E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	5.01E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	22.80	10.11	12.69	42.288333	75.9883333
Annual NO2 ug m-3	19.00	10.11	8.89	22.225	47.5
Max Hourly NO2 ug m-3	106.74	20.22	86.52	43.2605	53.3705
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	92.21	20.22	71.99	35.9936	46.1036
15 Minute Average SO2 ug m-3	4.85	2.79	2.06	0.775282	1.82415414
Max 15 Minute SO2 ug m-3	43.70	2.79	40.91	15.378609	16.4274812
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	41.80	2.79	39.01	14.664135	15.7130075
Annual SO2 ug m-3	4.82	2.79	2.03	0.58028	1.37742286
Max Hourly SO2 ug m-3	42.38	2.79	39.59	11.311	12.1081429
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	34.96	2.79	32.17	9.1902	9.98734286
24 Hour Average SO2 ug m-3	4.79	2.79	2.00	1.596752	1.2774016
Max 24 Hourly SO2 ug m-3	18.89	2.79	16.10	12.8816	10.30528
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	13.84	2.79	11.05	8.8412	7.07296
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.2231466	1.25762931
Maximum 8 Hour CO mg m-3	1.05	0.12	0.93	7.9931897	9.02767241
Annual PM10 ug m-3	23.32	22.48	0.84	2.0925	58.2925
Max Hourly PM10 ug m-3	38.87	22.48	16.39	40.98075	97.18075
24 Hour Average PM10 ug m-3	23.30	22.48	0.82	1.6478	46.6078
Max 24 Hourly PM10 ug m-3	28.96	22.48	6.48	12.9516	57.9116
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	25.09	22.48	2.61	5.225	50.185
Annual HCl ug m-3	0.28		0.28	1.38344	
Max Hourly HCl ug m-3	5.55		5.55	0.693865	
Max Hourly HF ug m-3	0.5551		0.56	0.2220368	
Annual Hg ug m-3	0.0011		0.00	0.42	
Max Hourly Hg ug m-3	0.0251		0.03	0.33	
Annual Cd and Th ug m-3	0.0011		0.00	21.1238	
Max Hourly Cd and Th ug m-3	0.0251		0.03	1.6716467	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	176.03	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.25		0.25	1.6716467	

Modelling Results: 2006 Met Data; 35 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294135.59	206872.88	23.65
Max Hourly NOx ug m-3	294033.91	206771.19	253.34
No of Points Hourly Concentration Exceeds the Annual Limit			2032.43
Annual NO2 ug m-3	294135.59	206872.88	19.59
No of Points Hourly Concentration Exceeds the Annual Limit			1462.46
Max Hourly NO2 ug m-3	294033.91	206771.19	105.37
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	294033.91	206771.19	91.67
15 Minute Average SO2 ug m-3	294135.59	206872.88	5.00
Max 15 Minute SO2 ug m-3	294033.91	206771.19	44.90
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294033.91	206771.19	38.81
Annual SO2 ug m-3	294135.59	206872.88	4.96
Max Hourly SO2 ug m-3	294033.91	206771.19	41.76
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	294033.91	206771.19	32.77
24 Hour Average SO2 ug m-3	294135.59	206872.88	4.87
Max 24 Hourly SO2 ug m-3	294033.91	206822.03	15.26
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	294033.91	206771.19	14.34
8 Hour Running Average CO mg m-3	294135.59	206872.88	0.15
Maximum 8 Hour CO mg m-3	293779.66	206923.73	1.03
Annual PM10 ug m-3	294135.59	206872.88	23.38
Max Hourly PM10 ug m-3	294033.91	206771.19	38.63
24 Hour Average PM10 ug m-3	294135.59	206872.88	23.34
Max 24 Hourly PM10 ug m-3	294033.91	206822.03	27.57
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294084.75	206822.03	24.84
Annual VOC ug m-3	294135.59	206872.88	0.85
Max Hourly VOC ug m-3	294033.91	206771.19	15.30
Annual HCl ug m-3	294135.59	206872.88	0.30
Max Hourly HCl ug m-3	294033.91	206771.19	5.48
Annual HF ug m-3	294135.59	206872.88	0.0301
Max Hourly HF ug m-3	294033.91	206771.19	0.4949
Annual Hg ug m-3	294135.59	206872.88	0.0015
Max Hourly Hg ug m-3	294033.91	206771.19	0.0274
Annual Cd and Th ug m-3	294135.59	206872.88	0.0015
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0274
No of Points Hourly Concentration Exceeds the Annual Limit			1346.75
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294135.59	206872.88	0.02
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.27
No of Points Hourly Concentration Exceeds the Annual Limit			2492.00
Annual Dioxin ug m-3	294135.59	206872.88	3.01E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	5.48E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	23.65	10.11	13.54	45.145667	78.845667
Annual NO2 ug m-3	19.59	10.11	9.48	23.703	48.978
Max Hourly NO2 ug m-3	105.37	20.22	85.15	42.577	52.687
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	91.67	20.22	71.45	35.7248	45.8348
15 Minute Average SO2 ug m-3	5.00	2.79	2.21	0.8298045	1.87867669
Max 15 Minute SO2 ug m-3	44.90	2.79	42.11	15.829887	16.8787594
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	38.81	2.79	36.02	13.542857	14.5917293
Annual SO2 ug m-3	4.96	2.79	2.17	0.6199886	1.41713143
Max Hourly SO2 ug m-3	41.76	2.79	38.97	11.133657	11.9308
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	32.77	2.79	29.98	8.5669143	9.36405714
24 Hour Average SO2 ug m-3	4.87	2.79	2.08	1.661416	1.3291328
Max 24 Hourly SO2 ug m-3	15.26	2.79	12.47	9.9768	7.98144
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	14.34	2.79	11.55	9.23816	7.390528
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.2594914	1.29397414
Maximum 8 Hour CO mg m-3	1.03	0.12	0.91	7.8581034	8.89258621
Annual PM10 ug m-3	23.38	22.48	0.90	2.2485	58.4485
Max Hourly PM10 ug m-3	38.63	22.48	16.15	40.37425	96.57425
24 Hour Average PM10 ug m-3	23.34	22.48	0.86	1.7204	46.6804
Max 24 Hourly PM10 ug m-3	27.57	22.48	5.09	10.1864	55.1464
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.84	22.48	2.36	4.7236	49.6836
Annual HCl ug m-3	0.30		0.30	1.50379	
Max Hourly HCl ug m-3	5.48		5.48	0.6844438	
Max Hourly HF ug m-3	0.4949		0.49	0.1979404	
Annual Hg ug m-3	0.0015		0.00	0.60	
Max Hourly Hg ug m-3	0.0274		0.03	0.37	
Annual Cd and Th ug m-3	0.0015		0.00	30.0758	
Max Hourly Cd and Th ug m-3	0.0274		0.03	1.8251867	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.02		0.02	250.63	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.27		0.27	1.8251867	

Modelling Results: 2007 Met Data; 35 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294084.75	206822.03	23.69
Max Hourly NOx ug m-3	294033.91	206771.19	257.91
No of Points Hourly Concentration Exceeds the Annual Limit			1906.96
Annual NO2 ug m-3	294084.75	206822.03	19.61
No of Points Hourly Concentration Exceeds the Annual Limit			1324.65
Max Hourly NO2 ug m-3	294033.91	206771.19	106.97
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	294033.91	206771.19	93.16
15 Minute Average SO2 ug m-3	294084.75	206822.03	5.00
Max 15 Minute SO2 ug m-3	294033.91	206771.19	43.61
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294033.91	206771.19	42.00
Annual SO2 ug m-3	294084.75	206822.03	4.96
Max Hourly SO2 ug m-3	294033.91	206771.19	42.50
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	294033.91	206771.19	34.96
24 Hour Average SO2 ug m-3	294084.75	206822.03	5.06
Max 24 Hourly SO2 ug m-3	294033.91	206771.19	18.04
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	294033.91	206771.19	15.13
8 Hour Running Average CO mg m-3	294084.75	206822.03	0.15
Maximum 8 Hour CO mg m-3	294033.91	206771.19	1.06
Annual PM10 ug m-3	294084.75	206822.03	23.38
Max Hourly PM10 ug m-3	294033.91	206771.19	38.98
24 Hour Average PM10 ug m-3	294084.75	206822.03	23.41
Max 24 Hourly PM10 ug m-3	294033.91	206771.19	28.76
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294084.75	206771.19	25.33
Annual VOC ug m-3	294084.75	206822.03	0.84
Max Hourly VOC ug m-3	294033.91	206771.19	15.64
Annual HCl ug m-3	294084.75	206822.03	0.29
Max Hourly HCl ug m-3	294033.91	206771.19	5.60
Annual HF ug m-3	294084.75	206822.03	0.0294
Max Hourly HF ug m-3	294033.91	206771.19	0.5599
Annual Hg ug m-3	294084.75	206822.03	0.0015
Max Hourly Hg ug m-3	294033.91	206771.19	0.0280
Annual Cd and Th ug m-3	294084.75	206822.03	0.0015
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0280
No of Points Hourly Concentration Exceeds the Annual Limit			1238.02
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294084.75	206822.03	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.28
No of Points Hourly Concentration Exceeds the Annual Limit			2382
Annual Dioxin ug m-3	294084.75	206822.03	2.94E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	5.60E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	23.69	10.11	13.58	45.2536667	78.9536667
Annual NO2 ug m-3	19.61	10.11	9.50	23.75925	49.03425
Max Hourly NO2 ug m-3	106.97	20.22	86.75	43.377	53.487
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	93.16	20.22	72.94	36.4697	46.5797
15 Minute Average SO2 ug m-3	5.00	2.79	2.21	0.83203383	1.88090602
Max 15 Minute SO2 ug m-3	43.61	2.79	40.82	15.3444361	16.3933083
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	42.00	2.79	39.21	14.742218	15.7910902
Annual SO2 ug m-3	4.96	2.79	2.17	0.62102	1.41816286
Max Hourly SO2 ug m-3	42.50	2.79	39.71	11.3466	12.1437429
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	34.96	2.79	32.17	9.19005714	9.9872
24 Hour Average SO2 ug m-3	5.06	2.79	2.27	1.813448	1.4507584
Max 24 Hourly SO2 ug m-3	18.04	2.79	15.25	12.20024	9.760192
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	15.13	2.79	12.34	9.8708	7.89664
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.24521552	1.27969828
Maximum 8 Hour CO mg m-3	1.06	0.12	0.94	8.12405172	9.15853448
Annual PM10 ug m-3	23.38	22.48	0.90	2.24075	58.44075
Max Hourly PM10 ug m-3	38.98	22.48	16.50	41.24675	97.44675
24 Hour Average PM10 ug m-3	23.41	22.48	0.93	1.8686	46.8286
Max 24 Hourly PM10 ug m-3	28.76	22.48	6.28	12.5558	57.5158
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	25.33	22.48	2.85	5.692	50.652
Annual HCl ug m-3	0.29		0.29	1.469645	
Max Hourly HCl ug m-3	5.60		5.60	0.69991625	
Max Hourly HF ug m-3	0.5599		0.56	0.2239732	
Annual Hg ug m-3	0.0015		0.00	0.59	
Max Hourly Hg ug m-3	0.0280		0.03	0.37	
Annual Cd and Th ug m-3	0.0015		0.00	29.3928	
Max Hourly Cd and Th ug m-3	0.0280		0.03	1.86644667	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	244.94	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.28		0.28	1.86644667	

Modelling Results: 2003 Met Data; 40 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294135.59	207025.42	19.52
Max Hourly NOx ug m-3	294033.91	206771.19	227.19
No of Points Hourly Concentration Exceeds the Annual Limit			1758.21
Annual NO2 ug m-3	294135.59	207025.42	16.70
No of Points Hourly Concentration Exceeds the Annual Limit			787.69
Max Hourly NO2 ug m-3	294033.91	206771.19	96.22
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	293830.5	206669.48	75.95
15 Minute Average SO2 ug m-3	294135.59	207025.42	4.33
Max 15 Minute SO2 ug m-3	294033.91	206771.19	39.19
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294033.91	206771.19	31.18
Annual SO2 ug m-3	294135.59	207025.42	4.30
Max Hourly SO2 ug m-3	294033.91	206771.19	37.47
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	293830.5	206669.48	26.67
24 Hour Average SO2 ug m-3	294135.59	207025.42	4.25
Max 24 Hourly SO2 ug m-3	293932.22	206669.48	17.28
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	293983.06	206720.34	12.07
8 Hour Running Average CO mg m-3	294135.59	207025.42	0.14
Maximum 8 Hour CO mg m-3	293983.06	206771.19	1.03
Annual PM10 ug m-3	294135.59	207025.42	23.11
Max Hourly PM10 ug m-3	294033.91	206771.19	36.90
24 Hour Average PM10 ug m-3	294135.59	207025.42	23.09
Max 24 Hourly PM10 ug m-3	293932.22	206669.48	28.48
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294135.59	207025.42	24.33
Annual VOC ug m-3	294135.59	207025.42	0.60
Max Hourly VOC ug m-3	294033.91	206771.19	13.57
Annual HCl ug m-3	294135.59	207025.42	0.21
Max Hourly HCl ug m-3	294033.91	206771.19	4.76
Annual HF ug m-3	294135.59	207025.42	0.0213
Max Hourly HF ug m-3	294033.91	206771.19	0.4761
Annual Hg ug m-3	294135.59	207025.42	0.0011
Max Hourly Hg ug m-3	294033.91	206771.19	0.0238
Annual Cd and Th ug m-3	294135.59	207025.42	0.0011
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0238
No of Points Hourly Concentration Exceeds the Annual Limit			715.24
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294135.59	207025.42	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.24
No of Points Hourly Concentration Exceeds the Annual Limit			2353.00
Annual Dioxin ug m-3	294135.59	207025.42	2.13E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	4.76E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	19.52	10.11	9.41	31.36	65.06
Annual NO2 ug m-3	16.70	10.11	6.59	16.46	41.74
Max Hourly NO2 ug m-3	96.22	20.22	76.00	38.00	48.11
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	75.95	20.22	55.73	27.86	37.97
15 Minute Average SO2 ug m-3	4.33	2.79	1.54	0.58	1.63
Max 15 Minute SO2 ug m-3	39.19	2.79	36.40	13.68	14.73
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	31.18	2.79	28.39	10.67	11.72
Annual SO2 ug m-3	4.30	2.79	1.51	0.43	1.23
Max Hourly SO2 ug m-3	37.47	2.79	34.68	9.91	10.71
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	26.67	2.79	23.88	6.82	7.62
24 Hour Average SO2 ug m-3	4.25	2.79	1.46	1.17	0.93
Max 24 Hourly SO2 ug m-3	17.28	2.79	14.49	11.59	9.28
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	12.07	2.79	9.28	7.42	5.94
8 Hour Running Average CO mg m-3	0.14	0.12	0.02	0.20	1.23
Maximum 8 Hour CO mg m-3	1.03	0.12	0.91	7.84	8.87
Annual PM10 ug m-3	23.11	22.48	0.63	1.58	57.78
Max Hourly PM10 ug m-3	36.90	22.48	14.42	36.04	92.24
24 Hour Average PM10 ug m-3	23.09	22.48	0.61	1.22	46.18
Max 24 Hourly PM10 ug m-3	28.48	22.48	6.00	11.99	56.95
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.33	22.48	1.85	3.70	48.66
Annual HCl ug m-3	0.21		0.21	1.07	
Max Hourly HCl ug m-3	4.76		4.76	0.60	
Max Hourly HF ug m-3	0.4761		0.48	0.19	
Annual Hg ug m-3	0.0011		0.00	0.43	
Max Hourly Hg ug m-3	0.0238		0.02	0.32	
Annual Cd and Th ug m-3	0.0011		0.00	21.35	
Max Hourly Cd and Th ug m-3	0.0238		0.02	1.59	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	177.91	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.24		0.24	1.59	

Modelling Results: 2004 Met Data; 40 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294084.75	206974.58	20.50
Max Hourly NOx ug m-3	293881.34	206720.34	230.00
No of Points Hourly Concentration Exceeds the Annual Limit			1900.00
Annual NO2 ug m-3	294084.75	206974.58	17.39
No of Points Hourly Concentration Exceeds the Annual Limit			845.80
Max Hourly NO2 ug m-3	293881.34	206720.34	97.17
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	293830.5	206669.48	79.06
15 Minute Average SO2 ug m-3	294084.75	206974.58	4.49
Max 15 Minute SO2 ug m-3	294033.91	206771.19	38.90
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	293881.34	206720.34	34.90
Annual SO2 ug m-3	294084.75	206974.58	4.46
Max Hourly SO2 ug m-3	293830.5	206923.73	37.90
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	293830.5	206669.48	28.10
24 Hour Average SO2 ug m-3	294084.75	206974.58	4.42
Max 24 Hourly SO2 ug m-3	293932.22	206669.48	17.20
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	293932.22	206669.48	13.60
8 Hour Running Average CO mg m-3	294084.75	206974.58	0.15
Maximum 8 Hour CO mg m-3	293881.34	206720.34	1.05
Annual PM10 ug m-3	294084.75	206974.58	23.20
Max Hourly PM10 ug m-3	294033.91	206771.19	37.00
24 Hour Average PM10 ug m-3	294135.59	207025.42	23.20
Max 24 Hourly PM10 ug m-3	293932.22	206669.48	28.30
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294084.75	206974.58	24.30
Annual VOC ug m-3	294084.75	206974.58	0.66
Max Hourly VOC ug m-3	294033.91	206771.19	13.80
Annual HCl ug m-3	294084.75	206974.58	0.23
Max Hourly HCl ug m-3	294033.91	206771.19	4.93
Annual HF ug m-3	294084.75	206974.58	0.0234
Max Hourly HF ug m-3	294033.91	206771.19	0.4930
Annual Hg ug m-3	294084.75	206974.58	0.0012
Max Hourly Hg ug m-3	294033.91	206771.19	0.0247
Annual Cd and Th ug m-3	294084.75	206974.58	0.0012
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0247
No of Points Hourly Concentration Exceeds the Annual Limit			786.79
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294084.75	206974.58	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.25
No of Points Hourly Concentration Exceeds the Annual Limit			2532.00
Annual Dioxin ug m-3	294084.75	206974.58	2.34E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	4.93E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	20.50	10.11	10.39	34.633333	68.333333
Annual NO2 ug m-3	17.39	10.11	7.28	18.18825	43.46325
Max Hourly NO2 ug m-3	97.17	20.22	76.95	38.4764	48.5864
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	79.06	20.22	58.84	29.4202	39.5302
15 Minute Average SO2 ug m-3	4.49	2.79	1.70	0.6390977	1.68796992
Max 15 Minute SO2 ug m-3	38.90	2.79	36.11	13.575188	14.6240602
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	34.90	2.79	32.11	12.071429	13.1203008
Annual SO2 ug m-3	4.46	2.79	1.67	0.4771429	1.27428571
Max Hourly SO2 ug m-3	37.90	2.79	35.11	10.031429	10.8285714
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	28.10	2.79	25.31	7.2314286	8.02857143
24 Hour Average SO2 ug m-3	4.42	2.79	1.63	1.304	1.0432
Max 24 Hourly SO2 ug m-3	17.20	2.79	14.41	11.528	9.2224
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	13.60	2.79	10.81	8.648	6.9184
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.2155172	1.25
Maximum 8 Hour CO mg m-3	1.05	0.12	0.93	8.0172414	9.05172414
Annual PM10 ug m-3	23.20	22.48	0.72	1.8	58
Max Hourly PM10 ug m-3	37.00	22.48	14.52	36.3	92.5
24 Hour Average PM10 ug m-3	23.20	22.48	0.72	1.44	46.4
Max 24 Hourly PM10 ug m-3	28.30	22.48	5.82	11.64	56.6
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.30	22.48	1.82	3.64	48.6
Annual HCl ug m-3	0.23		0.23	1.17	
Max Hourly HCl ug m-3	4.93		4.93	0.61625	
Max Hourly HF ug m-3	0.4930		0.49	0.1972	
Annual Hg ug m-3	0.0012		0.00	0.47	
Max Hourly Hg ug m-3	0.0247		0.02	0.33	
Annual Cd and Th ug m-3	0.0012		0.00	23.3572	
Max Hourly Cd and Th ug m-3	0.0247		0.02	1.6444333	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	194.64	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.25		0.25	1.6444333	

Modelling Results: 2005 Met Data; 40 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294135.59	206822.03	19.71
Max Hourly NOx ug m-3	294033.91	206771.19	233.21
No of Points Hourly Concentration Exceeds the Annual Limit			1592.84
Annual NO2 ug m-3	294135.59	206822.03	16.83
No of Points Hourly Concentration Exceeds the Annual Limit			920.84
Max Hourly NO2 ug m-3	294033.91	206771.19	98.33
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	294033.91	206771.19	84.27
15 Minute Average SO2 ug m-3	294135.59	206822.03	4.35
Max 15 Minute SO2 ug m-3	294033.91	206771.19	40.00
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294033.91	206771.19	37.07
Annual SO2 ug m-3	294135.59	206822.03	4.33
Max Hourly SO2 ug m-3	294033.91	206771.19	38.52
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	294033.91	206771.19	30.48
24 Hour Average SO2 ug m-3	294135.59	206822.03	4.30
Max 24 Hourly SO2 ug m-3	294033.91	206771.19	16.67
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	294033.91	206771.19	12.14
8 Hour Running Average CO mg m-3	294135.59	206822.03	0.14
Maximum 8 Hour CO mg m-3	293728.81	206720.34	1.04
Annual PM10 ug m-3	294135.59	206822.03	23.12
Max Hourly PM10 ug m-3	294033.91	206771.19	37.26
24 Hour Average PM10 ug m-3	294135.59	206822.03	23.10
Max 24 Hourly PM10 ug m-3	294033.91	206771.19	28.10
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294135.59	206771.19	24.53
Annual VOC ug m-3	294135.59	206822.03	0.60
Max Hourly VOC ug m-3	294033.91	206771.19	14.00
Annual HCl ug m-3	294135.59	206822.03	0.21
Max Hourly HCl ug m-3	294033.91	206771.19	5.01
Annual HF ug m-3	294135.59	206822.03	0.0211
Max Hourly HF ug m-3	294033.91	206771.19	0.5010
Annual Hg ug m-3	294135.59	206822.03	0.0011
Max Hourly Hg ug m-3	294033.91	206771.19	0.0251
Annual Cd and Th ug m-3	294135.59	206822.03	0.0011
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0251
No of Points Hourly Concentration Exceeds the Annual Limit			865.54
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294135.59	206822.03	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.25
No of Points Hourly Concentration Exceeds the Annual Limit			2141.00
Annual Dioxin ug m-3	294135.59	206822.03	2.11E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	5.01E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	19.71	10.11	9.60	31.993333	65.693333
Annual NO2 ug m-3	16.83	10.11	6.72	16.79825	42.07325
Max Hourly NO2 ug m-3	98.33	20.22	78.11	39.05295	49.16295
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	84.27	20.22	64.05	32.0263	42.1363
15 Minute Average SO2 ug m-3	4.35	2.79	1.56	0.5857068	1.63457895
Max 15 Minute SO2 ug m-3	40.00	2.79	37.21	13.987105	15.0359774
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	37.07	2.79	34.28	12.887632	13.9365038
Annual SO2 ug m-3	4.33	2.79	1.54	0.4392257	1.23636857
Max Hourly SO2 ug m-3	38.52	2.79	35.73	10.209457	11.0066
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	30.48	2.79	27.69	7.9108286	8.70797143
24 Hour Average SO2 ug m-3	4.30	2.79	1.51	1.2052	0.96416
Max 24 Hourly SO2 ug m-3	16.67	2.79	13.88	11.10376	8.883008
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	12.14	2.79	9.35	7.476	5.9808
8 Hour Running Average CO mg m-3	0.14	0.12	0.02	0.2114569	1.24593966
Maximum 8 Hour CO mg m-3	1.04	0.12	0.92	7.9162069	8.95068966
Annual PM10 ug m-3	23.12	22.48	0.64	1.59	57.79
Max Hourly PM10 ug m-3	37.26	22.48	14.78	36.953	93.153
24 Hour Average PM10 ug m-3	23.10	22.48	0.62	1.245	46.205
Max 24 Hourly PM10 ug m-3	28.10	22.48	5.62	11.237	56.197
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.53	22.48	2.05	4.1006	49.0606
Annual HCl ug m-3	0.21		0.21	1.056185	
Max Hourly HCl ug m-3	5.01		5.01	0.6268675	
Max Hourly HF ug m-3	0.5010		0.50	0.2004	
Annual Hg ug m-3	0.0011		0.00	0.42	
Max Hourly Hg ug m-3	0.0251		0.03	0.33	
Annual Cd and Th ug m-3	0.0011		0.00	21.1238	
Max Hourly Cd and Th ug m-3	0.0251		0.03	1.6716467	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	176.03	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.25		0.25	1.6716467	

Modelling Results: 2006 Met Data; 40 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294135.59	206872.88	20.68
Max Hourly NOx ug m-3	294033.91	206771.19	230.64
No of Points Hourly Concentration Exceeds the Annual Limit			1819.46
Annual NO2 ug m-3	294135.59	206872.88	17.51
No of Points Hourly Concentration Exceeds the Annual Limit			915.89
Max Hourly NO2 ug m-3	294033.91	206771.19	97.40
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	294033.91	206771.19	80.70
15 Minute Average SO2 ug m-3	294135.59	206872.88	4.51
Max 15 Minute SO2 ug m-3	294033.91	206771.19	41.15
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294033.91	206771.19	34.98
Annual SO2 ug m-3	294135.59	206872.88	4.48
Max Hourly SO2 ug m-3	294033.91	206771.19	38.12
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	294033.91	206771.19	28.65
24 Hour Average SO2 ug m-3	294135.59	206872.88	4.39
Max 24 Hourly SO2 ug m-3	294033.91	206771.19	13.97
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	294033.91	206822.03	11.90
8 Hour Running Average CO mg m-3	294135.59	206872.88	0.15
Maximum 8 Hour CO mg m-3	293728.81	206923.73	1.02
Annual PM10 ug m-3	294135.59	206872.88	23.18
Max Hourly PM10 ug m-3	294033.91	206771.19	37.11
24 Hour Average PM10 ug m-3	294135.59	206872.88	23.14
Max 24 Hourly PM10 ug m-3	294033.91	206771.19	26.98
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294135.59	206822.03	24.31
Annual VOC ug m-3	294135.59	206872.88	0.66
Max Hourly VOC ug m-3	294033.91	206771.19	13.85
Annual HCl ug m-3	294135.59	206872.88	0.24
Max Hourly HCl ug m-3	294033.91	206771.19	4.95
Annual HF ug m-3	294135.59	206872.88	0.0235
Max Hourly HF ug m-3	294033.91	206771.19	0.4950
Annual Hg ug m-3	294135.59	206872.88	0.0012
Max Hourly Hg ug m-3	294033.91	206771.19	0.0247
Annual Cd and Th ug m-3	294135.59	206872.88	0.0012
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0247
No of Points Hourly Concentration Exceeds the Annual Limit			808.79
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294135.59	206872.88	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.25
No of Points Hourly Concentration Exceeds the Annual Limit			2375.00
Annual Dioxin ug m-3	294135.59	206872.88	2.35E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	4.95E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	20.68	10.11	10.57	35.238333	68.9383333
Annual NO2 ug m-3	17.51	10.11	7.40	18.50175	43.77675
Max Hourly NO2 ug m-3	97.40	20.22	77.18	38.59	48.7
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	80.70	20.22	60.48	30.24	40.35
15 Minute Average SO2 ug m-3	4.51	2.79	1.72	0.6484887	1.6973609
Max 15 Minute SO2 ug m-3	41.15	2.79	38.36	14.420113	15.468985
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	34.98	2.79	32.19	12.101992	13.1508647
Annual SO2 ug m-3	4.48	2.79	1.69	0.4839	1.28104286
Max Hourly SO2 ug m-3	38.12	2.79	35.33	10.093229	10.8903714
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	28.65	2.79	25.86	7.3877429	8.18488571
24 Hour Average SO2 ug m-3	4.39	2.79	1.60	1.282848	1.0262784
Max 24 Hourly SO2 ug m-3	13.97	2.79	11.18	8.94648	7.157184
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	11.90	2.79	9.11	7.29024	5.832192
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.2484741	1.2829569
Maximum 8 Hour CO mg m-3	1.02	0.12	0.90	7.7765517	8.81103448
Annual PM10 ug m-3	23.18	22.48	0.70	1.7545	57.9545
Max Hourly PM10 ug m-3	37.11	22.48	14.63	36.56775	92.76775
24 Hour Average PM10 ug m-3	23.14	22.48	0.66	1.3278	46.2878
Max 24 Hourly PM10 ug m-3	26.98	22.48	4.50	9	53.96
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.31	22.48	1.83	3.6648	48.6248
Annual HCl ug m-3	0.24		0.24	1.17515	
Max Hourly HCl ug m-3	4.95		4.95	0.6185638	
Max Hourly HF ug m-3	0.4950		0.50	0.198	
Annual Hg ug m-3	0.0012		0.00	0.47	
Max Hourly Hg ug m-3	0.0247		0.02	0.33	
Annual Cd and Th ug m-3	0.0012		0.00	23.503	
Max Hourly Cd and Th ug m-3	0.0247		0.02	1.6495	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	195.86	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.25		0.25	1.6495	

Modelling Results: 2007 Met Data; 40 m Stack

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294135.59	206822.03	20.36
Max Hourly NOx ug m-3	294033.91	206771.19	236.45
No of Points Hourly Concentration Exceeds the Annual Limit			1714.46
Annual NO2 ug m-3	294135.59	206822.03	17.28
No of Points Hourly Concentration Exceeds the Annual Limit			956.49
Max Hourly NO2 ug m-3	294033.91	206771.19	99.46
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	294033.91	206771.19	84.27
15 Minute Average SO2 ug m-3	294135.59	206822.03	4.46
Max 15 Minute SO2 ug m-3	294033.91	206771.19	40.09
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294033.91	206771.19	37.53
Annual SO2 ug m-3	294135.59	206822.03	4.43
Max Hourly SO2 ug m-3	294033.91	206771.19	39.06
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	294033.91	206771.19	31.19
24 Hour Average SO2 ug m-3	294135.59	206822.03	4.50
Max 24 Hourly SO2 ug m-3	294033.91	206771.19	15.98
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	294033.91	206771.19	13.47
8 Hour Running Average CO mg m-3	294135.59	206822.03	0.15
Maximum 8 Hour CO mg m-3	294033.91	206771.19	1.05
Annual PM10 ug m-3	294135.59	206822.03	23.16
Max Hourly PM10 ug m-3	294033.91	206771.19	37.53
24 Hour Average PM10 ug m-3	294135.59	206822.03	23.19
Max 24 Hourly PM10 ug m-3	294033.91	206771.19	27.91
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294135.59	206822.03	24.66
Annual VOC ug m-3	294135.59	206822.03	0.64
Max Hourly VOC ug m-3	294033.91	206771.19	14.27
Annual HCl ug m-3	294135.59	206822.03	0.23
Max Hourly HCl ug m-3	294033.91	206771.19	5.10
Annual HF ug m-3	294135.59	206822.03	0.0225
Max Hourly HF ug m-3	294033.91	206771.19	0.5100
Annual Hg ug m-3	294135.59	206822.03	0.0011
Max Hourly Hg ug m-3	294033.91	206771.19	0.0255
Annual Cd and Th ug m-3	294135.59	206822.03	0.0011
Max Hourly Cd and Th ug m-3	294033.91	206771.19	0.0255
No of Points Hourly Concentration Exceeds the Annual Limit			889.11
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294135.59	206822.03	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294033.91	206771.19	0.26
No of Points Hourly Concentration Exceeds the Annual Limit			2285.00
Annual Dioxin ug m-3	294135.59	206822.03	2.25E-09
Max Hourly Dioxin ug m-3	294033.91	206771.19	5.10E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	20.36	10.11	10.25	34.155	67.855
Annual NO2 ug m-3	17.28	10.11	7.17	17.93325	43.20825
Max Hourly NO2 ug m-3	99.46	20.22	79.24	39.62065	49.73065
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	84.27	20.22	64.05	32.0268	42.1368
15 Minute Average SO2 ug m-3	4.46	2.79	1.67	0.62815789	1.67703008
Max 15 Minute SO2 ug m-3	40.09	2.79	37.30	14.0206767	15.0695489
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	37.53	2.79	34.74	13.0589474	14.1078195
Annual SO2 ug m-3	4.43	2.79	1.64	0.46889143	1.26603429
Max Hourly SO2 ug m-3	39.06	2.79	36.27	10.3625429	11.1596857
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	31.19	2.79	28.40	8.11425714	8.9114
24 Hour Average SO2 ug m-3	4.50	2.79	1.71	1.36784	1.094272
Max 24 Hourly SO2 ug m-3	15.98	2.79	13.19	10.54856	8.438848
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	13.47	2.79	10.68	8.54528	6.836224
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.23244828	1.26693103
Maximum 8 Hour CO mg m-3	1.05	0.12	0.93	8.0162931	9.05077586
Annual PM10 ug m-3	23.16	22.48	0.68	1.69675	57.89675
Max Hourly PM10 ug m-3	37.53	22.48	15.05	37.63075	93.83075
24 Hour Average PM10 ug m-3	23.19	22.48	0.71	1.4134	46.3734
Max 24 Hourly PM10 ug m-3	27.91	22.48	5.43	10.8514	55.8114
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.66	22.48	2.18	4.365	49.325
Annual HCl ug m-3	0.23		0.23	1.126595	
Max Hourly HCl ug m-3	5.10		5.10	0.63792125	
Max Hourly HF ug m-3	0.5100		0.51	0.204	
Annual Hg ug m-3	0.0011		0.00	0.45	
Max Hourly Hg ug m-3	0.0255		0.03	0.34	
Annual Cd and Th ug m-3	0.0011		0.00	22.532	
Max Hourly Cd and Th ug m-3	0.0255		0.03	1.70112	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	187.77	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.26		0.26	1.70112	

Modelling Results: 2007 Met Data; 40 m Stack With Fine Grid

Pollutant and Averaging Period	Grid Ref X	Grid Ref Y	Concentration
Annual NOx ug m-3	294121.22	206803.03	20.29
Max Hourly NOx ug m-3	294030.31	206742.42	266.57
No of Points Hourly Concentration Exceeds the Annual Limit			1726.49
Annual NO2 ug m-3	294121.22	206803.03	17.24
No of Points Hourly Concentration Exceeds the Annual Limit			978.15
Max Hourly NO2 ug m-3	294030.31	206742.42	110.01
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	294030.31	206742.42	91.14
15 Minute Average SO2 ug m-3	294121.22	206803.03	4.46
Max 15 Minute SO2 ug m-3	294030.31	206742.42	47.12
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	294030.31	206742.42	40.66
Annual SO2 ug m-3	294121.22	206803.03	4.42
Max Hourly SO2 ug m-3	294030.31	206742.42	43.89
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	294030.31	206742.42	33.80
24 Hour Average SO2 ug m-3	294121.22	206803.03	4.49
Max 24 Hourly SO2 ug m-3	294030.31	206772.73	16.35
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	294030.31	206772.73	13.61
8 Hour Running Average CO mg m-3	294121.22	206803.03	0.15
Maximum 8 Hour CO mg m-3	294030.31	206772.73	1.05
Annual PM10 ug m-3	294151.5	206833.33	23.15
Max Hourly PM10 ug m-3	294030.31	206742.42	39.54
24 Hour Average PM10 ug m-3	294121.22	206803.03	23.18
Max 24 Hourly PM10 ug m-3	294030.31	206772.73	28.06
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	294121.22	206803.03	24.75
Annual VOC ug m-3	294151.5	206833.33	0.64
Max Hourly VOC ug m-3	294030.31	206742.42	16.18
Annual HCl ug m-3	294151.5	206833.33	0.22
Max Hourly HCl ug m-3	294030.31	206742.42	5.79
Annual HF ug m-3	294151.5	206833.33	0.0224
Max Hourly HF ug m-3	294030.31	206742.42	0.5786
Annual Hg ug m-3	294151.5	206833.33	0.0011
Max Hourly Hg ug m-3	294030.31	206742.42	0.0289
Annual Cd and Th ug m-3	294151.5	206833.33	0.0011
Max Hourly Cd and Th ug m-3	294030.31	206742.42	0.0289
No of Points Hourly Concentration Exceeds the Annual Limit			902.35
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294151.5	206833.33	0.01
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	294030.31	206742.42	0.29
No of Points Hourly Concentration Exceeds the Annual Limit			2270.00
Annual Dioxin ug m-3	294151.5	206833.33	2.24E-09
Max Hourly Dioxin ug m-3	294030.31	206742.42	5.79E-08

Insignificance Test

Pollutant and Averaging Period	Concentration	Background	PC	% PC EAL	% PEC EAL
Annual NOx ug m-3	20.29	10.11	10.18	33.9486667	67.6486667
Annual NO2 ug m-3	17.24	10.11	7.13	17.82475	43.09975
Max Hourly NO2 ug m-3	110.01	20.22	89.79	44.8935	55.0035
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	91.14	20.22	70.92	35.46025	45.57025
15 Minute Average SO2 ug m-3	4.46	2.79	1.67	0.62627444	1.67514662
Max 15 Minute SO2 ug m-3	47.12	2.79	44.33	16.6640602	17.7129323
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	40.66	2.79	37.87	14.236203	15.2850752
Annual SO2 ug m-3	4.42	2.79	1.63	0.46588857	1.26303143
Max Hourly SO2 ug m-3	43.89	2.79	41.10	11.7422	12.5393429
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	33.80	2.79	31.01	8.85954286	9.65668571
24 Hour Average SO2 ug m-3	4.49	2.79	1.70	1.360816	1.0886528
Max 24 Hourly SO2 ug m-3	16.35	2.79	13.56	10.84888	8.679104
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	13.61	2.79	10.82	8.65824	6.926592
8 Hour Running Average CO mg m-3	0.15	0.12	0.03	0.23234483	1.26682759
Maximum 8 Hour CO mg m-3	1.05	0.12	0.93	8.05982759	9.09431034
Annual PM10 ug m-3	23.15	22.48	0.67	1.68425	57.88425
Max Hourly PM10 ug m-3	39.54	22.48	17.06	42.658	98.858
24 Hour Average PM10 ug m-3	23.18	22.48	0.70	1.4026	46.3626
Max 24 Hourly PM10 ug m-3	28.06	22.48	5.58	11.1552	56.1152
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	24.75	22.48	2.27	4.535	49.495
Annual HCl ug m-3	0.22		0.22	1.12145	
Max Hourly HCl ug m-3	5.79		5.79	0.72329	
Max Hourly HF ug m-3	0.5786		0.58	0.2314528	
Annual Hg ug m-3	0.0011		0.00	0.45	
Max Hourly Hg ug m-3	0.0289		0.03	0.39	
Annual Cd and Th ug m-3	0.0011		0.00	22.429	
Max Hourly Cd and Th ug m-3	0.0289		0.03	1.92877333	
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.01		0.01	186.91	
Max Hourly As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	0.29		0.29	1.92877333	

Predicted Concentrations at Local Sensitive Receptors

2003 Met Data; 40 m Stack

Pollutant and Averaging Period	Receptor	Concentration	Limit
Annual NOx ug m-3	House PR	14.59	30
Annual NO2 ug m-3	House PR	13.24	40
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	Eden	66.71	200
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	Eden	26.73	266
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	Eden	23.46	350
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	Eden	8.82	125
8 Hour Running Average CO mg m-3	House PR	0.14	11.6
Annual PM10 ug m-3	House PR	22.78	40
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	House PR	23.45	50
Annual VOC ug m-3	House PR	0.29	-
Annual HCl ug m-3	House PR	0.10	20
Annual HF ug m-3	House PR	0.01	-
Annual Hg ug m-3	House PR	0.001	0.0050
Annual Cd and Th ug m-3	House PR	0.001	0.0050
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	House PR	0.005	0.006
Annual Dioxin ug m-3	House PR	1.02E-09	-

2004 Met Data; 40 m Stack

Pollutant and Averaging Period	Receptor	Concentration	Limit
Annual NOx ug m-3	House PR	14.35	30
Annual NO2 ug m-3	House PR	13.08	40
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	Eden	67.61	200
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	Eden	25.94	266
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	Eden	24.28	350
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	Eden	9.23	125
8 Hour Running Average CO mg m-3	House PR	0.14	11.6
Annual PM10 ug m-3	House PR	22.77	40
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	House PR	23.34	50
Annual VOC ug m-3	House PR	0.27	-
Annual HCl ug m-3	House PR	0.10	20
Annual HF ug m-3	House PR	0.01	-
Annual Hg ug m-3	House PR	0.0005	0.0050
Annual Cd and Th ug m-3	House PR	0.0005	0.0050
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	House PR	0.0048	0.006
Annual Dioxin ug m-3	House PR	9.69E-10	-

2005 Met Data; 40 m Stack

Pollutant and Averaging Period	Receptor	Concentration	Limit
Annual NOx ug m-3	Eden	16.65	30
Annual NO2 ug m-3	Eden	14.69	40
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	Eden	68.73	200
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	Eden	26.98	266
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	Eden	24.84	350
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	Eden	11.29	125
8 Hour Running Average CO mg m-3	Eden	0.14	11.6
Annual PM10 ug m-3	Eden	22.91	40
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	Eden	23.74	50
Annual VOC ug m-3	Eden	0.40	-
Annual HCl ug m-3	Eden	0.14	20
Annual HF ug m-3	Eden	0.01	-
Annual Hg ug m-3	Eden	0.001	0.0050
Annual Cd and Th ug m-3	Eden	0.001	0.0050
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	Eden	0.007	0.006
Annual Dioxin ug m-3	Eden	1.39E-09	-

2006 Met Data; 40 m Stack

Pollutant and Averaging Period	Receptor	Concentration	Limit
Annual NOx ug m-3	Eden	17.09	30
Annual NO2 ug m-3	Eden	15.00	40
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	Eden	71.87	200
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	Eden	27.92	266
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	Eden	26.19	350
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	Eden	11.93	125
8 Hour Running Average CO mg m-3	Eden	0.15	11.6
Annual PM10 ug m-3	Eden	22.93	40
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	Eden	23.91	50
Annual VOC ug m-3	Eden	0.43	-
Annual HCl ug m-3	Eden	0.15	20
Annual HF ug m-3	Eden	0.01	-
Annual Hg ug m-3	Eden	0.001	0.0050
Annual Cd and Th ug m-3	Eden	0.001	0.0050
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	Eden	0.007	0.006
Annual Dioxin ug m-3	Eden	1.48E-09	-

2007 Met Data; 40 m Stack

Pollutant and Averaging Period	Receptor	Concentration	Limit
Annual NOx ug m-3	Eden	17.39	30
Annual NO2 ug m-3	Eden	15.21	40
Max Hourly NO2 ug m-3 (Minus up to 18 exceedences)	Eden	71.38	200
Max 15 Minute SO2 ug m-3 (Minus up to 35 exceedences)	Eden	27.66	266
Max Hourly SO2 ug m-3 (Minus up to 24 exceedences)	Eden	26.01	350
Max 24 Hourly SO2 ug m-3 (Minus up to 3 exceedences)	Eden	13.03	125
8 Hour Running Average CO mg m-3	Eden	0.15	11.6
Annual PM10 ug m-3	Eden	22.95	40
Max 24 Hourly PM10 ug m-3 (Minus up to 35 exceedences)	Eden	24.01	50
Annual VOC ug m-3	Eden	0.45	-
Annual HCl ug m-3	Eden	0.15	20
Annual HF ug m-3	Eden	0.02	-
Annual Hg ug m-3	Eden	0.001	0.0050
Annual Cd and Th ug m-3	Eden	0.001	0.0050
Annual As, Cr, Co, Cu, Mn, Ni, Pb, Sb and V ug m-3	Eden	0.008	0.006
Annual Dioxin ug m-3	Eden	1.54E-09	-

Note: The receptor names relate to:

Eden; Eden Industries

House PR; The house at the north eastern corner of Penderyn Reservoir

FIGURES

All figures are taken from models assuming a 40 m stack and 2007 meteorological data.

Base maps are taken from Ordnance Survey OS Select Explorer Map OL12,
Brecon Beacon National Park, West and Central Areas. 2002; 1:25,000 Scale.

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