INGHAM PROPERTY DEVELOPMENT PTY LTD

Ingham Turkey Processing Facility

Odour Impact Assessment

Tahmoor, NSW

Final Report

September 2013

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1 INTRODUCTION

In August 2012, The Odour Unit Pty Ltd (TOU) was engaged by Ingham Property Development Pty Ltd (Ingham) to conduct a site specific odour impact assessment of the Ingham Turkey Processing Facility (the site) at Tahmoor, NSW.

The basis for the study consisted of two site visits by a TOU Engineer with the assistance of a TOU Field Technician on 1 August 2012 and 26 March 2013. The first visit consisted of a familiarisation exercise of the site, investigation into all potential odour emission sources at the site, and the development of a site specific odour emissions inventory. Following this, a series of odour samples were collected from identified odour emission sources as well as relevant physical measurements. This emissions based inventory was then used as input for odour dispersion modelling. The second visit involved the collection of additional samples at the site, following notification from Ingham that wastewater treatment process conditions prevalent during the first visit were not representative of normal operating circumstances.

The results from dispersion modelling have been used to assess whether Council's proposed re-zoning to allow residential development up to the site boundary is likely to result in adverse odour impacts for the new residents, and if the need to maintain the currently proposed minimum 500 metres buffer zone for the existing site is appropriate.

The following report summarises the odour emission inventory for the site and the results from dispersion modelling.

2 PROCESS OVERVIEW

2.1 GENERAL SITE ARRANGEMENT

A general site arrangement schematic is shown in **Figure 2.1**.

2.2 SITE OPERATIONS

The site processes approximately 8,000 birds a day and operates 24 hours, 5 days a week. During this operating period, there are two modes of cycle:

- Killing Cycle: 0500 hrs to 1500 hrs ; and
- Cleaning/Maintenance Cycle: 1500 hrs to 0500 hrs.

The killing cycle commences by the arrival of delivery trucks to the site with live birds. The trucks park in the live birds holding area before subsequently moving to the Birds Receival Area. At this point the birds are hanged onto a conveyor and processed. The birds pass through the Scald Tank Area in which evisceration, defeathering and scalding occur. The feathers and offal are directed to a collection area in the southern end of the processing building. All solid waste is removed from site in covered bins on a daily basis. At the end of each processing day the bird's receival area is washed.

As advised by Ingham, the above process currently generates approximately 400 kilolitres /day of wastewater, all of which is directed to the Wastewater Treatment Pond System (WTPS) on-site. The WTPS is a network of ponds, connected in series. The effluent is treated by two anaerobic ponds, followed by three aerobic/anoxic ponds before storage in the irrigation storage pond. The treated wastewater is irrigated to an assigned patch of grassland, as shown in **Figure 2.2.**

ID.	Location
1	Anaerobic Pond 1
2	Anaerobic Pond 2
3	Aerobic Pond 3
4	Aerobic Pond 4
5	Aerobic Pond 5
6	Irrigation Pond 6
	Bird Holding Area
	Bird Receival Area (aka Live Bird Hanging)
	Offal/feather Collection Area
	Scald tank area – defeathering and evisceration (no samples)
	Kill/bleed room

Figure 2.1 – Ingham Tahmoor Turkey Processing Facility: General Site Arrangement

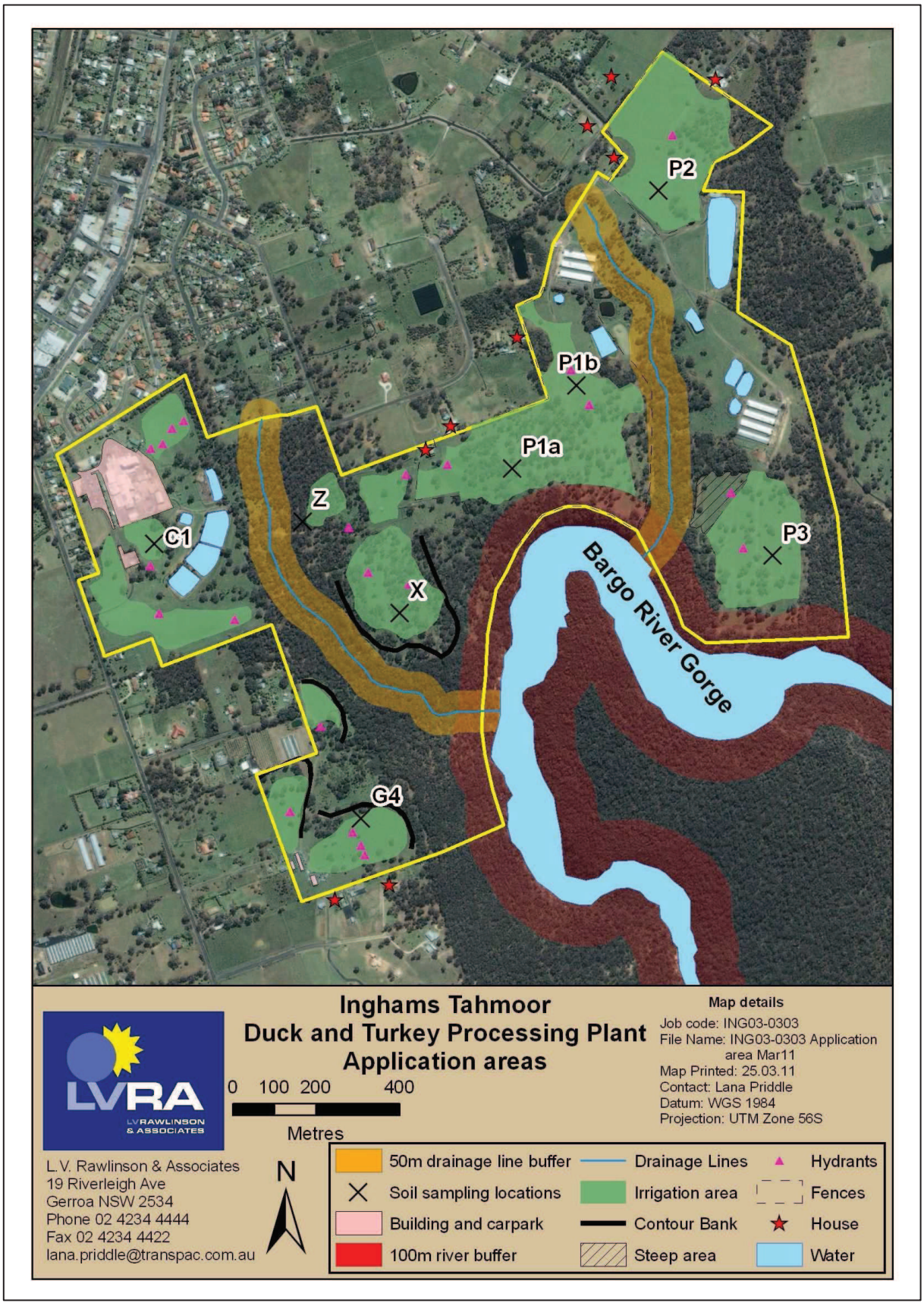


Figure 2.2 – Ingham Tahmoor Turkey Processing Facility: Irrigation Application Plan

3 SAMPLING PROGRAM AND METHOLODOGY

3.1 SAMPLING PROGRAM

The sampling program for this modelling assessment is summarised in **Table 3.1.** The sampling scope involved the collection of 19 gas samples from several key odour emission sources identified on-site during TOU's investigation in August 2012. These include:

- Bird Receival Area;
- Scalding Tank Area (Evisceration, defeathering and scalding);
- Offal/Feather Bin Collection Area; and
- Wastewater Treatment Pond System (WTPS).

Table 3.1 – Sampling Program: 1 August 2012 & 26 March 2013

Sampling Location	Sampling method	No. of samples	
		August 2012	March 2013
Bird Receival Area	Point source – Drum and Pump	1	-
Scalding Tank Area (Evisceration, defeathering and scalding)	Point source – Drum and Pump	1	-
Offal/feather bin collection area	Point source – Drum and Pump	1	-
Wastewater Treatment Pond System	Area source – Isolation Flux Hood	8	8
Total no. of samples		**19**	

As previously mentioned, a follow-up visit was required on 26 March 2013 to repeat the August 2012 sampling under more representative conditions.

3.2 SAMPLING METHODOLOGY

Given the varying nature of the sampling sources at the site, two different sampling techniques were utilised in this assessment for the collection of odour samples, namely:

- Point source – Drum and Pump Method (**Section 3.2.1**); and
- Area source – Isolation Flux Hood (IFH) Method (**Section 3.2.2**).

Each sampling technique has been described in the proceeding sections.

3.2.1 Point Source Sampling

The method used for collecting samples using this technique involved drawing the sample air through a Teflon™ sampling tube into a single use, Nalophan sample bag. The bag was housed within a container (sampling drum) that was evacuated with a vacuum pump, and the sample collected by induced flow. The "lung method", by which this sampling procedure is known, allowed the sample air to be collected without coming into contact with any potentially odourous material. **Figure 3.1** illustrates a schematic of the point source sampling method.

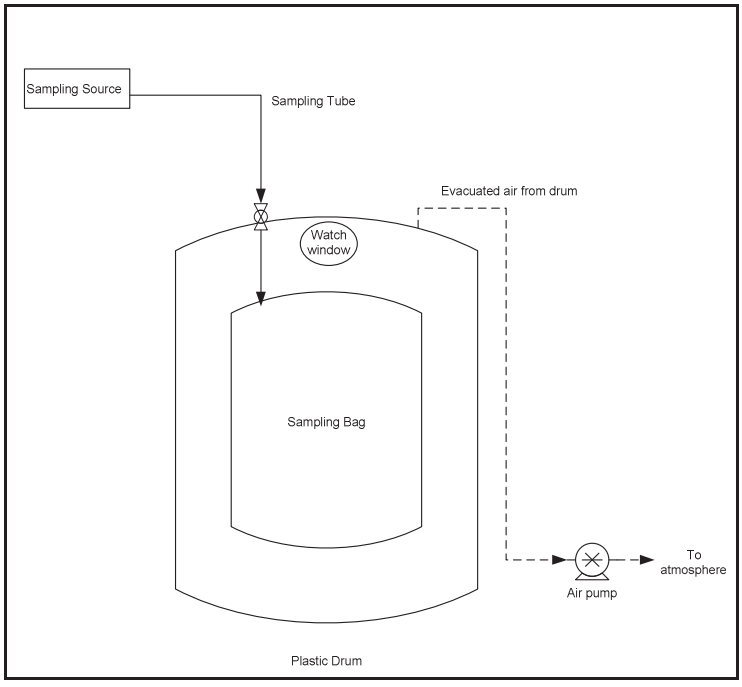


Figure 3.1 – Schematic of point source sampling

3.2.2 Area Source Sampling Method

The objective of the area source sampling programme was to collect representative of the WWTS. This was undertaken using an Isolation Flux Hood (IFH). All sampling using the IFH is carried out according to the method described in the US EPA technical report '*EPA/600/8-86/008*'. This method is also defined in Australian Standard AS/NZS4323.4. TOU's IFH adheres to the design specifications, materials of construction and supporting equipment that the US EPA report '*EPA/600/8-86/008*' defines. **Table 3.1** summarises the design specifications of the IFH.

Once the IFH apparatus is set up for sample collection, dry nitrogen is then introduced into the hood at a sweep rate of 5 litres per minute.

Table 3.2 - IFH Design Specifications	
Diameter (m)	0.406
Surface Area (m^2)	0.13
Volume (L)	30*

*When the skirt of the hood is immersed into the water or solid surface by the specified 25 millimetres

Area source samples are opened to the atmosphere resulting in wind being a major factor in the release of odourous pollutants from the pond surfaces and conveying the pollutant from this source to areas beyond the boundary of the site. The IFH system is designed to simulate the mass transfer of odorous pollutants into the atmosphere, resulting in a controlled and consistent sampling environment. This is achieved by the flux of dry nitrogen sweep gas into the IFH, as it is positioned on the solid or liquid surface. On a liquid surface this is achieved by floating the IFH within an inflated tyre inner tube. The nitrogen gas then transports the odour from the surface in a similar manner to the wind, albeit at a very low sweep velocity. This odorous air is then sampled, for subsequent odour concentration testing.

As the IFH has a constant 5 litres per minute inflow of nitrogen gas to it, the sampling chamber remains under very slight positive pressure (less than 2 Pa) and produces a net outflow through the vent on top of the IFH, therefore eliminating any chance of contamination with external air from the atmosphere. The IFH's volume of 30 litres and the 5 litres per minute nitrogen sweep rate results in a gas residence time of 6 minutes. The standard method prescribes a minimum of four (4) air changes in order

to achieve optimum purging and equilibrium in the hood, and hence a total of 24 minutes is allowed before sampling commences. The sample is then collected at a flow rate of approximately 2 litres per minute over a 5–10 minute period to obtain a 10–20 litre sample for analysis.

The method followed by TOU is depicted in the schematic of the sampling equipment shown in **Figure 3.1 & 3.2**. The IFH is manufactured from acrylic resin to ensure it does not contribute to the odour sample. All other surfaces in contact with the sample are made from Teflon ® or stainless steel.

The use of the IFH method enables a Specific Odour Emission Rate (SOER) to be calculated (ou.$m^3/m^2/s$). A SOER is a measure of odour released from a representative area unit. The SOER is multiplied by the area of the source to obtain an Odour Emission Rate (OER) (ou.m^3/s), or the total odour released from each source. This calculation has been illustrated in **Equations 3.1 & 3.2** below.All area source samples collected in this study were collected in the above manner.

$$SOER\ (ou.m^3 m^{-2} s^{-1}) = OC * \frac{Q}{A}$$ **Equation 3.1**

$$OER\ (ou.m^3 s^{-1}) = SOER * area\ of\ source\ unit\ (m^2)$$ **Equation 3.2**

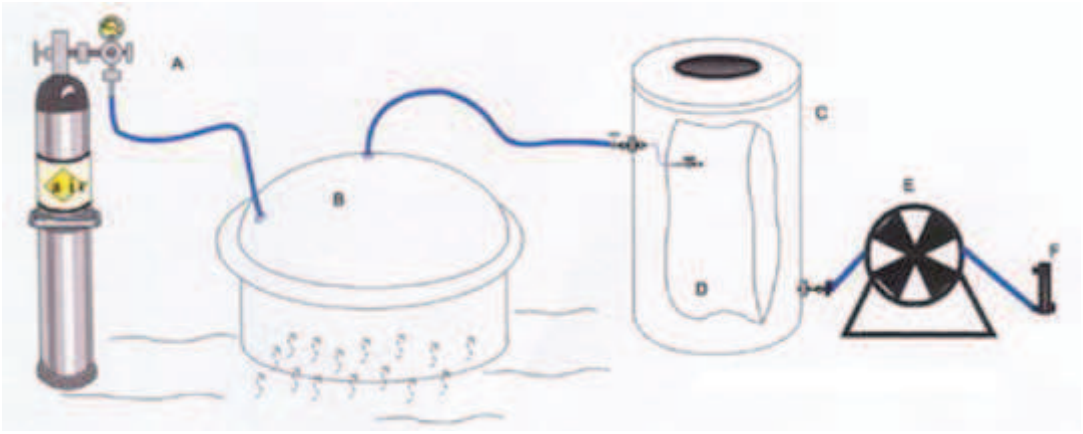
where,

QC = odour concentration of compound from air in the chamber (ou)

Q = sweep gas volumetric flow rate into chamber (m^3/s)

A = sample source total surface area (m^2)

Figure 3.2 - Schematic Drawing of Sampling with the Isolation Flux Hood (IFH)

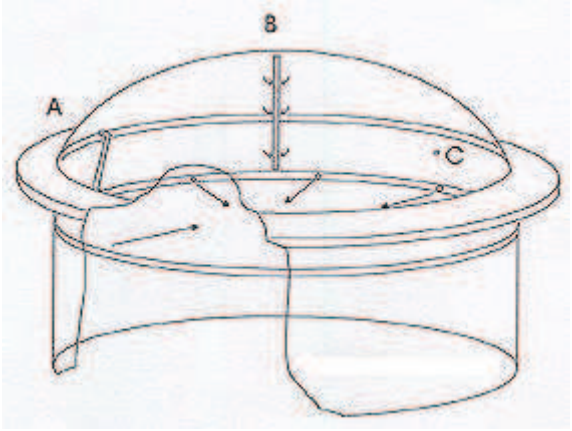


Source: Odotech - Odoflux Isolation Flux Hood Manual

Key

A	Cylinder of medical air, nitrogen or any neutral gas.
B	Isolation Flux Hood (detailed diagram shown in **Figure 4.2**)
C	Lung chamber (sampling drum)
D	Nalophan sampling bag
E	Sampling pump
F	Air flow meter

Figure 3.3 - Schematic of the Isolation Flux Hood



Source: Odotech - Odoflux Isolation Flux Hood Manual

Key

A	Inlet gas from gas cylinder.
B	Outlet to sample bag.
C	Additional gas outlet points for other sampling, or temperature and moisture monitoring.

4 ODOUR CONCENTRATION MEASUREMENT METHOD

TOU's odour laboratory operates to the Australian Standard for odour measurement '*Determination of odour concentration by dynamic olfactometry*' (AS/NZS 4323.3:2001) which prescribes a method for sample analysis that provides quality assurance/quality control and ensures a high degree of confidence in the accuracy, repeatability and reproducibility of results.

The concentration of the gaseous odour samples were measured using a technique known as dynamic olfactometry. Dynamic olfactometry involves the repeated presentation of both a diluted gaseous odour sample and an odour-free air stream to a panel of qualified assessors through two adjacent ports on the olfactometer (known as the Odormat™). TOU utilises four to six trained assessors (or panellists) for sample analysis, with the results from four qualified panellists being the minimum allowed under the Australian Standard AS/NZS 4323.3:2001. For this study, up to six panelists were used.

The method for odour concentration analysis involves the odorous gas sample initially being diluted to the point where it cannot be detected by any member of the panel. The assessor's step- up to the olfactometer in turn, takes a sniff from each port, then choose which port contains the odour and enter their response. At each stage of the testing process, the concentration of odorous gas is systematically increased (doubled) and re-presented to the panel. A round is completed when all assessors have correctly detected the presence of the odour with certainty. The odour is presented to the panel for three rounds and results taken from the latter two rounds, as stated in AS/NZS 4323.3:2001.

The results obtained give an odour measurement measured in terms of odour units (ou). One (1) ou is the concentration of odorous air that can be detected by 50% of members of an odour panel (persons chosen as representative of the average population sensitivity to odour). It is effectively the concentration of an odour at detection threshold level. This process is defined within AS/NZS 4323.3:2001. The odour units can be subsequently multiplied by an emission rate or volumetric flow to

obtain an Odour Emission Rate (ou.m^3/s) or a SOER (ou. m^3/m^2/s) for area source samples collected using the IFH method (see **Section 3.2.2**).

4.1 ODOUR MEASUREMENT ACCURACY

The repeatability and odour measurement accuracy of the Odormat™ is determined by its deviation from statistically reference values specified in AS/NZS4323.3:2001. This includes calculation of instrumental repeatability (r), where r must be less than 0.477 to comply with the standard criterion for repeatability. The accuracy (A) is also tested against the 95th percentile confidence interval, where A must be less than 0.217 to comply with the accuracy criterion as mentioned in the Standard.

For this study, the Odormat™ V02 and Odormat^{TM} V04 were used and last calibrated on August 2011 and September 2012 respectively. Both Odormats complied with all requirements set out in the AS/NZS4323.3:2001 (see **Appendix A** –Result sheets: *Repeatability and Accuracy*). The calibration gas used for both sets of testing was 50 ppm n-butanol in nitrogen (N_2) gas.

5 NSW ODOUR CRITERIA AND DISPERSION MODEL GUIDELINES

Regulatory authority guidelines for odorous impacts of gaseous process emissions are not designed to satisfy a 'zero odour impact criteria', but rather to minimise the nuisance effect to acceptable levels of these emissions to a large range of odour sensitive receptors within the local community.

The odour impact assessment for this project has been carried out in accordance with the methods outlined by the NSW EPA documents:

- "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (2005); and
- "*Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW*" (2006).

The EPA documents specify that the odour modelling for Level 3 impact assessments upon which this study has been conducted be based on the use of:

- 99.0th percentile dispersion model predictions;
- 1-hour averaging times with built–in peak-to-mean ratios to adjust the averaging time to a 1-second nose-response-time;
- The peak-to-mean ratio in the near- and far-field for wake-affected stack/roof vent and volume sources for Pasquill-Gifford atmospheric stability classes A-F is 2.3;
- The peak-to-mean ratio in the near-field for an area source for Pasquill-Gifford atmospheric stability classes A-D is 2.5 and E-F is 2.3;
- The peak-to-mean ratio in the far-field for an area source for Pasquill-Gifford atmospheric stability classes A-D is 2.3 and E-F is 1.9;

- The near field distance is defined as typically 10 times the largest source dimension, either height or width; and
- The appropriate odour unit performance criterion, based on the population of the affected community in the vicinity of the development.

The impact assessment criteria for complex mixtures of odours are designed to include receptors with a range of sensitivities. Therefore a statistical approach is used to determine the acceptable ground level concentration of odour at the nearest sensitive receptor. This criterion is determined by the following equation outlined in the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2005* (p. 37):

$$IAC = \frac{\log_{10}(p) - 4.5)}{-0.6}$$ **Equation 5.1**

where,

IAC = Impact Assessment Criterion (ou)

***p* =** population

Based on **Equation 5.1**, **Table 5.1** outlines the odour performance criteria for six different affected population density categories, and is reproduced from the EPA's *Approved Methods* document. It states that higher odour concentrations are permitted in lower population density applications.

Table 5.1 - Odour Performance Criteria under Various Population Densities

Population of affected community	Odour performance criterion (ou)
Urban Area (≥ ~2000)	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤ ~2)	7.0

Source: Department of Environment and Climate Change (NSW), 2005, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.

Given the NSW EPA classification of population densities presented in **Table 5.1**, the odour performance criteria (OPC) adopted for this dispersion modelling and odour impact assessment study is **2 odour units (ground level concentration)** for surrounding existing and proposed urban areas.

6 ODOUR DISPERSION MODELLING METHOD

6.1 THE ODOUR DISPERSION MODEL

The odour dispersion modelling study for this study was carried out using AUSPLUME Version 6.0, a Gaussian, steady-state, plume dispersion model developed by the Victorian Environmental Protection Authority (EPA Victoria). AUSPLUME is the approved dispersion model recommended by the NSW EPA in their document - *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales (2005)*.

The AUSPLUME Version 6.0 atmospheric dispersion model is used to project downwind ground level concentrations of air contaminants by taking into consideration various factors including:

- Odour emissions data - odour emission rate and source dimensions;
- Site specific meteorology;
- Geophysical impact (topography); and
- Building wake effects.

For this modelling assessment, the air contaminant was odour and ground level concentrations in odour units (ou) have been projected.

6.2 METEOROLOGICAL DATASET

The meteorological dataset (metfile) used in this study was developed using observational data from Xstrata Tahmoor Colliery Meteorological Station for the period from 6 February 2007 - 5 February 2008. **Figure 6.1** illustrates the station location, which is on a mine pit top in the centre of a grassed area immediately west of coal stockpiles.

Figure 6.1 - Xstrata Tahmoor meteorological station location

This dataset was compared with the closest Bureau of Meteorology (BoM) Automatic Weather Station (AWS) over a 6-year period from 6 February 2001 to 5 February 2007 which was at Camden located approximately 25 km to the NNE of the Tahmoor Meteorological Station.

The following parameters were used to build the AUSPLUME MetFile:

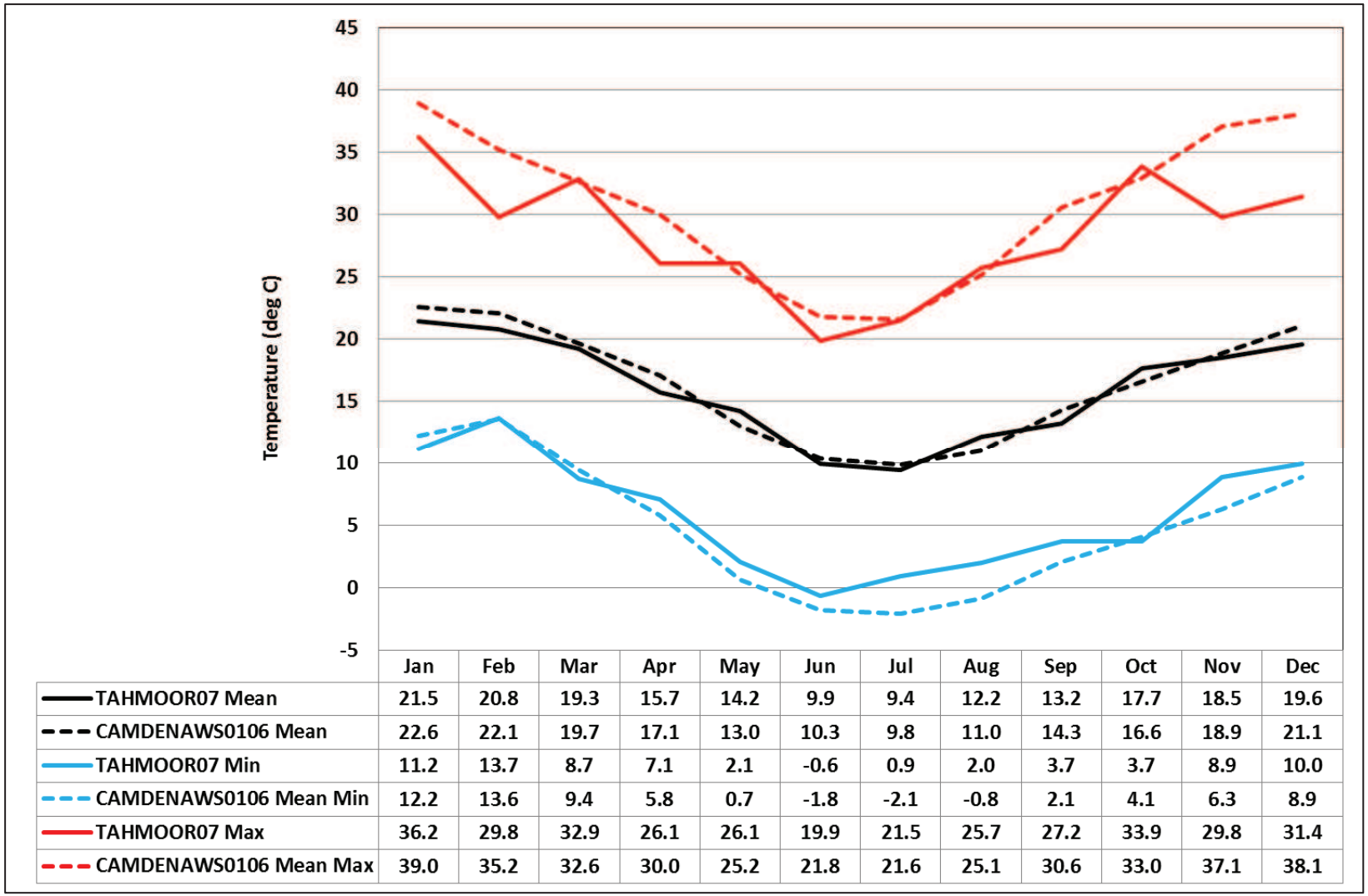
- Wind speed;
- Wind direction;
- 2 metre air temperature;
- 10 metre air temperature; and
- Solar radiation.

The raw data was checked and had any incomplete days and/or wind stalls removed. Any small gaps in the data were substituted with previous or following data. Data completeness for this metfile was 100%.

Vertical stability (Pasquill class) was determined using the solar radiation/delta-T (SRDT) method. The method uses wind speed in combination with measurements of total solar radiation during the day and vertical temperature difference at night (WebMET.com, 2002). Mixing height was fixed at a constant 5,000 metres, which is considered appropriate for modelling impacts from short wake affected stacks and low-level diffuse sources but not for tall stacks or elevated diffuse sources where processes such as plume reflection could be an issue.

The metfile had an annual average temperature 0.3 degrees cooler than Camden AWS. A monthly temperature comparison graph and data table for the MetFile and 6-year climate temperatures are presented in **Figure 6.2.**

The hourly wind field frequencies have been analysed using wind rose plots for wind speed and direction and are presented in **Figure 6.3.** The rose diagrams for the annual datasets illustrates a high frequency of light South Westerly to Westerly winds occurring at Tahmoor approximately 30% of the time. In contrast, Camden has a prevailing light southerly wind occurring approximately 12% of the time. Light winds typically correlate with poor odour dispersion conditions from short wake affected stacks and low-level diffuse sources. The difference in the prevailing winds is most likely due to the large distance between the two locations (25 km) and/or local scale effects.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TAHMOOR07 Mean	21.5	20.8	19.3	15.7	14.2	9.9	9.4	12.2	13.2	17.7	18.5	19.6
CAMDENAWS0106 Mean	22.6	22.1	19.7	17.1	13.0	10.3	9.8	11.0	14.3	16.6	18.9	21.1
TAHMOOR07 Min	11.2	13.7	8.7	7.1	2.1	-0.6	0.9	2.0	3.7	3.7	8.9	10.0
CAMDENAWS0106 Mean Min	12.2	13.6	9.4	5.8	0.7	-1.8	-2.1	-0.8	2.1	4.1	6.3	8.9
TAHMOOR07 Max	36.2	29.8	32.9	26.1	26.1	19.9	21.5	25.7	27.2	33.9	29.8	31.4
CAMDENAWS0106 Mean Max	39.0	35.2	32.6	30.0	25.2	21.8	21.6	25.1	30.6	33.0	37.1	38.1

Figure 6.2 - Monthly temperature graph comparison of metfile against 6-year climate

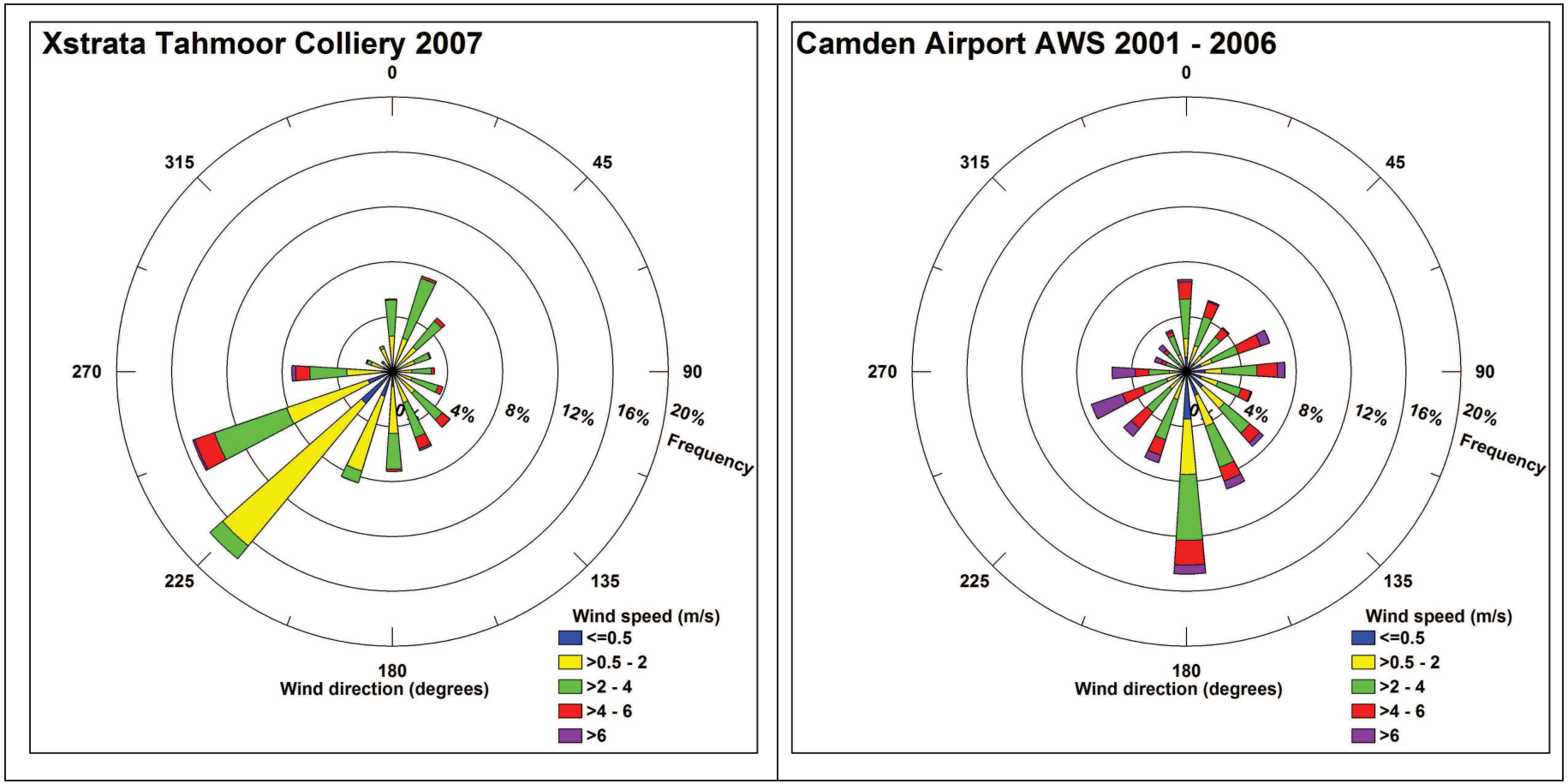


Figure 6.3 - Annual wind rose comparison of metfile against 6-year climate

In addition to wind direction and speed, atmospheric stability is an important factor in odour transport and dispersion. Stability refers to the vertical movement of the atmosphere and subsequently the dispersion of pollutants vertically within the atmospheric boundary layer. Atmospheric stability is classified under the Pasquill-Gifford scheme where seven stability classes have been defined as: A – very unstable; B – unstable; C – slightly unstable; D – neutral; E – slightly stable; F – stable; and G – very stable. F and G tend to be grouped together as F in dispersion models. When the atmosphere is stable, vertical movement is suppressed and dispersion is poor. This is the case for classes E and F, which are apparent during temperature inversions. Neutral conditions also result in poor vertical dispersion for ambient temperature or cool plumes. The frequency distribution of each stability class for the Tahmoor dataset is presented in **Figure 6.4**. Tables with stability class versus wind speed is presented in **Table 6.1** and distributed against the time of day in **Table 6.2**.

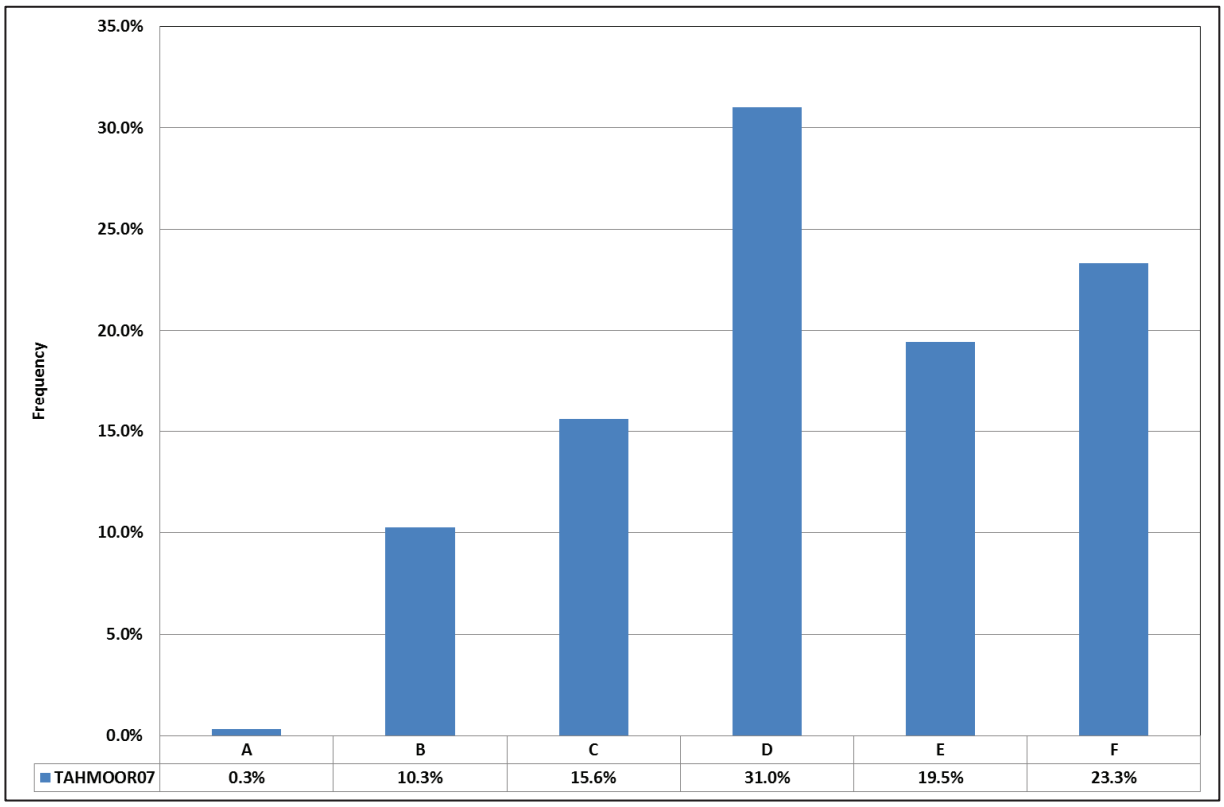


Figure 6.4 - Stability class frequency histogram

Table 6.1 - Distribution of stability classes vs wind speed						
Stability class	Wind speed (m/s)					
	< 2	< 4	< 8	< 12	≥ 12	Total
A	26	3	0	0	0	29
B	690	200	10	0	0	900
C	0	1121	247	0	0	1368
D	979	1414	323	1	0	2717
E	1510	193	0	0	0	1703
F	2022	20	0	0	0	2042

Table 6.2 - Distribution of stability classes vs time of day									
Stability class	Time of day (hrs)								
	0000 - 0259	0300 - 0559	0600 - 0859	0900 - 1159	1200 - 1459	1500 - 1759	1800 - 2059	2100 - 2359	Total
A	0	0	0	20	9	0	0	0	29
B	0	0	131	431	300	38	0	0	900
C	0	0	31	414	601	322	0	0	1368
D	160	197	750	230	185	627	392	176	2717
E	426	384	54	0	0	72	351	417	1704
F	509	514	129	0	0	36	352	502	2042

6.3 TOPOGRAPHICAL DATA AND LAND USE

Topographical information was not incorporated into the dispersion model. The aim of the study is to determine the suitability of the 500 m buffer zone to the east of the wastewater ponds which had relatively flat vegetated terrain compared to the complex terrain of the riverine gorge just beyond the buffer zone. TOU considers use of AUSPLUME as acceptable within the buffer zone. Interpretation of the modelling results and findings beyond the buffer zone should be approached with caution. More advanced dispersion models such as CALPUFF would be considered appropriate for handling complex terrain conditions.

The surface roughness category (Z_o) used in the dispersion model was 0.6 m, which was selected as a midpoint between 'Residential' and 'Forest' land use categories. This is reflective of the vegetation within the 500 m buffer zone of interest and the possibility of residential development beyond the buffer zone.

6.4 GRIDDED RECEPTOR FILE

The Receptor file used in the model was a Cartesian grid with receptors spaced at 100 m by 100 m intervals. The domain size was 5.2 km by 3.1 km.

6.5 ODOUR EMISSION RATES, SOURCES AND MODEL INPUT CONFIGURATIONS

6.5.1 Odour Emission Rate Data

The odour laboratory certificates and odour emission rate data file used in the dispersion model have been provided in **Appendix A & B** respectively**.** The emission rates used for the WTPS were derived from the odour measurements carried out by TOU on 26 March 2013.

The processing plant roof vents and the bird holding area were estimated from previous measurements carried out by TOU from other Ingham plants.

6.5.1.1 Evisceration/Scald Tank/Kill Room Area

- TOU was unable to obtain odour emission measurements directly from the Evisceration/Scald Tank Area roof vents at Tahmoor due to accessibility issues. A single ambient odour sample was collected from the Kill Room Area; however, it is uncertain whether it is fully representative of the odours from the Evisceration/Scald Tank Area. A recent set of more extensive measurements was collected at a poultry processing plant located at Murarrie, Qld which were used for this modelling assessment.

- A mean odour concentration of 222 ou was measured by collection of 8 odour samples from 5 roof vents at the QLD Plant. The measurements are presented in **Table 6.3**.

Table 6.3 - Murarrie, Qld Processing Plant Roof Vent Measurements (2011)	
Location	**Odour Concentration (ou)**
EF15-1	99
EF15-2	304
EF15-2	332
EF15-5	362
EF15-5	279
EF15-4	197
EF15-4	197
EF15-3	152
Geo-mean	**222**

6.5.2 Bird Receival Area/Bird Holding Area

- TOU was unable to obtain reliable odour emission measurements downwind of trucks laden with turkey birds on-site at Tahmoor due to wind velocity being higher than ideal (> 1 m/s). This leads to odour emission rate calculations being adversely overstated.

- TOU has conducted previous sampling and testing at other poultry processing plant sites downwind of trucks laden with chicken birds and within unloading areas. The measurements are presented in **Table 6.4.**

- The Hoxton Park mean odour emission rate value of 0.35 ou.m^3/s/bird was used for the modelling assessment.

- It was advised by Ingham that Live Turkey Weight is 13.7 kg and Live Chicken Weight is 2.5 kg. This equates to turkeys having 5.48 times greater weight than chickens.

- There are approximately 725 turkey birds per truck. This is equivalent to a total number of 3,973 chicken birds by weight.

- Therefore an estimated odour emission rate of 1,391 ou.m^3/s was calculated to be discharged per truck.

- It is assumed that approximately one truck load per hour is contained within the bird receival area between 0300 hrs and 1500 hrs daily

- It is assumed that approximately one truck load per hour is stored within the bird holding area between 0400 hrs am and 1400 hrs daily
- The model assumes a processing rate of 8,700 turkey birds per day. This is overestimated; in fact 8,000 turkey birds per day are processed.

Table 6.4 - Odour Emission Rate per live bird measurements at other Processing Plants

Location	Bird Number	Odour Emission Rate ($ou.m^3/s$)	OER per bird ($ou.m^3/s/bird$)
Hoxton Park, NSW (2006)			
Truck in open forecourt	4,400	2,000	0.45
Truck in open forecourt	4,400	1,230	0.28
Geo-mean OER per bird			**0.35**
Osborne Park, WA (2005)			
Bird unloading area	10,800	5,980	0.55
Bird unloading area	20,160	5,100	0.25
Bird unloading area	20,160	4,430	0.22
Bird unloading area	20,160	7,960	0.38
Geo-mean OER per bird			**0.33**

6.5.3 AUSPLUME Model Input Configurations

Detailed AUSPLUME model input configurations, including AUSPLUME text output file and BPIP, are provided in **Appendix C**. The meteorological dataset file used for modelling has been provided in **Appendix D**. This should allow for full reproduction of the modelling.

6.6 ODOUR DISPERSION MODELLING SCENARIOS RESULTS

- As measured by TOU on 26 March 2013 or as otherwise estimated.

7 ODOUR DISPERSION MODELLING RESULTS

7.1 ODOUR EMISSIONS INVENTORY

The odour emission inventory for the site has been provided in **Appendix B.** The emissions inventory contains data used for modelling scenario used in this study. The data contained in the inventory should be adequate for full reproduction of modelling results for each emission source measured in this study.

The modelling plot results are shown in **Figure 7.1**. It shows the impact arising from key emissions sources at the site, including:

- Killing/Evisceration Room Vents;
- Bird Receival Area Vents;
- Bird Holding Area; and
- Wastewater Treatment Pond System.

The impact from of these individual sources has been shown in the plot, along with the cumulative impact from all sources combined.

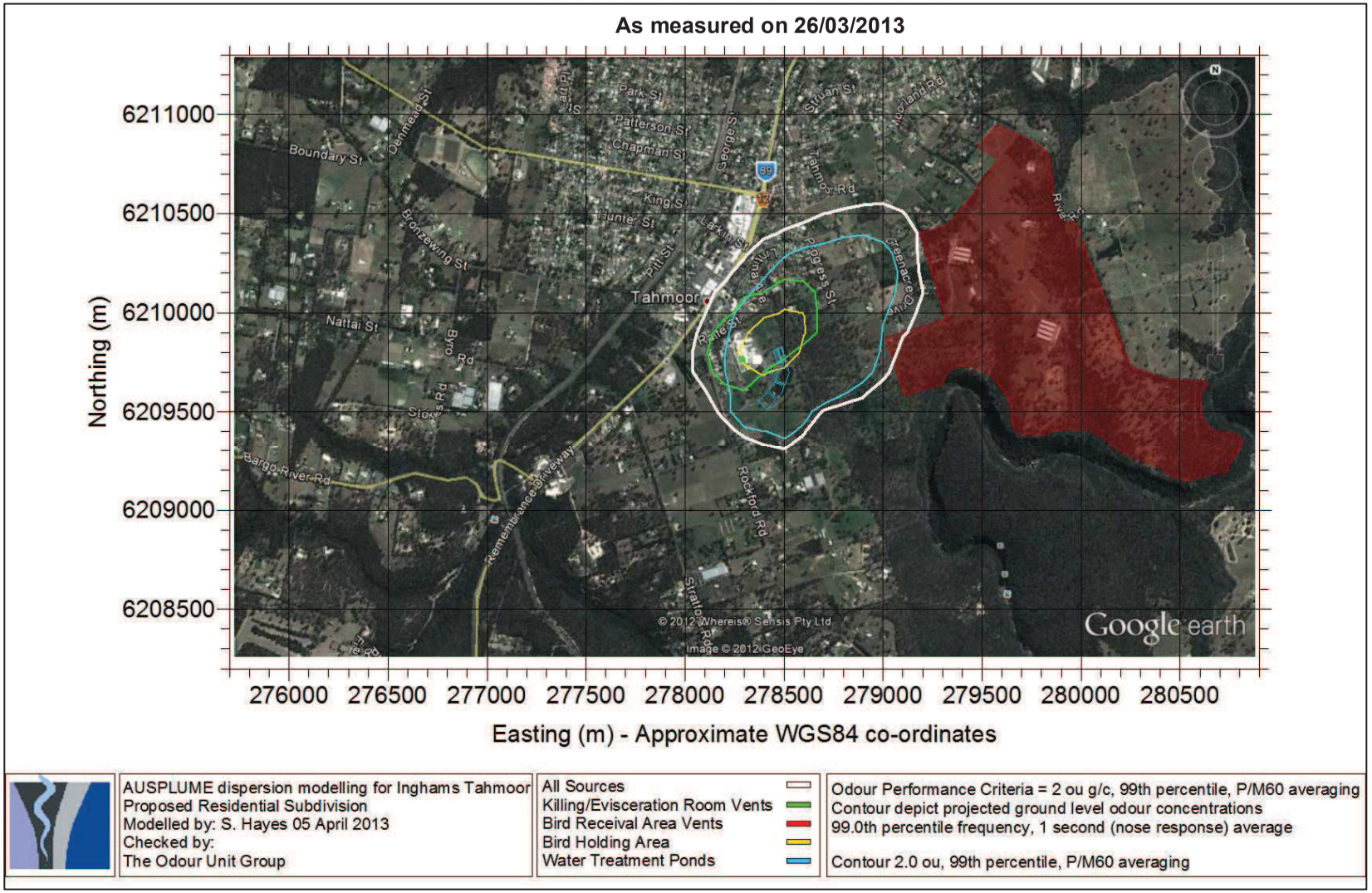


Figure 7.1 – Ingham Tahmoor Turkey Processing Facility: Modelling Plot Results

8 DISCUSSION AND CONCLUSION

In August 2012, TOU was engaged by Ingham to conduct a site specific modelling-based odour impact assessment of the Ingham Turkey Processing Facility at Tahmoor, NSW. The basis for the modelling assessment is to evaluate whether the proposed re-zoning to allow residential development up to the site boundary is likely to result in adverse odour impacts for the new residents, and if the need to maintain the currently proposed minimum 500 metres buffer zone for the existing site is appropriate.

The modelling results from this assessment indicate that the EPA's 2 ou performance criterion will be exceeded beyond the plant boundary, suggesting that there may be some level of odour impact at existing residences, under certain meteorological conditions. The bulk of this exceedence is due to the WTPS, with the anaerobic ponds being the primary contributors. The extent to which this odour impact projection aligns with actual incidences of nuisance and/or complaints in the community is to some extent a measure of the accuracy of the modelling. In addition, the inherent conservatism built in to the EPA criterion means that odour receptors inside the 2 ou contour will not automatically be inconvenienced by odour.

It is understood that an area of land to the north and north-east of the Ingham site, including the indicated residential rezoning development plan, is pending approval from Council. Notwithstanding the above comments concerning the interpretation of the modelling results, the modelling shows that sections of this land area lie within the 2 ou odour contour and are therefore potentially susceptible to odour impact from the Ingham operation. In the context of an appropriate buffer area around the Ingham plant two approaches to the setting of this odour buffer could be considered. The first would be entirely based upon the 2 ou contour derived from this modelling study and be consistent with buffer zone determination for 'greenfield' developments. The second approach would be to follow the existing 500m buffer distance that is currently proposed for the site. The modelling finds no justification for a buffer distance of less than 500m.

REPORT SIGNATURE PAGE

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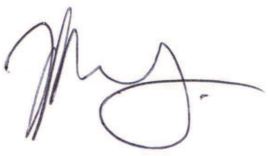

Terry Schulz
Managing Director

Michael Assal
Engineer

Steven Hayes
Senior Consultant

REFERENCES

- AS/NZS 4323.3:2001 *Stationary source emissions – Determination of odour concentration by dynamic olfactometry*
- DEC, 2006, *Technical framework (and notes): assessment and management of odour from stationary sources in NSW.*
- DEC, 2007, *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales.*
- DEC, 2005, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*

APPENDIX A: ODOUR CONCENTRATION LABORATORY RESULTS SHEET

THE ODOUR UNIT

THE ODOUR UNIT

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NATA

Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Ingham Enterprises Pty Ltd	Telephone	(02) 9826 4525
Contact	Michael Parkinson	Facsimile	(02) 9600 9878
Sampling Site	Tahmoor Turkey Processing	Email	mparkinson@inghams.com.au
Sampling Method	Area source sampling - IFH	Sampling Team	TOU (MA + AS)

Order details:

Order requested by	Michael Parkinson	Order accepted by	M. Assal
Date of order	4 March 2013	TOU Project #	N1800L
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Michael Parkinson	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
Identification	The odour sample bags were labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification), sampling date and time, dilution ratio (if dilution was used) and whether further chemical analysis was required.
Method	The odour concentration measurements were performed using dynamic olfactometry according to the Australian Standard 'Determination of Odour Concentration by Dynamic Olfactometry AS/NZS4323.3:2001. The odour perception characteristics of the panel within the presentation series for the samples were analogous to that for butanol calibration. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V04
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V04: $r = 0.3234$ (September 2012) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V04: $A = 0.1995$ (September 2012) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
Traceability	The measurements have been performed using standards for which the traceability to the national standard has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Wednesday, 17 April 2013

Panel Roster Number: SYD20130327_029

J. Schulz
NSW Laboratory Coordinator

A. Schulz
Authorised Signatory

THE ODOUR UNIT PTY LIMITED

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20130327_029

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/s$)
#1 Irrigation Pond 6 (Western Section)	SC13216	26.03.2013 1045 hrs	27.03.2013 1031 hrs	6	12	--	--	81	81	0.05
#2 Aerobic Pond 4 (Western Section)	SC12317	26.03.2013 1100 hrs	27.03.2013 1058 hrs	6	12	--	--	102	102	0.07
#3 Aerobic Pond 3 (Western section - Furthest from Inlet)	SC13218	26.03.2013 1125 hrs	27.03.2013 1127 hrs	6	12	--	--	192	192	0.13
#4 Aerobic Pond 3 (Western Section – Middle)	SC13219	26.03.2013 1140 hrs	27.03.2013 1155 hrs	6	12	--	--	322	322	0.21
#5 Anaerobic Pond 2 (Furthest from Inlet)	SC13220	26.03.2013 1222 hrs	27.03.2013 1305 hrs	6	12	--	--	483	483	0.28
#6 Anaerobic Pond 2 (Western Section - Middle)	SC13221	26.03.2013 1243 hrs	27.03.2013 1338 hrs	6	12	--	--	542	542	0.31
#7 Anaerobic Pond 1 (Western section – middle)1 of 2	SC13222	26.03.2013 1337 hrs	27.03.2013 1414 hrs	6	12	--	--	2,170	2,170	1.31
#8 Anaerobic Pond 1 (Western section – middle) 2 of 2	SC13223	26.03.2013 1347 hrs	27.03.2013 1451 hrs	6	12	--	--	2,050	2,050	1.23

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

THE ODOUR UNIT PTY LIMITED

Accreditation Number: 14974

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20130327_029	50,000	$20 \leq \chi \leq 80$	912	55	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

Note This report shall not be reproduced, except in full, without written approval of The Odour Unit Pty Ltd. Any attachments to this Report are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd.

END OF DOCUMENT

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NATA

Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Inghams Enterprises Pty Ltd	Telephone	(02) 9826 4525
Contact	Michael Parkinson	Facsimile	(02) 9600 9878
Sampling Site	Tahmoor Turkey Processing	Email	mparkinson@inghams.com.au
Sampling Method	Drum & Pump, IFH	Sampling Team	TOU (MA + JS)

Order details:

Order requested by	Urbis Pty Ltd	Order accepted by	MA
Date of order	10 May 2012	TOU Project #	N1800L
Order number	Michael Parkinson	Project Manager	MA
Signed by	Michael Parkinson	Testing operator	AS

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
Identification	The odour sample bags were labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification), sampling date and time, dilution ratio (if dilution was used) and whether further chemical analysis was required.
Method	The odour concentration measurements were performed using dynamic olfactometry according to the Australian Standard 'Determination of Odour Concentration by Dynamic Olfactometry AS/NZS4323.3:2001. The odour perception characteristics of the panel within the presentation series for the samples were analogous to that for butanol calibration. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V02
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V02: $r = 0.3158$ (June – November 2011) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V02: $A = 0.2165$ (June – November 2011) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
Traceability	The measurements have been performed using standards for which the traceability to the national standard has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Monday, 13 August 2012

Panel Roster Number: SYD20120802_051

J. Schulz
NSW Laboratory Coordinator

A. Schulz
Authorised Signatory

Odour Sample Measurement Results
Panel Roster Number: SYD20120802_051

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
Sample 1 – Bird Receival Area (Downwind Truck)	SC12321	01/08/2012 1130hrs	02/08/2012 1121hrs	4	8	-	-	91	91	N/A
Sample 6 – Offal / Feather Bin Collection Area	SC12326	01/08/2012 1315hrs	02/08/2012 1434hrs	4	8	-	-	181	181	N/A
Sample 7 – Killing Room (Ambient)	SC12320	01/08/2012 1350hrs	02/08/2012 1017hrs	4	8	-	-	83	83	N/A

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20120802_051	49,900	$20 \leq \chi \leq 80$	724	69	Yes

Comments: Results Sheet Part 1 of 2.

Disclaimer: Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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APPENDIX B: ODOUR EMISSIONS INVENTORY (AUSPLUME DATA INPUT)

Ingham Tahmoor Turkey Processing Facility

Scenario 3 - As measured 26/03/2013

Point sources															
Source Description	**Source ID**	**X Coordinates**	**Y Coordinates**	**Elevation (m)**	**Height (m)**	**Diameter (m)**	**Temperature (^{0}C)**	**Exit Velocity (m/s)**	**Cross-Sectional Area (m^2)**	**Odour Concentration (ou)**	**Odour Emission Rate ($ou.m^3/s$)**	**Peak Total Odour Emission Rate P/M60 2.5 ($ou.m^3/s$)**	**Peak Total Odour Emission Rate P/M60 2.3 ($ou.m^3/s$)**	**Peak Total Odour Emission Rate P/M60 1.9 ($ou.m^3/s$)**	**Comments**
Scald Tank Area	Vent 7	278282	6209770	0	5.5	0.6	0	0	0.28	222	753	N/A	1,732	N/A	Ingham Murarrie Processing Plant Roof Vents. 10% OER during non-processing.
Scald Tank Area	Vent 8	278284	6209763	0	5.5	0.6	0	0	0.28	222	753	N/A	1,732	N/A	Ingham Murarrie Processing Plant Roof Vents. 10% OER during non-processing.
Scald Tank Area	Vent 10	278285	6209769	0	5.6	0.5	0	0	0.20	222	523	N/A	1,203	N/A	Ingham Murarrie Processing Plant Roof Vents. 10% OER during non-processing.
Scald Tank Area	Vent 11	278287	6209771	0	5.1	0.6	0	0	0.28	222	753	N/A	1,732	N/A	OER during non-processing.
Scald Tank Area	Vent 12	278289	6209766	0	5.9	0.6	0	0	0.28	222	753	N/A	1,732	N/A	OER during non-processing.
Kill/Bleed Room	Vent 9	278293	6209759	0	5.5	0.6	0	0	0.28	83	282	N/A	648	N/A	OER during non-processing.
Bird Receival Area	Vent 13	278290	6209751	0	5.5	0.9	0	12	0.64	N/A	696	N/A	1,601	N/A	Hours 4 - 15. Calculated on 1 truck per hour
Bird Receival Area	Vent 14	278291	6209748	0	5.5	0.9	0	12	0.64	N/A	696	N/A	1,601	N/A	Hours 4 - 15. Calculated on 1 truck per hour

Area sources															
Source Description	**Source ID**	**X Coordinates**	**Y Coordinates**	**Initial Vertical Spead (m)**	**Height (m)**	**X-side length (m)**	**Y-side length (m)**	**Angle (degrees)**	**Surface Area (m^2)**	**Specific Odour Emission Rate ($ou.m^3/m^2/s$)**	**Odour Emission Rate ($ou.m^3/s$)**	**Peak Specific Odour Emission Rate P/M60 2.5 ($ou.m^3/m^2/s$)**	**Peak Specific Odour Emission Rate P/M60 2.3 ($ou.m^3/m^2/s$)**	**Peak Specific Odour Emission Rate P/M60 1.9 ($ou.m^3/m^2/s$)**	**Comments**
Anaerobic Pond 1	Pond 1	278468	6209742	1	0	20	70	-18	1,400	1.27	1,778	3.18	2.92	2.41	
Anaerobic Pond 2	Pond 2	278491	6209751	1	0	20	70	-18	1,400	0.29	406	0.73	0.67	0.55	
Aerobic Pond 3	Pond 3	278472	6209718												
		278516	6209728												
		278527	6209700												
		278506	6209640												
		278454	6209656	1	0	N/A	N/A	N/A	4,275	0.17	727	0.43	0.39	0.32	
Aerobic Pond 4	Pond 4	278451	6209649												
		278501	6209635												
		278489	6209596												
		278463	6209570												
		278421	6209607	1	0	N/A	N/A	N/A	4,800	0.07	336	0.18	0.16	0.13	
Aerobic Pond 5	Pond 5	278370	6209556	1	0	60	65	45	3,900	0.06	234	0.15	0.14	0.11	Geometric mean of Ponds 4 & 6.
Irrigation Pond 6	Pond 6	278407	6209701	1	0	25	25	23	625	0.05	31	0.13	0.12	0.10	

Volume sources															
Source Description	**Source ID**	**X Coordinates**	**Y Coordinates**	**Horizontal Spread (m)**	**Vertical Spread (m)**	**Height (m)**					**Odour Emission Rate ($ou.m^3/s$)**	**Peak Total Odour Emission Rate P/M60 2.5 ($ou.m^3/s$)**	**Peak Total Odour Emission Rate P/M60 2.3 ($ou.m^3/s$)**	**Peak Total Odour Emission Rate P/M60 1.9 ($ou.m^3/s$)**	**Comments**
Bird Holding Area	BHA	278362	6209763	5.5	1	2.2					1,391	N/A	3,199	N/A	Hours 5 - 14. Calculated on 1 truck per hour

APPENDIX C: AUSPLUME TEXT OUTPUT FILE

N1800 Inghams Tahmoor

Concentration or deposition	Concentration
Emission rate units	OUV/second
Concentration units	Odour_Units
Units conversion factor	1.00E+00
Constant background concentration	0.00E+00
Terrain effects	None
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Roughness height at the wind vane site	0.450 m
Use the convective PDF algorithm?	No
Averaging time for sigma-theta values	60 min.

DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Sigma-theta
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.600m
Adjustment for wind directional shear	None

PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	PRIME method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients
given by the hourly met. file, a value from the following table
(in K/m) is used:

Wind Speed Category	Stability Class A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES
Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIMES
1 hour

N1800 Inghams Tahmoor

SOURCE GROUPS

Group No.	Members
1	VENT7 VENT8 VENT10 VENT11 VENT12 VENT9 VENT13 VENT14 POND1 POND2 POND3 POND4 POND5 POND6 BHA
2	VENT7 VENT8 VENT10 VENT11 VENT12 VENT9
3	VENT13 VENT14
4	BHA
5	POND1 POND2 POND3 POND4 POND5 POND6

1

N1800 Inghams Tahmoor

SOURCE CHARACTERISTICS

STACK SOURCE: VENT7

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278282	6209770	0m	6m	0.60m	0C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	138	137	132	123	110	94	74	77	82	86	99	112
Along-flow distance from stack	-34	-34	-32	-30	-27	-23	-18	-31	-46	-60	-72	-82
Across-flow distance from stack	17	22	26	29	31	32	32	33	35	36	36	34

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	123	110	94	75	78	82	86	99	112	121	126	128
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	121	126	128	125	128	135	138	138	132	123	110	94
Along-flow distance from stack	-89	-94	-96	-95	-97	-102	-105	-104	-100	-93	-84	-71
Across-flow distance from stack	32	28	24	19	8	-5	-17	-22	-26	-29	-31	-32

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	125	128	135	139	137	132	123	110	94	74	78	82
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	74	78	82	86	99	112	121	126	128	125	128	135
Along-flow distance from stack	-57	-47	-36	-26	-27	-30	-31	-32	-32	-30	-32	-33
Across-flow distance from stack	-32	-33	-35	-35	-35	-34	-32	-28	-24	-19	-8	5

Emission rates by hour of day in OUV/second:

1	1.73E+02	2	1.73E+02	3	1.73E+02	4	1.73E+02
5	1.73E+02	6	1.73E+03	7	1.73E+03	8	1.73E+03
9	1.73E+03	10	1.73E+03	11	1.73E+03	12	1.73E+03
13	1.73E+03	14	1.73E+03	15	1.73E+03	16	1.73E+02
17	1.73E+02	18	1.73E+02	19	1.73E+02	20	1.73E+02
21	1.73E+02	22	1.73E+02	23	1.73E+02	24	1.73E+02

No gravitational settling or scavenging.

STACK SOURCE: VENT8

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278284	6209763	0m	6m	0.60m	0C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	138	137	132	123	110	94	74	77	82	86	99	112
Along-flow distance from stack	-27	-28	-27	-26	-24	-21	-17	-32	-48	-63	-76	-87
Across-flow distance from stack	20	27	31	35	38	39	40	40	42	42	41	39

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	123	110	94	75	78	82	86	99	112	121	126	128
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	121	126	128	125	128	135	138	138	132	123	110	94
Along-flow distance from stack	-95	-101	-103	-102	-104	-109	-111	-110	-105	-97	-86	-73
Across-flow distance from stack	36	31	26	20	7	-7	-20	-27	-31	-35	-38	-39

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	125	128	135	139	137	132	123	110	94	74	78	82
Effective building height	5	5	5	5	5	5	5	5	5	5		

5	5										
Along-flow building length	74	78	82	86	99	112	121	126	128	125	128	135
Along-flow distance from stack	-57	-46	-34	-23	-23	-25	-25	-26	-25	-23	-24	-26
Across-flow distance from stack	-40	-40	-42	-42	-41	-39	-36	-31	-26	-20	-7	7

Emission rates by hour of day in OUV/second:

1	1.73E+02	2	1.73E+02	3	1.73E+02	4	1.73E+02
5	1.73E+02	6	1.73E+03	7	1.73E+03	8	1.73E+03
9	1.73E+03	10	1.73E+03	11	1.73E+03	12	1.73E+03
13	1.73E+03	14	1.73E+03	15	1.73E+03	16	1.73E+02
17	1.73E+02	18	1.73E+02	19	1.73E+02	20	1.73E+02
21	1.73E+02	22	1.73E+02	23	1.73E+02	24	1.73E+02

No gravitational settling or scavenging.

STACK SOURCE: VENT10

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278285	6209769	0m	6m	0.50m	0C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	138	137	132	123	110	94	74	77	82	86	99	112
Along-flow distance from stack	-34	-34	-33	-31	-29	-25	-20	-34	-49	-63	-75	-85
Across-flow distance from stack	20	26	29	32	34	35	34	34	36	36	35	33

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	123	110	94	75	78	82	86	99	112	121	126	128
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	121	126	128	125	128	135	138	138	132	123	110	94
Along-flow distance from stack	-92	-97	-98	-97	-98	-103	-105	-104	-99	-92	-82	-69
Across-flow distance from stack	31	27	22	17	5	-8	-20	-25	-29	-32	-34	-35

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	125	128	135	139	137	132	123	110	94	74	78	82
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	74	78	82	86	99	112	121	126	128	125	128	135
Along-flow distance from stack	-54	-44	-33	-23	-24	-27	-28	-29	-29	-29	-30	-32
Across-flow distance from stack	-34	-34	-36	-36	-35	-34	-30	-27	-22	-17		

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Emission rates by hour of day in OUV/second:

1	1.20E+02	2	1.20E+02	3	1.20E+02	4	1.20E+02
5	1.20E+02	6	1.20E+03	7	1.20E+03	8	1.20E+03
9	1.20E+03	10	1.20E+03	11	1.20E+03	12	1.20E+03
13	1.20E+03	14	1.20E+03	15	1.20E+03	16	1.20E+02
17	1.20E+02	18	1.20E+02	19	1.20E+02	20	1.20E+02
21	1.20E+02	22	1.20E+02	23	1.20E+02	24	1.20E+02

No gravitational settling or scavenging.

STACK SOURCE: VENT11

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278287	6209771	0m	5m	0.60m	0C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	138	137	132	123	110	94	74	77	82	86	99	112
Along-flow distance from stack	-36	-36	-35	-34	-32	-27	-23	-36	-51	-65	-76	-86
Across-flow distance from stack	22	27	30	32	34	34	33	32	34	34	33	31

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	123	110	94	75	78	82	86	99	112	121	126	128
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	121	126	128	125	128	135	138	138	132	123	110	94
Along-flow distance from stack	-92	-97	-98	-96	-97	-101	-103	-101	-97	-89	-79	-66
Across-flow distance from stack	28	24	20	14	3	-10	-22	-27	-30	-32	-33	-34

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	125	128	135	139	137	132	123	110	94	74	78	82
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	74	78	82	86	99	112	121	126	128	125	128	135
Along-flow distance from stack	-52	-42	-31	-22	-23	-26	-28	-30	-30	-30	-32	-34
Across-flow distance from stack	-33	-32	-34	-33	-33	-31	-28	-24	-19	-14	-3	10

Emission rates by hour of day in OUV/second:

1	1.73E+02	2	1.73E+02	3	1.73E+02	4	1.73E+02
5	1.73E+02	6	1.73E+03	7	1.73E+03	8	1.73E+03

9	1.73E+03	10	1.73E+03	11	1.73E+03	12	1.73E+03
13	1.73E+03	14	1.73E+03	15	1.73E+03	16	1.73E+02
17	1.73E+02	18	1.73E+02	19	1.73E+02	20	1.73E+02
21	1.73E+02	22	1.73E+02	23	1.73E+02	24	1.73E+02

No gravitational settling or scavenging.

STACK SOURCE: VENT12

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278289	6209766	0m	6m	0.60m	0C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	138	137	132	123	110	94	74	77	82	86	99	112
Along-flow distance from stack	-31	-32	-32	-31	-30	-27	-23	-37	-53	-67	-80	-90
Across-flow distance from stack	24	30	34	37	39	39	39	38	39	38	37	34

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	123	110	94	75	78	82	86	99	112	121	126	128
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	121	126	128	125	128	135	138	138	132	123	110	94
Along-flow distance from stack	-97	-102	-103	-101	-102	-106	-107	-105	-100	-92	-81	-67
Across-flow distance from stack	30	25	20	14	2	-12	-24	-30	-34	-37	-39	-39

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	125	128	135	139	137	132	123	110	94	74	78	82
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	74	78	82	86	99	112	121	126	128	125	128	135
Along-flow distance from stack	-51	-41	-29	-19	-19	-22	-24	-25	-25	-24	-27	-29
Across-flow distance from stack	-39	-38	-39	-38	-37	-34	-30	-25	-20	-14	-2	12

Emission rates by hour of day in OUV/second:

1	1.73E+02	2	1.73E+02	3	1.73E+02	4	1.73E+02
5	1.73E+02	6	1.73E+03	7	1.73E+03	8	1.73E+03
9	1.73E+03	10	1.73E+03	11	1.73E+03	12	1.73E+03
13	1.73E+03	14	1.73E+03	15	1.73E+03	16	1.73E+02
17	1.73E+02	18	1.73E+02	19	1.73E+02	20	1.73E+02
21	1.73E+02	22	1.73E+02	23	1.73E+02	24	1.73E+02

No gravitational settling or scavenging.

STACK SOURCE: VENT9

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278293	6209759	0m	6m	0.60m	0C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	138	137	132	123	110	94	74	77	82	86	99	112
Along-flow distance from stack	-25	-27	-28	-29	-28	-27	-25	-40	-57	-73	-86	-97
Across-flow distance from stack	30	36	41	45	47	47	47	45	46	44	42	38

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	123	110	94	75	78	82	86	99	112	121	126	128
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	121	126	128	125	128	135	138	138	132	123	110	94
Along-flow distance from stack	-105	-110	-111	-109	-110	-113	-114	-111	-104	-95	-82	-67
Across-flow distance from stack	33	27	20	13	-1	-16	-30	-36	-41	-44	-47	-47

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	125	128	135	139	137	132	123	110	94	74	78	82
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	74	78	82	86	99	112	121	126	128	125	128	135
Along-flow distance from stack	-50	-38	-25	-14	-13	-15	-16	-17	-17	-16	-19	-22
Across-flow distance from stack	-47	-45	-46	-44	-42	-38	-33	-27	-20	-13	1	16

Emission rates by hour of day in OUV/second:

1	6.50E+01	2	6.50E+01	3	6.50E+01	4	6.50E+01
5	6.50E+01	6	6.48E+02	7	6.48E+02	8	6.48E+02
9	6.48E+02	10	6.48E+02	11	6.48E+02	12	6.48E+02
13	6.48E+02	14	6.48E+02	15	6.48E+02	16	6.50E+01
17	6.50E+01	18	6.50E+01	19	6.50E+01	20	6.50E+01
21	6.50E+01	22	6.50E+01	23	6.50E+01	24	6.50E+01

No gravitational settling or scavenging.

STACK SOURCE: VENT13

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278290	6209751	0m	6m	0.90m	0C	12.0m/s

_____ Effective building dimensions (in metres) _____

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	138	137	132	123	110	94	74	77	82	86	99	112
Along-flow distance from stack	-17	-19	-20	-20	-21	-20	-19	-35	-54	-71	-86	-98
Across-flow distance from stack	28	36	42	47	51	53	53	53	54	53	51	46

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	123	110	94	75	78	82	86	99	112	121	126	128
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	121	126	128	125	128	135	138	138	132	123	110	94
Along-flow distance from stack	-108	-114	-116	-115	-117	-121	-122	-119	-112	-103	-90	-74
Across-flow distance from stack	41	34	27	18	4	-13	-28	-36	-43	-47	-51	-53

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	125	128	135	139	137	132	123	110	94	74	78	82
Effective building height	5	5	5	5	5	5	5	5	5	5	5	5
Along-flow building length	74	78	82	86	99	112	121	126	128	125	128	135
Along-flow distance from stack	-56	-42	-28	-15	-13	-14	-13	-12	-11	-10	-12	-14
Across-flow distance from stack	-53	-53	-54	-53	-51	-47	-41	-34	-27	-18	-4	13

Emission rates by hour of day in OUV/second:

1	0.00E+00	2	0.00E+00	3	0.00E+00	4	1.60E+03
5	1.60E+03	6	1.60E+03	7	1.60E+03	8	1.60E+03
9	1.60E+03	10	1.60E+03	11	1.60E+03	12	1.60E+03
13	1.60E+03	14	1.60E+03	15	1.60E+03	16	0.00E+00
17	0.00E+00	18	0.00E+00	19	0.00E+00	20	0.00E+00
21	0.00E+00	22	0.00E+00	23	0.00E+00	24	0.00E+00

No gravitational settling or scavenging.

STACK SOURCE: VENT14

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
278291	6209748	0m	6m	0.90m	0C	12.0m/s

_____ Effective building dimensions (in metres) _____

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	86	99	112	121	126	128	125	128	135	138	137	132

Effective building height	5	5	5	5	5	5	5	5	5	5
5	5									
Along-flow building length	138	137	132	123	110	94	74	77	82	86
99	112									
Along-flow distance from stack	-14	-16	-18	-19	-20	-19	-19	-36	-55	-73
-88	-101									
Across-flow distance from stack	29	38	45	50	54	56	56	56	57	56
53	49									

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°
230°	240°									
Effective building width	123	110	94	75	78	82	86	99	112	121
126	128									
Effective building height	5	5	5	5	5	5	5	5	5	5
5	5									
Along-flow building length	121	126	128	125	128	135	138	138	132	123
110	94									
Along-flow distance from stack	-110	-117	-120	-119	-120	-124	-125	-122	-115	-104
-91	-74									
Across-flow distance from stack	43	35	28	18	3	-14	-29	-38	-45	-50
-54	-56									

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°
350°	360°									
Effective building width	125	128	135	139	137	132	123	110	94	74
78	82									
Effective building height	5	5	5	5	5	5	5	5	5	5
5	5									
Along-flow building length	74	78	82	86	99	112	121	126	128	125
128	135									
Along-flow distance from stack	-56	-42	-27	-14	-11	-11	-10	-10	-8	-7
-8	-11									
Across-flow distance from stack	-56	-56	-57	-55	-53	-49	-43	-36	-28	-18
-3	14									

Emission rates by hour of day in OUV/second:

1	0.00E+00	2	0.00E+00	3	0.00E+00	4	1.60E+03
5	1.60E+03	6	1.60E+03	7	1.60E+03	8	1.60E+03
9	1.60E+03	10	1.60E+03	11	1.60E+03	12	1.60E+03
13	1.60E+03	14	1.60E+03	15	1.60E+03	16	0.00E+00
17	0.00E+00	18	0.00E+00	19	0.00E+00	20	0.00E+00
21	0.00E+00	22	0.00E+00	23	0.00E+00	24	0.00E+00

No gravitational settling or scavenging.

INTEGRATED AREA SOURCE: POND1

X0(m)	Y0(m)	Ground El	Length X	Length Y	Or. Angle	Ver. spread	Height
278468	6209742	0m	20m	70m	-18deg	1m	0m

Emission rates by stability and wind speed, in OUV/second per square metre:

Wind speeds (m/s):	< 1.5	1.5_ 3.1	3.1_ 5.1	5.1_ 8.2	8.2_10.8	>10.8
Stability A:	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
Stability B:	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
Stability C:	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
Stability D:	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00	3.18E+00
Stability E:	2.92E+00	2.92E+00	2.92E+00	2.92E+00	2.92E+00	2.92E+00
Stability F:	2.92E+00	2.92E+00	2.92E+00	2.92E+00	2.92E+00	2.92E+00

No gravitational settling or scavenging.

INTEGRATED AREA SOURCE: POND2

X0(m)	Y0(m)	Ground El	Length X	Length Y	Or. Angle	Ver. spread	Height
278491	6209751	0m	20m	70m	-18deg	1m	0m

Emission rates by stability and wind speed, in OUV/second per square metre:

Wind speeds (m/s):	< 1.5	1.5_ 3.1	3.1_ 5.1	5.1_ 8.2	8.2_10.8	>10.8
Stability A:	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01
Stability B:	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01
Stability C:	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01
Stability D:	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01	7.30E-01
Stability E:	6.70E-01	6.70E-01	6.70E-01	6.70E-01	6.70E-01	6.70E-01
Stability F:	6.70E-01	6.70E-01	6.70E-01	6.70E-01	6.70E-01	6.70E-01

No gravitational settling or scavenging.

INTEGRATED POLYGON AREA SOURCE: POND3

X0(m)	Y0(m)	Ground El	No. Vertices	Ver. spread	Height
278472	6209718	0m	5	1m	0m

Integrated Polygon Area Source Vertice Locations (in metres)

No.	X	Y	No.	X	Y
1	278472	6209718	2	278516	6209728
3	278527	6209700	4	278506	6209640
5	278454	6209656			

Emission rates by stability and wind speed, in OUV/second per square metre:

Wind speeds (m/s):	< 1.5	1.5_ 3.1	3.1_ 5.1	5.1_ 8.2	8.2_10.8	>10.8
Stability A:	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01
Stability B:	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01
Stability C:	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01
Stability D:	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01
Stability E:	3.90E-01	3.90E-01	3.90E-01	3.90E-01	3.90E-01	3.90E-01
Stability F:	3.90E-01	3.90E-01	3.90E-01	3.90E-01	3.90E-01	3.90E-01

No gravitational settling or scavenging.

INTEGRATED POLYGON AREA SOURCE: POND4

X0(m)	Y0(m)	Ground El	No. Vertices	Ver. spread	Height
278451	6209649	0m	5	1m	0m

Integrated Polygon Area Source Vertice Locations (in metres)

No.	X	Y	No.	X	Y
1	278451	6209649	2	278501	6209635
3	278489	6209596	4	278463	6209570
5	278421	6209607			

Emission rates by stability and wind speed, in OUV/second per square metre:

Wind speeds (m/s):	< 1.5	1.5_ 3.1	3.1_ 5.1	5.1_ 8.2	8.2_10.8	>10.8
Stability A:	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01

Stability B:	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01
Stability C:	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01
Stability D:	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01	1.80E-01
Stability E:	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01
Stability F:	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01	1.60E-01

No gravitational settling or scavenging.

INTEGRATED AREA SOURCE: POND5

X0(m)	Y0(m)	Ground El	Length X	Length Y	Or. Angle	Ver. spread	Height
278370	6209556	0m	60m	65m	45deg	1m	0m

Emission rates by stability and wind speed, in OUV/second per square metre:

Wind speeds (m/s):	< 1.5	1.5_ 3.1	3.1_ 5.1	5.1_ 8.2	8.2_10.8	>10.8
Stability A:	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Stability B:	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Stability C:	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Stability D:	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Stability E:	1.40E-01	1.40E-01	1.40E-01	1.40E-01	1.40E-01	1.40E-01
Stability F:	1.40E-01	1.40E-01	1.40E-01	1.40E-01	1.40E-01	1.40E-01

No gravitational settling or scavenging.

INTEGRATED AREA SOURCE: POND6

X0(m)	Y0(m)	Ground El	Length X	Length Y	Or. Angle	Ver. spread	Height
278407	6209701	0m	25m	25m	23deg	1m	0m

Emission rates by stability and wind speed, in OUV/second per square metre:

Wind speeds (m/s):	< 1.5	1.5_ 3.1	3.1_ 5.1	5.1_ 8.2	8.2_10.8	>10.8
Stability A:	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01
Stability B:	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01
Stability C:	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01
Stability D:	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01	1.30E-01
Stability E:	1.20E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01
Stability F:	1.20E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01

No gravitational settling or scavenging.

VOLUME SOURCE: BHA

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
278362	6209763	0m	2m	6m	1m

Emission rates by hour of day in OUV/second:

1	0.00E+00	2	0.00E+00	3	0.00E+00	4	0.00E+00
5	3.20E+03	6	3.20E+03	7	3.20E+03	8	3.20E+03
9	3.20E+03	10	3.20E+03	11	3.20E+03	12	3.20E+03
13	3.20E+03	14	3.20E+03	15	0.00E+00	16	0.00E+00
17	0.00E+00	18	0.00E+00	19	0.00E+00	20	0.00E+00
21	0.00E+00	22	0.00E+00	23	0.00E+00	24	0.00E+00

No gravitational settling or scavenging.

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N1800 Inghams Tahmoor

RECEPTOR LOCATIONS

The Cartesian receptor grid has the following x-values (or eastings):
275700.m 275800.m 275900.m 276000.m 276100.m 276200.m 276300.m
276400.m 276500.m 276600.m 276700.m 276800.m 276900.m 277000.m
277100.m 277200.m 277300.m 277400.m 277500.m 277600.m 277700.m
277800.m 277900.m 278000.m 278100.m 278200.m 278300.m 278400.m
278500.m 278600.m 278700.m 278800.m 278900.m 279000.m 279100.m
279200.m 279300.m 279400.m 279500.m 279600.m 279700.m 279800.m
279900.m 280000.m 280100.m 280200.m 280300.m 280400.m 280500.m
280600.m 280700.m 280800.m 280900.m

and these y-values (or northings):
6208200.m 6208300.m 6208400.m 6208500.m 6208600.m 6208700.m 6208800.m
6208900.m 6209000.m 6209100.m 6209200.m 6209300.m 6209400.m 6209500.m
6209600.m 6209700.m 6209800.m 6209900.m 6210000.m 6210100.m 6210200.m
6210300.m 6210400.m 6210500.m 6210600.m 6210700.m 6210800.m 6210900.m
6211000.m 6211100.m 6211200.m 6211300.m

DISCRETE RECEPTOR LOCATIONS (in metres)

No.	X	Y	ELEVN	HEIGHT	No.	X	Y	ELEVN	HEIGHT
1	278965	6209858	0.0	0.0	2	279116	6209574	0.0	0.0

METEOROLOGICAL DATA : Xstrata Tahmoor Colliery 2007 Surface Roughness est
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1 Peak values for the 100 worst cases (in Odour_Units)
Averaging time = 1 hour; Source group No. 1

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	1.06E+02	06,09/08/07	(278500, 6209800, 0.0)
2	9.91E+01	07,16/05/07	(278500, 6209800, 0.0)
3	9.91E+01	06,18/02/07	(278500, 6209800, 0.0)
4	9.78E+01	06,13/05/07	(278500, 6209800, 0.0)
5	9.78E+01	07,13/05/07	(278500, 6209800, 0.0)
6	9.78E+01	06,14/05/07	(278500, 6209800, 0.0)
7	9.78E+01	06,12/10/07	(278500, 6209800, 0.0)
8	9.12E+01	05,13/05/07	(278500, 6209800, 0.0)
9	9.08E+01	07,27/08/07	(278500, 6209800, 0.0)
10	9.08E+01	06,18/06/07	(278500, 6209800, 0.0)
11	9.06E+01	05,22/06/07	(278500, 6209800, 0.0)
12	9.00E+01	05,05/04/07	(278500, 6209800, 0.0)
13	9.00E+01	06,16/01/08	(278500, 6209800, 0.0)
14	8.76E+01	05,04/06/07	(278500, 6209800, 0.0)
15	8.57E+01	05,16/01/08	(278500, 6209800, 0.0)
16	8.49E+01	07,05/04/07	(278500, 6209800, 0.0)
17	8.48E+01	05,03/04/07	(278500, 6209800, 0.0)

18	8.30E+01	06,26/08/07	(278500, 6209800, 0.0)
19	8.30E+01	05,26/08/07	(278500, 6209800, 0.0)
20	8.13E+01	06,09/05/07	(278500, 6209800, 0.0)
21	8.07E+01	06,24/07/07	(278500, 6209800, 0.0)
22	7.99E+01	06,21/03/07	(278500, 6209800, 0.0)
23	7.99E+01	05,04/03/07	(278500, 6209800, 0.0)
24	7.93E+01	06,24/09/07	(278500, 6209800, 0.0)
25	7.93E+01	06,19/03/07	(278500, 6209800, 0.0)
26	7.93E+01	05,19/03/07	(278500, 6209800, 0.0)
27	7.84E+01	06,19/02/07	(278500, 6209800, 0.0)
28	7.84E+01	04,11/03/07	(278500, 6209800, 0.0)
29	7.84E+01	01,15/02/07	(278500, 6209800, 0.0)
30	7.84E+01	24,04/04/07	(278500, 6209800, 0.0)
31	7.84E+01	03,05/04/07	(278500, 6209800, 0.0)
32	7.84E+01	01,13/05/07	(278500, 6209800, 0.0)
33	7.84E+01	01,27/08/07	(278500, 6209800, 0.0)
34	7.83E+01	06,27/07/07	(278500, 6209800, 0.0)
35	7.83E+01	04,20/03/07	(278500, 6209800, 0.0)
36	7.83E+01	07,14/04/07	(278500, 6209800, 0.0)
37	7.83E+01	03,19/04/07	(278500, 6209800, 0.0)
38	7.83E+01	04,19/04/07	(278500, 6209800, 0.0)
39	7.83E+01	02,09/05/07	(278500, 6209800, 0.0)
40	7.83E+01	04,27/01/08	(278500, 6209800, 0.0)
41	7.83E+01	05,27/01/08	(278500, 6209800, 0.0)
42	7.83E+01	03,28/05/07	(278500, 6209800, 0.0)
43	7.83E+01	23,22/07/07	(278500, 6209800, 0.0)
44	7.83E+01	23,31/07/07	(278500, 6209800, 0.0)
45	7.83E+01	24,16/09/07	(278500, 6209800, 0.0)
46	7.83E+01	22,27/10/07	(278500, 6209800, 0.0)
47	7.82E+01	05,27/04/07	(278500, 6209800, 0.0)
48	7.82E+01	03,11/03/07	(278500, 6209800, 0.0)
49	7.82E+01	03,16/03/07	(278500, 6209800, 0.0)
50	7.82E+01	02,04/06/07	(278500, 6209800, 0.0)
51	7.81E+01	05,12/05/07	(278500, 6209800, 0.0)
52	7.81E+01	05,31/08/07	(278500, 6209800, 0.0)
53	7.81E+01	02,23/03/07	(278500, 6209800, 0.0)
54	7.81E+01	02,20/04/07	(278500, 6209800, 0.0)
55	7.81E+01	02,04/07/07	(278500, 6209800, 0.0)
56	7.81E+01	02,24/08/07	(278500, 6209800, 0.0)
57	7.81E+01	22,19/04/07	(278500, 6209800, 0.0)
58	7.81E+01	03,13/05/07	(278500, 6209800, 0.0)
59	7.81E+01	19,16/05/07	(278500, 6209800, 0.0)
60	7.81E+01	03,27/05/07	(278500, 6209800, 0.0)
61	7.81E+01	04,27/05/07	(278500, 6209800, 0.0)
62	7.81E+01	04,04/06/07	(278500, 6209800, 0.0)
63	7.81E+01	22,05/10/07	(278500, 6209800, 0.0)
64	7.80E+01	05,12/11/07	(278500, 6209800, 0.0)
65	7.79E+01	23,16/05/07	(278500, 6209800, 0.0)
66	7.79E+01	05,24/09/07	(278500, 6209800, 0.0)
67	7.79E+01	05,22/10/07	(278500, 6209800, 0.0)
68	7.79E+01	04,08/03/07	(278500, 6209800, 0.0)
69	7.79E+01	05,11/03/07	(278500, 6209800, 0.0)
70	7.79E+01	02,28/03/07	(278500, 6209800, 0.0)
71	7.79E+01	05,15/04/07	(278500, 6209800, 0.0)
72	7.79E+01	22,18/04/07	(278500, 6209800, 0.0)
73	7.79E+01	24,19/04/07	(278500, 6209800, 0.0)
74	7.79E+01	22,16/05/07	(278500, 6209800, 0.0)
75	7.79E+01	02,31/07/07	(278500, 6209800, 0.0)
76	7.78E+01	04,04/03/07	(278500, 6209800, 0.0)
77	7.78E+01	04,14/05/07	(278500, 6209800, 0.0)
78	7.78E+01	01,15/05/07	(278500, 6209800, 0.0)
79	7.78E+01	01,02/06/07	(278500, 6209800, 0.0)
80	7.78E+01	19,25/07/07	(278500, 6209800, 0.0)

81	7.78E+01	21,04/10/07	(278500, 6209800, 0.0)
82	7.78E+01	07,08/05/07	(278500, 6209800, 0.0)
83	7.78E+01	07,14/05/07	(278500, 6209800, 0.0)
84	7.78E+01	05,16/05/07	(278500, 6209800, 0.0)
85	7.77E+01	05,28/08/07	(278500, 6209800, 0.0)
86	7.76E+01	04,15/04/07	(278500, 6209800, 0.0)
87	7.76E+01	20,24/06/07	(278500, 6209800, 0.0)
88	7.76E+01	03,02/10/07	(278500, 6209800, 0.0)
89	7.76E+01	06,12/04/07	(278500, 6209800, 0.0)
90	7.76E+01	05,26/07/07	(278500, 6209800, 0.0)
91	7.76E+01	06,17/05/07	(278500, 6209800, 0.0)
92	7.75E+01	07,10/04/07	(278500, 6209800, 0.0)
93	7.75E+01	06,21/04/07	(278500, 6209800, 0.0)
94	7.75E+01	23,13/05/07	(278500, 6209800, 0.0)
95	7.75E+01	07,21/05/07	(278500, 6209800, 0.0)
96	7.75E+01	02,30/07/07	(278500, 6209800, 0.0)
97	7.75E+01	06,05/04/07	(278500, 6209800, 0.0)
98	7.75E+01	05,18/04/07	(278500, 6209800, 0.0)
99	7.75E+01	06,28/05/07	(278500, 6209800, 0.0)
100	7.75E+01	07,28/05/07	(278500, 6209800, 0.0)

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1 Peak values for the 100 worst cases (in Odour_Units)
Averaging time = 1 hour; Source group No. 2

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	5.93E+01	10,01/03/07	(278200, 6209800, 0.0)
2	5.35E+01	09,28/02/07	(278200, 6209800, 0.0)
3	5.02E+01	10,25/10/07	(278200, 6209800, 0.0)
4	4.27E+01	12,22/11/07	(278200, 6209800, 0.0)
5	4.24E+01	09,08/02/07	(278200, 6209800, 0.0)
6	3.76E+01	06,02/09/07	(278300, 6209700, 0.0)
7	3.74E+01	06,22/05/07	(278300, 6209700, 0.0)
8	3.59E+01	10,06/09/07	(278200, 6209800, 0.0)
9	3.57E+01	07,16/05/07	(278400, 6209800, 0.0)
10	3.57E+01	06,18/02/07	(278400, 6209800, 0.0)
11	3.55E+01	06,13/05/07	(278400, 6209800, 0.0)
12	3.55E+01	07,13/05/07	(278400, 6209800, 0.0)
13	3.55E+01	06,14/05/07	(278400, 6209800, 0.0)
14	3.55E+01	06,12/10/07	(278400, 6209800, 0.0)
15	3.54E+01	10,16/02/07	(278200, 6209800, 0.0)
16	3.38E+01	06,03/03/07	(278300, 6209800, 0.0)
17	3.32E+01	06,03/12/07	(278300, 6209700, 0.0)
18	3.31E+01	07,27/08/07	(278400, 6209800, 0.0)
19	3.31E+01	06,18/06/07	(278400, 6209800, 0.0)
20	3.30E+01	06,15/05/07	(278300, 6209900, 0.0)
21	3.30E+01	07,15/05/07	(278300, 6209900, 0.0)
22	3.29E+01	06,20/01/08	(278300, 6209700, 0.0)
23	3.26E+01	07,21/12/07	(278300, 6209700, 0.0)
24	3.21E+01	08,24/03/07	(278300, 6209700, 0.0)
25	3.17E+01	06,06/02/07	(278300, 6209900, 0.0)
26	3.14E+01	07,09/12/07	(278300, 6209700, 0.0)
27	3.12E+01	06,16/01/08	(278400, 6209800, 0.0)
28	3.12E+01	06,11/01/08	(278300, 6209700, 0.0)
29	3.08E+01	10,06/05/07	(278300, 6209800, 0.0)
30	3.05E+01	06,01/06/07	(278300, 6209900, 0.0)
31	3.03E+01	08,16/11/07	(278300, 6209700, 0.0)
32	2.98E+01	06,18/03/07	(278300, 6209900, 0.0)
33	2.84E+01	07,02/05/07	(278300, 6209900, 0.0)

34	2.83E+01	06,27/12/07	(278300, 6209700, 0.0)
35	2.83E+01	06,02/01/08	(278300, 6209700, 0.0)
36	2.80E+01	14,18/05/07	(278300, 6209800, 0.0)
37	2.73E+01	06,09/08/07	(278400, 6209800, 0.0)
38	2.71E+01	07,27/12/07	(278300, 6209700, 0.0)
39	2.71E+01	08,06/02/07	(278300, 6209700, 0.0)
40	2.67E+01	08,25/11/07	(278300, 6209900, 0.0)
41	2.65E+01	10,27/12/07	(278300, 6209800, 0.0)
42	2.65E+01	11,28/04/07	(278200, 6209800, 0.0)
43	2.64E+01	08,27/02/07	(278400, 6209800, 0.0)
44	2.64E+01	09,07/08/07	(278400, 6209800, 0.0)
45	2.64E+01	06,19/02/07	(278400, 6209900, 0.0)
46	2.64E+01	07,18/03/07	(278400, 6209800, 0.0)
47	2.64E+01	07,11/10/07	(278400, 6209800, 0.0)
48	2.64E+01	09,03/03/07	(278300, 6209800, 0.0)
49	2.64E+01	11,29/03/07	(278300, 6209700, 0.0)
50	2.63E+01	07,14/04/07	(278400, 6209900, 0.0)
51	2.62E+01	06,07/10/07	(278400, 6209800, 0.0)
52	2.61E+01	07,28/04/07	(278200, 6209900, 0.0)
53	2.59E+01	12,16/08/07	(278300, 6209700, 0.0)
54	2.59E+01	08,04/06/07	(278400, 6209800, 0.0)
55	2.59E+01	07,24/09/07	(278400, 6209800, 0.0)
56	2.59E+01	10,02/04/07	(278300, 6209800, 0.0)
57	2.57E+01	06,23/07/07	(278300, 6209800, 0.0)
58	2.54E+01	07,04/11/07	(278300, 6209800, 0.0)
59	2.54E+01	08,28/08/07	(278300, 6209800, 0.0)
60	2.54E+01	08,31/08/07	(278300, 6209800, 0.0)
61	2.54E+01	07,16/04/07	(278300, 6209900, 0.0)
62	2.53E+01	10,09/05/07	(278300, 6209900, 0.0)
63	2.53E+01	07,01/12/07	(278300, 6209900, 0.0)
64	2.53E+01	13,08/05/07	(278300, 6209800, 0.0)
65	2.50E+01	09,07/11/07	(278300, 6209900, 0.0)
66	2.50E+01	07,03/03/07	(278400, 6209800, 0.0)
67	2.50E+01	07,06/01/08	(278400, 6209800, 0.0)
68	2.50E+01	07,24/12/07	(278400, 6209800, 0.0)
69	2.50E+01	09,25/08/07	(278400, 6209800, 0.0)
70	2.49E+01	10,31/10/07	(278200, 6209800, 0.0)
71	2.49E+01	11,01/06/07	(278300, 6209800, 0.0)
72	2.49E+01	08,29/01/08	(278300, 6209800, 0.0)
73	2.47E+01	09,31/01/08	(278300, 6209800, 0.0)
74	2.46E+01	09,24/09/07	(278300, 6209800, 0.0)
75	2.45E+01	11,27/07/07	(278300, 6209700, 0.0)
76	2.45E+01	09,15/01/08	(278300, 6209900, 0.0)
77	2.45E+01	08,22/10/07	(278300, 6209900, 0.0)
78	2.45E+01	08,15/01/08	(278300, 6209900, 0.0)
79	2.45E+01	09,26/09/07	(278300, 6209700, 0.0)
80	2.45E+01	10,27/05/07	(278300, 6209800, 0.0)
81	2.43E+01	09,19/03/07	(278300, 6209800, 0.0)
82	2.42E+01	08,16/01/08	(278300, 6209800, 0.0)
83	2.41E+01	06,17/08/07	(278400, 6209800, 0.0)
84	2.41E+01	06,22/03/07	(278400, 6209800, 0.0)
85	2.40E+01	12,20/08/07	(278200, 6209800, 0.0)
86	2.40E+01	10,29/05/07	(278300, 6209800, 0.0)
87	2.40E+01	08,09/12/07	(278300, 6209800, 0.0)
88	2.39E+01	10,12/05/07	(278300, 6209800, 0.0)
89	2.39E+01	09,02/10/07	(278200, 6209800, 0.0)
90	2.39E+01	06,21/09/07	(278300, 6209900, 0.0)
91	2.38E+01	07,16/02/07	(278400, 6209800, 0.0)
92	2.38E+01	07,21/11/07	(278400, 6209800, 0.0)
93	2.37E+01	08,04/01/08	(278200, 6209800, 0.0)
94	2.37E+01	08,21/09/07	(278300, 6209900, 0.0)
95	2.36E+01	14,26/03/07	(278200, 6209800, 0.0)
96	2.35E+01	07,31/08/07	(278200, 6210000, 0.0)

97	2.31E+01	15,16/12/07	(278300, 6209800, 0.0)
98	2.28E+01	07,20/12/07	(278200, 6209800, 0.0)
99	2.28E+01	09,22/10/07	(278200, 6209800, 0.0)
100	2.27E+01	09,16/11/07	(278300, 6209800, 0.0)

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1 Peak values for the 100 worst cases (in Odour_Units)
Averaging time = 1 hour; Source group No. 3

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	1.92E+00	05,05/02/08	(278200, 6209800, 0.0)
2	1.72E+00	09,03/01/08	(278200, 6209800, 0.0)
3	1.72E+00	15,21/03/07	(278200, 6209800, 0.0)
4	1.72E+00	15,18/01/08	(278200, 6209800, 0.0)
5	1.72E+00	06,15/05/07	(278300, 6209900, 0.0)
6	1.72E+00	07,15/05/07	(278300, 6209900, 0.0)
7	1.68E+00	11,27/02/07	(278200, 6209800, 0.0)
8	1.68E+00	05,07/02/07	(278300, 6209900, 0.0)
9	1.68E+00	11,26/03/07	(278200, 6209800, 0.0)
10	1.67E+00	11,08/10/07	(278200, 6209800, 0.0)
11	1.67E+00	05,01/03/07	(278300, 6209900, 0.0)
12	1.67E+00	05,22/02/07	(278300, 6209900, 0.0)
13	1.66E+00	11,18/12/07	(278200, 6209800, 0.0)
14	1.66E+00	04,28/08/07	(278300, 6209900, 0.0)
15	1.65E+00	05,09/11/07	(278200, 6209800, 0.0)
16	1.65E+00	11,05/09/07	(278200, 6209800, 0.0)
17	1.63E+00	11,31/10/07	(278200, 6209800, 0.0)
18	1.63E+00	14,05/06/07	(278200, 6209800, 0.0)
19	1.62E+00	11,09/09/07	(278200, 6209800, 0.0)
20	1.61E+00	15,24/11/07	(278200, 6209800, 0.0)
21	1.59E+00	12,07/11/07	(278200, 6209800, 0.0)
22	1.58E+00	14,30/07/07	(278200, 6209800, 0.0)
23	1.58E+00	10,18/01/08	(278200, 6209800, 0.0)
24	1.58E+00	12,05/06/07	(278200, 6209800, 0.0)
25	1.57E+00	12,24/11/07	(278200, 6209800, 0.0)
26	1.57E+00	04,27/07/07	(278300, 6209900, 0.0)
27	1.57E+00	14,24/11/07	(278200, 6209800, 0.0)
28	1.57E+00	15,26/03/07	(278200, 6209800, 0.0)
29	1.57E+00	14,22/11/07	(278200, 6209800, 0.0)
30	1.56E+00	13,05/06/07	(278200, 6209800, 0.0)
31	1.54E+00	11,01/09/07	(278200, 6209800, 0.0)
32	1.54E+00	04,01/10/07	(278300, 6209900, 0.0)
33	1.52E+00	06,12/02/07	(278200, 6209800, 0.0)
34	1.51E+00	10,12/03/07	(278200, 6209800, 0.0)
35	1.51E+00	06,12/03/07	(278200, 6209800, 0.0)
36	1.50E+00	08,12/03/07	(278200, 6209800, 0.0)
37	1.50E+00	05,24/02/07	(278300, 6209900, 0.0)
38	1.50E+00	15,05/12/07	(278200, 6209800, 0.0)
39	1.50E+00	11,15/08/07	(278200, 6209800, 0.0)
40	1.50E+00	11,18/11/07	(278200, 6209800, 0.0)
41	1.49E+00	08,04/01/08	(278200, 6209800, 0.0)
42	1.49E+00	04,02/08/07	(278300, 6209900, 0.0)
43	1.48E+00	06,01/06/07	(278300, 6209900, 0.0)
44	1.48E+00	09,12/10/07	(278200, 6209800, 0.0)
45	1.48E+00	15,16/01/08	(278200, 6209800, 0.0)
46	1.48E+00	14,20/04/07	(278200, 6209800, 0.0)
47	1.48E+00	04,13/09/07	(278400, 6209900, 0.0)
48	1.48E+00	07,16/04/07	(278300, 6209900, 0.0)
49	1.47E+00	10,09/01/08	(278200, 6209800, 0.0)

50	1.46E+00	07,25/08/07	(278400, 6209900, 0.0)
51	1.46E+00	12,18/08/07	(278200, 6209800, 0.0)
52	1.46E+00	11,03/09/07	(278200, 6209800, 0.0)
53	1.46E+00	06,24/08/07	(278400, 6209800, 0.0)
54	1.46E+00	08,23/06/07	(278400, 6209900, 0.0)
55	1.46E+00	12,16/04/07	(278200, 6209800, 0.0)
56	1.46E+00	11,16/04/07	(278200, 6209800, 0.0)
57	1.45E+00	04,22/02/07	(278300, 6209900, 0.0)
58	1.45E+00	06,27/05/07	(278400, 6209900, 0.0)
59	1.45E+00	06,31/05/07	(278400, 6209900, 0.0)
60	1.45E+00	05,27/07/07	(278400, 6209900, 0.0)
61	1.45E+00	15,20/04/07	(278200, 6209800, 0.0)
62	1.43E+00	04,25/10/07	(278200, 6209800, 0.0)
63	1.43E+00	05,09/04/07	(278400, 6209900, 0.0)
64	1.43E+00	04,18/04/07	(278400, 6209900, 0.0)
65	1.43E+00	06,14/03/07	(278400, 6209900, 0.0)
66	1.43E+00	05,29/11/07	(278400, 6209900, 0.0)
67	1.42E+00	07,02/05/07	(278300, 6209900, 0.0)
68	1.42E+00	05,12/08/07	(278400, 6209900, 0.0)
69	1.42E+00	07,12/04/07	(278400, 6209900, 0.0)
70	1.42E+00	06,25/08/07	(278400, 6209900, 0.0)
71	1.42E+00	04,07/06/07	(278400, 6209900, 0.0)
72	1.42E+00	04,04/04/07	(278400, 6209800, 0.0)
73	1.41E+00	11,25/12/07	(278200, 6209800, 0.0)
74	1.41E+00	06,22/07/07	(278400, 6209800, 0.0)
75	1.41E+00	11,12/12/07	(278200, 6209800, 0.0)
76	1.40E+00	04,07/07/07	(278300, 6209900, 0.0)
77	1.40E+00	11,08/09/07	(278200, 6209800, 0.0)
78	1.40E+00	13,09/02/07	(278200, 6209800, 0.0)
79	1.40E+00	05,11/11/07	(278400, 6209900, 0.0)
80	1.40E+00	05,26/05/07	(278400, 6209900, 0.0)
81	1.39E+00	07,29/03/07	(278400, 6209900, 0.0)
82	1.39E+00	06,10/03/07	(278400, 6209900, 0.0)
83	1.38E+00	04,29/03/07	(278400, 6209900, 0.0)
84	1.38E+00	15,12/12/07	(278200, 6209800, 0.0)
85	1.38E+00	05,15/05/07	(278400, 6210000, 0.0)
86	1.38E+00	04,16/09/07	(278300, 6209900, 0.0)
87	1.38E+00	07,31/08/07	(278200, 6210000, 0.0)
88	1.38E+00	04,18/08/07	(278400, 6209900, 0.0)
89	1.37E+00	11,18/01/08	(278200, 6209800, 0.0)
90	1.37E+00	06,28/03/07	(278400, 6209900, 0.0)
91	1.37E+00	05,19/04/07	(278400, 6209900, 0.0)
92	1.37E+00	04,28/03/07	(278400, 6209900, 0.0)
93	1.37E+00	04,05/02/08	(278200, 6209800, 0.0)
94	1.37E+00	06,19/08/07	(278300, 6209900, 0.0)
95	1.37E+00	07,18/04/07	(278400, 6209900, 0.0)
96	1.37E+00	04,15/11/07	(278300, 6209900, 0.0)
97	1.37E+00	04,26/06/07	(278300, 6209900, 0.0)
98	1.36E+00	06,26/07/07	(278400, 6209800, 0.0)
99	1.36E+00	13,24/06/07	(278200, 6209800, 0.0)
100	1.36E+00	05,15/10/07	(278400, 6209800, 0.0)

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1 Peak values for the 100 worst cases (in Odour_Units)
Averaging time = 1 hour; Source group No. 4

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	4.20E+01	05,24/09/07	(278400, 6209800, 0.0)
2	4.20E+01	05,22/10/07	(278400, 6209800, 0.0)

3	4.19E+01	05,12/11/07	(278400, 6209800, 0.0)
4	4.18E+01	05,28/08/07	(278400, 6209800, 0.0)
5	4.16E+01	05,12/05/07	(278400, 6209800, 0.0)
6	4.16E+01	05,31/08/07	(278400, 6209800, 0.0)
7	4.14E+01	06,12/04/07	(278400, 6209800, 0.0)
8	4.11E+01	05,27/04/07	(278400, 6209800, 0.0)
9	4.08E+01	06,05/04/07	(278400, 6209800, 0.0)
10	4.08E+01	05,18/04/07	(278400, 6209800, 0.0)
11	4.08E+01	06,19/04/07	(278400, 6209800, 0.0)
12	4.08E+01	07,21/04/07	(278400, 6209800, 0.0)
13	4.08E+01	07,26/04/07	(278400, 6209800, 0.0)
14	4.08E+01	07,09/05/07	(278400, 6209800, 0.0)
15	4.08E+01	06,28/05/07	(278400, 6209800, 0.0)
16	4.08E+01	07,28/05/07	(278400, 6209800, 0.0)
17	4.00E+01	07,01/05/07	(278400, 6209800, 0.0)
18	4.00E+01	06,11/06/07	(278400, 6209800, 0.0)
19	4.00E+01	05,14/10/07	(278400, 6209800, 0.0)
20	3.95E+01	06,19/02/07	(278400, 6209800, 0.0)
21	3.90E+01	05,18/06/07	(278400, 6209800, 0.0)
22	3.83E+01	07,14/04/07	(278400, 6209800, 0.0)
23	3.83E+01	05,27/01/08	(278400, 6209800, 0.0)
24	3.78E+01	05,08/08/07	(278400, 6209800, 0.0)
25	3.49E+01	06,17/05/07	(278400, 6209800, 0.0)
26	3.49E+01	05,26/07/07	(278400, 6209800, 0.0)
27	3.48E+01	07,08/04/07	(278400, 6209800, 0.0)
28	3.45E+01	05,15/02/07	(278400, 6209800, 0.0)
29	3.43E+01	05,27/05/07	(278400, 6209800, 0.0)
30	3.40E+01	05,11/03/07	(278400, 6209800, 0.0)
31	3.40E+01	05,15/04/07	(278400, 6209800, 0.0)
32	3.40E+01	05,10/03/07	(278400, 6209800, 0.0)
33	3.40E+01	05,28/05/07	(278400, 6209800, 0.0)
34	3.37E+01	06,03/10/07	(278400, 6209800, 0.0)
35	3.33E+01	06,29/03/07	(278400, 6209800, 0.0)
36	3.33E+01	07,22/06/07	(278400, 6209800, 0.0)
37	3.33E+01	08,22/06/07	(278400, 6209800, 0.0)
38	3.33E+01	07,08/05/07	(278400, 6209800, 0.0)
39	3.33E+01	07,14/05/07	(278400, 6209800, 0.0)
40	3.33E+01	05,16/05/07	(278400, 6209800, 0.0)
41	3.29E+01	05,13/11/07	(278400, 6209800, 0.0)
42	3.25E+01	06,11/03/07	(278400, 6209800, 0.0)
43	3.24E+01	07,10/04/07	(278400, 6209800, 0.0)
44	3.24E+01	06,21/04/07	(278400, 6209800, 0.0)
45	3.24E+01	07,21/05/07	(278400, 6209800, 0.0)
46	3.06E+01	06,05/10/07	(278400, 6209700, 0.0)
47	3.06E+01	07,25/08/07	(278400, 6209800, 0.0)
48	3.00E+01	06,08/05/07	(278400, 6209800, 0.0)
49	2.99E+01	05,04/10/07	(278400, 6209800, 0.0)
50	2.97E+01	06,27/07/07	(278400, 6209800, 0.0)
51	2.97E+01	05,03/06/07	(278400, 6209800, 0.0)
52	2.97E+01	07,29/08/07	(278400, 6209800, 0.0)
53	2.97E+01	07,18/04/07	(278400, 6209800, 0.0)
54	2.94E+01	05,17/05/07	(278400, 6209800, 0.0)
55	2.94E+01	05,20/09/07	(278400, 6209800, 0.0)
56	2.91E+01	05,14/09/07	(278400, 6209800, 0.0)
57	2.91E+01	07,19/04/07	(278400, 6209800, 0.0)
58	2.91E+01	07,17/08/07	(278400, 6209800, 0.0)
59	2.88E+01	05,19/09/07	(278400, 6209800, 0.0)
60	2.87E+01	07,29/03/07	(278400, 6209800, 0.0)
61	2.87E+01	06,27/05/07	(278400, 6209800, 0.0)
62	2.87E+01	06,31/05/07	(278400, 6209800, 0.0)
63	2.87E+01	08,23/06/07	(278400, 6209800, 0.0)
64	2.87E+01	05,27/07/07	(278400, 6209800, 0.0)
65	2.87E+01	06,25/08/07	(278400, 6209800, 0.0)

66	2.82E+01	06,11/04/07	(278400, 6209800, 0.0)
67	2.82E+01	07,16/08/07	(278400, 6209800, 0.0)
68	2.74E+01	05,24/06/07	(278400, 6209800, 0.0)
69	2.70E+01	06,10/03/07	(278400, 6209800, 0.0)
70	2.69E+01	05,26/05/07	(278400, 6209800, 0.0)
71	2.65E+01	06,17/02/07	(278400, 6209800, 0.0)
72	2.65E+01	06,07/03/07	(278400, 6209800, 0.0)
73	2.61E+01	05,22/03/07	(278400, 6209800, 0.0)
74	2.60E+01	05,09/02/07	(278400, 6209800, 0.0)
75	2.60E+01	05,27/10/07	(278400, 6209800, 0.0)
76	2.60E+01	05,19/12/07	(278400, 6209800, 0.0)
77	2.60E+01	06,06/05/07	(278400, 6209800, 0.0)
78	2.60E+01	06,16/08/07	(278400, 6209800, 0.0)
79	2.60E+01	05,19/03/07	(278400, 6209800, 0.0)
80	2.60E+01	06,19/03/07	(278400, 6209800, 0.0)
81	2.60E+01	06,24/09/07	(278400, 6209800, 0.0)
82	2.59E+01	07,23/08/07	(278400, 6209800, 0.0)
83	2.58E+01	07,22/03/07	(278400, 6209800, 0.0)
84	2.58E+01	05,16/11/07	(278400, 6209800, 0.0)
85	2.57E+01	05,30/10/07	(278400, 6209800, 0.0)
86	2.55E+01	06,04/04/07	(278400, 6209800, 0.0)
87	2.55E+01	07,01/08/07	(278400, 6209800, 0.0)
88	2.55E+01	05,11/11/07	(278400, 6209800, 0.0)
89	2.54E+01	07,17/05/07	(278400, 6209800, 0.0)
90	2.50E+01	06,12/09/07	(278300, 6209800, 0.0)
91	2.50E+01	05,09/05/07	(278400, 6209800, 0.0)
92	2.50E+01	06,03/06/07	(278400, 6209800, 0.0)
93	2.50E+01	05,21/07/07	(278400, 6209800, 0.0)
94	2.50E+01	06,12/05/07	(278400, 6209800, 0.0)
95	2.50E+01	06,01/10/07	(278400, 6209800, 0.0)
96	2.49E+01	07,07/05/07	(278400, 6209800, 0.0)
97	2.48E+01	06,27/01/08	(278400, 6209800, 0.0)
98	2.44E+01	05,08/03/07	(278400, 6209800, 0.0)
99	2.44E+01	05,09/01/08	(278400, 6209800, 0.0)
100	2.43E+01	05,14/12/07	(278400, 6209800, 0.0)

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1 Peak values for the 100 worst cases (in Odour_Units)
Averaging time = 1 hour; Source group No. 5

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	7.84E+01	01,15/02/07	(278500, 6209800, 0.0)
2	7.84E+01	06,19/02/07	(278500, 6209800, 0.0)
3	7.84E+01	04,11/03/07	(278500, 6209800, 0.0)
4	7.84E+01	24,04/04/07	(278500, 6209800, 0.0)
5	7.84E+01	03,05/04/07	(278500, 6209800, 0.0)
6	7.84E+01	01,13/05/07	(278500, 6209800, 0.0)
7	7.84E+01	01,27/08/07	(278500, 6209800, 0.0)
8	7.83E+01	04,20/03/07	(278500, 6209800, 0.0)
9	7.83E+01	07,14/04/07	(278500, 6209800, 0.0)
10	7.83E+01	03,19/04/07	(278500, 6209800, 0.0)
11	7.83E+01	04,19/04/07	(278500, 6209800, 0.0)
12	7.83E+01	02,09/05/07	(278500, 6209800, 0.0)
13	7.83E+01	04,27/01/08	(278500, 6209800, 0.0)
14	7.83E+01	05,27/01/08	(278500, 6209800, 0.0)
15	7.83E+01	03,28/05/07	(278500, 6209800, 0.0)
16	7.83E+01	23,22/07/07	(278500, 6209800, 0.0)
17	7.83E+01	23,31/07/07	(278500, 6209800, 0.0)
18	7.83E+01	24,16/09/07	(278500, 6209800, 0.0)

19	7.83E+01	22,27/10/07	(278500, 6209800, 0.0)
20	7.82E+01	03,11/03/07	(278500, 6209800, 0.0)
21	7.82E+01	03,16/03/07	(278500, 6209800, 0.0)
22	7.82E+01	05,27/04/07	(278500, 6209800, 0.0)
23	7.82E+01	02,04/06/07	(278500, 6209800, 0.0)
24	7.81E+01	02,23/03/07	(278500, 6209800, 0.0)
25	7.81E+01	02,20/04/07	(278500, 6209800, 0.0)
26	7.81E+01	05,12/05/07	(278500, 6209800, 0.0)
27	7.81E+01	02,04/07/07	(278500, 6209800, 0.0)
28	7.81E+01	02,24/08/07	(278500, 6209800, 0.0)
29	7.81E+01	05,31/08/07	(278500, 6209800, 0.0)
30	7.81E+01	22,19/04/07	(278500, 6209800, 0.0)
31	7.81E+01	03,13/05/07	(278500, 6209800, 0.0)
32	7.81E+01	19,16/05/07	(278500, 6209800, 0.0)
33	7.81E+01	03,27/05/07	(278500, 6209800, 0.0)
34	7.81E+01	04,27/05/07	(278500, 6209800, 0.0)
35	7.81E+01	04,04/06/07	(278500, 6209800, 0.0)
36	7.81E+01	22,05/10/07	(278500, 6209800, 0.0)
37	7.79E+01	23,16/05/07	(278500, 6209800, 0.0)
38	7.79E+01	05,12/11/07	(278500, 6209800, 0.0)
39	7.79E+01	04,08/03/07	(278500, 6209800, 0.0)
40	7.79E+01	05,11/03/07	(278500, 6209800, 0.0)
41	7.79E+01	02,28/03/07	(278500, 6209800, 0.0)
42	7.79E+01	05,15/04/07	(278500, 6209800, 0.0)
43	7.79E+01	22,18/04/07	(278500, 6209800, 0.0)
44	7.79E+01	24,19/04/07	(278500, 6209800, 0.0)
45	7.79E+01	22,16/05/07	(278500, 6209800, 0.0)
46	7.79E+01	02,31/07/07	(278500, 6209800, 0.0)
47	7.78E+01	04,04/03/07	(278500, 6209800, 0.0)
48	7.78E+01	04,14/05/07	(278500, 6209800, 0.0)
49	7.78E+01	01,15/05/07	(278500, 6209800, 0.0)
50	7.78E+01	01,02/06/07	(278500, 6209800, 0.0)
51	7.78E+01	19,25/07/07	(278500, 6209800, 0.0)
52	7.78E+01	05,24/09/07	(278500, 6209800, 0.0)
53	7.78E+01	21,04/10/07	(278500, 6209800, 0.0)
54	7.78E+01	05,22/10/07	(278500, 6209800, 0.0)
55	7.76E+01	04,15/04/07	(278500, 6209800, 0.0)
56	7.76E+01	20,24/06/07	(278500, 6209800, 0.0)
57	7.76E+01	05,28/08/07	(278500, 6209800, 0.0)
58	7.76E+01	03,02/10/07	(278500, 6209800, 0.0)
59	7.75E+01	07,10/04/07	(278500, 6209800, 0.0)
60	7.75E+01	06,21/04/07	(278500, 6209800, 0.0)
61	7.75E+01	23,13/05/07	(278500, 6209800, 0.0)
62	7.75E+01	07,21/05/07	(278500, 6209800, 0.0)
63	7.75E+01	02,30/07/07	(278500, 6209800, 0.0)
64	7.75E+01	23,16/03/07	(278500, 6209800, 0.0)
65	7.75E+01	06,12/04/07	(278500, 6209800, 0.0)
66	7.75E+01	04,12/05/07	(278500, 6209800, 0.0)
67	7.75E+01	21,23/07/07	(278500, 6209800, 0.0)
68	7.75E+01	04,24/07/07	(278500, 6209800, 0.0)
69	7.75E+01	01,12/10/07	(278500, 6209800, 0.0)
70	7.73E+01	02,29/03/07	(278500, 6209800, 0.0)
71	7.73E+01	06,05/04/07	(278500, 6209800, 0.0)
72	7.73E+01	05,18/04/07	(278500, 6209800, 0.0)
73	7.73E+01	06,19/04/07	(278500, 6209800, 0.0)
74	7.73E+01	07,21/04/07	(278500, 6209800, 0.0)
75	7.73E+01	07,26/04/07	(278500, 6209800, 0.0)
76	7.73E+01	07,09/05/07	(278500, 6209800, 0.0)
77	7.73E+01	20,23/05/07	(278500, 6209800, 0.0)
78	7.73E+01	06,28/05/07	(278500, 6209800, 0.0)
79	7.73E+01	07,28/05/07	(278500, 6209800, 0.0)
80	7.73E+01	02,06/06/07	(278500, 6209800, 0.0)
81	7.73E+01	01,16/07/07	(278500, 6209800, 0.0)

82	7.73E+01	02,24/07/07	(278500, 6209800, 0.0)
83	7.73E+01	22,29/07/07	(278500, 6209800, 0.0)
84	7.71E+01	02,03/04/07	(278500, 6209800, 0.0)
85	7.71E+01	24,13/05/07	(278500, 6209800, 0.0)
86	7.71E+01	23,21/05/07	(278500, 6209800, 0.0)
87	7.71E+01	07,25/08/07	(278500, 6209800, 0.0)
88	7.71E+01	04,13/09/07	(278500, 6209800, 0.0)
89	7.71E+01	24,14/02/07	(278500, 6209800, 0.0)
90	7.71E+01	07,01/05/07	(278500, 6209800, 0.0)
91	7.71E+01	06,11/06/07	(278500, 6209800, 0.0)
92	7.71E+01	24,09/09/07	(278500, 6209800, 0.0)
93	7.71E+01	05,14/10/07	(278500, 6209800, 0.0)
94	7.69E+01	04,05/04/07	(278500, 6209800, 0.0)
95	7.69E+01	05,18/06/07	(278500, 6209800, 0.0)
96	7.69E+01	20,12/09/07	(278500, 6209800, 0.0)
97	7.68E+01	23,28/04/07	(278500, 6209800, 0.0)
98	7.68E+01	01,02/05/07	(278500, 6209800, 0.0)
99	7.68E+01	21,06/05/07	(278500, 6209800, 0.0)
100	7.68E+01	05,08/08/07	(278500, 6209800, 0.0)