

Appendix C - Air Quality

Environmental Appraisal  
Volume II

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Air Emissions Inventory Base Option, Release Point: 1 'Powder Handling Booth Extract'

### Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Meas'ment Method	Operating Mode (if relevant)	Data relating to Long Term effects				Data relating to Short Term effects			
				Conc.	Release Rate	Meas'ment Basis	Conc.	Release Rate	Meas'ment Basis	Annual Rate	ELV Conc.
1	Particulates	Estimated*		1	0.0016	Annual average	1	0.0016	Hourly average	2.1	1

Measurement method: \* provide detail in comments box. Comments

Air Emissions Inventory Base Option, Release Point: 2 'Drying Oven Extract'

### Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Meas'ment Method	Operating Mode (if relevant)	Data relating to Long Term effects				Data relating to Short Term effects			
				Conc.	Release Rate	Meas'ment Basis	Conc.	Release Rate	Meas'ment Basis	Annual Rate	ELV Conc.
1	Butan-2-one	Estimated*		2.86	0.002	Annual Average	2.86	0.002	Short term average	0.064	

Measurement method: \* provide detail in comments box. Comments

### Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Operating Mode (if relevant)	Data relating to Long Term effects				Data relating to Short Term effects						
			Meas'ment Method	Conc.	Release Rate	Meas'ment Basis	Conc.	Release Rate	Meas'ment Basis	Annual Rate	ELV Conc.		
1	Hydrogen chloride	Estimated*	mg/m3	0.2016	0.00014	Annual average	mg/m3	0.2016	0.00014	Short term average	tonne/yr	0.0044	mg/m3
2	Parachloroxyliene	Estimated*	mg/m3	0.2016	0.00014	Annual average	mg/m3	0.2016	0.00014	Short term average	tonne/yr	0.0044	mg/m3

Measurement method: \* provide detail in comments box Comments

#### Air Impacts Base Option

### 3.3.1 Air Impacts

#### Calculate Process Contributions of Emissions to Air

This table estimates the Process Contribution (PC), calculated as the maximum ground level concentration for each emission listed in the inventory, according to the release point parameters input earlier. If you have more accurate data obtained through dispersion modelling, this may be entered as indicated and will be used instead of the estimated PC.

Number	Substance	Long Term			Short Term		
		EAL µg/m3	PC µg/m3	* Modelled PC µg/m3	EAL µg/m3	PC µg/m3	Modelled PC µg/m3
1	Particulates	40	0.0504		50	0.915	
1	Hydrogen chloride	20	0.0102		800	0.244	
1	Butan-2-one	6000	0.0630		89900	1.15	

Note that the Process Contribution shown for each substance is the sum of the individual process contributions of each point from which the substance is emitted. Process Contributions obtained from modelling data should incorporate all relevant release points and flow conditions.

\* State the location of any detailed air dispersion modelling and also the main assumptions. Comments

### 3.3.2 Air Impact Screening

Screen out Insignificant Emissions to Air

This page displays the Process Contribution as a proportion of the EAL or EOS. Emissions with PCs that are less than the criteria indicated may be screened from further assessment as they are likely to have an insignificant impact.

Number	Substance	Long Term		Short Term		Long Term		Short Term	
		EAL	µg/m3	EAL	µg/m3	PC	%	PC	%
1	Particulates	40.0	40.0	50.0	50.0	0.0504	0.126	0.915	1.83
1	Hydrogen chloride	20.0	20.0	800	800	0.0102	0.0509	0.244	0.0305
1	Butan-2-one	6,000	6,000	89,900	89,900	0.0630	0.00105	1.15	0.00128

> 1% of EAL?

%

µg/m3

EAL

µg/m3

PC

%

PC

%

> 10% of EAL?

No

No

No

No

No

No

No

No

No

No

## AIR QUALITY CRITERIA

**Table 10-B.1 - Nitrogen Dioxide**

Description	Criteria	Value $\mu\text{g}/\text{m}^3$	Target Date
EC Directive limit value	98 <sup>th</sup> percentile of hourly means	200	present day
EC Directive guide value	98 <sup>th</sup> percentile of hourly means	135	present day
EC Directive guide value	50 <sup>th</sup> percentile of hourly means	50	present day
EU Daughter Directive limit value	1 hour mean (not to be exceeded more than 18 times a year)	200	1 January 2010
EU Daughter Directive limit value	Annual mean	40	1 January 2010
AQS Objective	Annual mean	40	31 December 2005
AQS Objective	1 hour mean (not to be exceeded more than 18 times a year)	200	31 December 2005

**Table 10-B.2 - Carbon Monoxide**

Description	Criteria	Value $\text{mg}/\text{m}^3$	Target Date
EU Daughter Directive limit value	8 hour mean	10	1 January 2005
AQS Objective	8 hour running mean	10	31 December 2003

**Table 10-B.3 - Benzene**

Description	Criteria	Value $\mu\text{g}/\text{m}^3$	Target Date
EU Daughter Directive limit value	Annual mean	5	1 January 2010
AQS Objective	Running annual mean	16.25	31 December 2003
AQS Objective	Running annual mean	5	31 December 2010

**Table 10-B.4 - 1,3-Butadiene**

Description	Criterion	Value $\mu\text{g}/\text{m}^3$	Target Date
AQS Objective	Running annual mean	2.26	31 December 2003

Table 10-B.5 - PM<sub>10</sub>

Description	Criteria	Value	Target Date
		µg/m <sup>3</sup>	
EU Daughter Directive limit value <sup>1</sup>	24 hour mean (not to be exceeded more than 35 times a year)	50	1 January 2005
EU Daughter Directive limit value <sup>1</sup>	Annual mean	40	1 January 2005
Indicative Stage 2: EU Daughter Directive limit value <sup>1,2</sup>	24 hour mean (not to be exceeded more than 7 times a year)	50	1 January 2010
Indicative Stage 2: EU Daughter Directive Limit Value <sup>1,2</sup>	Annual mean	20	1 January 2010
AQS Objective <sup>1</sup>	24 hour mean (not to be exceeded more than 35 times a year)	50	31 December 2004
AQS Objective <sup>1</sup>	Annual mean	40	31 December 2004
Provisional AQS Objective <sup>3</sup>	24 hour mean (not to be exceeded more than 7 times a year)	50	31 December 2010
Provisional AQS Objective <sup>3</sup>	Annual Mean	20	31 December 2010

<sup>1</sup> Measured gravimetrically.

<sup>2</sup> Subject to review

<sup>3</sup> England (apart from London) and will not be included in the Regulations in the short term.

## MONITORING

- 1.1 Defra carry out a nationwide monitoring survey using continuous analysers and diffusion tubes. National survey results from both types of monitoring are published on the Air Quality Archive<sup>1</sup>. Defra operates two continuous analysers within approximately 40 kilometres of the Aldermaston site these sites are:
- **Harwell** – A rural background site located within the grounds of the Harwell Science Centre. The site has been in operation since 1982 and measures concentrations of PM<sub>10</sub> and NOx.
  - **Reading New Town** - An urban background site located in a cemetery at the junction of two busy main roads (A4 and A329) to the east of Reading town centre. The site has been in operation since 1997 and measures concentrations of CO, PM<sub>10</sub> and NOx.
- 1.2 Defra has located four nitrogen dioxide diffusion tubes within the borough of Basingstoke and Deane as part of the non-automatic survey.
- 1.3 In addition local authorities carry out their own monitoring within their boroughs as part of their local air quality management. Both WBC and BDBC carry out nitrogen dioxide diffusion tube surveys throughout their areas. BDBC also has an automatic monitor:
- **Eastrop Way, Basingstoke** – An urban background site located 20 metres from the roadside. The site measures concentrations of PM<sub>10</sub> and NOx.
- 1.4 Results for Eastrop continuous analyser in 2003 are for a five month period due to technical difficulties. The data available for 2004 has been taken from the most recent report available, the detailed assessment published July 2005. Hence the data presented for 2004 is only available for the period between the last progress report and the detailed assessment.

### *Nitrogen Dioxide*

- 1.5 Table 1.1 shows the annual mean concentrations of nitrogen dioxide measured by the continuous analysers between 2003 and 2005.

**Table 1 – Annual Mean Concentrations of Nitrogen Dioxide (µg/m<sup>3</sup>)**

Site Name	Grid Reference		Concentrations		
	Easting	Northing	2003	2004	2005
Harwell	447400	186300	16	12	12
Reading New Town	473500	173200	n/a	25	23
Eastrop Way	464292	152263	23*	23**	-

AQS annual mean objective of 40 µg/m<sup>3</sup>

\*data period October 2003 to March 2004

\*\* data period May 2004 to March 2005

<sup>1</sup> [www.airquality.co.uk](http://www.airquality.co.uk)



- 1.6 Results show that concentrations of nitrogen dioxide were below the annual mean objectives at all continuous analyser sites in all years.

Table 2 – Annual Mean Concentrations of Nitrogen Dioxide ( $\mu\text{g}/\text{m}^3$ )

Site Name	Grid Reference		Concentrations			Network
	Easting	Northing	2003	2004	2005	
Basingstoke 1N	463600	151800	n/a	36	37	Defra
Basingstoke 3N	465600	153300	n/a	23	26	Defra
Basingstoke 4N	463500	150700	21	23	24	Defra
Basingstoke 6N	462300	150700	41	40	44	Defra
Adjacent 36 Winchester Street	463624	151854	36	36.6	37.6	Local Authority
Traffic lights at Winton Square	463641	151857	44	53.7	59.2	Local Authority
Corner of New St./Winton Square junction	463659	151866	21	53.8	54.2	Local Authority
Corner of Winton Square/Sarum Hill junction	463566	151862	24	39.9	43.3	Local Authority
o/s 4 Winton Square	463608	151840	22	53.0	52.8	Local Authority
Eastrop, collocated at Automatic Monitor	464292	152283	18	23.9	31.9	Local Authority
Eastrop, collocated at Automatic Monitor	464292	152283	14	24.4	28.0	Local Authority
Eastrop, collocated at Automatic Monitor	464292	152283	17	26.3	30.6	Local Authority
A339 Greenham Road			42	38	-	Local Authority
A339 Ambulance Station Western Avenue			65	49	-	Local Authority
A339 Willows edge Hutton close			37	30	-	Local Authority
A4 London Road			56	53	-	Local Authority
A4 Chapel Street			53	43	-	Local Authority

- 1.7 Results from Defra and BDBC indicate exceedences in 2005 at roadside sites. These exceedences may not necessarily represent concentrations at building facades. The exceedences in the Basingstoke and Deane district are within the area discussed previously in this section (para 1.9). It is unlikely that roadside concentrations are going to be representative of the local air quality in the AWE area due to its rural location.
- 1.8 Results for WBC survey are currently unavailable for 2005. Results in 2004 show exceedences at roadside locations. West Berkshire extended the survey in March 2005 with an additional 28 tubes located at sites more relevant to public exposure. Results from this survey will be presented in the 2006 USA.

*PM<sub>10</sub>*

- 1.9 Annual mean concentrations and 24hr exceedence data from the continuous analysers are represented in Table 1.3.

**Table 3 – Results for PM<sub>10</sub> Measured at the Continuous Analysers**

Site Name	Statistic	Concentrations		
		2003	2004	2005
Harwell	Annual Mean *	20	19	19
	No. of exceedences of 24hr mean**	7	0	1
Reading New Town	Annual Mean	n/a	19	21
	No. of exceedences of 24hr mean	1	0	1
Eastrope Way	Annual Mean	18.2***	-	-
	No. of exceedences of 24hr mean	-	-	-

\*AQS annual mean objective of 40 µg/m<sup>3</sup>

\*\* Less than 35 exceedences of 50µg/m<sup>3</sup> 24hr mean

\*\*\* data period October 2003 to March 2004

- 1.10 Results show that concentrations of PM<sub>10</sub> meet both annual mean and 24hr mean objectives at Harwell and Reading New Town in all years. The data for Eastrope way is only available for five months in 2003. Concentrations for PM<sub>10</sub> were found to be below the relevant criteria in BDCDs USA. No further analysis was required for this pollutant therefore no results were presented for 2004 in the 2005 detailed assessment. Data for 2005 is not yet available.

*Carbon Monoxide*

- 1.11 Concentrations of carbon monoxide measured at Reading New Town are represented in Table 1.4.

**Table 4 – Concentrations of Carbon  
Monoxide (mg/m<sup>3</sup>)**

Site Name	Concentrations		
	2003	2004	2005
Reading New Town	n/a	0.3	0.3

1.12 Results show that concentrations were below the AQS objectives at Reading New Town in all years. This is fairly typical of sites within the UK.

## Meteorological Data

A useful overview of the mean meteorological conditions experienced by the AWE sites is provided by the Meteorological (Met) Office's weather recording station at Wisley, approximately 25 kilometres east of the two sites (Table 10-D.1).

The data in the table are typical of a temperate northern hemisphere mid-latitude setting and are representative of the region in which the AWE sites are located.

Table 10-D.1 Mean meteorological data for the period 1971 – 2000

Wisley (38 m Above Mean Sea Level)						
Month	Max Temp [deg C]	Min Temp [deg C]	Days of Air Frost [days]	Sunshine [hours]	Rainfall [mm]	Days of Rainfall >= 1mm [days]
Jan	7.6	1.8	9.5	52.1	62.5	11.6
Feb	8	1.5	9.6	70.6	40.6	8.6
Mar	10.7	3	6.3	107.6	47.7	9.6
Apr	13.3	4	3.9	152.4	47.6	9
May	17.2	6.8	0.9	194.4	51.1	9.3
Jun	19.9	9.7	0	188.1	51.6	8.3
Jul	22.5	12	0	203.7	39.6	6.3
Aug	22.3	11.6	0	200.6	49.4	7.2
Sep	19.1	9.5	0	143.4	61.2	9.1
Oct	15	6.8	2.2	112.8	71.2	10
Nov	10.6	3.8	6.6	66.6	60.3	10
Dec	8.4	2.7	8.4	42.5	64.5	11.2
Year	14.6	6.1	47.4	1534.7	647.1	110.2

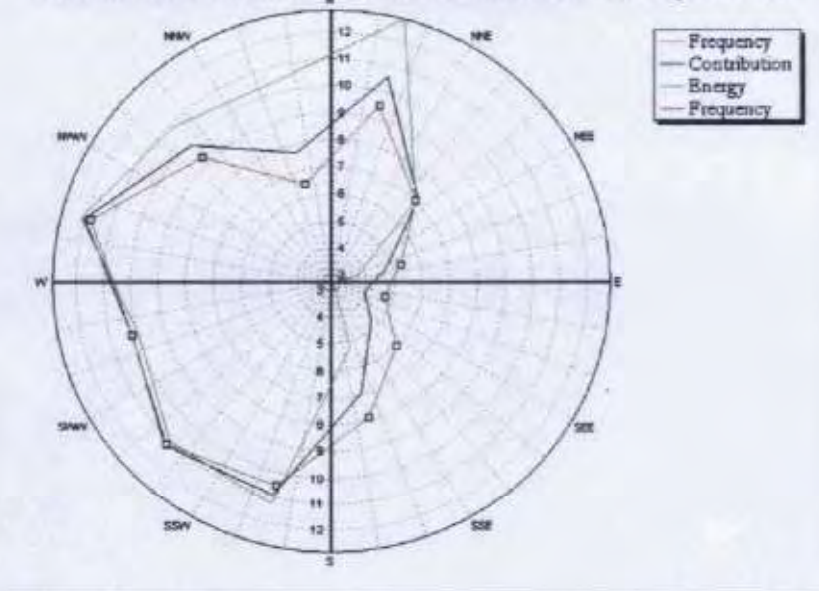
Meteorological data from the Automatic Weather Station (AWS) at Aldermaston indicates that in general, climatic conditions are as would be expected for south-east England; a temperate, humid climate without great extremes. Temperature measurements show the expected seasonal fluctuation around a mean of about 10.6 °C (Table 10-D.2). Radiation refers to electro-magnetic radiation (solar).

Table 10-D.2 Summary statistics for the meteorological measurements – (1/12/2000 - 20/11/2003)

	Relative Humidity (%)	Air Temperature (°C)	Incoming Radiation (Wm <sup>-2</sup> )	Outgoing Radiation (Wm <sup>-2</sup> )	Soil Temperature (°C)	Soil resistance (kΩ)
Minimum	14.68	-6.86	0.00	0.00	0.68	0.01
5%	47.93	0.86	0.00	0.00	2.96	0.17
Mean	78.05	10.56	118.61	22.97	11.76	5.06
Median	82.13	10.44	3.25	1.00	11.20	0.25
95%	95.35	20.52	576.00	112.25	20.34	30.08
Maximum	106.20	36.78	1012.50	254.50	24.38	491.78

Wind speed data indicate the sheltered nature of the Aldermaston site – even the maximum gust is less than the annual means observed in exposed moorland regions of the UK. Wind direction data is best expressed in the form of a wind rose (Figure A10-D.1). West and south-west prevailing winds are apparent and are representative of the predominant prevailing wind direction in the UK. However, the highest energy contribution comes from northerly winds.

Figure A10-D.1 Wind-rose for the AWS sited at AWE Aldermaston  
 Wind rose for the Automatic Weather Station on the Site Tip at AWE.



The total volume of precipitation collected by the bulk precipitation collector from 1<sup>st</sup> December 2000 to 31<sup>st</sup> October 2003 was 2054 mm, an average of 89.3 mm per calendar month.