

Appendix 6.2

Derivation of Baseline Air Quality



APPENDIX 6.2: DERIVATION OF BASELINE AIR QUALITY

Details of the site survey are provided in Appendix 6.3.

A6.2.1 Sulphur Dioxide

Levels of sulphur dioxide measured during the site survey are set out in Table A6.2.1

Table A6.2.1 Measured Sulphur Dioxide Levels

Reference	NO ₂ Concentration (µg/m ³)						Average
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	
MP1	1.9	0.8	3.8	2.0	4.9	5.1	3.1
MP2	1.2	0.9	5.7	7.3	0.6	5.8	3.6
MP3	1.5	1.2	6.5	4.6	1.6	7.2	3.8
MP4	1.6	1.3	3.8	3.5	0.7	3.5	2.4

The Defra interpolated value for the local area for 2001 is 3.5µg/m³ (Ref. 8). Background levels of sulphur dioxide are likely to have fallen over the period since 2001.

The baseline sulphur dioxide level used in the air quality study was 3.8µg/m³, the highest measured level at any of the four survey locations.

A6.2.2 Nitrogen Dioxide

Levels of nitrogen dioxide measured during the site survey are set out in Table A6.2.2.

Table A6.2.2 Measured Nitrogen Dioxide Levels

Reference	NO ₂ Concentration (µg/m ³)						Average
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	
MP1	27.5	23.2	29.8	34.6	22.5	36.7	29.0
MP2	19.0	23.8	23.5	27.8	19.6	31.9	24.3
MP3	33.1	32.7	36.1	34.2	29.9	39.0	34.2
MP4	17.9	20.7	21.2	26.2	15.2	28.6	21.6

The Defra interpolated value for the local area for 2010 is 16.5µg/m³ (Ref. 8). Levels of nitrogen dioxide are also measured by South Staffordshire District Council (Ref. 7). Levels are measured at a network of 34 locations throughout the District using a diffusion tube method similar to that used in the site survey. Nitrogen dioxide is measured at a rural background location in the village of Congreve, to the west of Penkridge. The average levels measured in 2005 and 2006 were 14.6µg/m³ and 13.6µg/m³ respectively.

Nitrogen dioxide levels are measured by South Staffordshire District Council at a number of other locations in the vicinity of the proposed facility. All these locations are at roadside sites. Air quality at roadside locations is discussed separately in this report.

The potential effect of emissions from the nearby SSI Europe chemicals manufacturing facility on air quality was assessed. The PPC permit application for the SSI Europe facility (Ref. 27) indicates that the only substance released to air which required a more detailed assessment of air quality effects was nitrogen dioxide. A detailed assessment was previously carried out by Enviros Consulting Ltd. This showed that levels of nitrogen dioxide in the local area were forecast to be acceptable. Emissions from the SSI Europe facility were forecast to result in a maximum process contribution of $0.22\mu\text{g}/\text{m}^3$. This would not be significant in the context of other sources of nitrogen dioxide in the local area. In any case, the monitoring survey carried out for the proposed EFW plant takes account of any contribution to environmental levels of nitrogen dioxide which may result from emissions from the SSI Europe facility.

The baseline nitrogen dioxide level used in the air quality study was $34.2\mu\text{g}/\text{m}^3$ the highest measured level at any of the four site survey locations.

A6.2.3 PM₁₀

The average level of PM₁₀ measured during the site survey was $29.4\mu\text{g}/\text{m}^3$. The 90.4th percentile of 24 hour mean concentrations was $48.1\mu\text{g}/\text{m}^3$.

The Defra interpolated value for the local area for 2010 is $18.1\mu\text{g}/\text{m}^3$ (Ref. 8)

The baseline PM₁₀ level used in the air quality study was the level of $29.4\mu\text{g}/\text{m}^3$ measured during the site survey. The measured 90.4th percentile concentration of 24 hour mean concentrations of $48.1\mu\text{g}/\text{m}^3$ was used for the short-term baseline level.

A6.2.4 Hydrogen Chloride and Hydrogen Fluoride

Airborne levels of hydrogen chloride are measured at 12 locations across the UK (Ref. 28). The most representative monitoring station for the proposed development site is the station at Sutton Bonnington. The measured level of hydrogen chloride at this location in 2005 was $0.31\mu\text{g}/\text{m}^3$.

The Government's Expert Panel on Air Quality Standards (EPAQS) has published a draft report for the EA entitled "*Guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects*". This report found that measured monthly mean levels of hydrogen fluoride in the vicinity of specific sources of hydrogen fluoride were between 0.05 and $3.5\mu\text{g}/\text{m}^3$. In view of these findings, background levels of hydrogen fluoride in the vicinity of the proposed facility are unlikely to be higher than $2\mu\text{g}/\text{m}^3$. This value was used to represent annual mean background air quality for the assessment of the proposed facility.

A6.2.5 Dioxins and Furans

Levels of dioxins and furans are measured at six locations in the UK (Ref. 29). Levels measured at these locations in 2006 were as follows:

- ◆ Hazelrigg 26.8fgTEQ/m³ Equivalent to 26.8×10^{-9} µgTEQ/m³
- ◆ High Muffles 0.5fgTEQ/m³ Equivalent to 0.5×10^{-9} µgTEQ/m³
- ◆ London 5.9fgTEQ/m³ Equivalent to 5.9×10^{-9} µgTEQ/m³
- ◆ Manchester 18.7fgTEQ/m³ Equivalent to 18.7×10^{-9} µgTEQ/m³
- ◆ Middlesbrough 17.0fgTEQ/m³ Equivalent to 17.0×10^{-9} µgTEQ/m³
- ◆ Stoke Ferry 6.6fgTEQ/m³ Equivalent to 6.6×10^{-9} µgTEQ/m³

The baseline level of dioxins and furans used in the air quality study was the average of these values: 12.6fgTEQ/m³.

A6.2.6 Metals

Levels of metals were measured during the site survey. The average measured concentrations during the survey are shown in Table A6.2.3. Levels of metals are also measured at 17 locations across the UK (Ref. 9). Some of these measurements are made close to known sources of airborne emissions such as non-ferrous metals manufacturing facilities. The monitoring locations likely to give levels of metals which are representative of baseline conditions at the Staffordshire site are: BZL Hallen and Weston Point Runcorn (background sites), and London Horseferry Road, Leeds, Glasgow and Motherwell (urban background sites). The levels measured at these sites during 2006 are set out in Table A6.2.3.

Table A6.2.3 Measured Levels of Metals (ng/m³)

Substance	Location							
	Site Survey	Hallen	Weston Point	London Horseferry Road	Leeds	Glasgow	Motherwell	Average
Arsenic	<0.67	1.05	0.82	0.95	0.89	0.68	0.91	0.85
Cadmium	1.0	0.42	0.23	0.28	0.25	0.50	0.53	0.46
Chromium	7.3	3.62	3.86	3.16	6.13	3.92	5.49	4.79
Copper	400	7.53	9.37	18.74	10.21	10.74	6.28	66.12
Manganese	9.3	6.91	4.42	6.30	9.30	4.18	3.40	6.26
Nickel	3.3	3.72	3.08	2.07	1.77	1.69	0.68	2.33
Lead	5.0	17.99	10.54	14.07	16.86	8.35	6.24	11.29
Vanadium	1.0	3.33	3.50	4.15	2.00	1.90	1.26	2.45
Mercury	< 0.67	0.33	32.56	2.22	2.87	2.22	2.79	6.24

The average levels of metals recorded during the survey and across the six sites listed in Table A6.2.3 during 2006 were used as the baseline level in the study.

There is little information available on background levels of thallium, antimony or cobalt. Antimony was measured during the site survey and in Pontardawe in 2003. The average measured concentration during the site survey and in Pontardawe was 1.67ng/m³ 1.09ng/m³ respectively. Cobalt was measured during

the site survey and in London until 1995/6. The average measured concentration during the site survey and in London was $<0.67\text{ng/m}^3$ and 1.1ng/m^3 respectively. Ambient levels of thallium were measured during the site survey. The average measured concentration was 0.8ng/m^3 . This value was used in the air quality assessment.

A6.2.7 Carbon Monoxide

The Defra interpolated annual mean background value for the local area for 2001 is $295\mu\text{g/m}^3$ (Ref. 8). This value was used to represent background air quality in the study.

A6.2.8 Ammonia

Levels of ammonia are measured by the Centre for Ecology and Hydrology (Ref. 10). The network is part of the Co-ordinated Ammonia Research Activities programme ("CARA"). The most recent full year of reported data is for 2003. Measured levels during 2003 at the closest sites to the proposed development site are as follows:

- ◆ Wem Moss: $2.9\mu\text{g/m}^3$
- ◆ Brown Moss: $3.9\mu\text{g/m}^3$
- ◆ Llyncllys Common: $1.7\mu\text{g/m}^3$
- ◆ Sutton Bonnington: $9.4\mu\text{g/m}^3$

The average recorded background ammonia level in 2003 of $4.5\mu\text{g/m}^3$ was used in the study.

A6.2.9 Polycyclic Aromatic Hydrocarbons

The substance of primary concern is benzo(a)pyrene. The average level of benzo(a)pyrene measured during the site survey was $0.00013\mu\text{g/m}^3$.

Levels measured elsewhere in the UK during 2006 were between 0.000036 and $0.00076\mu\text{g/m}^3$ (Ref. 30). Higher values were generally recorded in areas with extensive coal burning and areas with heavy industrial installations.

The baseline level of benzo(a)pyrene used in the air quality study was the level of $0.00013\mu\text{g/m}^3$ measured during the site survey.

A6.2.10 Summary

Baseline levels used in this study are summarised in Table A6.2.4.

Table A6.2.4 Baseline Levels Used in this Study

SUBSTANCE	LONG-TERM MEAN BASELINE CONCENTRATION (MG/M ³)	BASIS
NITROGEN DIOXIDE	34.2	HIGHEST MEASURED LEVEL IN SITE SURVEY
SULPHUR DIOXIDE	3.8	HIGHEST MEASURED LEVEL IN SITE SURVEY
PM10	29.4	MEASURED LEVEL IN SITE SURVEY
HYDROGEN CHLORIDE	0.31	LEVEL MEASURED AT SUTTON BONNINGTON, 2005
HYDROGEN FLUORIDE	2	ESTIMATED MAXIMUM BASED ON EPAQS REPORT
DIOXINS AND FURANS	1.26×10^{-8}	AVERAGE VALUE FROM 2006 NATIONAL UK SURVEY (VALUE GIVEN IS TOXIC EQUIVALENT (UNSPECIFIED), TEQ)
ARSENIC	0.00085	AVERAGE LEVEL RECORDED DURING THE SITE SURVEY AND ACROSS SIX NATIONAL SURVEY SITES
CADMIUM	0.00046	
CHROMIUM	0.00479	
COPPER	0.0661	
MANGANESE	0.00626	
NICKEL	0.0023	
LEAD	0.0113	
VANADIUM	0.00245	
MERCURY	0.00624	
ANTIMONY	0.00167	
COBALT	0.00067	LEVEL MEASURED DURING THE SITE SURVEY
THALLIUM	0.0008	MEASURED LEVEL IN SITE SURVEY
BENZO(A)PYRENE	0.00013	MEASURED LEVEL IN SITE SURVEY
CARBON MONOXIDE	295	VALUE FROM DEFRA INTERPOLATED DATABASE
AMMONIA	4.5	AVERAGE LEVEL RECORDED IN NATIONAL SURVEY