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Appendix 5.3: Air Quality – Additional Baseline Assessment

Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North
(WKN) Waste to Energy Facility DCO

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Appendix 5.3: Additional Baseline Assessment

Chapter 5 sets out the background concentrations for the key combustion-related pollutants, NO₂ and PM₁₀. This Appendix sets out the background concentrations for other pollutants emitted from the WKN and K3 stacks.

Carbon Monoxide

In the absence of any local carbon monoxide (CO) monitoring, the background annual-mean concentration has been extracted from the Defra mapped background concentration estimate for the grid square of the site. A maximum daily running 8-hour mean of 542 µg.m⁻³ has been estimated as twice the annual-mean CO concentration in line with Environment Agency guidance [1].

Particulate Matter with a Mean Aerodynamic Diameter less than 2.5 µm (PM_{2.5})

In the absence of any local monitoring of particulate matter with a mean aerodynamic diameter less than 2.5 µm (PM_{2.5}), the background annual-mean concentration has been extracted from the Defra mapped background concentration estimate for the grid square of the site of 10.6 µg.m⁻³.

Sulphur Dioxide

The nearest monitoring sulphur dioxide (SO₂) monitor is located at Rochester and operated by Defra as part of the Automatic Urban Rural Network (AURN). The measured concentrations in the two most recent years are provided in Table 5.3.1. For each averaging period, the maximum measure concentration has been used in the assessment.

Table 5.3.1: Measured SO₂ Concentrations (µg.m⁻³)

Averaging Period	SO ₂ Concentration (µg.m ⁻³)		
	2016	2017	Maximum
15 minute (99.90th percentile)	22.14	8.22	22.14
1 hour (99.73th percentile)	15.67	6.30	15.67
24 hour (99.18th percentile)	8.00	2.96	8.00
Annual mean (1 hour)	2.10	1.17	2.10

For each averaging period, the maximum measured concentration has been used in the assessment.

Heavy Metals

The Heavy Metals Network monitors the concentrations in air, and the deposition rates of a range of metallic elements. The nearest monitor is located at Detling, approximately 15 km south west of the DCO site boundary. With the exception of mercury (Hg), the measured concentrations in the last full calendar year (2017) are provided in Table 5.3.2. Hg monitoring has ceased at Detling and the measurement from the most recent year of monitoring (2012) is provided instead.

Table 5.3.2: Measured Metals Concentrations (ng.m⁻³)

Group	Metal	Concentration (ng.m ⁻³)
1	Cd	0.123
	Tl	-
2	Hg	0.784 (2012)
3	As	0.778
	Co	0.062
	Cr	1.321
	Cu	4.543
	Mn	3.266
	Ni	0.675
	Pb	6.128
	Sb	-
	V	0.663

Polycyclic Aromatic Hydrocarbons (PAHs)

The polycyclic aromatic hydrocarbon (PAH) network monitors ambient concentrations of PAHs at 31 sites in the UK. Gaseous and solid PAHs are monitored at Harwell. The most recent available measurements from Harwell are provided in Table 5.3.3.

Table 5.3.3: Annual-mean PAHs Concentrations (ng.m⁻³)

Site Name	2011	2012	2013	2014	Maximum
Harwell (solid and gas)	0.062	0.084	0.096	0.043	0.096

The maximum measured concentration monitored of 0.096 µg.m⁻³ has been used within the assessment.

Hydrogen Chloride (HCl)

Hydrogen chloride (HCl) is monitored as part of the Acid Gas and Aerosol Network, part of the UK Eutrophying and Acidifying Pollutants (UKEAP) Network. The nearest monitoring location is Detling. The maximum hourly-mean concentrations in the most recent years of measurements from Detling are provided in Table 5.3.4. (Note that monitoring ceased at Detling in 2016).

Table 5.3.4: Measured HCl Concentrations (µg.m⁻³) at Detling

Site Name	2012	2013	2014	2015	Maximum
Detling	0.81	0.78	1.16	0.62	1.16

The maximum measured concentration of 1.16 µg.m⁻³ has been used within the assessment.

Hydrogen Fluoride

The Expert Panel on Air Quality Standards (EPAQS) was set up in 1991 to provide independent advice on air quality issues. In 2005 it published a draft report entitled 'Guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects' [2]. The report noted that only a small number of measurements of ambient concentrations of hydrogen fluoride have been made in the UK. All of these have been made in the vicinity of three industrial plants. Many samples were below the limit of detection; however, measurable values were in the range 0.05 to 3.5 $\mu\text{g.m}^{-3}$ as approximate monthly averages. The report concluded that it would be reasonable to expect maximum 1 hour mean hydrogen fluoride concentrations to reach about 2.46 $\mu\text{g.m}^{-3}$ at rural sites exposed to coal-fired power station plumes.

Polychlorinated Biphenyls (PCBs)

PCB concentration data are currently available from five sites in the UK that form the Toxic Organic Micropollutants (TOMPS) network. The closest site urban background site is Nobel House in London. Table 5.3.5 present the most recent available years of monitoring data at London for PCBs [3].

Table 5.3.5: Annual-Mean Concentrations ($\mu\text{g.m}^{-3}$) of Polychlorinated Biphenyls

Site Name	2012	2013	2014	2015	2016	Average
Nobel House	83.2	83.2	107.0	111.3	118.9	100.7

The average annual-mean concentration of PCBs of 100.7 $\mu\text{g.m}^{-3}$ has been used within the assessment.

Dioxins and Furans

Dioxins and Furans concentration data from the TOMPS network Nobel House site are provided in Table 5.3.6.

Table 5.3.6: Annual-Mean Concentrations (fg.m^{-3}) of Dioxins and Furans

Site Name	2012	2013	2014	2015	2016	Average
Nobel House	15.5	3.5	2.9	5.5	24.3	10.3

The average annual-mean concentration of dioxins and furans of 10.3 fg.m^{-3} has been used within the assessment.

Ammonia (NH₃)

NH₃ is monitored as part of the Ammonia Network, part of the UKEAP Network. The nearest monitoring location is Detling. The maximum hourly-mean concentrations in the most recent years of measurements from Detling are provided in Table 5.3.7.

Table 5.3.7: Measured NH₃ Concentrations (µg.m⁻³) at Detling

Site Name	2014	2015	2016	2017	Maximum
Detling	0.98	0.96	1.11	0.90	0.99

The maximum measured concentration of 0.99 µg.m⁻³ has been used within the assessment.

References

- 1 <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>
- 2 Expert Panel on Air Quality Standards: guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects. Draft consultation document. Defra 2005
Available at <http://www.defra.gov.uk/corporate/consult/airqual-halogen/index.htm>
- 3 <http://www.defra.gov.uk/evidence/statistics/environment/airqual/download/xls/aqtb29.xls>