

Document 3.3 – 2010 Environmental Statement (2013 Addendum)

ES Chapter 7

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Supplementary Report to the Environmental Statement

Chapter 7 – Air Quality

Introduction

1. This note has been produced to supplement the Environmental Statement (ES) Air Quality chapter (Chapter 7) to take account of a change to the site layout of the proposed Kemsley Sustainable Energy Plant (SEP).
2. Changes in the location of the stack and the location and dimensions of nearby buildings can alter the dispersion characteristics, potentially changing the process contributions to ground level pollutant concentrations. Therefore, the releases of pollutants from the proposed stack at the Kemsley site have been re-modelled for the new proposed site layout, to determine whether the ground level concentrations at sensitive human receptors remain acceptable.

Input Data

3. The emissions data for the proposed stack remain the same as in the original ES chapter (stack K3; Tables 7.8 and 7.9); only the location of the stack and the location and dimensions of nearby buildings are different. The original and updated layout plans are shown in Figure 1.
4. To allow for direct comparison of the updated results with the results in the ES chapter, the same meteorological data, complex terrain data, baseline air quality data, receptors and impact significance criteria have been used.
5. The original models were run with ADMS 4.2 modelling software. In the intervening period, the modelling software has been updated by its supplier to version 5; the updated models were run on the latest version, ADMS 5.

Results

6. The updated results for Tables 7.19 to 7.22 in the original ES chapter are presented below. The original results tables are presented in Annex A, for comparison.
7. Tables 7.19 and 7.21 summarise the maximum process contribution (PC) to ground-level concentrations that are predicted when the model is run with pollutant releases at 100% of the short-term and long-term emission limit values, respectively.
8. Tables 7.20 and 7.22 present the resulting predicted environmental concentration (PEC) once the PC has been added to the background ambient concentration (AC), for all relevant

pollutants with short-term and long-term emission limit values, respectively. The PEC for each pollutant is then compared with the relevant Environmental Quality Standard (EQS).

Ground-level Concentrations for Releases at Short-term Emission Limits

Table 7.19: Maximum Process Contributions ($\mu\text{g.m}^{-3}$) at Short-Term EU Directive Emission Limits

Pollutant	Averaging Period	EQS	Max PC	Max PC as % of EQS	Magnitude of PC
NO ₂	1 hour 99.79th percentile	200	25.7	12.9	Small
SO ₂	15 minute 99.9th percentile	266	39.3	14.8	Small
	1 hour 99.73rd percentile	350	36.6	10.5	Small
HCl	1 hour maximum	750	13.2	1.8	Very Small
HF	1 hour maximum	160	0.9	0.5	Very Small

Note: PC – Process contribution
EQS – Environmental Quality Standard

Table 7.20: Maximum Predicted Environmental Concentrations ($\mu\text{g.m}^{-3}$) at Short-Term EU Directive Emission Limits

Pollutant	Averaging Period	EQS	AC	Max PEC	Max PEC as % of EQS	Significance Descriptor
NO ₂	1 hour 99.79th percentile	200	42.6	68.3	34.2	Slight Adverse
SO ₂	15 minute 99.9th percentile	266	4.0	43.3	16.3	Slight Adverse
	1 hour 99.73rd percentile	350	4.0	40.6	11.6	Slight Adverse
HCl	1 hour maximum	750	0.6	13.8	1.8	Negligible
HF	1 hour maximum	160	4.9	5.8	3.6	Negligible

Note: AC – Ambient concentration
PEC – Predicted environmental concentrations
EQS – Environmental Quality Standard

9. The results presented in Table 7.19 and Table 7.20 show that there were slight variations in the process contributions compared with what was predicted in the original assessment, with decreases in the PCs for NO₂ and SO₂ (maximum decrease of 6.1 $\mu\text{g.m}^{-3}$, for the 99.73rd percentile of hourly mean SO₂) and slight increases in the PCs for HCl and HF (maximum increase of 0.3 $\mu\text{g.m}^{-3}$, for the maximum hourly mean HCl).
10. The significance criteria show that, if the SEP operated at 100% of the short-term emission limits, the air quality impacts from the predicted concentrations would range from ‘negligible’ to ‘slight adverse’. The descriptors for the magnitude of the PCs and the significance descriptors are the same as in the original assessment for all of the pollutants.
11. All of the PECs are well below the relevant EQSs, so the impact on local air quality from emissions from the SEP at the short-term emission limits remains acceptable.

Ground-level Concentrations for Releases at Long-term Emission Limits

Pollutant	Averaging Period	EQS	Max PC	Max PC as % of EQS	Magnitude of PC
PM ₁₀	24 hour (90.41st percentile)	50	0.46	0.9%	Very Small
	Annual	40	0.12	0.3%	Very Small
HCl	1 hour (maximum)	750	2.19	0.3%	Very Small
	Annual	20	0.13	0.6%	Very Small
HF	1 hour (maximum)	160	0.22	0.1%	Very Small
SO ₂	15 minute (99.90th percentile)	266	9.84	3.7%	Very Small
	1 hour (99.73rd percentile)	350	9.13	2.6%	Very Small
	24 hour (99.18th percentile)	125	5.35	4.3%	Very Small
	Annual	50	0.63	1.3%	Small
NO ₂	1 hour (99.79th percentile)	200	12.9	6.4%	Very Small
	Annual	40	1.75	4.4%	Small
CO	8 hour (maximum daily running)	10,000	9.13	0.1%	Very Small
	Annual	350	0.63	0.2%	Very Small
Cd	1 hour (maximum)	1.5	5.47E-03	0.4%	Very Small
	Annual	0.005	3.13E-04	6.3%	Medium
Ti	1 hour (maximum)	30	5.47E-03	0.02%	Very Small
	Annual	1	3.13E-04	0.03%	Very Small
Hg	1 hour (maximum)	7.5	5.47E-03	0.07%	Very Small
	Annual	0.25	3.13E-04	0.1%	Very Small
Sb	1 hour (maximum)	150	1.22E-02	0.008%	Very Small
	Annual	5	6.96E-04	0.01%	Very Small
As	1 hour (maximum)	15	5.34E-03	0.04%	Very Small
	Annual	0.2	3.06E-04	0.2%	Very Small
Cr	1 hour (maximum)	3	2.68E-02	0.9%	Very Small
	Annual	0.1	1.54E-03	1.5%	Small
Co	1 hour (maximum)	6	1.22E-02	0.2%	Very Small
	Annual	0.2	6.96E-04	0.3%	Very Small
Cu	1 hour (maximum)	60	1.17E-02	0.02%	Very Small
	Annual	2	6.70E-04	0.03%	Very Small
Pb	Annual	0.5	2.20E-03	0.4%	Very Small
Mn	1 hour (maximum)	1500	1.22E-02	0.0008%	Very Small
	Annual	1	6.96E-04	0.07%	Very Small
Ni	1 hour (maximum)	30	2.72E-02	0.09%	Very Small
	Annual	1	1.56E-03	0.2%	Very Small
V	1 hour (maximum)	5	1.22E-02	0.2%	Very Small
	Annual	1	6.96E-04	0.07%	Very Small
Dioxins & Furans	Annual	-	1.25E-09	-	-
Ammonia	1 hour (maximum)	2500	1.09	0.04%	Very Small
	Annual	180	0.06	0.03%	Very Small
PAHs (B[a]P)	Annual	0.00025	1.25E-05	5.0%	Medium
PCBs	Annual	0.2	6.27E-05	0.03%	Very Small

Note: PC – Process contribution
EQS – Environmental Quality Standard

Pollutant	Averaging Period	EQS	AC	Max PEC	Max PEC as % of EQS	Significance Descriptor
PM ₁₀	24 hour (90.41st percentile)	50	28.3	28.8	58%	Negligible
	Annual	40	28.3	28.4	71%	Negligible
HCl	1 hour (maximum)	750	0.6	2.79	0.4%	Negligible
	Annual	20	0.3	0.43	2.1%	Negligible
HF	1 hour (maximum)	160	4.92	5.14	3.2%	Negligible
SO ₂	15 minute (99.90th percentile)	266	4.0	13.8	5.2%	Negligible
	1 hour (99.73rd percentile)	350	4.0	13.1	3.8%	Negligible
	24 hour (99.18th percentile)	125	4.0	9.35	7.5%	Negligible
	Annual	50	2.0	2.63	5.3%	Slight Adverse
NO ₂	1 hour (99.79th percentile)	200	42.6	55.5	28%	Negligible
	Annual	40	21.3	23.1	58%	Slight Adverse
CO	8 hour (maximum daily running)	10,000	5400	5409	54%	Negligible
	Annual	350	0.27	0.90	0.3%	Negligible
Cd	1 hour (maximum)	1.5	0.4×10^{-3}	5.87E-03	0.4%	Negligible
	Annual	0.005	0.2×10^{-3}	5.13E-04	10%	Slight Adverse
Ti	1 hour (maximum)	30	0.02×10^{-3}	5.49E-03	0.02%	Negligible
	Annual	1	0.01×10^{-3}	3.23E-04	0.03%	Negligible
Hg	1 hour (maximum)	7.5	0.1×10^{-3}	5.57E-03	0.1%	Negligible
	Annual	0.25	0.2×10^{-3}	5.13E-04	0.2%	Negligible
Sb	1 hour (maximum)	150	2.8×10^{-3}	1.50E-02	0.01%	Negligible
	Annual	5	1.4×10^{-3}	2.10E-03	0.04%	Negligible
As	1 hour (maximum)	15	2.0×10^{-3}	7.34E-03	0.0%	Negligible
	Annual	0.2	1.0×10^{-3}	1.31E-03	0.7%	Negligible
Cr	1 hour (maximum)	3	2.3×10^{-3}	2.91E-02	1.0%	Negligible
	Annual	0.1	4.6×10^{-3}	6.14E-03	6.1%	Slight Adverse
Co	1 hour (maximum)	6	0.2×10^{-3}	1.24E-02	0.2%	Negligible
	Annual	0.2	0.1×10^{-3}	7.96E-04	0.4%	Negligible
Cu	1 hour (maximum)	60	10.0×10^{-3}	2.17E-02	0.04%	Negligible
	Annual	2	5.0×10^{-3}	5.67E-03	0.3%	Negligible
Pb	Annual	0.5	15×10^{-3}	1.72E-02	3.4%	Negligible
Mn	1 hour (maximum)	1500	6.7×10^{-3}	1.89E-02	0.0013%	Negligible
	Annual	1	13.4×10^{-3}	1.41E-02	1.4%	Negligible
Ni	1 hour (maximum)	30	6.4×10^{-3}	3.36E-02	0.1%	Negligible
	Annual	1	3.2×10^{-3}	4.76E-03	0.5%	Negligible
V	1 hour (maximum)	5	14.8×10^{-3}	2.70E-02	0.5%	Negligible
	Annual	1	7.4×10^{-3}	8.10E-03	0.8%	Negligible
Dioxins & Furans	Annual	-	6.0×10^{-3}	6.00E-03	-	-
Ammonia	1 hour (maximum)	2500	2.2	3.29	0.1%	Negligible
	Annual	180	1.1	1.16	0.6%	Negligible
PAHs (B[a]P)	Annual	0.00025	9.0×10^{-5}	1.03E-04	41%	Slight Adverse
PCBs	Annual	0.2	1.10×10^{-6}	6.38E-05	0.03%	Negligible

Note: AC – Ambient concentration
 PEC – Predicted environmental concentrations
 EQS – Environmental Quality Standard

12. The results presented in Table 7.21 and Table 7.22 show that there were slight variations in the process contributions compared with what was predicted in the original assessment, with decreases in the PCs for all pollutants measured (maximum decrease of $1.9 \mu\text{g.m}^{-3}$, for the 99.18th percentile of 24 hour mean SO_2), with the exception of slight increases in the PCs for the 99.9th percentile of 15 minute mean SO_2 and in the PCs for the maximum hourly mean concentrations (maximum increase of $0.8 \mu\text{g.m}^{-3}$, for the 99.9th percentile of 15 minute mean SO_2).
13. The significance criteria also show that, if the SEP operated at 100% of the long-term emission limits, the air quality impacts from the predicted concentrations would range from 'negligible' to 'slight adverse'.
14. In the original assessment, the descriptor of the magnitude of the PC and significance descriptor were listed as 'very small' and 'slight adverse' for 90.41st percentile 24 hour mean PM_{10} and maximum 8 hour rolling mean CO, where these should have been 'very small' and 'negligible'. In addition, the annual mean NO_2 was listed as 'small' and 'slight adverse', where it should have been 'medium' and 'slight adverse', and the annual mean Cr was listed as 'very small' and 'negligible', where it should have been 'small' and 'slight adverse'. Taking these into account, the descriptors of magnitude of the PCs and the significance descriptors are the same as in the original assessment for all of the pollutants, with the exception of annual mean NO_2 , where the descriptor for magnitude of the PC has reduced from 'medium' to 'small'.
15. All of the PECs are well below the relevant EQSs, so the impact on local air quality from emissions from the SEP at the long-term emission limits remains acceptable.

Conclusion

16. The results from the models with the proposed updated site layout do not vary significantly from those in the original ES. There are some slight increases and decreases in process contributions, but the descriptors of the magnitude of the PCs and the significance descriptors remain the same as in the original assessment. In addition, the PECs are all still well below the relevant EQSs.
17. It is therefore concluded that the proposed change in site layout will not alter the conclusion of the original Air Quality ES chapter and the proposed SEP is acceptable from an air quality perspective.

Figure 1 – Site Layouts

Previous (green) and proposed (red) site layout plans showing amended building layout and stack location



Annex A – Results from Original ES Chapter

Table Error! No text of specified style in document..1: Maximum Process Concentration ($\mu\text{g.m}^{-3}$) at Short-Term EU Directive Emission Limits

Pollutant	Averaging Period	EQS	Max PC	Max PC as % of EQS	Magnitude of PC
NO ₂	1 hour 99.79th percentile	200	28.5	14.2	Small
SO ₂	15 minute 99.9th percentile	266	43.6	16.3	Small
	1 hour 99.73rd percentile	350	42.7	12.2	Small
HCl	1 hour maximum	750	12.9	1.7	Very Small
HF	1 hour maximum	160	0.8	0.5	Very Small

Table Error! No text of specified style in document..2: Maximum Environmental Contributions ($\mu\text{g.m}^{-3}$) at Short-Term EU Directive Emission Limits

Pollutant	Averaging Period	EQS	AC	Max PEC	Max PEC as % of EQS	Significance Descriptor
NO ₂	1 hour 99.79th percentile	200	42.6	71.1	35.5	Slight Adverse
SO ₂	15 minute 99.9th percentile	266	4.0	20.3	7.6	Slight Adverse
	1 hour 99.73rd percentile	350	4.0	44.6	12.7	Slight Adverse
HCl	1 hour maximum	750	0.6	2.3	0.3	Negligible
HF	1 hour maximum	160	4.9	5.7	3.5	Negligible

Table Error! No text of specified style in document..3: Predicted Maximum Process Contributions ($\mu\text{g}\cdot\text{m}^{-3}$) at Long-Term EU Directive Emission Limits ADMS Modelling					
Pollutant	Averaging Period	EQS	Max PC	Max PC as % of EQS	Magnitude of PC
PM ₁₀	24 hour (90.41st percentile)	50	0.62	1.2	Very Small
	Annual	40	0.15	0.4	Very Small
HCl	1 hour (maximum)	750	2.15	0.3	Very Small
	Annual	20	0.15	0.8	Very Small
HF	1 hour (maximum)	160	0.22	0.1	Very Small
SO ₂	15 minute (99.90th percentile)	266	9.0	3.4	Very Small
	1 hour (99.73rd percentile)	350	10.1	2.9	Very Small
	24 hour (99.18th percentile)	125	7.2	5.8	Very Small
	Annual	50	0.7	1.4	Small
NO ₂	1 hour (99.79th percentile)	200	14.3	7.2	Very Small
	Annual	40	2.10	5.3	Small
CO	8 hour (maximum daily running)	10,000	9.82	0.1	Very Small
	Annual	350	0.75	0.2	Very Small
Cd	1 hour (maximum)	1.5	5.39×10^{-3}	0.4	Very Small
	Annual	0.005	3.76×10^{-4}	7.5	Medium
Ti	1 hour (maximum)	30	5.39×10^{-3}	0.0	Very Small
	Annual	1	3.76×10^{-4}	0.0	Very Small
Hg	1 hour (maximum)	7.5	1.08×10^{-2}	0.1	Very Small
	Annual	0.25	7.51×10^{-4}	0.3	Very Small
Sb	1 hour (maximum)	150	1.20×10^{-2}	0.0	Very Small
	Annual	5	8.35×10^{-4}	0.0	Very Small
As	1 hour (maximum)	15	5.26×10^{-3}	0.0	Very Small
	Annual	0.2	3.66×10^{-4}	0.2	Very Small
Cr	1 hour (maximum)	3	2.64×10^{-2}	0.9	Very Small
	Annual	0.1	1.84×10^{-3}	1.8	Very Small
Co	1 hour (maximum)	6	1.20×10^{-2}	0.2	Very Small
	Annual	0.2	8.35×10^{-4}	0.4	Very Small
Cu	1 hour (maximum)	60	1.15×10^{-2}	0.0	Very Small
	Annual	2	8.04×10^{-4}	0.0	Very Small
Pb	Annual	0.5	2.63×10^{-3}	0.5	Very Small
Mn	1 hour (maximum)	1500	1.20×10^{-2}	0.0	Very Small
	Annual	1	8.35×10^{-4}	0.1	Very Small
Ni	1 hour (maximum)	30	2.68×10^{-2}	0.1	Very Small
	Annual	1	1.87×10^{-3}	0.2	Very Small
V	1 hour (maximum)	5	1.20×10^{-2}	0.2	Very Small
	Annual	1	8.35×10^{-4}	0.1	Very Small
Dioxins & Furans	Annual	-	1.50×10^{-9}	-	-
Ammonia	1 hour (maximum)	2500	1.08	0.0	Very Small
	Annual	180	0.08	0.0	Very Small
PAHs (B[a]P)	Annual	0.00025	1.53×10^{-5}	6.1	Medium
PCBs	Annual	0.2	7.54×10^{-5}	0.0	Very Small

Table Error! No text of specified style in document..4: Predicted Environmental Quality Standard ($\mu\text{g.m}^{-3}$) at Long-Term EU Directive Emission Limits ADMS Modelling						
Pollutant	Averaging Period	EQS	AC	Max PEC	Max PEC as % of EQS	Significance Descriptor
PM ₁₀	24 hour (90.41st percentile)	50	28.3	28.9	57.8	Slight Adverse
	Annual	40	28.3	28.45	71.1	Negligible
HCl	1 hour (maximum)	750	0.6	2.75	0.4	Negligible
	Annual	20	0.3	0.45	2.3	Negligible
HF	1 hour (maximum)	160	4.92	5.14	3.2	Negligible
SO ₂	15 minute (99.90th percentile)	266	4.0	13	4.9	Negligible
	1 hour (99.73rd percentile)	350	4.0	14.1	4.0	Negligible
	24 hour (99.18th percentile)	125	4.0	11.2	9.0	Negligible
	Annual	50	2.0	2.7	5.4	Slight Adverse
NO ₂	1 hour (99.79th percentile)	200	42.6	56.9	28.5	Negligible
	Annual	40	21.3	23.4	58.5	Slight Adverse
CO	8 hour (maximum daily running)	10,000	5400	5410	54.1	Slight Adverse
	Annual	350	0.27	1.02	0.3	Negligible
Cd	1 hour (maximum)	1.5	0.4×10^{-3}	5.79×10^{-3}	0.4	Negligible
	Annual	0.005	0.2×10^{-3}	5.76×10^{-4}	11.5	Slight Adverse
Ti	1 hour (maximum)	30	0.02×10^{-3}	5.41×10^{-3}	0.0	Negligible
	Annual	1	0.01×10^{-3}	3.86×10^{-4}	0.0	Negligible
Hg	1 hour (maximum)	7.5	0.1×10^{-3}	1.09×10^{-2}	0.1	Negligible
	Annual	0.25	0.2×10^{-3}	9.51×10^{-4}	0.4	Negligible
Sb	1 hour (maximum)	150	2.8×10^{-3}	1.48×10^{-2}	0.0	Negligible
	Annual	5	1.4×10^{-3}	2.24×10^{-3}	0.0	Negligible
As	1 hour (maximum)	15	2.0×10^{-3}	7.26×10^{-3}	0.0	Negligible
	Annual	0.2	1.0×10^{-3}	1.37×10^{-3}	0.7	Negligible
Cr	1 hour (maximum)	3	2.3×10^{-3}	2.87×10^{-2}	1.0	Negligible
	Annual	0.1	4.6×10^{-3}	6.44×10^{-3}	6.4	Negligible
Co	1 hour (maximum)	6	0.2×10^{-3}	1.22×10^{-2}	0.2	Negligible
	Annual	0.2	0.1×10^{-3}	9.35×10^{-4}	0.5	Negligible
Cu	1 hour (maximum)	60	10.0×10^{-3}	2.15×10^{-2}	0.0	Negligible
	Annual	2	5.0×10^{-3}	5.80×10^{-3}	0.3	Negligible
Pb	Annual	0.5	15×10^{-3}	1.76×10^{-2}	3.5	Negligible
Mn	1 hour (maximum)	1500	6.7×10^{-3}	1.87×10^{-2}	0.0	Negligible
	Annual	1	13.4×10^{-3}	1.42×10^{-2}	1.4	Negligible
Ni	1 hour (maximum)	30	6.4×10^{-3}	3.32×10^{-2}	0.1	Negligible
	Annual	1	3.2×10^{-3}	5.07×10^{-3}	0.5	Negligible
V	1 hour (maximum)	5	14.8×10^{-3}	2.68×10^{-2}	0.5	Negligible
	Annual	1	7.4×10^{-3}	8.24×10^{-3}	0.8	Negligible
Dioxins & Furans	Annual	-	6.0×10^{-3}	6.15×10^{-8}	-	-
Ammonia	1 hour (maximum)	2500	2.2	3.3	0.1	Negligible
	Annual	180	1.1	1.2	0.7	Negligible
PAHs (B[a]P)	Annual	0.00025	9.0×10^{-5}	1.05×10^{-4}	42.1	Slight Adverse
PCBs	Annual	0.2	1.10×10^{-6}	7.65×10^{-5}	0.0	Negligible