Air Quality Assessment of Abnormal Operations

North Beck Energy Centre

Environmental Permit Application

For North Beck Energy Limited






rpsgroup.com/uk

Quality Management

Prepared by:	Fiona Prismall MSc, BSc (Hons), CEnv, MIAQM, MIEnvSc	Technical Director		06/08/2018
Checked by:	Rosemary Challen MSc, BSc (Hons), MIAQM, AMIEnvSc	Senior Air Quality Consultant		06/08/2018
Reviewed & Authorised by:	Jon Pullen PhD, CSci, CChem, MRSC, FIAQM, MIEnvSc	Operational Director		06/08/2018
Date of issue:	06 August 2018		**Revision number:**	0
Project number	JAR10581			
Document file path:	O:\Jobs_10000-11000\10581r\Deliverable\10581r Air Qualiy Permit 20180806.docx			

Revision History				
Rev	**Date**	**Status**	**Reason for revision**	**Additional comments**
0	06/8/2018	Draft	-	-

Calculations or models filename, location or link:				
Prepared by:	Fiona Prismall MSc, BSc (Hons), CEnv, MIAQM, MIEnvSc	Technical Director		06/08/2018
Checked by:	Rosemary Challen MSc, BSc (Hons), MIAQM, AMIEnvSc	Senior Air Quality Consultant		06/08/2018

Contents

Tables

1 Introduction

1.1 An air quality impact assessment has been undertaken to accompany the planning application (ref: DM/0026/18/FUL) for the proposed North Beck energy recovery facility. The results are presented in Chapter 8, and associated Appendices, of the Environmental Statement [1].

1.2 This report provides the results of an assessment of the potential long and short-term air quality impacts during abnormal operations.

2 Abnormal Operations

Background

2.1 Article 46 of the Industrial Emissions Directive (IED) [2] provides operators with some operational flexibility to resolve plant problems without initiating a complete shutdown of the energy recovery facility. These scenarios are termed *'abnormal operations'* and include incidents such as technically unavoidable stoppages, disturbances, or failures of the air pollution control equipment or monitoring equipment.

2.2 The IED requires that such abnormal operations must not exceed a maximum of four hours at any one time and the cumulative duration of these periods must not exceed 60 hours in a year. If the failure cannot be rectified after four hours, then the energy recovery facility must shutdown.

2.3 The modelling results presented in Chapter 8 of the Environmental Statement (ES) [3] were prepared on the basis of continuous operations, with emissions to air for each pollutant considered being at the IED limits for the entire time. In practice, for the majority of plant operating conditions, emissions would be well below the IED limits.

2.4 The potential long-term and short-term air quality impacts during abnormal operations are summarised below.

Failure of the Selective Non-Catalytic Reduction (SNCR) System

2.5 The SNCR air pollution control system is expected to abate nitrogen oxides (NO_x) down to levels well below the IED daily-mean emissions limit value of 200 $mg.m^{-3}$. Unabated concentrations of NO_x are anticipated to be 350 $mg.m^{-3}$, i.e. 1.75 times the daily-mean emissions limit value.

2.6 The IED emission limit applies to NOx emissions. In order to assess the human-health related impacts of abnormal operations NO_x concentrations need to be converted to nitrogen dioxide (NO_2). Total conversion (i.e. 100%) of NO to NO_2 is sometimes used for the estimation of the absolute upper limit of the annual mean NO_2. This technique is based on the assumption that all NO emitted is converted to NO_2 before it reaches ground level. However, in reality the conversion is an equilibrium reaction and even at ambient concentrations a proportion of NO_X remains in the form of NO.

2.7 Historically, the Environment Agency has recommended that for a 'worse case scenario', a 70% conversion of NO to NO_2 should be considered for calculation of annual average concentrations. Following the withdrawal of the Environment Agency's H1 guidance document, there is no longer an explicit recommendation; however, for the purposes of determining the impacts during abnormal operations, a 70% conversion of NO to NO_2 has been assumed for annual average NO_2 concentrations in line with the Environment Agency's historic recommendations and an assumed conversion of 35% follows the Environment Agency's recommendations [4] for the

calculation of 'worse case scenario' short-term NO_2 concentrations. This is consistent with the methodology adopted for the ES and set out in ES, Appendix 8.2, paragraph 2.4.

2.8 The ground-level concentrations under abnormal operations are then compared to the relevant Environmental Assessment Levels (EALs) for ambient NO_2 concentrations set out in ES, Chapter 8, Table 8.1 but repeated, as appropriate, throughout this report for ease of reference.

Short-term Impacts

2.9 Under abnormal operations, the maximum short-term emission rate has been considered to be 1.75 times the normal emission rate and this will have the effect of increasing the modelled Process Contribution (PC) by a factor of 1.75. The predicted short-term contributions from the energy recovery facility under normal and abnormal operations are set out in Table 2.1.

Table 2.1 Predicted Short-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	Averaging Period	EAL	AC	Normal	Abnormal					
				Max PC	Max PC	Max PC as % of EQS	PC <10% EAL?	Screen Out	PEC	PEC as % of EAL
NO_2	1 hour (99.79th %ile)	200	63.1	19.45	34.04	17	No	No	97.14	49

PC and Ambient Concentration (AC) drawn from ES Appendix 8.2, Table 4.1. The Predicted Environmental Concentration (PEC) is the sum of the PC and the AC.

2.10 Under abnormal operations, the short-term NO_2 PC will be 34.04 µg.m^{-3}. This equates to 17% of the EAL of 200 µg.m^{-3} and as such cannot be screened out without considering the total Predicted Environmental Concentration (PEC).

2.11 The short-term PEC during abnormal operations is 97.14 µg.m^{-3}, which is 49% of the EAL. The PEC is well below the NO_2 EAL of 200 µg.m^{-3} and this is considered to provide sufficient headroom to prevent significant adverse effects on human health and the environment from arising.

Long-term Impacts

2.12 The maximum long-term PC for NO_2 under normal operating conditions is 2.06 µg.m^{-3}. Under abnormal operations, emissions are expected to be 1.75 times the normal operating concentration for a maximum of 60 hours out of the year and, as such, the PC can be calculated using the following formula 2.06 x [(1.75 x 60/8760) + (8700/8760)], based on continuous operation throughout the year. The predicted long-term contributions from the energy recovery facility under normal and abnormal operations are set out in Table 2.2.

Table 2.2 Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	Averaging Period	EAL	AC	Normal	Abnormal					
				Max PC	Max PC	PC as % of EQS	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
NO_2	Annual	40	31.5	2.06	2.07	5	No	No	33.57	84

PC and AC drawn from ES Appendix 8.2, Table 4.1.

2.13 Under abnormal operations, the maximum long-term NO_2 PC is predicted to be 2.07 µg.m^{-3}. This equates to 5% of the EAL of 40 µg.m^{-3} and cannot therefore be screened out without considering the PEC. The PEC during abnormal operations is 33.57 µg.m^{-3}, which is 84% of the EAL. The 16% headroom between the PEC and the EAL of 40 µg.m^{-3} is considered to provide sufficient headroom to avoid significant adverse effects to human health and the environment.

Failure of the Bag Filters (Control of Particulates and Heavy Metals)

Short-term Impacts

2.14 The EAL makes provisions for a daily-mean PM_{10} concentration of 50 µg.m^{-3}, not to be exceeded more than 35 times a year. Under the IED, abnormal emissions must not last longer than four hours, after which time the energy recovery facility must cease operating.

2.15 As the EAL for PM_{10} is based on a daily-average, emissions during the abnormal operation have been calculated assuming that the plant operates abnormally for four hours during any 24 hour period. Part 3 to the IED specifies a maximum emission concentration during abnormal operations of 150 mg.Nm^{-3} for total dust. This is five times greater than the maximum emission concentration of 30 mg.Nm^{-3} specified in the IED during normal operations. The 24-hour average PC for PM_{10} under abnormal operations has been calculated using the following formula: PC (normal) x [(5 x 4/24) + (20/24)].

2.16 The EALs for heavy metals are based upon hourly values, as such only the maximum hourly abnormal concentration needs to be considered. Assuming that the metals concentrations increase by the same ratio as total dust, the 1-hour PC for each of the heavy metals has been multiplied by five to predict the maximum hourly emissions of each during abnormal operations. The maximum abnormal PC is reported in Table 2.3.

Table 2.3: Predicted Short-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EQS	PC <10% EAL?	Screen Out	PEC	PEC as % of EAL
PM_{10}	50	-	0.44	0.7333	1.47	Yes	Yes	-	-
Cd	No EAL	-	-	-	-	-	-	-	-
Tl	30	-	0.0050	0.0250	0.08	Yes	Yes	-	-
Hg	7.5	-	0.00997	0.0499	0.66	Yes	Yes	-	-
Sb	150	-	0.0997	0.4986	0.33	Yes	Yes	-	-
As	No EAL	-	-	-	-	-	-	-	-
Cr	150	-	0.0997	0.4986	0.33	Yes	Yes	-	-
Co	No EAL	-	-	-	-	-	-	-	-
Cu	200	-	0.0997	0.4986	0.25	Yes	Yes	-	-
Pb	No EAL	-	-	-	-	-	-	-	-
Mn	1500	-	0.0997	0.4986	0.03	Yes	Yes	-	-
Ni	No EAL	-	-	-	-	-	-	-	-
V	1	0.0053	0.0997	0.4986	49.86	No	No	0.50	50

PCs and ACs drawn from ES Appendix 8.2, Table 4.1 and Table 4.8.

2.17 All short-term emissions, except vanadium, can be screened-out as being insignificant solely by consideration of their PCs alone, as they are predicted to be below 10% of the short-term EAL.

2.18 For vanadium, further consideration needs to be given to the PEC, which is predicted to be 0.5 µg.m^{-3}, 50% of the short-term EAL. The PEC is well below the relevant EAL, and this is considered to provide sufficient headroom to avoid significant adverse effects to human health and the environment do not arise.

Long-term Impacts

2.19 Under abnormal operations, emissions will be 5 times the normal operating concentration for a maximum of 60 hours out of the year and, as such, the annual-mean PC for PM_{10} has been calculated using the following formula: [PC (normal) x ((5 x 60/8760) + (8700/8760)].

Table 2.4: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EQS	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
PM_{10}	40	-	0.150	0.1541	0.39	Yes	Yes	-	-
Cd	0.005	0.0008	0.0004	0.0004	7.60	No	No	0.001	24
Tl	1	-	0.0004	0.0004	0.04	Yes	Yes	-	-
Hg	0.25	-	0.00074	0.00076	0.30	Yes	Yes	-	-
Sb	5	-	0.0074	0.0076	0.15	Yes	Yes	-	-
As	0.003	0.00081	0.0074	0.0076	252.05	No	No	0.01	279
Cr	5	-	0.0074	0.0076	0.15	Yes	Yes	-	-
Cr (VI)	0.0002	0.0024	0.0074	0.0076	3780.82	No	No	0.01	4981
Co	No EAL	-	-	-	-	-	-	-	-
Cu	10	-	0.0074	0.0076	0.08	Yes	Yes	-	-
Pb	0.25	0.022	0.0074	0.0076	3.02	No	No	0.03	12
Mn	0.15	0.03	0.0074	0.0076	5.06	No	No	0.04	24
Ni	0.02	0.00865	0.0074	0.0076	37.81	No	No	0.02	81
V	5	-	0.0074	0.0076	0.15	Yes	Yes	-	-

PCs and ACs drawn from ES Appendix 8.2, Table 4.1 and Table 4.7.

2.20 All long-term emissions except Cd, As, Cr (VI), Co, Pb, Mn and Ni, can be screened out as being insignificant by consideration of the PCs alone, as they are predicted to be below 1% of the long-term EAL.

2.21 The PEC for all pollutants except As and Cr(VI) are below the relevant EALs, which are considered to provide sufficient headroom to avoid significant adverse effects to human health and the environment.

2.22 The Environment Agency Group 3 guidance requires the assessment to progress to the second stage assessment for those metals that cannot be screened out based on 100% of the emission limit. Cr(VI) and As cannot be screened out at Step 1, these two metals have to be considered in more detail as part of the Step 2 assessment which assumes each element is emitted at 11% of the total Group 3 limit. The results are shown below.

Table 2.5: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations – Step 2

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EAL	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
As	0.003	0.00081	0.0074	0.00084	28.01	No	No	0.0017	55
Cr (VI)	0.0002	0.0024	0.0074	0.00084	420.09	No	No	0.0032	1620.09

2.23 The results of the step 2 assessment show the PC for As to be below the relevant EAL, however further consideration is required for Cr (VI) as both the PC and PEC remain above the EAL.

2.24 The EA Step 3 assessment assumes that each metal, not screened out in Step 2, is emitted at a realistic proportion of the IED limit based on empirical studies.

2.25 For hexavalent chromium (CrVI), the measured concentrations in the Environment Agency *document 'Releases from waste incinerators – Guidance on assessing group 3 metal stack emissions from incinerators'* version 4 (undated), provides a mean measured Cr(VI) concentration of 0.01% of the IED emission concentration limit. Table 2.6 shows the predicted PCs at this proportion.

Table 2.6: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations – Step 3

Pollutant	Percentage of the IED Emission Limit	EAL	Normal	Abnormal					
			Max PC	Max PC	PC as % of EAL	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
Cr (VI)	0.01	0.0002	7.36E-07	7.56E-07	0.38	Yes	Yes	-	-

2.26 The table above shows the predicted concentration of Cr(VI) emitted from the facility is 7.56 x 10^{-7} µg.m^{-3}, which represents 0.4% of the EAL for Cr(VI). As the maximum predicted ground-level concentration is less than 1% of the EAL no significant impact is anticipated due to the proposed facility and consideration of the PEC is not required.

Dioxins and Furans

2.27 There is no reliable figure available for the likely unabated concentration of dioxins. As such, in-line with EA assessment methodology, the IED emission limit has been multiplied by a factor of 100, giving an emission concentration of 10 ng.m^{-3}, to assess the effects. In practice, given that dioxins are most likely to be associated with the particulate phase, this is a very conservative

assumption as the factor of 5 derived for unabated particulate emissions would be a more realistic assumption.

Short-term Impacts

2.28 The effect of elevated short-term emissions of dioxins and furans is not considered likely to be significant as they accumulate slowly in the body over time due to inhalation and ingestion (a time period of 70 years is assumed for lifetime exposure to dioxins and furans). Accordingly, a short-term emission of 100 times the benchmark value for four hours will have no acute effect by inhalation on human health.

Long-term Impacts

2.29 An increase of 100 times the benchmark value for 60 hours per year will increase the amount deposited over a year at any given site by a factor of [(100 x 60/8760) + (8700/8760)] = 1.67.

2.30 Appendix 8.3 provides results of a Human Health Risk Assessment (HHRA). Table 7.3 provides the calculated Mean Daily Intake (MDI) which is the typical intake from background sources (including dietary intake) across the UK and the Tolerable Daily Intake (TDI)

2.31 The Process Contribution presented in Table 7.3 has been increased by a factor of 1.67 to determine an abnormal Process Contribution. The results are provided in Table 2.7.

Table 2.7: Impact Analysis TDI Maximum for Dioxins During Normal and Abnormal Operations

Maximum Impacted Receptor	MDI as % of TDI	Process Contribution as % of TDI (Normal)	Process Contribution as % of TDI (Abnormal)	Overall % of TDI (sum of MDI and Abnormal)
Adult	35%	1.26%	2.1%	37.1%
Child	91%	1.793%	3.0%	94%

2.32 The results show that the overall dioxins are below the TDI at the maximum impact receptors.

Failure of the Acid Gas Abatement System

Short-term Impacts

2.33 Failure of the acid gas abatement system has been considered as follows. The unabated emission of each acid gas is expected to be HCl 900 $mg.m^{-3}$, HF 10 $mg.m^{-3}$ and SO_2 250 $mg.m^{-3}$. The abnormal PC has been calculated based on the ratio of unabated emissions to IED short-term emission limits and reported in Table 2.8.

Table 2.8: Predicted Short-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	Averaging Period	EAL	Normal	Abnormal						
			Max PC	Max PC	PC as % of EQS	PC <10% EAL?	Screen Out	AC	PEC	PEC as % of EAL
HCl	1 hour (max)	750	11.97	179.6	23.94	No	No	1.4	180.95	24
HF	1 hour (max)	160	0.8	2.0	1.25	Yes	Yes	4.7	6.70	4
SO_2	15 min (99.9th %ile)	266	30.51	38.1	14.34	No	No	-	-	-
	1 hr (99.73th %ile)	350	27.76	34.7	9.91	Yes	Yes	33.4	68.10	19
	Daily-mean (99.18th %ile)	125	4.67	5.8	4.67	Yes	Yes	33.4	39.24	31

PCs and ACs drawn from ES Appendix 8.2, Table 4.1.

2.34 Short-term emission of HF and 15-min mean SO_2 can be screened out as insignificant based on the PC being less than 10% of the EAL. The short-term PECs for HCl and hourly and daily-mean SO_2 concentrations are below the EALs over the relevant averaging periods and as such will have no significant adverse effect.

Long-term Impacts

2.35 The energy recovery facility can operate for a maximum of 60 hours each year at these emission concentrations. The ratio of abnormal to normal emissions for HF is 2.5:1 and as such the PC can be calculated using the following formula: PC (normal) x [(ratio abnormal to normal operations x 60/8760) + (8700/8760)]. Table 2.9 sets out the PC under abnormal operations.

Table 2.9: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	Averaging Period	EAL	Normal	Abnormal					
			Max PC	Max PC	PC as % of EQS	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
HF	Annual	16	0.01	0.01	0.06	Yes	Yes	-	-

PCs and ACs drawn from ES Appendix 8.2, Table 4.1.

2.36 At long-term emissions, the PC for HF is below 1% of the EAL and can be screened out.

Failure of the Activated Carbon Injection System (Vapour phase heavy metal and dioxin and furan control)

2.37 Chemosphere, Vol 45, No 8 pp 1151 - 1157 reports that activated carbon injection systems are up to 98.7% efficient in the removal of dioxins and furans. As such it has been conservatively assumed that in the event of a failure of the activated carbon system all emission will increase by an order of 100 times.

Metals

Short-term Impacts

2.38 Based on the assumption above it has been assumed that heavy metals are emitted at 100 times the mass emitted under normal operations. Table 2.10 sets out the PC under abnormal operations.

2.39 It should be noted that the Activated Carbon injection system is used to control vapour phase emissions of metals. Most metals will be in the particulate phase, with only Hg and a limited amount of Cd emitted as vapour at the stack temperature of around 140^0C. Some metals, such as Cu, may be volatised at this temperature but it unlikely that elements with a higher melting point, e.g. V and Ni will vaporise.

Table 2.10: Predicted Short-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EQS	PC <10% EAL?	Screen Out	PEC	PEC as % of EAL
Cd	No EAL	-	-	-	-	-	-	-	-
Tl	30	-	0.005	0.50	1.66	Yes	Yes	-	-
Hg	7.5	0.04	0.00997	0.997	13.29	No	No	1.04	14
Sb	150	-	0.0997	9.97	6.65	Yes	Yes	-	-
As	No EAL	-	-	-	-	-	-	-	-
Cr	150	-	0.0997	9.97	6.65	Yes	Yes	-	
Co	No EAL	-	-	-	-	-	-	-	-
Cu	200	-	0.0997	9.97	4.99	Yes	Yes	-	
Pb	No EAL	-	-	-	-	-	-	-	-
Mn	1500	-	0.0997	9.97	0.66	Yes	Yes	-	
Ni	No EAL	-	-	-	-	-	-	-	-
V	1	0.005	0.0997	9.97	997.10	No	No	9.98	997.63

PCs and ACs drawn from ES Appendix 8.2, Table 4.1 and Table 4.8

2.40 All short-term emissions, with the exception of Hg and V are below 10% of the EAL and can be screened out as insignificant. Under abnormal operations the PEC of Hg is below the EAL.

2.41 Using the maximum monitored emissions of V as 0.12% of the IED emissions concentration limit, provided in ES Appendix 8.2 Table 4.8, the PC would be 0.12/100 x 997.10 = 1.2% of the EAL. As this is well below 10% of the EAL, the abnormal emission can be screened out as insignificant.

2.42 It should be noted that the Activated Carbon injection system is used to control vapour phase emissions of metals. Most metals will be in the particulate phase, with only Hg and a limited amount of Cd emitted as vapour. As such failure of the Activated Carbon injection system is unlikely to lead to any significant short-term emissions of metals. No significant adverse effect on human health is anticipated

Long-term Impacts

2.43 Based on the assumption used above that heavy metals are emitted at 100 times the normal emission concentration for a maximum of 60 hours then under abnormal operations the impact can be calculated using the following formula: PC (normal) x [(100 x 60/8760) + (8700/8760)]. Table 2.11 sets out the PC under abnormal operations.

Table 2.11: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EQS	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
Cd	0.005	0.0008	0.00037	0.001	12.42	No	No	0.001	28.42
Tl	1	-	0.00037	0.001	0.06	Yes	Yes	-	-
Hg	0.25	-	0.00074	0.001	0.50	Yes	Yes	-	-
Sb	5	-	0.00736	0.012	0.25	Yes	Yes	-	-
As	0.003	0.00081	0.00736	0.012	411.69	No	No	0.01	438.69
Cr	5	-	0.00736	0.012	0.25	Yes	Yes	-	-
Cr (VI)	0.0002	0.0024	0.00736	0.012	6175.34	No	No	0.01	7375.34
Co	No EAL	-	-	-	-	-	-	-	-
Cu	10	-	0.00736	0.012	0.12	Yes	Yes	-	-
Pb	0.25	0.022	0.00736	0.012	4.94	No	No	0.03	13.74
Mn	0.15	0.03	0.00736	0.012	8.23	No	No	0.04	28.23
Ni	0.02	0.00865	0.00736	0.012	61.75	No	No	0.02	105.00
V	5	-	0.00736	0.012	0.25	Yes	Yes	-	-

2.44 All long-term emissions, with the exception of As, Cr(VI) and Ni are below the EAL and can be screened out as insignificant.

2.45 The Environment Agency Group 3 guidance requires the assessment to progress to the second stage assessment for those metals that cannot be screened out based on 100% of the emission limit. Cr(VI), As and Ni cannot be screened out at Step 1, these metals have to be considered in more detail as part of the Step 2 assessment which assumes each element is emitted at 11% of the total Group 3 limit. The results are shown below.

Table 2.12: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations – Step 2

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EQS	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
As	0.003	0.00081	0.00736	0.001372	45.7	No	No	0.002	73
Cr (VI)	0.0002	0.0024	0.00736	0.001372	686.1	No	No	0.004	1886
Ni	0.02	0.00865	0.00736	0.001372	6.86	No	No	0.010	50

2.46 The PC and PEC for Cr(VI) has been recalculated using the Environment Agency mean measured Cr(VI) concentration of 0.01% of the IED emission concentration limit.

Table 2.13: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations – Step 3

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EAL	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
Cr (VI)	0.0002	0.0024	7.36E-07	1.24E-06	0.6	Yes	Yes	-	-

2.47 It should be noted that the Activated Carbon injection system is used to control vapour phase emissions of metals. Most metals will be in the particulate phase, with only Hg and a limited amount of Cd emitted as vapour at the stack temperature of around 140^{0}C. As such failure of the Activated Carbon injection system is unlikely to lead to any significant short-term impact.

Mercury

2.48 An unabated mercury emission concentration of 0.25 mg.Nm^{-3} has been provided. This is five times the IED emission concentration limit of 0.05 mg.Nm^{-3}. An abnormal PC has been calculated as five times the normal PC. The results are provided in Table 2.14 below.

Table 2.14: Predicted Long-term Concentrations (µg.m^{-3}) During Normal and Abnormal Operations

Pollutant	EAL	AC	Normal	Abnormal					
			Max PC	Max PC	PC as % of EAL	PC <1% EAL?	Screen Out	PEC	PEC as % of EAL
Hg	0.25	0.02	7.4E-04	3.7E-03	1.48	No	No	0.0237	9

2.49 The PEC is below the relevant EAL. As such, failure of the activated carbon injection system will not affect the conclusion of the air quality assessment that mercury will have no adverse impact.

3 Summary of Conclusions

3.1 Under abnormal operations, all air quality impacts are considered to have an insignificant effect.

References

1 Environmental Statement (January 2018) Proposed Development of an Energy Recovery Facility and Associated Infrastructure on Land South of Queens Road, Immingham, North East Lincolnshire

2 Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast)

3 Environmental Statement (January 2018) Proposed Development of an Energy Recovery Facility and Associated Infrastructure on Land South of Queens Road, Immingham, North East Lincolnshire

4 Environment Agency (undated) Conversion Ratios for NOx and NO_2

RPS

Contact

Fiona Prismall
Technical Director

RPS Planning & Development
6-7 Lovers Walk
Brighton
East Sussex
BN1 6AH

T: +44 (0) 1273 546 800
prismallf@rpsgroup.com