Air Quality Impact Assessment for Kemira

AQIA – Goole_001

PREPARED FOR

Kemira Chemicals UK Ltd

DATE

21st March 2024

REFERENCE

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1	21/03/2024	10	Initial Issue.

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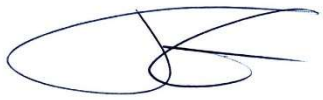

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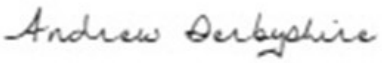

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1. INTRODUCTION

ERM understands that Kemira have applied for a planning application to expand the existing plant in Goole. From the perspective of emissions to air, this change will alter the process from one emission point to five. The local authority, noting this change, have requested an Air Quality Impact Assessment (AQIA) be prepared to quantify the impacts of this change. ERM understands that the proposed change to the process will result in five new emission points that are essentially the same as the one existing, decommissioned, emission point. This report sets out the findings of the AQIA.

1.1 METHODOLOGY

The process emits particulate matter (PM) and sulphur dioxide (SO_2). A dispersion model was prepared based on the design data to predict the Process Contribution (PC). The PC was combined with the baseline to calculate the Predicted Environmental Contribution (PEC). The PC and PEC were compared to the relevant air quality standards to determine the significance of the impacts.

Kemira provided ERM with emissions data, stack parameters and buildings design data for the proposed plant. These were combined with appropriate meteorological data, and model set up parameters.

The emissions data are summarised in Table 1.

TABLE.1 EMISSIONS PARAMETERS

Parameter	Units	EP 01	EP 02	EP 03	EP 04	EP 05
Stack height	m	17.43	17.43	17.50	17.40	8.22
Stack diameter	m	0.2678	0.2678	0.317	0.317	0.213
Exit velocity	m/s	15.79	15.79	16.90	16.90	0.58
Volume flow rate	Am^3/s	0.89	0.89	1.33	1.33	0.021
Normalised Volume flow rate	Nm^3/s	0.70	0.70	1.05	1.05	0.016
Temperature	Celsius	75	75	75	75	75
PM	g/s	0.00108	0.00108	0.00108	0.00108	0.00108
SO2	g/s	0.000103	0.000103	0.000103	0.000103	0.000103

The model parameters are summarised in Table 2.

TABLE.2 MODEL PARAMETERS

Parameter	Value	Notes
Dispersion model	CERC ADMS 6.1	ADMS is widely recognized by UK regulators and is suitable for this type of application
Number of model scenarios	1	One model scenario was run with the future configuration of four stacks
Model domain	5 km x 5 km	This model domain captures nearby sensitive human receptors. No assessment of ecological receptors was required
Receptor grid resolution	10	Resolution is <1.5 x lowest stack height
Buildings	Included	The main plant structures were include as these are >1/3rd stack height within 5 x the stack height
Terrain	Not included	There are no sustained gradients of >1:10 within the 5km x 5km model domain. Therefore, terrain effects will not be significant.
Meteorological data	Leconfield, 2019 – 2023 inclusive	Hour-sequential data.
Surface Roughness	1.00	Surface roughness representative of suburban areas
Baseline	PM_{10}: 17.4 µg/m^3 $PM_{2.5}$: 10.4 µg/m^3 SO2: 5.00 µg/m^3	Data obtained from East Riding of Yorkshire Council[1] and DEFRA air quality background maps[2]

The Air Quality Standards (AQS) relevant for PM and SO_2 are set out in Table 3. In terms of PM, the conservative assumption is made that all of the PM emissions occur in the PM_{10} and $PM_{2.5}$ size fraction.

TABLE.3 AIR QUALITY STANDARDS

Pollutant	Averaging period	Units	Value
PM_{10}	Annual mean	µg/m^3	40
	24 hour mean (as 90.4th percentile)	µg/m^3	50
$PM_{2.5}$	Annual mean	µg/m^3	25
SO_2	1 hour mean	µg/m^3	350
	24 hour mean	µg/m^3	125

[1] East Yorkshire Council, 2023, 2023 Air Quality Annual Status Report (ASR), https://downloads.eastriding.org.uk/corporate/pages/air-quality-monitoring/pdfs/Air%20Quality%20Annual%20Status%20Report%20(ASR)%202023.pdf

[2] Department for Environment Food & Rural Affairs (DEFRA), 2024, Background Mapping data for local authorities, https://uk-air.defra.gov.uk/data/laqm-background-home

The significance of impacts is determined based on the criteria set out in Table 4. These are derived from the Institute of Air Quality Management (IAQM).

TABLE.4 SIGNIFICANCE CRITERIA

PEC at receptor as percent of AQS	**Percent change relative to air quality standard**			
	1	2-5	6-10	>10
<75%	Negligible	Negligible	Slight	Moderate
76% to 94%	Negligible	Slight	Moderate	Moderate
95% to 102%	Slight	Moderate	Moderate	Substantial
103% to 109%	Moderate	Moderate	Substantial	Substantial
>110%	Moderate	Substantial	Substantial	Substantial
Short term				
<10%	Negligible			
>10%	Moderate/Substantial			

2. RESULTS

The results of the AQIA are set out in Table 5.

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TABLE.1 RESULTS

Pollutant	**Averaging period**	**AQS**	**PC**	**PC/AQS**	**PEC**	**PEC/AQS**	**Significance**
			µg/m^3	%	µg/m^3	%	
PM_{10}	Annual mean	40	0.09	0.23%	17.5	43.8%	Negligible
	24 hour mean (as 90.4th percentile)	50	0.27	0.54%	35.1	70.2%	Negligible
$PM_{2.5}$	Annual mean	25	0.09	0.37%	10.5	42.2%	Negligible
SO_2	1 hour mean	350	0.008	0.02%	5.04	1.44%	Negligible
	24 hour mean	125	0.008	0.01%	10.1	8.05%	Negligible

3. CONCLUSIONS

The AQIA identified that the emissions from the Kemira facility are predicted to have a negligible impact on sensitive human receptors for both PM and SO_2 emissions. On this basis, no mitigation or changes to project design are required, and air quality is not a constraint to the proposed project.

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