PROPOSED WASTE TYRE FACILITY

PORT OF SUNDERLAND

Schedule 5 Response

Air Emissions Risk Assessment

Screening Assessment

Prepared for: Wastefront AS

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BASIS OF REPORT

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1.0 INTRODUCTION

SLR Consulting Ltd (SLR) has been commissioned by Wastefront AS to undertake an Air Emissions Risk Assessment (AERA) for a proposed waste tyre facility ('Proposed Development') at the Port of Sunderland (the 'Site'). The Site lies within the administrative area of Sunderland City Council (SCC).

The Proposed Development comprises a series of regulated Emission Points (A1 – A19), including a 30m flue stack (A1 – 'Proposed Installation').

1.1 Scope of Assessment

Following submission of the original AERA, the Environment Agency (EA) issued a Schedule 5 notice (Notice of Requirement for More Information) – seeking clarification and/or further assessment of air emissions. Furthermore, in the interim the design of the process has also evolved.

The AERA has been revised to account for these design changes and Schedule 5 notice, where relevant. Of relevance to this assessment is the screening of emissions to air for those pollutants which do not require detailed assessment. This relates to 12 liquid tank vents (A8 – A19) which have the potential to release a range of hydrocarbons (Figure 1-1). The assessment has focussed on naphtha - following the recommendations of the design engineering team. Naphtha is the most volatile product which has the potential to be released as a vapour during the displacement of headspace air during tank filling.

As per the EA's AERA guidance, naphtha is not listed as a primary or secondary pollutant that requires consideration of ecological impacts. Therefore, the objective of the assessment is to determine the extent of potential air quality effects, by comparison to relevant guidelines for the protection of human health only.

The scope of the screening assessment is based on the approach prescribed within the EA's Air Emissions Risk Assessment guidance[1] (herein referred to as the AERA guidance).

The following assessments will be issued separately:

- dispersion modelling of emissions to air (under normal conditions) for those pollutants which require detailed assessment (A1, A5, A6 and A7); and
- dispersion modelling assessment of abnormal conditions.

Consideration of these task elements are excluded from this assessment and not referred to herein.

[1] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

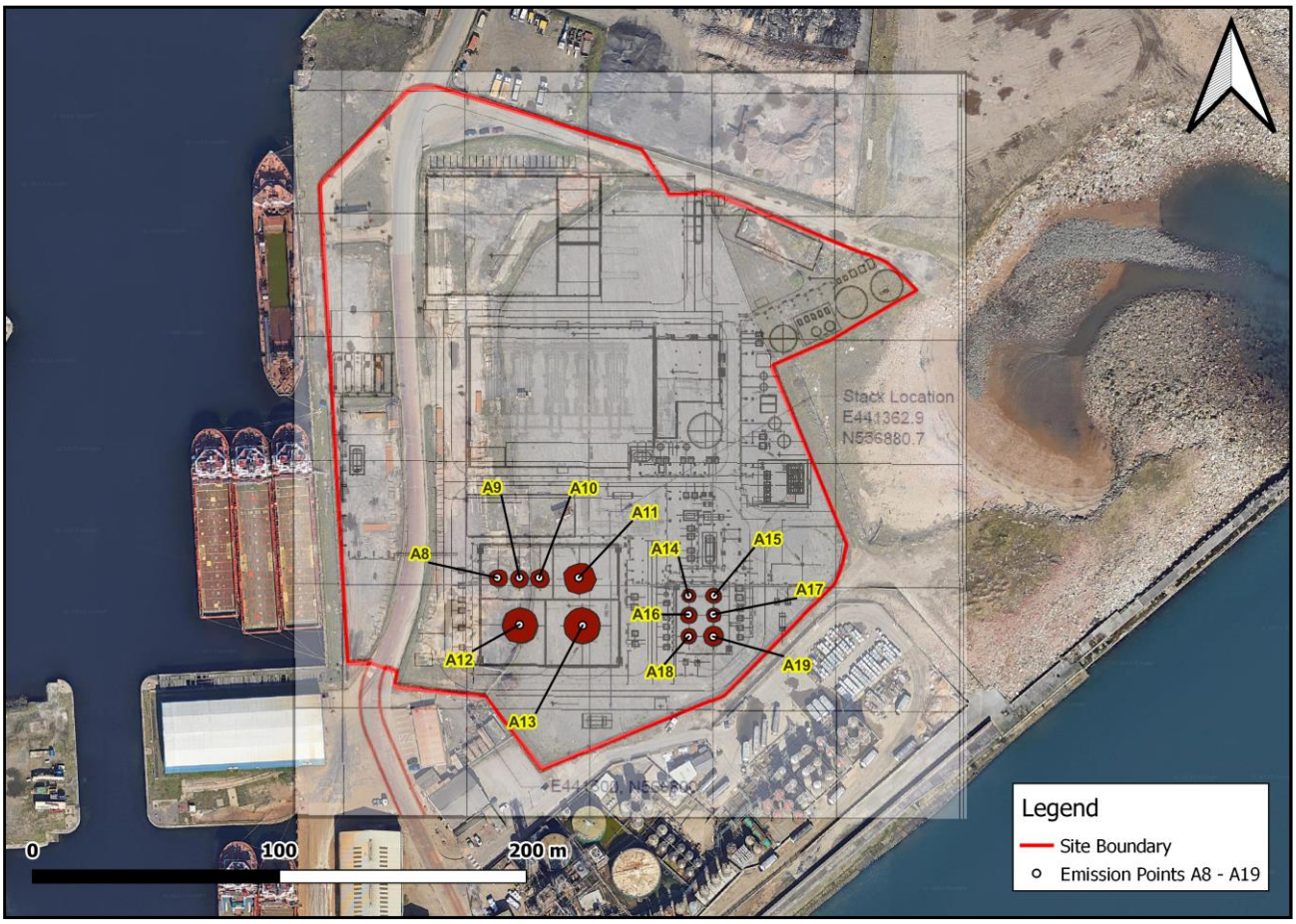

Figure 1-1
A8 – A19 Emissions to Air Locations

2.0 ASSESSMENT METHODOLOGY

2.1 Derivation of Environmental Assessment Levels

There are no environmental thresholds for the assessment of naphtha currently operable within the UK. Similarly, no Environmental Assessment Levels (EALs) for naphtha are provided within the EA's AERA guidance.

Short and long-term EALs applied in this assessment of naphtha are based upon the United States Department of Labor occupational exposure limits, which have been derived (as per EA guidance) to account for the duration of exposure and sensitivity of the general population (Table 2-1). These EALs relate to 1-hour and annual mean averaging periods.

Table 2-1
Naphtha: Derived EALs

Chemical Database	Exposure Limit (mg/m^3)				EAL (µg/m^3)	
	Source	Type	8-Hour	15-Minute	8-Hour	15-Minute
Naphtha (Coal Tar)	CAL/OSHA	PEL-TWA	400	-	800	-
VM&P Naphtha	NIOSH REL	REL-C	-	1,800	-	36,000
Table Notes: PEL-TWA = Permissible Exposure Limit – Time Weighted Average REL-C = Recommended Exposure Limit - Ceiling						

Both exposure limits have been considered as a Maximum Exposure Limit (MEL) as part of the EAL derivation calculation, as they cannot be exceeded at any given time.

2.2 Quantification of Emissions

Emission Points A1 – A19 relate to vents associated with 12 liquid storage tanks – blanketed with nitrogen. Emission releases are anticipated as a result of displacement of headspace air during filling.

The design of tanks account for a range of conditions to control/minimise vapour emission releases – specifically pressure, given the use of a blanketed control system. In the event that the pressure falls below the minimum design threshold value, a valve will open briefly to introduce more nitrogen to restore design conditions. During loading of the liquid product into the tanks, the headspace compresses, increasing the pressure. If the pressure increases above the maximum design threshold value, a pressure control valve opens briefly (several seconds) to release some of the nitrogen to atmosphere via the tank vents. For the majority of tank loading scenarios, the pressure would not increase above the maximum design threshold value and venting would not be required. This scenario is expected to last for a maximum of 30 minutes, once a week.

Whilst stored, naphtha can dissipate into the nitrogen headspace, however the concentration is dependent on the vapour pressure of each product. The design engineering team has confirmed that 0.1% (1,000 parts per million (PPM)) of the nitrogen vapour could contain naphtha, assuming a worst-case scenario for all tanks. This equates to 4,499mg/m^3 (25°C / 1 ATM).

2.3 Effective Release Height and Dispersion Factors

Emission Points A1 – A19 are all located on the roof of a tank (Figure 1-1). The effective release height of all Emission Points (A1 – A19) is 0m. Details of the applied dispersion factors (0m) are provided in Table 2-2.

It has been assumed that naphtha emission releases occur continuously for 8,760 hours per year (i.e. 24 hours per day 7 days per week). Use of this assumption facilities a conservative assessment, as emission releases are only expected to last a maximum of 30 minutes, once a week.

Table 2-2
Applied Dispersion Factors (0m)

Parameter	Unit	Value
Dispersion Factors (Annual)	µg/m^3/s	148
Dispersion Factors (1-hour)	µg/m^3/s	3,900

2.4 Outputs

Predicted pollutant concentrations are summarised in the following formats:

- process contribution (PC) – the predicted contributions from the installation alone; and
- predicted environmental concentration (PEC) – the resultant predicted concentration (i.e. PC + ambient background concentration value).

Naphtha is not routinely measured in the UK. For the purposes of informing a PEC, background concentrations are assumed to be negligible.

2.5 Assessment of Impact and Significance

In relation to human receptors, the AERA guidance states that emissions to air can be considered insignificant and not require further assessment if:

- the long-term PC is <1% of the long-term AQAL; and
- the short-term PC is <10% of the short-term AQAL.

For PCs that cannot be considered insignificant, further consideration is required. Detailed modelling is not required where neither of the following are met:

- PEC (long-term) <70% of the long-term AQAL; or
- PC (short-term) is <20% of the difference between the short-term AQAL minus twice the long-term background concentration.

3.0 ASSESSMENT RESULTS

Predicted impacts are summarised in Table 3-1.

Table 3-1
AERA Screening Results

EAL			PC (µg/m³)	PC % of EAL	PEC (µg/m³)	PEC % of EAL
Pollutant	Period	µg/m³				
Naphtha	Annual	800	160.4	20.0	160.4	20.0
Naphtha	1-Hour	36,000	4,225.7	11.7	4,225.7	11.7

Both long and short-term PCs cannot be considered insignificant. However the calculated PECs are:

- Long Term: <70% of the EAL; and
- Short Term: <20% of the EAL (minus twice the long term background concentration – nil).

No further assessment or detailed modelling is therefore required.

Appendix A – Emission Release Characteristics

Table A-1
Emission Release Characteristics (A8 – A19)

Emission Point	Description	NGR		Diameter (cm)	Actual Volumetric Flow (m^3/hr)	Naphtha Emission Rate (g/s)
		X	Y			
A8	Off-spec and slops buffer tank	441313	556853	10.0	40	0.049989
A9	Generator fuel tank	441322	556853	7.5	40	0.049989
A10	Generator fuel tank	441330	556853	7.5	40	0.049989
A11	Naphtha final product storage tank	441346	556853	7.5	400	0.499886
A12	Bunker oil / fuel oil final product storage tank	441322	556834	7.5	72	0.089980
A13	Bunker oil / heavy distillate final product storage tank	441341	556834	7.5	72	0.089980
A14	Commercial Diesel storage tank	441390	556846	7.5	40	0.049989
A15	Pyrolysis oil distillation feed tank	441400	556846	5.0	30	0.037491
A16	Naphtha buffer tank	441390	556839	5.0	43	0.053738
A17	Bunker oil / fuel oil buffer tank	441400	556839	5.0	10	0.012497
A18	Heavy distillate buffer tank	441390	556830	5.0	37	0.046239
A19	Light distillate buffer tank	441400	556830	5.0	43	0.053738

Table Note:
PPM to mg/m^3 conversion: 24.45 (25°C / 1 ATM)

EUROPEAN OFFICES

United Kingdom

AYLESBURY
T: +44 (0)1844 337380

BELFAST
belfast@slrconsulting.com

BRADFORD-ON-AVON
T: +44 (0)1225 309400

BRISTOL
T: +44 (0)117 906 4280

CARDIFF
T: +44 (0)29 2049 1010

CHELMSFORD
T: +44 (0)1245 392170

EDINBURGH
T: +44 (0)131 335 6830

EXETER
T: + 44 (0)1392 490152

GLASGOW
glasgow@slrconsulting.com

GUILDFORD
guildford@slrconsulting.com

LONDON
T: +44 (0)203 805 6418

MAIDSTONE
T: +44 (0)1622 609242

MANCHESTER (Denton)
T: +44 (0)161 549 8410

MANCHESTER (Media City)
T: +44 (0)161 872 7564

NEWCASTLE UPON TYNE
T: +44 (0)191 261 1966

NOTTINGHAM
T: +44 (0)115 964 7280

SHEFFIELD
T: +44 (0)114 2455153

SHREWSBURY
T: +44 (0)1743 23 9250

STIRLING
T: +44 (0)1786 239900

WORCESTER
T: +44 (0)1905 751310

Ireland

DUBLIN
T: + 353 (0)1 296 4667

France

GRENOBLE
T: +33 (0)6 23 37 14 14