SCHEDULE 5 RESPONSE

APPLICATION REF: PAN – 000505

OPERATOR: GRAYS BIOGAS LTD

FACILITY: MONA AD PLANT, MONA INDUSTRIAL ESTATE, GWALCHMAI LL65 4RJ

AIR QUALITY

1/ Phase 2 Potential maximum release of Ammonia

Information detailed in Document 3407-819-A Mona AD Ammonia Assessment version 1.0 dated 26 October 2016 (ANNEX 1)

Information submitted on 28/10/2016 under separate correspondence

CONTAINMENT

2/ Proposed containment and control measures for Phase 2

(Awaiting further correspondence from Agraferm which will then be submitted to NRW as part of the Schedule 5 Response)

3/ Agraferm have confirmed that the bunded area (ie main AD Tank Farm) has been designed with sufficient capacity to include the Ammonium Sulphate tank (ASL) as well as the other storage tanks. Secondary containment has been provided which equates to as a minimum 110% of the largest tank volume.

The ASL tank is fitted with a binary maximum level indicator (L) as well as containing an analogue level measurement (LR). When the LR is reached the tank is full and the pumps feeding material into the ASL are stopped. This is the ASL pump of the evaporator units and the SL pump of the belt dryer. If the LR is reached the automatic valves in the feedlines are closed and an alarm will be triggered in the visualisation. In case of a sensor failure (L) will give an alarm and close the valves as well.

Tank loading with pump control is fully manual operation to take into account that Ammonium Sulphate is a possible harmful liquid. The procedure is detailed in Agraferm's Control Document a copy of which is kept in the site office.

Details of the tank capacities and other relevant bund details are shown on the Drainage Drawings in Appendix O to the EMS.

4/ Potential corrosive effect of sulphuric acid/ammonia vapour on fabric of the building and the potential for fugitive odour emissions in the future:

There is an infrastructure maintenance check carried out quarterly which would check for any signs of corrosion. All vapour from the washers is directed outside the dryer hall and vented approximately 1 metre away from all steel structures. Dispersion is performed by natural dispersion. The building infrastructure is constructed of galvanised steel with a design life of 25 years and therefore not anticipated to corrode to the point of allowing fugitive emissions. The building is enclosed on three sides and has a 20% opening on the forth side. However the belt dryer has its own integrated unit as it was never the intention to design the building to contain emissions. The Sulphuric acid tank vents from a stub on top of the tank within the building. See also 6/ below.

5/ Sulphuric acid delivery point

An operation procedure will be in place to ensure that no spills can leave the interfaces of the AD plant. The offloading of H_2SO_4 will only be permitted by the operator once the closure of the value after the attenuation pond has been closed. This valve will only be opened again after loading has been completed without spillages.

Copy of the operational procedures involving the delivery of sulphuric acid onto the Mona AD site and details of the sulphuric acid delivery point (wall mounted cabinet with filling line and integrated drip tray) are attached in ANNEX 2 of this document.

6/ Sulphuric acid bulk tank (SAT) venting arrangement

The Sulphuric acid bulk tank consists of a double skinned plastic tank located inside the dryer hall. The tank consists of a 'Hull' type cylinder tank with catchment tank. Tank material: PE-100-RC-WK-S-8000, welded sheets. Tank dimensions: Inside diameter 2.885m, Height (clear) 3.454m, Gross volume $15m^3$.

The tank provides acid to both the dryer and the evaporators to acidify the washing water in the respective scrubber allowing the capture of ammonia. Only small amounts of H_2SO_4 are used in the process.

The tank vents from a stub on top of the tank within the building. The building infrastructure is constructed of galvanised steel with a design life of 25 years and therefore not anticipated to corrode to the point of allowing fugitive emissions. There is an infrastructure maintenance check carried out quarterly which would check for any signs of corrosion.

ANNEX 1

Mona AD Plant
Ammonia Assessment

(3407-819-A)

MONA AD PLANT AMMONIA ASSESSMENT

Grays Biogas Ltd

VERSION:	1.1	DATE:	28 October 2016		
DOC. REF:	3407-819-Z	AUTHOR:	DY	CHECKED:	
CLIENT NO:	819	JOB NO:	3407		

Oaktree Environmental Ltd

Waste, Planning & Environmental Consultants

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REGISTERED IN THE UK | COMPANY NO. 4850754

Document History:

Version	*Issue date*	*Author*	*Checked*	*Description*
1.0	26/10/2016	DY		Draft for internal review
1.1	28/10/2016	DY		Final

CONTENTS

List of Appendices:

1 Summary

1.1 A detailed assessment of potential emissions of ammonia arising from the operation of an Anaerobic Digestion (AD) plant at Mona Industrial Estate has been undertaken using AERMOD. The model has incorporated potential sources of ammonia as emission sources, which includes the exhaust vents serving the proposed digestate drying process. The report has included an assessment of potential impacts of sensitive human and ecological receptors, with comparison to Environmental Assessment Levels (EALs) and critical levels.

2 Introduction

2.1 Background and Context of Assessment

2.1.1 An ammonia modelling assessment has been undertaken in support of an Environmental Permit Variation application being submitted for an AD Facility to be located at Mona Industrial Estate, Anglesey. The assessment has been undertaken to predict the potential impacts at surrounding human and ecological receptor locations as a result of the proposed operations. Detailed dispersion modelling has been undertaken to predict likely resulting ground level ammonia concentrations surrounding the proposed plant at sensitive receptor locations, which have been compared with the relevant assessment criteria.

2.2 Site Location

2.2.1 The site is located off the A5 road, within the Mona Industrial Estate, at approximate National Grid Reference (NGR) 242029, 375477. Reference should be made to Appendix I for a map illustrating the site location and layout plan.

2.3 Proposed Activities

2.3.1 The proposed activities include the operation of an AD plant. AD is a biological process, which breaks down organic matter within biodegradable wastes in the absence of oxygen, through the actions of a variety of micro-organisms. The result of these processes is the production of biogas, which consists predominantly of methane (CH_4) and carbon dioxide (CO_2) and a useable digestate product which has environmental benefits when used in place of fertilisers. It is proposed to utilise the biogas to power internal combustion engines for the production of electricity and heat. The electricity produced will be exported to the National Grid. The digestate will undergo a series of separation and drying processes to produce a compost product.

2.3.2 The feedstocks to be used will include the following, which are annual quantities:

- 15,000 tonnes chicken litter;
- 25,000 tonnes DAF effluent;
- 10,000 tonnes energy crops; and,
- 3,000 tonnes glycerol.

2.3.3 The site has already been awarded full planning permission. An Environmental Permit (EP) was previously issued for the operation of an AD facility at the site. However, since the EP was issued, the site layout, proposed feedstocks and quantities have been revised. As such, an application is required to vary the EP for the site. This report contains a detailed assessment of potential ammonia arising from the operation, in support of the EP variation application.

3 UK Ammonia Legislation and Regulation

3.1 Overview

3.1.1 The United Kingdom (UK) was committed to reducing airborne ammonia emissions by 17% of the 1990 base value by the year 2010. This was a target agreed during the Gothenburg Protocol (1999) which was developed by the United Nations Economic Commission for Europe (UNECE).

3.1.2 Ammonia is reported to affect plants and vegetation at relatively low atmospheric concentrations. Critical atmospheric levels have been established by UNECE, above which it is indicated that ammonia can cause damage to ecological receptors. Short and long term Environmental Assessment Levels (EALs) are also in place for ammonia for the protection of human health.

3.1.3 The atmospheric release of ammonia from the proposed AD plant will be controlled under the Environmental Permitting (England and Wales) Regulations 2010 (as amended).

3.2 Critical Level for Ammonia for Protection of Vegetation

3.2.1 A worst case critical level of 1µg.m^{-3} as an annual mean ammonia concentration has been confirmed as appropriate by Natural Resources Wales (NRW) for the nearest statutory ecological receptor (Cors Bodwrog Site of Special Scientific Interest (SSSI)). As a precautionary approach, this conservative critical level has been assigned for all ecological receptors considered within this assessment. Nitrogen deposition associated with ammonia emissions has not been assessed since the worst critical level of 1µg.m^{-3} for annual mean ammonia concentration can be considered a catch-all for critical loads, therefore, if impacts can be screened/modelled as insignificant against the worst case critical level for ammonia, impacts will be insignificant on critical loads for acid and nitrogen deposition.

3.3 Environmental Assessment Levels for Ammonia for Protection of Human Health

3.3.1 NRW have confirmed that impacts on short term EALs for ammonia should be considered, assuming that the short term EAL is a daily average EAL. The short term EAL for ammonia which is relevant to this assessment is contained in the table below. This has been obtained from the UK government website[1]. This is stated to be an hourly limit. For completeness, both 1-hour mean and 24-hour mean ammonia concentrations have been assessed against this criteria.

Table 1 Short Term EAL for Ammonia

Pollutant	Short Term EAL (Hourly Limit) ($\mu g.m^{-3}$)
Ammonia	2,500

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

4 Baseline Position

4.1 Site Context

4.1.1 The proposed site is located in a rural location with other potential sources of ammonia in the vicinity, including the poultry farm to the North.

4.2 Sensitive Receptors

4.2.1 Table 2 contains a list of all identified sensitive receptors within the vicinity of the proposed plant, which would be most sensitive to ammonia. Where these are referred to in the report, they are identified as A1 to A9. These include a combination of residential receptors and statutory ecological receptors. The identified NGR for each receptor represents the nearest point to the proposed site boundary in order to ensure a 'worst case' assessment.

Table 2 Identified Ammonia Sensitive Receptor Locations

Ammonia Receptor Identifier	Ammonia Sensitive Receptor Description	National Grid Reference (m)	
		X	Y
A1	Fronleu Haulfre	242095	375823
A2	Mathafarn	242210	375539
A3	Cae Eithin	241938	375216
A4	Tyn Rhos	241138	376194
A5	Cors Bodwrog SSSI	240894	377078
A6	Corsydd Mon a Llyn/Anglesey and Llyn Fens ramsar/Corsydd Mon/Anglesey Fens Special Area of Conservation (SAC)	247587	379909
		246983	380542
		249926	378755
		247285	377783
		247540	377331
A7	Glan-traeth SAC	241732	366989
A8	Glannau Mon: Cors heli/Anglesey Coast:Saltmarsh SAC	240754	368757
A9	Y Twyni o Abermenai i Aberffraw/Abermenai to Aberffraw Dunes SAC	237890	370630

5 Modelling Methodology

5.1 Model Description

5.1.1 The potential air quality impact that may arise through emissions of ammonia during operation of the AD facility has been quantified using AERMOD, which is a steady state, next generation, dispersion model. AERMOD was developed jointly by the American Meteorological Society (AMS) and the United States (US) Environmental Protection Agency (EPA) Regulatory Model Improvement Committee. The AERMOD model is a development from the ISC(Industrial Source Complex) 3 dispersion model and incorporates improved dispersion algorithms and pre-processors to integrate the impact of meteorology and topography within the modelling output, and is approved for use within the UK by the EA and NRW. The version of AERMOD that has been used for this current assessment is Lakes Environmental ISC-AERMOD View Version 9.2. The model has been run using the most recent version of the AERMOD executable file, 15181. In order to improve modelling running times, Lakes Environmental have produced an equivalent source code to 15181, known as AERMOD parallel which enables the model to be run over multiple processors. The model was run using Lakes Environmental AERMOD MPI 15181.

5.2 Model Inputs

5.2.1 Ammonia Emissions and Sources

5.2.1.1 There are no emission limit values for ammonia. A potential source of ammonia emission at the proposed plant includes exhaust stacks associated with the air cleaning system on the drying shed. The technology provider has advised that this system will control ammonia emissions to a maximum residual ammonia concentration of 7.3mg.m^{-3}.

5.2.1.2 The following table provides a summary of ammonia emission sources and parameters assigned within the model. Reference should be made to Appendix I for a plan illustrating emission sources used as model inputs.

Table 3 Summary of Ammonia Emission Sources and Parameters Assigned in Model

Ammonia Source	Type of Emission Source	Point Source Diameter (m)	Exhaust Flow Rate Per Stack ($m^3.s^{-1}$)	Ammonia Emission Rate Per Stack ($g.s^{-1}$)	Release Height (m)	Release Temperature
Vents on Control Unit serving drying hall	Point source (5 in total)	0.8	2.46	0.017967	11	303

5.2.2 Building Downwash

5.2.2.1 The on-site structures were digitised within the model from site layout and height information provided by the site operator. As the closest buildings to the odour emission sources, these would be expected to have an influence on pollutant dispersion from point source emissions. Table 4 contains information on building dimensions assigned within the model. Reference should be made to the drawing in Appendix I for details of structure locations.

Table 4 Building and Structure Heights

Structure	Max Height (m)	Length and Width (m)	Diameter (m)
Storage Tank	14.45	-	25.31
Post Digester	14.45	-	24.93
Digester 2	12.63	-	18.98
Digester 1	12.63	-	19.08
Chicken Litter Storage Building	10.02	15.99 x 8.29	-
Drying Hall	8.58	14.65 x 28.13	-
Silage Clamp	6.1	46 x 53	-
Compost Hall	7.38	13.25 x 13.62	-
Glycerol Tank	6.4	-	4.4
DAF SCC1	7.2	-	4.06
DAF SCC2	7.2	-	4
DAF Glambia	6.4	-	3.75
Feedstock Hoppers	3	13.72 x 2.71	-
Hydronisation Tanks	5.4	-	2.5
Buffer Tank	5.4	-	3.17
PW Tank	5.4	-	3.25
CHP	4.420	13.8 x 3.4	-

5.2.2.2 The integrated Building Profile Input Programme (BPIP) module within AERMOD was used to assess the potential impact of building downwash upon predicted dispersion characteristics. Building downwash occurs when turbulence, induced

by nearby structures, causes pollutants emitted from an elevated source to be displaced and dispersed rapidly towards the ground, resulting in elevated ground level concentrations. All building structures were input into the BPIP processor.

5.2.3 Meteorological Data

5.2.3.1 Meteorological data used in this assessment was obtained from Valley meteorological station, including missing cloud cover data from Liverpool. Valley meteorological station is located approximately 11km to the West of the proposed site.

5.2.3.2 Five years of meteorological data observed between 2004 and 2008 was used within the assessment. Data was previously supplied by ADM Ltd, an established distributor of met data within the UK. The data provided by ADM Ltd was in ADMS format. This was converted to the required format required by AERMET using the ADMS UK to SAMSON converter, which is a tool within the AERMET processor. The AERMET processor within AERMOD was used to process the data to be site specific. US EPA guidance on processing met data for use within AERMOD states that land use up to 1km upwind from a site should be considered when determining surface roughness characteristics, whilst for Bowen ratio and albedo, land use types within a 10km by 10km area centred over the site should be considered[2]. The land use over the 10km by 10km area is dominated by rural and cultivated land, which make up approximately 90% of the land coverage. The remaining 10% consists of buildings and trees. AERMOD guidance states that albedo and bowen ratio should be calculated as the arithmetic and geometric mean respectively of land use types over the 10km by 10km grid, not weighted by direction or distance. In terms of surface roughness, land use surrounding the site consists of scattered trees, hedges and buildings, therefore, a surface roughness factor of 0.3 was considered appropriate.

[2] AERMOD Implementation Guide, US EPA, 2015.

5.2.3.3 The parameters use to process the meteorological data are contained within Table 4

Table 5 Parameters for Surface Roughness, Albedo and Bowen Ratio

Parameter	Directional Sector	Value
Surface Roughness	All	0.3
Albedo	All	0.239
Bowen Ratio	All	0.8608

5.2.4 Terrain Data

5.2.4.1 Topographical features can have a significant impact on pollutant dispersion, however, the gradient of the land across the site and surrounding modelling domain is predominantly <10%. Therefore, it was not considered necessary to include terrain data, in accordance with the relevant guidance[3].

5.2.5 Assessment Area

5.2.5.1 The model was used to predict resulting ammonia concentrations at discrete sensitive human and ecological receptors. The NGR for receptors used as model inputs is contained within Table 2. In addition, numerous Cartesian receptors were placed along the boundary of the closest ecological receptor (Cors Bodwrog SSSI), to ensure the point of highest impact was captured. Furthermore, a 2,000m x 2,000m uniform Cartesian receptor grid was used to represent the modelling domain with a grid spacing of 25m, centred on the site location, so that the point of maximum impact could be captured.

5.2.6 Modelled Scenarios

5.2.6.1 The scenarios modelled are contained within Table 6.

Table 6 Modelled Scenarios

[3] LAQM.TG(09), DEFRA, 2009.

Scenario	Modelled Scenarios
All years	1-hour mean, 24-hour mean and annual mean ammonia concentrations.

5.2.7 Model Uncertainty and Error

5.2.7.1 It is widely accepted that there can be a significant degree of uncertainty in predictions made by any atmospheric dispersion model, which needs to be taken into account when assessing modelled results. As the site is not yet operational, the modelling assessment has incorporated ammonia emission rates based on the maximum ammonia concentration that the control system is designed to achieve. As such, residual ammonia concentrations are likely to be a degree lower than the values used in this report. A series of conservative assumptions have been used in this assessment which are considered to provide a high level of confidence that that the ammonia model predictions present a highly conservative, worst case assessment, despite potential model uncertainty and errors. A summary of these worst case assumptions is as follows:

- Ammonia emission rates based upon worst case concentrations for control unit;
- It was assumed that the plant will be operational for 24 hours per day, 365 days per year with no shut down for maintenance;
- Worst case concentrations across five years of met data used to assess potential impacts;
- No inclusion of the effects of plume depletion as a result of wet and dry deposition, which would likely result in lower ammonia concentrations at sensitive receptors than those predicted in this report.

5.2.8 Methodology for Assessment of Potential Impacts

5.2.8.1 In order to assess potential impacts, reference has been made to the air emissions risk assessment guidance on the government website[4]. The guidance indicates that potential impacts from a process can be considered insignificant if the following screening criteria are met:

- The long term process contribution is <1% of the long term environmental standard; and/or,
- The short term process contribution is <10% of the short term environmental standard.

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

6 Model Results

6.1 The tables below present the maximum modelled ammonia concentrations at sensitive receptor locations. As is indicated, the maximum modelled process contribution to the 1-hour mean and 24-hour mean EAL for ammonia will be less than 10% at all locations within the modelling domain, including the closest sensitive human receptor locations. As such, impacts on human receptors are not predicted to be significant. The modelled process contribution to the worst case critical level at sensitive ecological receptors is not predicted to exceed 1%. As such, impacts on sensitive ecological receptors are not predicted to be significant.

Table 7 Maximum Modelled Process Contribution to 24-Hour Mean Ammonia Concentrations

Maximum Modelled 24-Hour Mean Ammonia Concentrations Within Model Domain (µg.m^{-3})	Process Contribution as Percentage of EAL (%)
50.65	2.03

Table 8 Maximum Modelled Process Contribution to 1-Hour Mean Ammonia Concentrations

Maximum Modelled 1-Hour Mean Ammonia Concentrations Within Model Domain (µg.m^{-3})	Process Contribution as Percentage of EAL (%)
104.23	4.17

Table 9 Maximum Modelled Process Contribution to 24-Hour Mean Ammonia Concentrations at Sensitive Receptors

Receptor	Modelled 24-Hour Mean Ammonia Concentrations For Each Assessment Year at Sensitive Receptors (µg.m^{-3})	Process Contribution as Percentage of EAL (%)
A1	2.08	0.08
A2	3.7	0.15
A3	3.15	0.13
A4	0.54	0.02

Table 10 Maximum Modelled Process Contribution to 1-Hour Mean Ammonia Concentrations at Sensitive Receptors

Receptor	Modelled 1-Hour Mean Ammonia Concentrations For Each Assessment Year at Sensitive Receptors (µg.m^{-3})	Process Contribution as Percentage of EAL (%)
A1	15.06	0.6
A2	33.05	1.32
A3	22.89	0.92
A4	5.17	0.21

Table 11 Modelled Process Contribution to Annual Mean Ammonia Concentrations at Sensitive Ecological Receptors

Receptor	Modelled Annual Mean Ammonia Concentrations For Each Assessment Year at Sensitive Ecological Receptors ($\mu g.m^{-3}$)						Max Process Contribution as Percentage of Worst Case Critical Level
	2004	2005	2006	2007	2008	Max	
A5	0.006	0.009	0.010	0.010	0.009	**0.01**	1
A6	0.001	0.002	0.002	0.002	0.002	**0.002**	0.2
A7	0.002	0.002	0.002	0.003	0.002	**0.003**	0.3
A8	0.002	0.002	0.003	0.003	0.004	**0.004**	0.4

7 Conclusions

7.1 A detailed assessment of potential ammonia arising from the operation of an AD plant at Mona Industrial Estate has been undertaken using AERMOD. The model has incorporated potential sources of ammonia as emission sources, which includes the exhaust vents serving the digestate drying process. The modelled process contribution is not predicted to exceed 1% of the critical level for annual mean ammonia concentration at statutory ecological receptors. Furthermore, the modelled process contribution to the short term EAL for ammonia as a 1-hour mean and 24-hour mean is predicted to be less than 10% at all location surrounding the plant, including sensitive human receptors. Given the above, potential impacts from ammonia are not predicted to be significant. Given the series of conservative, worst case assumptions used in the assessment, the confidence in this prediction is considered to be high.

Appendix I

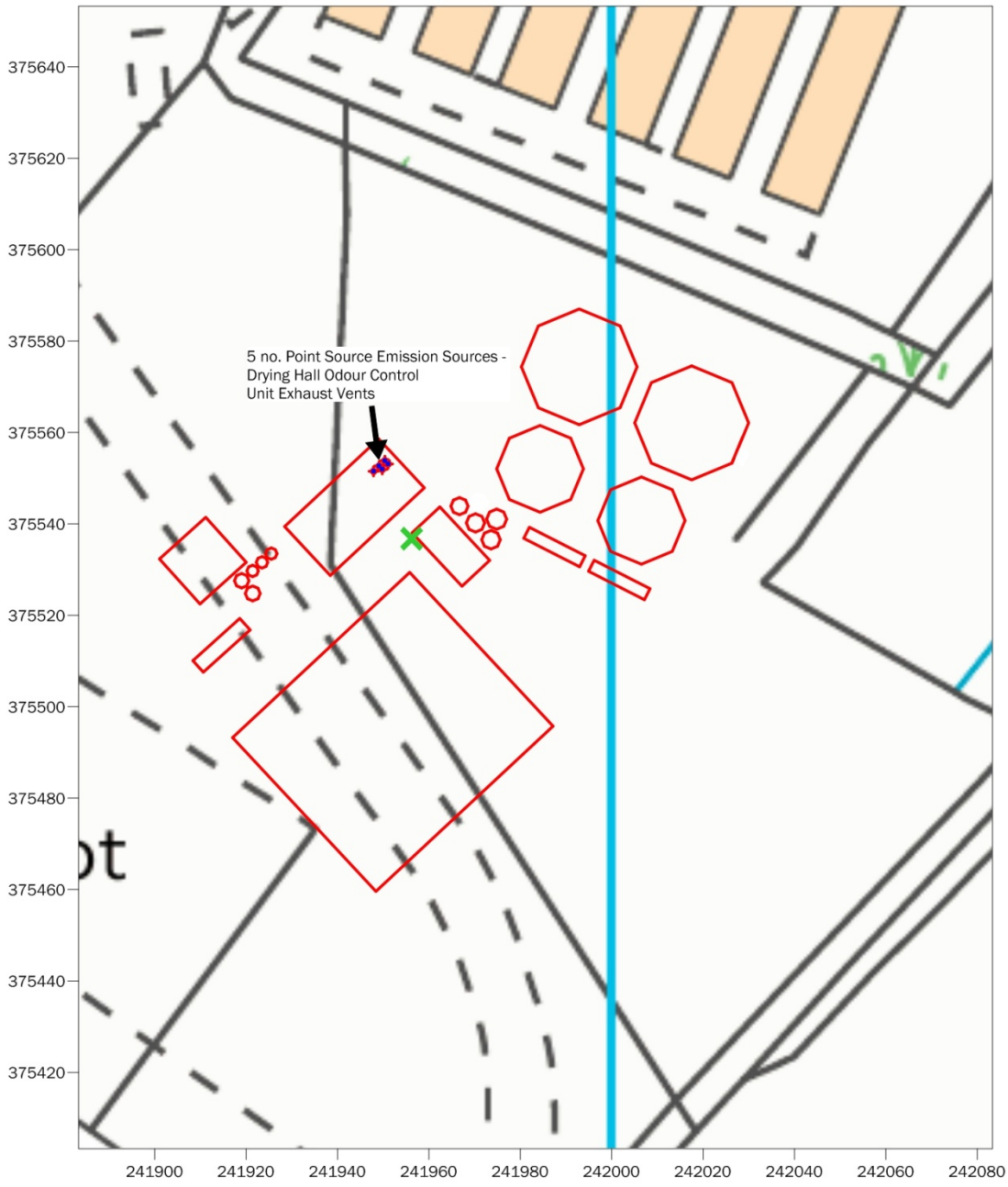
Site Location and Layout Plans

Rev.	Date	Drawn	Checked	Revision
G				
F				
E	11.04.2016	G.Spreng	J.Weyer	piping new position
D	11.04.2016	G.Spreng	J.Weyer	position PW-tank, pump
C	08.04.2016	G.Spreng	J.Weyer	Piping, ASL-tank, buffer tanks, flare updated
B	22.02.2016	HST	J.Weyer	Layout update
A	02.12.2015	V.Abels	J.Weyer	EYS, LV Station, pump leachate tank, compost hall, siclamps, CHP, gateway, weighbridge

Project:	A2529UK_MONA
State Of Planning:	draft
Drawing Title:	General Layout overview
Client:	
Plan Author:	agraferm technologies Agraferm Technologies AG Färberstraße 7 D-85276 Pfaffenhofen/Ilm www.agraferm.com

	Drawn	Checked
Date	08.10.2015	
Name	V.Abels	
Drawing No.:	A2529UK_MONA-00-01-layout	

Rev:	Sheet Size:	Scale:
E	A0	1:250



Appendix I - Buildings and Emission Sources Digitised within Model

● Point Source Emission - Drying Hall Exhaust Vents

Oaktree Environmental Ltd
Unit 5 Oasis Park
19 Road One
Winsford
Cheshire
CW7 3RY

Appendix II

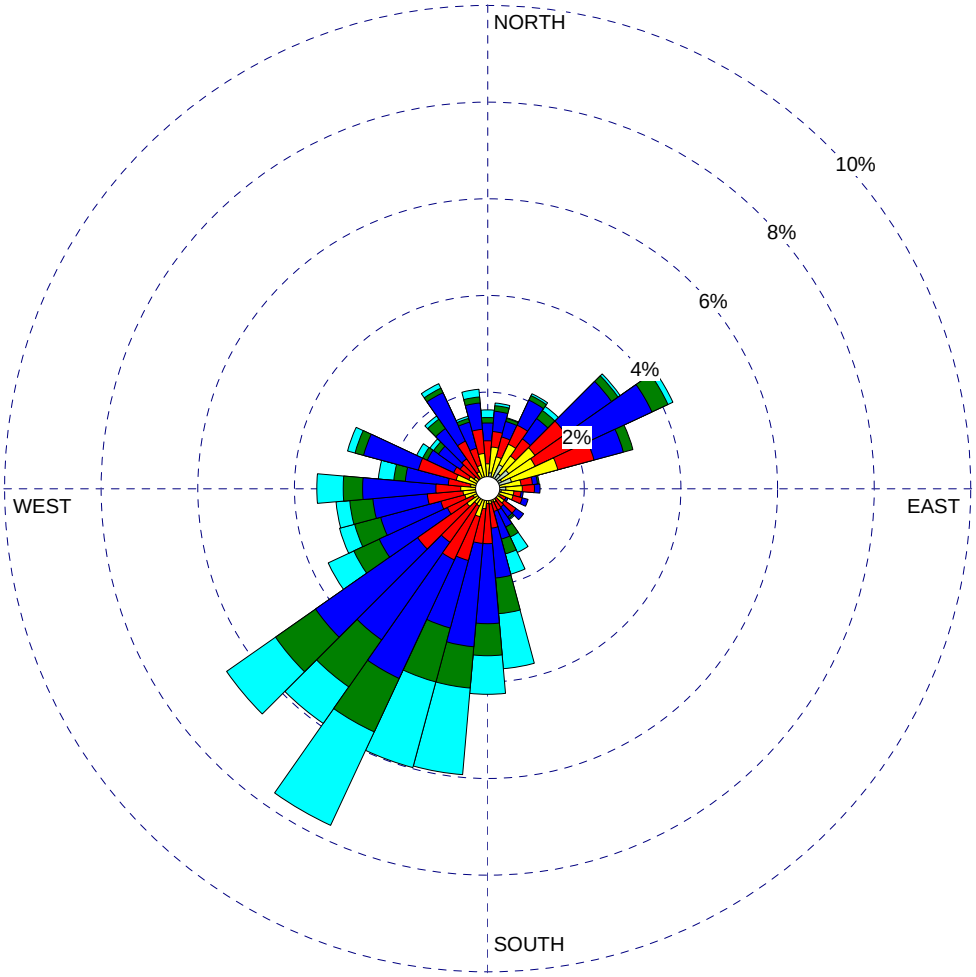
Wind Roses

WIND ROSE PLOT:

Valley - Wind Speed and Direction Frequency

DISPLAY:

Wind Speed
Direction (blowing from)



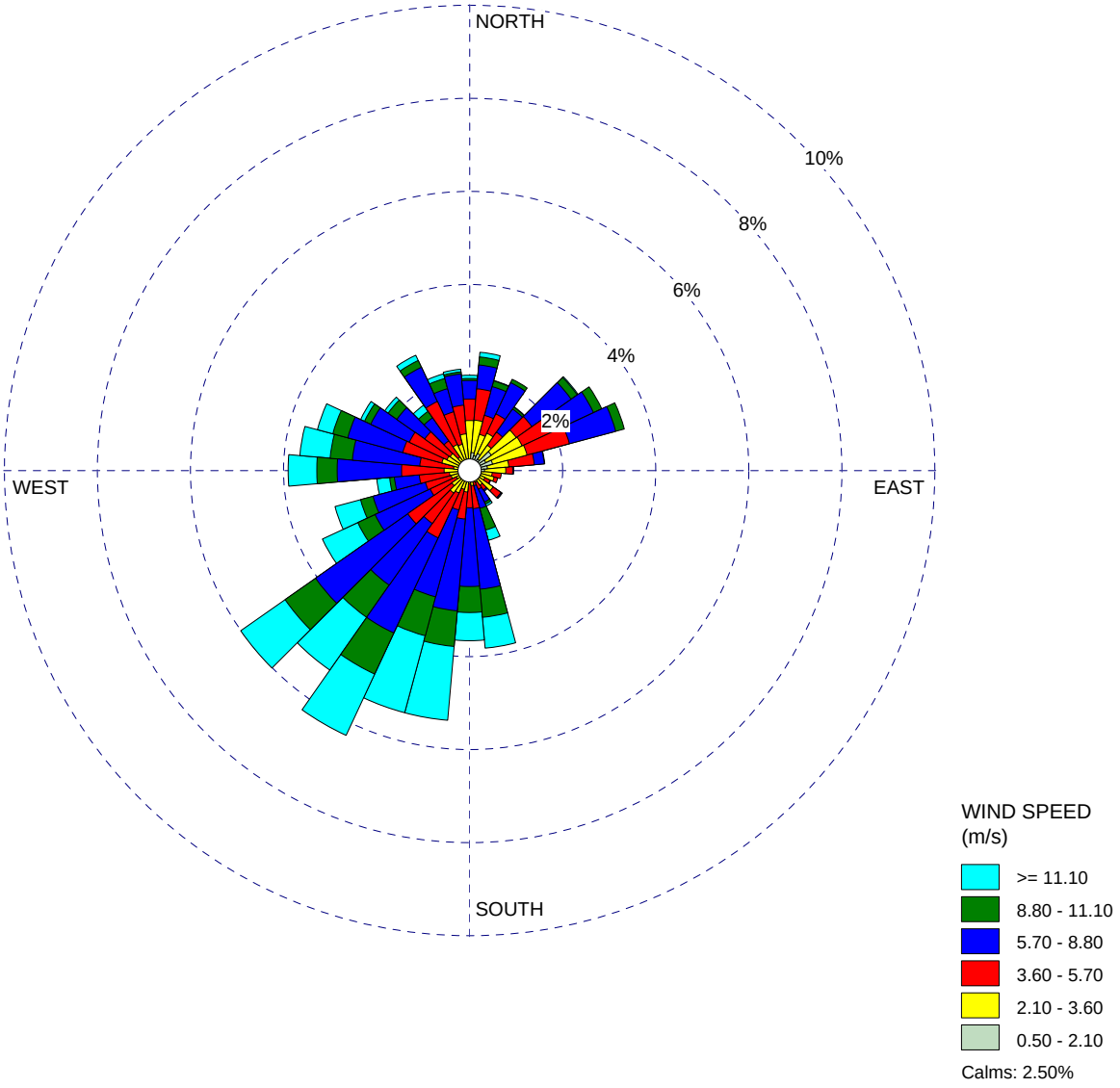
COMMENTS:	DATA PERIOD: **Start Date: 01/01/2008 - 00:00** **End Date: 31/12/2008 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **0.40%**	TOTAL COUNT: **8707 hrs.**	
	AVG. WIND SPEED: **6.81 m/s**	DATE: **09/03/2016**	PROJECT NO.: **819**

WIND ROSE PLOT:

Valley - Wind Speed and Direction Frequency

DISPLAY:

Wind Speed
Direction (blowing from)



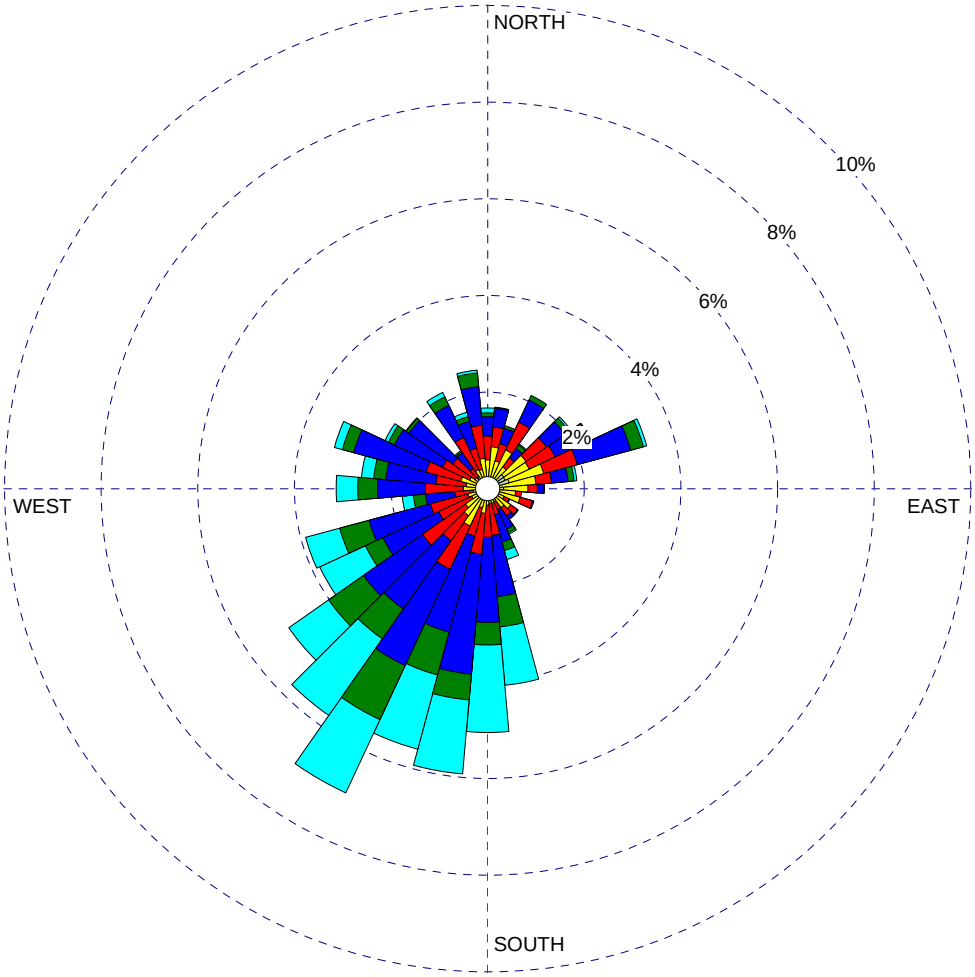
COMMENTS:	DATA PERIOD: **Start Date: 01/01/2007 - 00:00** **End Date: 31/12/2007 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **2.50%**	TOTAL COUNT: **8689 hrs.**	
	AVG. WIND SPEED: **6.39 m/s**	DATE: **09/03/2016**	PROJECT NO.: **819**

WIND ROSE PLOT:

Valley - Wind Speed and Direction Frequency

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 5.80%

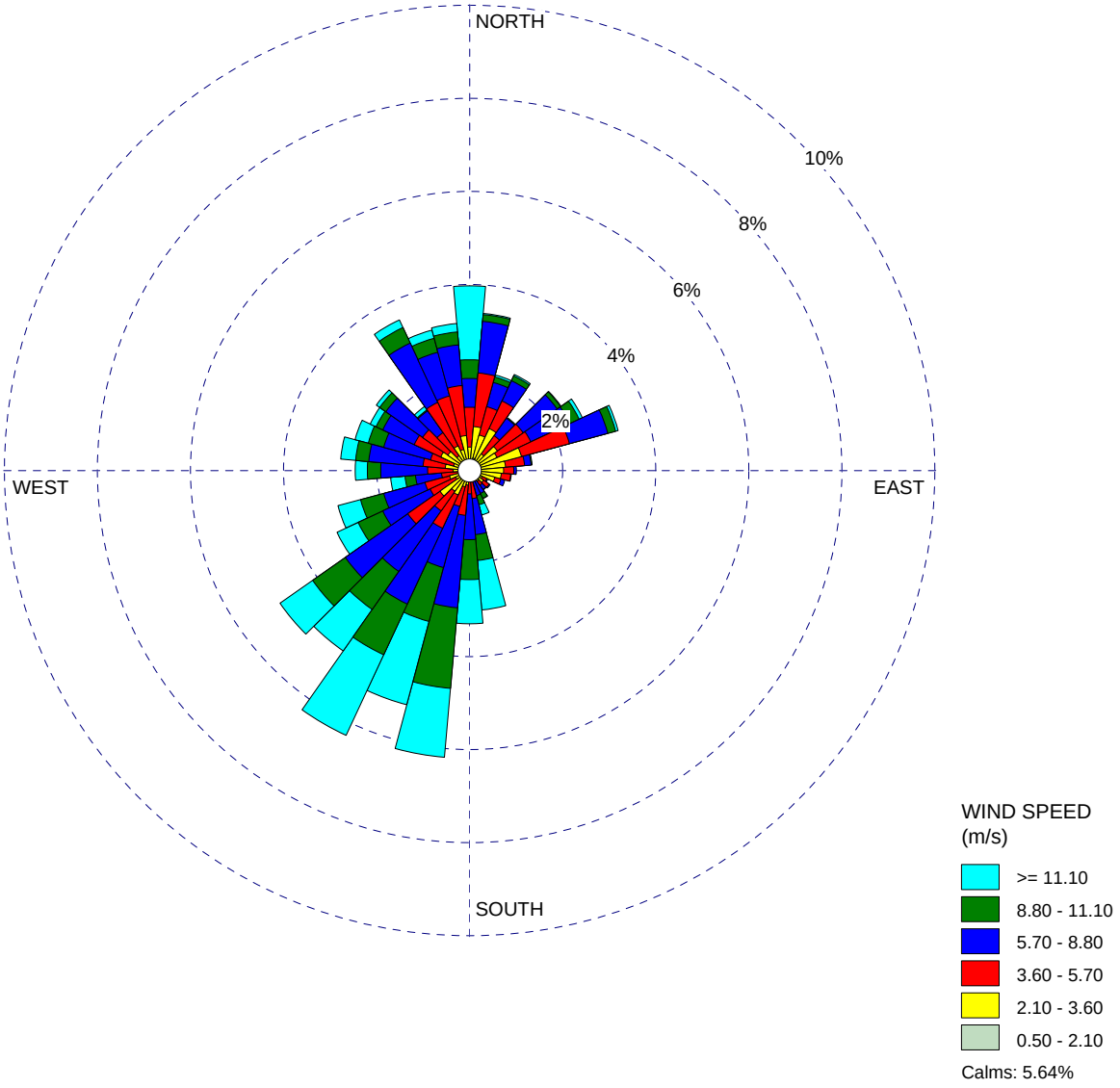
COMMENTS:	DATA PERIOD: **Start Date: 01/01/2006 - 00:00** **End Date: 31/12/2006 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **5.80%**	TOTAL COUNT: **8704 hrs.**	
	AVG. WIND SPEED: **6.46 m/s**	DATE: **09/03/2016**	PROJECT NO.: **819**

WIND ROSE PLOT:

Valley - Wind Speed and Direction Frequency

DISPLAY:

Wind Speed
Direction (blowing from)



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		MODELER:	
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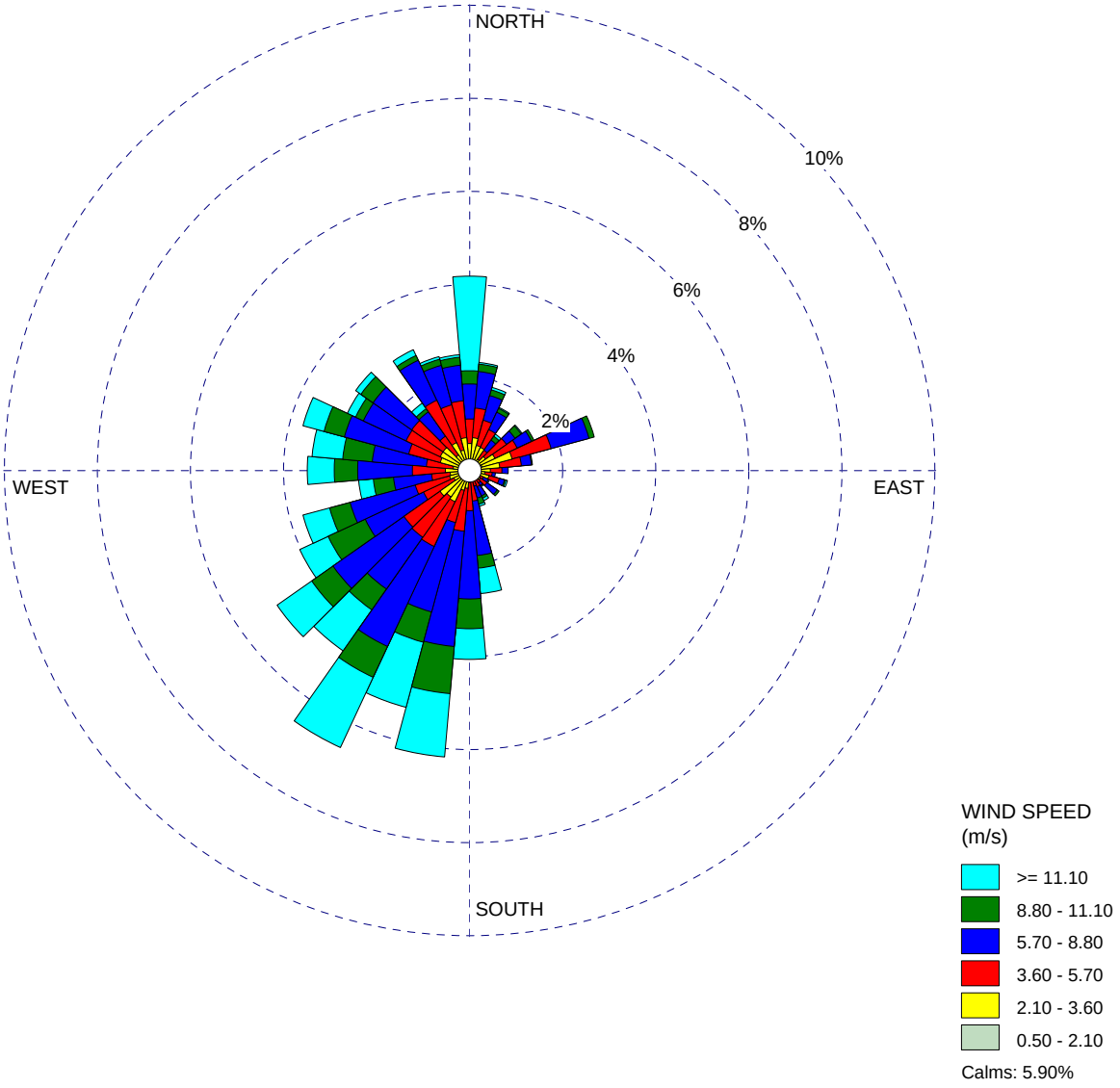
	AVG. WIND SPEED: **9.04 m/s**	DATE: **09/03/2016**	PROJECT NO.: **819**

WIND ROSE PLOT:

Valley - Wind Speed and Direction Frequency

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
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	CALM WINDS: **5.90%**	TOTAL COUNT: **8766 hrs.**	
	AVG. WIND SPEED: **9.57 m/s**	DATE: **09/03/2016**	PROJECT NO.: **819**

ANNEX 2

Sulphuric Acid Delivery Procedure

SMALL BULK DISCHARGE PROCEDURE

INDEX

APPENDICES

SECONDARY DOCUMENT CONTROL

"Ops Docs" - OPS-TYP.ARR.BLK	Typical Arrangement of Storage tank for Small Bulk Deliveries
"Ops Docs" – OPS-CUST.INSP	Customer Installation Inspection

SMALL BULK DISCHARGE PROCEDURE

A SCOPE

This procedure covers the transfer of material from an Intermediate Bulk container (IBC) (and Pressure Bins) on a BRENNTAG vehicle to a customer's small bulk storage tank.

B OBJECTIVES

The objectives are to ensure a safe discharge operation at the customer's premises and to minimise the risks from an interruption to the liquid transfer.

C RESPONSIBILITY

The Operations Manager is responsible for the equipment being used and that Section D is fully implemented. The Transport Manager is responsible for ensuring that drivers are fully trained in this procedure and that records of training are maintained at the depot.

Drivers are responsible for implementing the discharge procedure.

D CUSTOMER INSTALLATION INSPECTION RECORDS

The depot objective is to have on file a satisfactory completed Customer Installation Inspection form (see 'OPS.DOC' OPS-CUST.INSP)

In the event that this is not in place, then the driver must complete the "Drivers Pre-Discharge Inspection Report" (Appendix 1) in addition to "Final checks Before Discharge" (Appendix II). If the full "Customer Installation Inspection Report" is in place then completion and full implementation of Appendix II will suffice.

E INTRODUCTION

There are 3 generic types of 1,000 litre container for the purposes of small bulk delivery:-

i) "True" pressurisable IBC's, almost exclusively of Flo-bin manufacture:-

- a) All metallic bodied, some plastic lined.
- b) Pressurisable to 7.5 PSI with air or nitrogen
- c) Fully subject to UN Ch 16 and ADR restrictions.

ii) Pressure vessels which are not in fact IBC's but transportable pressure vessels, to SI 743 (for the purposes of this procedure they are referred to as IBC's):-

a) All metallic bodies, some plastic lined.

b) Pressurisable to 20 PSI with air or nitrogen.

c) Not subject to ADR restrictions but tested and plated to UN Ch 16 as well as SI 743.

iii) Gravity IBC's which may be all plastic, composite plastic/steel, or all metallic:-

a) Subject to UN Ch 16 and ADR

b) Only dischargeable by gravity or pump.

F ACTION ON ARRIVAL AT CUSTOMER

i) On arrival at a customer's premises, the driver will present a BRENNTAG Despatch Note**,** usually the top two copies of the set, at the gatehouse or plant office, confirm that the details are correct and await the customer's instructions.

ii) When the vehicle is parked at the designated discharge point, it is essential that the driver obtains a signature at the top of the "Final Checks Before Discharge" form which authorises him to safely commence the discharge procedures. This instruction equally applies when the driver delivers to our own company locations. The "Final Checks Before Discharge" form will then be used for each individual connection as per procedure/document.

iii) The driver must ensure that he observes all safety measures required by the customer. In particular he should ensure that specified equipment, including necessary tank venting equipment, including scrubbers, is used as the customer directs. It must always be remembered that the customer has an obligation to provide suitable supervision and the driver should not proceed with any discharge operations unless he is sure that a customer's supervisor is always readily available.

G PRE-DISCHARGE ROUTINE

(See Operations Support Manual Secondary Document OPS-TYP.ARR.BLK for Typical Storage Tank Arrangement)

i) The following procedure should be observed as a normal system. However, special discharge procedures may apply to suit particular customer arrangements. Always ensure that safe working practice is incorporated in any variance from these procedures. The customer's installation should have been subject to a pre-delivery inspection (see Policy & Procedure 9.8 – Customer Installation Inspection) using the current approved form or a previously authorised form/document and any special requirements determined - these should be specified on the Despatch Note as "Special Instructions". Drivers should fully understand these requirements at all times. Note also that each step should be completed without delay because undue delay could itself cause hazardous circumstances due to product movement in pipelines, etc.

a) Implement Paragraph D. If satisfactory, continue. If not, report to base for further instruction.

b) Any driver involved in this type of transfer operation or when attempting to clear a blockage must wear a full PVC suit, goggles and visor, hard hat, gauntlets, PVC/nitrile Wellingtons.

If for any reason access to the vehicle is required during the discharge procedure then the vehicle access ladders should be used.

c) All IBC discharge despatch documents will contain only one product line and prior to any connections that product name, grade and strength must be checked as being the same as the labels on the IBC's for discharge and the customer's inlet point. If they do not, **STOP** and report to the customer and BRENNTAG base.

Note also that this is reconfirmed for each individual tank connection as per Section (f) of this same section.

d) Ensure that the bottom valve on the IBC is closed before removing the safety "dust" cap. Remove the dust cap (acting as a secondary seal) from the valve on the IBC. The closure on the customer's inlet point should be removed by the customer's representative. Take care to release the lower end of the fitting initially, so that any residual product/pressure is directed downwards.

e) Under the supervision of the customer's representative, inspect hoses and couplings for defects, check gaskets, ensure cleanliness of discharge point and securely couple-up the delivery hose camlocks, or other connections as appropriate. Ensure that only gaskets compatible with the products are used. In the case of flammable liquids, the customer's inlet fitting, BRENNTAG hose and the IBC must all be electrically linked together. This will be via an earthing lead incorporated with the hose and by the customer's own lead, if available, but the IBC and customer inlet point **must** be electrically connected before discharge starts.

Dedicated hoses must be used for Solvent deliveries to avoid the possibility of cross contamination from water, corrosives etc.

f) Complete "Final Checks Before Discharge" (see Appendix II), sign and obtain customer's signature **PRIOR TO EACH INDIVIDUAL TANK DISCHARGE**.

g) Where a scrubber is fitted to control fumes discharged from the customer's tank, confirm with the customer's representative that the water supply is on and the scrubber is draining.

h) Assist customer in taking a sample if applicable.

H DISCHARGE METHODS

If, during the following discharge methods at steps i(c), ii(c) or iii(d), the customer declines the invitation to open his own inlet/reception valve, then the driver must contact base to receive further direction. Customers are invited to open their reception valve for each individual IBC.

i) COMPRESSOR DISCHARGE METHOD

a) Confirm that the IBC outlet valve is closed and then remove the dust cap (secondary seal) from the top of the IBC and fit the pressure hose to the IBC.

b) Fit the pressure hose head to the compressed air take off point.

c) Check that any drain valves on the line are closed. Invite the customer representative to open the customer's reception valve and open the outlet valve on the IBC. Check to ensure there is no leakage from hose or connections.

d) Open the inlet valve on the IBC "manifold unit", checking that the exhaust valve is shut. One piece manifold units, although more common on nitrogen discharge systems, have direct compressor discharge equivalent assemblies, in that a valve is available to vent the system down prior to disconnection.

e) Start the compressor and the open inlet valve on IBC manifold unit, checking that the vent valve is shut. Check the pressure control valve on the compressor unit is operating correctly. Maintain pressure at a minimum level sufficient to discharge the IBC. **Ensure the pressure rating of the IBC used is not exceeded**.

f) Check for product leakage as pressure builds up in the IBC and product begins to transfer. In cases of any leakage, take the necessary actions where applicable as described in Section J.

g) Where practicable, allow the discharge pressure to fall at the final stages of discharge, so that any vented fumes or vapours are kept to a minimum.

h) When product transfer is completed, allow time for the customer's pipeline to be blown clear into the storage tank then shut down the compressor.

i) Allow the IBC to depressurise by venting through the customers system before closing the IBC outlet valve.

j) Close the customer's inlet valve.

k) In the event of total de-pressurisation not being achieved through the customer's systems, you should obtain authorisation from the customer's representative to carefully release all pressure in a safe place by removing the top blanking cap, taking care that you do not affect people or the environment by these actions.

When using the safety air feed device please refer to Appendix III, Section 4.2-4.9 for the depressurisation guidance.

l) Replace the blanking cap when the IBC is totally depressurised.

m) If still attached, disconnect the pressure supply hose from the compressor system to the inlet valve on the IBC.

n) Disconnect the product delivery hose or pipe, initially at the customer's end, remembering to open the lower part of the fitting first in order to direct any spillage downwards.

o) After confirming the arrangements for discharge hose washing, thoroughly wash out flexible hoses and secure them safely on your vehicle.

p) Replace blank plates or cap to the IBC outlet. The customer's representative should replace the cap or closure to their tank point.

q) Protective clothing may now be removed.

r) Obtain a signature from the customer's representative on the BRENNTAG Despatch Note in order to signify the safe completion of the discharge procedures and to establish proof of the actual delivery.

s) The driver should remain at the side of the vehicle throughout the discharge operation. He should always be in a position to deal quickly with any emergency situation which may arise. He should not be seated in the vehicle cab during the product discharge operation.

t) **STOP DISCHARGE AT ANY TIME IF NECESSARY.**

u) **REPORT ANY SUSPECT DELIVERIES OR INCIDENTS AS SOON AS POSSIBLE, TO BASE. STOP DISCHARGE AT ANY TIME IF NECESSARY. USE THE APPROPRIATE DOCUMENT, FOR A WRITTEN REPORT ON RETURN.**

ii) <u>NITROGEN DISCHARGE METHOD</u>

a) Confirm that the IBC outlet valve is closed and then remove the dust cap from the top of the IBC and fit the valve manifold unit to the IBC.

b) Fit the pressure head to the nitrogen cylinder and fit the short nitrogen hose from the pressure head to the sealed pre-set pressure reducer. Fit the long hose from the outlet of the reducer to the IBC manifold unit (long brass connection).

c) Check that the drain valves on the line are closed. Invite the customer's representative to open the customer's reception valve and open the outlet valve on the IBC. Check to ensure that there is no leakage from hose or connections.

d) Open the inlet valve on the IBC manifold unit, checking that the vent valve is closed.

Check that the pressure control valve on the pressure head unit is closed (fully anti-clockwise), open the gas cylinder and adjust the pressure to read **no more than the pressure rating of the IBC**. Maintain pressure at a minimum level sufficient to discharge the IBC. **Do not exceed the IBC pressure rating**.

e) Check for product leakage as pressure builds up in the IBC and product begins to transfer. In cases of any leakage, take the necessary actions where applicable as described in Section J.

f) Where practicable, allow the discharge pressure to fall at the final stages of discharge, so that any vented fumes or vapours are kept to a minimum.

g) When product transfer is completed, allow time for the customer's pipeline to be blown clear into the storage tank then shut down the Nitrogen supply and close the inlet supply on the manifold unit.

h) Allow the IBC to depressurise by venting through the customers system before closing the IBC discharge valve.

i) Close the customer's inlet valve.

j) In the event of total de-pressurisation not being achieved through the customer's system, you should obtain authorisation from the customer's representative to carefully release all pressure in a safe place by removing the top blanking cap, taking care that you do not affect people or the environment by these actions.

When using the safety air feed device please refer to Appendix III, Section 4.2-4.9 for the depressurisation guidance.

k) Close the IBC vent valve/replace the blanking cap when the IBC is completely depressurised.

l) Disconnect the product delivery hose or pipe, initially at the customer's end, remembering to open the lower part of the fitting first in order to direct any spillage downwards.

m) After confirming the arrangements for discharge hose washing, thoroughly wash out flexible hoses and secure them safely on your vehicle.

n) Replace blank plates or cap to the IBC outlet. The customer's representative should replace the cap or closure to their tank point.

o) Protective clothing may now be removed.

p) Obtain a signature from the customer's representative on the BRENNTAG Despatch Note in order to signify the safe operation of the discharge procedures and to establish proof of the actual delivery completion.

q) The driver should remain at the side of the vehicle throughout the discharge operation. He should always be in a position to deal quickly with any emergency situation which may arise. He should not be seated in the vehicle cab during the product discharge operation.

r) **STOP DISCHARGE AT ANY TIME IF NECESSARY.**

s) **REPORT ANY SUSPECT DELIVERIES OR INCIDENTS AS SOON AS POSSIBLE, TO BASE. USE THE APPROPRIATE DOCUMENT, FOR A WRITTEN REPORT ON RETURN.**

iii) DISCHARGE BY GRAVITY OR PUMP (CUSTOMER'S OR BRENNTAG)

THE USE OF POSITIVE DISPLACEMENT PUMPS IS NOT PERMITTED UNLESS WRITTEN AUTHORITY FROM TECHNICAL SERVICES MANAGER IS OBTAINED

a) After checking that the outlet valve is closed, remove the IBC outlet blank plate or cap. The closure on the customer's inlet point should be removed by the customer's representative. Take care to release the lower part of fittings initially so that any residual product/pressure is directed downwards.

b) Under the supervision of the customer's representative, securely couple up the delivery hoses or pipes as appropriate. Ensure that only gaskets compatible with the products are used.

c) Gravity or pump discharge procedures require the IBC to be vented so that a vacuum effect is not produced within the tank which could cause the implosion of the IBC or prevent discharge of the product.

d) Invite the customer's representative to open the customer's product inlet valve.

e) Open the IBC discharge valve, then check to ensure that there is no leakage from the hose or the connections.

f) Certain customers have vent-return systems which allow vapours to circulate between their storage tank and the vapour ullage section of IBC's. These systems should be utilised wherever practicable. Connection compatibilities should be established before arrival on site and should be referred to as "Special Instructions" on the Despatch Note.

g) In the above procedure, drivers are required to use their practical expertise and particular care to ensure the safe discharge of the product.

h) Where applicable, arrange for the customer's suction pump to be started by the customer's representative or start own vehicle suction pump.

i) In cases of any leakage, take the necessary actions where applicable, as described in Section H.

j) When transfer is complete, close the customer's inlet valve and the IBC outlet valve. Switch of the pump. (**Note** Ensure (if pump discharge) that the pump is not switched off until this is done, unless a dry-run protection system has already shut the pump off).

k) Close and secure the IBC vent.

l) Disconnect any tank venting equipment if used during the discharge process, e.g. flexible connections to customer's vent systems.

m) Disconnect the product delivery hose or pipe, initially at the customer's end, remember to open the lower part of the fitting first in order to direct any spillage downwards.

n) After confirming the arrangements for discharge hose washing, thoroughly wash out flexible hoses and secure them safely on your vehicle.

o) Replace blank plates or cap to the IBC outlet. The customer's representative should replace the cap or closure to their tank point.

p) Protective clothing may now be removed.

q) Obtain a signature from the customer's representative on the Brenntag Despatch Note in order to signify the safe operation of the discharge procedures and to establish proof of the actual delivery completion.

r) The driver should remain at the side of the vehicle throughout the discharge operation. He should always be in a position to deal quickly with any emergency situation which may arise. He should not be seated in the vehicle cab during the product discharge operation.

s) **STOP DISCHARGE AT ANY TIME IF NECESSARY.**

t) **REPORT ANY SUSPECT DELIVERIES OR INCIDENTS AS SOON AS POSSIBLE, TO BASE. USE THE APPROPRIATE DOCUMENT, FOR A WRITTEN REPORT ON RETURN.**

I BLOCKAGE IN LINE

i) COMPRESSOR OR NITROGEN PRESSURE DISCHARGE

If at any time, either before discharge can begin or during the discharge itself, a line blockage occurs, the following sequence of actions must be implemented:-

a) If is suspected that a line is blocked anywhere, check that all protective clothing is properly fitted, especially eye protection - goggles and visor. Start by closing off the IBC outlet valve.

b) Quickly close the pressure system inlet valve, switch off compressor or shut off nitrogen supply.

c) Start a washdown hose running in the immediate vicinity and have a second person standing by to use it.

d) Relieve any pressure in the IBC slowly by venting from the top of the container, or from the pressurising pipeline, as appropriate. Disconnect the manifold from the top of the pressure bin, leaving the pressure bin open to atmosphere.

Open the IBC outlet valve to back depressurise the flexible line. Once settled, close all product valves, including customer's inlet valve.

e) If the customer's pipe work has a drain or sample valve, use it to relieve pressure and/or remove any liquid possible from the line. Close any drains before proceeding further.

f) Disconnect the hose from the customer's end, keeping fitting pointing downwards and ensuring any spillage is neutralised or washed away in an appropriate manner.

g) Disconnect the hose from the pressure bin and wash out to a safe place, checking for any blockage in the hose.

h) If the blockage is in BRENNTAG' hose, clear the blockage or use alternative hose, after first making the original hose safe.

i) If the problem is with the customer's equipment, re-secure the outlet camlock on the IBC.

j) Contact base.

k) Site management are then responsible for communication with the customer to ensure adequate remedial action is taken to avoid recurrence.

ii) DISCHARGE BY GRAVITY

a) If it is suspected that the line is blocked anywhere, check that all protective clothing is properly fitted, especially eye protection - goggles and visor. Start by closing off the IBC outlet valve.

b) If the customer's pipe work has a drain or sample valve, use it to relieve pressure and/or remove any liquid possible from the line.

c) Close any customer inlet valves.

d) Start a wash down hose running in the immediate vicinity and have a second person standing by to use it.

e) Disconnect the delivery hose from the customer's connection. Collect or wash away any spillage as appropriate.

f) Disconnect the hose from the IBC and check for blockage by washing out the hose to a safe area.

g) If the blockage is in BRENNTAG's hose, clear the blockage or use alternative hose, after first making the original hose safe.

h) If the problem is with the customer's equipment, re-secure the outlet camlock on the IBC.

i) Contact base.

j) Site management are then responsible for communication with the customer to ensure adequate remedial action is taken to avoid recurrence.

iii) PUMPED DISCHARGE METHOD (CUSTOMER'S OR BRENNTAG PUMP)

a) If it is suspected that a line is blocked anywhere, or there is a pump failure at any stage, check that all protective clothing is properly fitted, especially eye protection - goggles and visor. Start by closing off the IBC outlet valve.

b) Quickly switch off the pump - either our transport pump or customer's suction pump.

c) Close any customer inlet valves.

d) Start a wash down hose running in the immediate vicinity and have a second person standing by to use it.

e) Relieve any pressure in the line by opening the IBC outlet valve. Once settled, close all product valves including the customer's inlet valve.

f) Disconnect the hoses from the pump to the inlet point, if used, and from the IBC to the pump. Check for blockage by washing out the hose to a safe area.

g) If the blockage is in BRENNTAG'S hose, clear the blockage or use alternative hose, after first making the original hose safe.

h) If the problem is with the customer's equipment, re-secure the outlet camlock on the IBC.

i) Contact base.

j) Site management are then responsible for communication with the customer to ensure adequate remedial action is taken to avoid recurrence.

J LEAKAGE OF PRODUCT DURING DISCHARGE

i) Ensure that the designated protective clothing is worn and fully fitted.

ii) In the case of a leak on the IBC or pipeline, take the following action:-

a) If possible isolate the leak by closing the relevant valves.

b) Ensure that persons in the area are warned and kept clear, then inform the customer's management staff in order that they can institute their own company safety procedures.

c) Close the IBC pressure inlet valve and shut off the compressor or inlet gas supply or switch off the pump.

d) Close the IBC outlet valve and the customer's inlet valve.

e) Obtain authorisation from the customer's representative to carefully release all pressure in a safe place by removing the top blanking cap, taking care that you do not affect people or the environment by these actions.

When using the safety air feed device please refer to Appendix III, Section 4.2-4.9 for the depressurisation guidance.

f) If possible, make the necessary adjustments to pipelines or gaskets.

iii) In all cases, the driver will use his training and experience to deal with or assist the customer's staff in emergency control procedures.

iv) The driver should report all leakages to the Operations Manager or Transport Manager at his depot as soon as is practicable. If this is not possible, and if the leakage is sufficient to give cause for complaint by the customer or a member of the public, he should report the facts to the Shift Manager at Sandbach (Tel: 01270 758366) at the first opportunity. Emergency Response actions can then be taken, if necessary.

v) On return to base, a formal written report must be made by the driver without delay and handed to a company supervisor.

K CARRIAGE OF DANGEROUS GOODS BY ROAD REGULATIONS

As the delivery tank will not have been washed out, for the purpose of the above regulations, it must be treated as full when determining whether or not to remove the Hazard Placard from the vehicle. Specific restrictions may also have to be considered, e.g. Blackwall Tunnel (Greenwich). In this case the Hazard Placard should be removed if notionally empty containers only, such as the delivery tanks are on the vehicle, i.e. no others "classified" under CDG.

L REPORTING OF SUSPECT DELIVERIES, ACCIDENTS OR INCIDENTS

i) **STOP DISCHARGE AT ANY TIME IF NECESSARY.**

ii) **REPORT ANY SUSPECT DELIVERIES OR INCIDENTS AS SOON AS POSSIBLE, TO BASE. USE THE APPROPRIATE DOCUMENT, FOR A WRITTEN REPORT ON RETURN**.

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SMALL BULK DISCHARGE PROCEDURE
FINAL CHECKS BEFORE DISCHARGE

PHASE 1 - Product/Order Verification

DESPATCH NOTE NO. _____ DATE: _____

PRODUCT (include grade & concentration) _____

ON ARRIVAL **I certify that the product detailed on the Despatch Note is as ordered and that the relevant storage installation is fit and suitable to receive the load.**

COMPANY NAME (Print)	**CUSTOMER REPRESENTATIVE**	**DRIVER NAME**
	PRINT:	PRINT:
	SIGN:	SIGN:

PHASE 2 - Before First Connection

DRIVER SAFETY PRECAUTIONS	**YES**	**NO**	
Inlet labelled?			
Hose connection sound and inlet pipe secure?			IF ANY OF THE ANSWERS ARE "NO" CONTACT BASE FOR FURTHER DIRECTIONS
Water hose available?			
N.B. Note if shower also available			
Earthing system available? (if applicable)			

PHASE 3 - Connection

Ensure all valves are closed before any connection and disconnection. Ensure valves are only opened at PHASE 4, i.e. after the following 3 checks have been verified by dual signature by IBC.

COMBINED CHECK (DRIVER & CUSTOMER)

1) IBC LABEL, TANK INLET & DELIVERY NOTE ALL SAME PRODUCT.
(BRENNTAG driver to check that any Hypochlorite Pressure Bins are painted black with additional Hypochlorite label directly above valve)

CUSTOMER CHECK ONLY

2) TANK HAS CAPACITY FOR DELIVERY QUANTITY.

CUSTOMER CHECK ONLY

3) TANK VENTING AND EQUIPMENT IS SOUND.
NB - Pressure Discharge - Vent 4" minimum - absolute minimum 3" Pump Discharge - Vent 3" minimum - absolute minimum 2".
Use 1" restrictor fitted to discharge line if "absolute minimum" for both methods.

SIGNED AT SITE AND PRIOR TO EACH INDIVIDUAL TANK DISCHARGE

	IBC NO.	CUSTOMER (Signature)	DRIVER (Signature)
TANK 1			
TANK 2			
TANK 3			
TANK 4			
TANK 5			
TANK 6			

PHASE 4 – Discharge

Open valves and commence discharge

ADDITIONAL INFORMATION

i) PPE requirements are as per current PPE Matrix (OPS-PPE)
ii) On completion of the above for each IBC, the BRENNTAG driver will proceed with the discharge procedure.
iii) The BRENNTAG driver is not permitted to discharge product if the above points are not authorised by the customer.
iv) Thank you for your co-operation in ensuring the safe operation of this discharge procedure.

PHASE 5 – Transport Department (Pre File)

Checked By: _____ Date Checked: _____

NOTE: Hold document on file for minimum of 6 months

SMALL BULK DISCHARGE PROCEDURE

DRIVER'S PRE-DISCHARGE INSPECTION REPORT

Customer Name:

Delivery Address:

Despatch Note No:

Date of Delivery: / /

Product:

	YES	NO	COMMENTS
Inlet labelled			
Tank Visible from Inlet point & labelled			
Vent: 3"* minimum preferable if Pump Delivery Only Possible *NB - Pressure Discharge - Vent 4" minimum - if only 3" fit 1" restrictor fitted to discharge line* *Pump Discharge - Vent 3" minimum - absolute minimum is 2" and if less than 3", discharge using restricted delivery rate and 1" restrictor fitted to discharge line*			
Valve on Inlet Pipe *			
Inlet Locked			
Hose Connection Sound & Inlet Pipe Secure			
Discharge Point Visible from Vehicle Parking Area and Readily Accessible			
Water Hose Available (NB note if shower also available)			
Contents Gauge (*Mark method under comments)*			
Bund Wall Round Tank *			
Scrubber Fitted If Applicable *			
Earthing System Available if Applicable			
Required to Park on Public Highway During Discharge			
Discharge Supervised by Customer **			
Area Secured During Discharge			
Sampling Procedure OK? (If applicable)			

* **THESE MAY NOT BE AVAILABLE TO VIEW. IF NOT ASK CUSTOMER**

** **CUSTOMER MUST BE PRESENT AT THE START & COMPLETION OF DISCHARGE OF EACH CONTAINER AND ABLE TO BE SUMMONED IF REQUIRED**

	GOO	BAD	COMMENTS
General Condition of Intake Fixtures			

	TOP	BOTTOM	COMMENTS
Filling Point			
Length of Hose Required			

Driver's Name: Vehicle Reg No:

- UNABLE TO PROCEED CONTACT BASE

- PROCEED AFTER CHECKING SAFE METHOD OF WORK AVAILABLE

SMALL BULK DISCHARGE PROCEDURE

DRIVER'S PRE-DISCHARGE INSPECTION REPORT

Customer Name:

Delivery Address:

Despatch Note No:

Date of Delivery: / /

Product:

	YES	NO	COMMENTS
Inlet labelled			
Tank Visible from Inlet point & labelled			
Vent: 3"* minimum preferable if Pump Delivery Only Possible *NB - Pressure Discharge - Vent 4" minimum - if only 3" fit 1" restrictor fitted to discharge line* *Pump Discharge - Vent 3" minimum - absolute minimum is 2" and if less than 3", discharge using restricted delivery rate and 1" restrictor fitted to discharge line*			
Valve on Inlet Pipe *			
Inlet Locked			
Hose Connection Sound & Inlet Pipe Secure			
Discharge Point Visible from Vehicle Parking Area and Readily Accessible			
Water Hose Available (NB note if shower also available)			
Contents Gauge (*Mark method under comments)*			
Bund Wall Round Tank *			
Scrubber Fitted If Applicable *			
Earthing System Available if Applicable			
Required to Park on Public Highway During Discharge			
Discharge Supervised by Customer **			
Area Secured During Discharge			
Sampling Procedure OK? (If applicable)			

* **THESE MAY NOT BE AVAILABLE TO VIEW. IF NOT ASK CUSTOMER**

** **CUSTOMER MUST BE PRESENT AT THE START & COMPLETION OF DISCHARGE OF EACH CONTAINER AND ABLE TO BE SUMMONED IF REQUIRED**

	GOO	BAD	COMMENTS
General Condition of Intake Fixtures			

	TOP	BOTTOM	COMMENTS
Filling Point			
Length of Hose Required			

Driver's Name: Vehicle Reg No:

- UNABLE TO PROCEED CONTACT BASE

- PROCEED AFTER CHECKING SAFE METHOD OF WORK AVAILABLE

FLEXIBLE SAFETY AIR FEED / GROUND OPERATED

AIR FEED OPERATING GUIDELINES

1. Assumptions

1.1. This procedure is written on the assumption that Brenntag will fit one F-SAF to each Pressure Bin and will not remove it during normal filling or discharge operations. Further work instructions will be needed if this assumption is not correct. Please also refer to Appendix 4 (drawing).

2. Filling Operations

2.1. The F-SAF pipe and fittings should be checked for any obvious signs of damage. If in doubt, the F-SAF should not be used

2.2. The operator will remove the F-SAF Bottom Dustcap (9)

2.3. The Operator will remove the Locking Pin (8) and open the F-SAF Bottom Valve (7). This will allow the IBC to vent during filling.

2.4. Existing Brenntag procedures apply to filling the IBC, either by top fill or bottom fill.

2.5. When the IBC filling is completed, the F-SAF Bottom Valve (7) will be closed and the Locking Pin (8) fitted.

2.6. The F-SAF Bottom Dustcap (9) will be fitted and secured.

2.7. The top of the IBC will be sealed according to the product being filled.

2.7.1. For Hypo IBCs, the Dustcap Vent Assembly (3) will be fitted to the IBC Top Camlock (2).

2.7.2. For General Use IBCs, the IBC Top Dustcap (1) will be fitted to the IBC Top Camlock (2).

2.8. Check that Magnet (5) is attached to the Foot (6) of the IBC, so that the valve arrangement is safely underneath the overhang of the IBC body.

3. Discharge Operations

3.1. The IBC will be checked in accordance with existing Brenntag procedures.

3.2. The chemical filling line will be connected to the Bottom Camlock (10) in accordance with existing Brenntag Procedures. The IBC Outlet Valve (11) will remain closed.

3.3. The operator will check that the F-SAF Bottom Valve (7) is in the closed position and then remove the F-SAF Bottom Dustcap (9)

3.4. The F-SAF Bottom Camlock (12) will be connected to the vehicle's flexible airline.

3.5. The operator will open the bypass valve on the compressor so that the airline is open to atmosphere.

3.6. The Operator will remove the Locking Pin (8) and open the F-SAF Bottom Valve (7).

3.7. The IBC Outlet Valve (11) will be opened to check that the chemical delivery line has no leaks. Atmospheric air will pass through the compressor bypass and the FSAF, into the container to allow the liquid to flow out of the IBC Outlet Valve (11)

3.8. The operator will close the compressor bypass, start the vehicle compressor and introduce pressurised air into the air feed line. Chemical will be discharged from the container

3.9. When discharge is complete, the operator will turn off the vehicle compressor, vent the lines and the pressure gauge should fall to zero.

3.10. The operator will then close the IBC Outlet Valve (11).

3.11. The F-SAF Bottom Valve (7) will be closed and the Locking Pin (8) fitted

3.12. The chemical filling line and the air feed line will be removed in accordance with existing Brenntag procedures.

3.13. The IBC Outlet Dustcap (13) and the F-SAF Bottom Dustcap (9) will be fitted.

3.14. If the Magnet (5) has become detached during the discharge operation, it should be reconnected to the Foot (6) of the IBC, so that the valve assembly is safely underneath the overhang of the IBC body.

4. Interrupted delivery procedure

4.1. If the delivery of the product from the IBC needs to interrupted before all the product has been emptied, then standard Brenntag procedures should be followed to close the IBC Outlet valve (11) and turn off the vehicle compressor.

4.2. If pressure remains in the IBC then the procedure to remove the pressure should be followed: -

4.3. Close the FSAF Bottom Valve (7) to isolate the pressure in the IBC.

4.4. If possible vent the pressure from the vehicle's flexible airline back through the compressor.

4.5. Carefully remove the vehicle's flexible airline by disconnecting it from the FSAF Bottom Camlock (12)

4.6. The FSAF Bottom Camlock should be pointed away from the body or vehicle as it is possible that chemical may be present in the FSAF assembly.

4.7. Very slowly, the operator should open the FSAF Bottom Valve (7) to allow air to escape from the valve.

4.8. When air stops passing through the valve, the FSAF Bottom Valve (7) should be opened full and then closed.

4.9. The Locking Pin (8) is then fitted.

4.10. If the Magnet (5) has become detached during the discharge operation, it should be reconnected to the Foot (6) of the IBC, so that the valve assembly is safely underneath the overhang of the IBC body.

5. Ongoing checking and testing of units

5.1. At service intervals to be specified by Brenntag, the F-SAF will be removed and checked as follows.

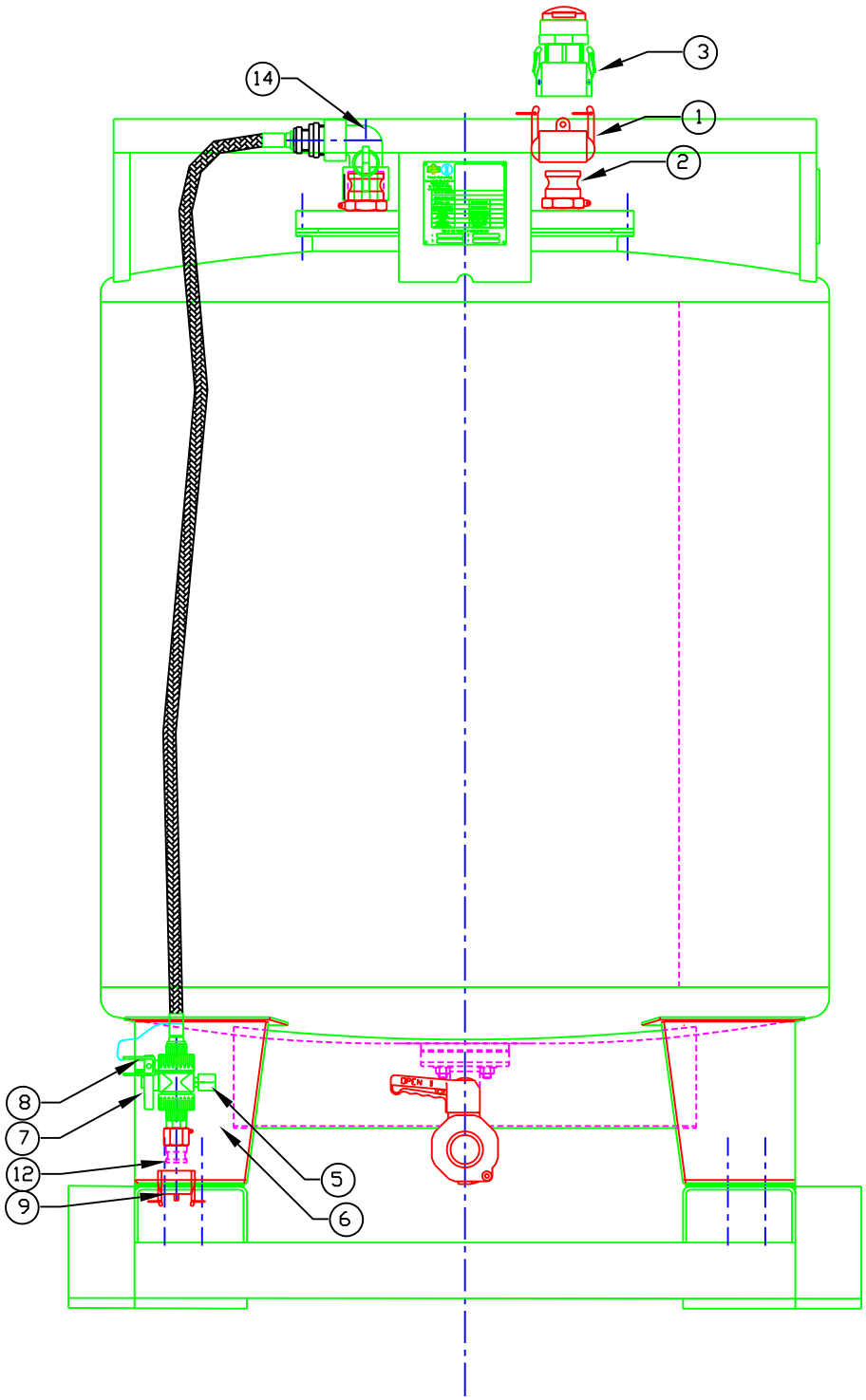
5.2. The splashguard seal inside the F-SAF Top Coupler (14) will be checked for damage or wear and replaced if necessary.

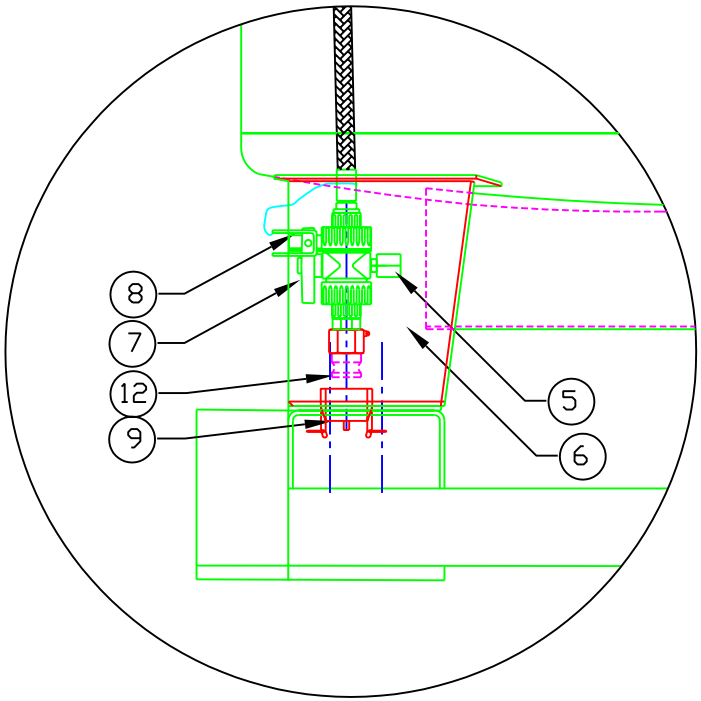
5.3. The unit will be visually inspected for any signs of wear on the pipe or damage to the valve or other fittings. If any sign of damage is identified the unit must not be used.

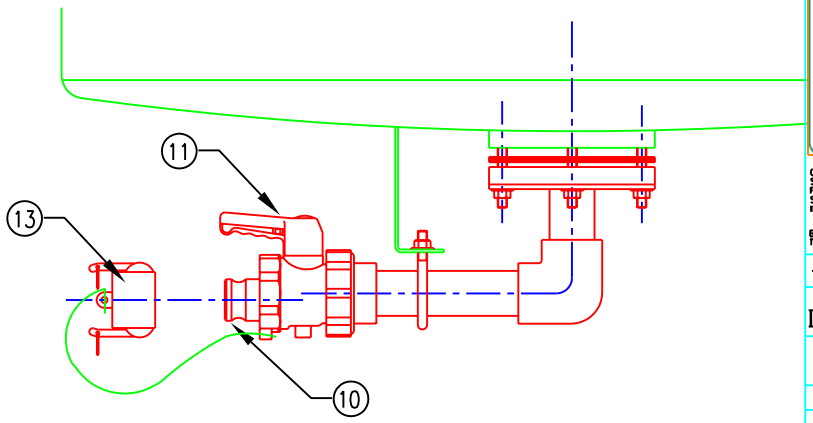
5.4. The unit will be Leakproofness tested in accordance with UN Periodic Inspection procedures. All units will be provided with a serial number by Francis Ward to assist in control of this testing.

6. Initial verification of product performance

6.1. It is intended that Francis Ward will check sample F-SAFs at Manchester and Bradford sites at intervals after first use of three months, six months and one year.







ISSUE	AMENDMENTS	DATE
A	ORIGINAL ISSUE	AS DRAWN

FRANCIS WARD

FRANCIS WARD LTD, BROOK HOUSE, 221 BOWLING BACK LANE BRADFORD, W.YORKSHIRE UNITED KINGDOM BD4 8SJ
TEL:- (+44) 01274 707030 FAX:- (+44) 01274 724704

THIRD ANGLE PROJECTION
IF IN DOUBT ASK-DO NOT SCALE

DRAWN	DATE
L.PHILLIPS	05/12/08
SCALE	CHECKED
N.T.S	

PRODUCT DESCRIPTION

PCM 1000 PEL
FLEXIBLE SAF
(EPDM SPEC)

DRAWING NUMBER

5800121A

SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006

Sulphuric acid >51 - <96%

Version 7.0 Print Date 2013/05/03

Revision date / valid from 2013/05/03 **MSDS code: MSUL051**

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name	:	Sulphuric acid >51 - <96%
Substance name	:	sulphuric acid
Index-No.	:	016-020-00-8
CAS-No.	:	7664-93-9
EC-No.	:	231-639-5
Registration number	:	01-2119458838-20-xxxx

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture	:	Identified use: See table in front of appendix for a complete overview of identified uses.
Uses advised against	:	At this moment we have not identified any uses advised against

1.3. Details of the supplier of the safety data sheet

Company	:	Brenntag UK & Ireland Albion House, Rawdon Park GB LS19 7XX Leeds Yeadon
Telephone	:	+44 (0) 113 3879 200
Telefax	:	+44 (0) 113 3879 280
E-mail address	:	msds@brenntag.co.uk

1.4. Emergency telephone number

Emergency telephone number	:	Emergency only telephone number (open 24 hours): +44 (0) 1865 407333 (N.C.E.C. Culham)

Section 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

REGULATION (EC) No 1272/2008			
Hazard class	**Hazard category**	**Target Organs**	**Hazard statements**
Corrosive to metals	Category 1	---	H290
Skin corrosion	Category 1A	---	H314

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Directive 67/548/EEC or 1999/45/EC	
Hazard symbol / Category of danger	**Risk phrases**
Corrosive (C)	R35

For the full text of the R-phrases mentioned in this Section, see Section 16.

Most important adverse effects

Human Health	:	See section 11 for toxicological information.
Physical and chemical hazards	:	See section 9 for physicochemical information.
Potential environmental effects	:	See section 12 for environmental information.

2.2. Label elements

Labelling according to Regulation (EC) No 1272/2008

Hazard symbols :

Signal word : Danger

Hazard statements :

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.

Precautionary statements

Prevention :

P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response :

P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P390	Absorb spillage to prevent material damage.

Hazardous components which must be listed on the label:

- sulphuric acid

2.3. Other hazards

For Results of PBT and vPvB assessment see section 12.5.

Section 3: Composition/information on ingredients

3.1. Substances

Chemical nature : Aqueous solution

Hazardous components	Amount [%]	Classification (REGULATION (EC) No 1272/2008)		Classification (67/548/EEC)
		Hazard class / Hazard category	Hazard statements	
sulphuric acid				
Index-No. : 016-020-00-8 CAS-No. : 7664-93-9 EC-No. : 231-639-5 Registration : 01-2119458838-20-xxxx C&L-No. : 02-2119752444-38-0000	> 51 - < 96	Skin Corr.1A	H314	Corrosive; C; R35

For the full text of the R-phrases mentioned in this Section, see Section 16.
For the full text of the H-Statements mentioned in this Section, see Section 16.

Section 4: First aid measures

4.1. Description of first aid measures

General advice : Take off all contaminated clothing immediately.

If inhaled : In case of accident by inhalation: remove casualty to fresh air and keep at rest. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

In case of skin contact : First swab the concentrated acid with dry pulp or textile; because the acid reacts vigorously with water and with strong evolution of heat. Wash off with plenty of water. Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult an eye specialist immediately. Go to an ophthalmic hospital if possible.

If swallowed	: Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Call a physician immediately.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms	: See Section 11 for more detailed information on health effects and symptoms.
Effects	: See Section 11 for more detailed information on health effects and symptoms.

4.3. Indication of any immediate medical attention and special treatment needed

Treatment	: Treat symptomatically.

Section 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. The product itself does not burn.
Unsuitable extinguishing media	:	No information available.

5.2. Special hazards arising from the substance or mixture

Specific hazards during firefighting	:	May decompose in a fire giving off toxic fumes, Hazardous decomposition products, Sulphur oxides, Reacts exothermic with water

5.3. Advice for firefighters

Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus.Wear appropriate body protection (full protective suit)
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains.Cool closed containers exposed to fire with water spray.

Section 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions	: Use personal protective equipment. Provide adequate ventilation. Avoid contact with skin and eyes. Do not breathe vapours or spray mist.

6.2. Environmental precautions

Environmental precautions	: Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration. If the product contaminates rivers and lakes or drains inform respective authorities. Local authorities should be advised if significant spillages cannot be

contained.

6.3. Methods and materials for containment and cleaning up

Methods and materials for containment and cleaning up	:	Neutralize with soda and flush with plenty of water. Taking into account local regulations the product may be disposed of as waste water after neutralisation. Clean-up methods - small spillage: Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders). Keep in suitable, closed containers for disposal.
Further information	:	Treat recovered material as described in the section "Disposal considerations".

6.4. Reference to other sections

See Section 1 for emergency contact information.
See Section 8 for information on personal protective equipment.
See Section 13 for waste treatment information.

Section 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling	:	Keep container tightly closed. Use personal protective equipment. Avoid contact with the skin and the eyes. Do not breathe vapours or spray mist. Emergency eye wash fountains and emergency showers should be available in the immediate vicinity. When diluting, always add the product to water. Never add water to the product.
Hygiene measures	:	Keep away from food, drink and animal feedingstuffs. Smoking, eating and drinking should be prohibited in the application area. Wash hands before breaks and at the end of workday. Take off all contaminated clothing immediately. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers	:	Keep in an area equipped with acid resistant flooring. Store in original container.
Advice on protection against fire and explosion	:	The product is not flammable. Normal measures for preventive fire protection. Gives off hydrogen by reaction with metals. Risk of explosion.
Further information on storage conditions	:	Keep tightly closed in a dry and cool place. Keep in a well-ventilated place. Product is hygroscopic.
Advice on common storage	:	Keep away from food, drink and animal feedingstuffs. Keep away from combustible material.

7.3. Specific end use(s)

Specific use(s)	:	Identified use: See table in front of appendix for a complete overview of identified uses.

Section 8: Exposure controls/personal protection

8.1. Control parameters

Component:	sulphuric acid	CAS-No. 7664-93-9

Other Occupational Exposure Limit Values

EU ELV, Time Weighted Average (TWA):, Mist.
0.05 mg/m3
Indicative

EH40 WEL, Time Weighted Average (TWA):
0.05 mg/m3
Mist.
Thoracic fraction.

ELV (IE), Time Weighted Average (TWA):, Mist.
0.05 mg/m3
Indicative OELV

8.2. Exposure controls

Appropriate engineering controls
Refer to protective measures listed in sections 7 and 8.

Personal protective equipment
Respiratory protection

Advice	:	Required if vapours or aerosol are released. Recommended Filter type: Combination filter:E-P2

Hand protection

Advice	:	The glove material has to be impermeable and resistant to the product / the substance / the preparation. Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact). Protective gloves should be replaced at first signs of wear. The following materials are suitable:
Material	:	Fluorinated rubber
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm

Material	:	butyl-rubber
Break through time	:	>= 2 h
Glove thickness	:	0.5 mm

Eye protection

Advice	:	Tightly fitting safety goggles

Skin and body protection

Advice	:	Acid resistant protective clothing.

Environmental exposure controls

General advice	:	Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration. If the product contaminates rivers and lakes or drains inform respective authorities. Local authorities should be advised if significant spillages cannot be contained.

Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Form	:	liquid
Colour	:	colourless or slight coloured
Odour	:	odourless
Odour Threshold	:	no data available
pH	:	< 1 (20 °C)
Solidification point	:	ca. 8 °C
Boiling point/boiling range	:	ca. 290 °C
Flash point	:	not applicable
Evapouration rate	:	no data available
Flammability (solid, gas)	:	The product is not flammable.
Upper explosion limit	:	not applicable
Lower explosion limit	:	not applicable

Vapour pressure	:	< 0.01 hPa (20 °C)
Relative vapour density	:	3.4
Density	:	1.84 g/cm3 (20 °C)
Water solubility	:	completely miscible
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	not applicable
Thermal decomposition	:	ca. 338 °C
Viscosity, dynamic	:	21 mPa.s
Viscosity, kinematic	:	no data available
Explosivity	:	Product is not explosive.
Oxidizing properties	:	no data available

9.2. Other information

Molecular Weight	:	98.1 g/mol
Corrosion to metals	:	Corrosive to metals

Section 10: Stability and reactivity

10.1. Reactivity

Advice : Is corrosive to metals.

10.2. Chemical stability

Advice : Stable under normal conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions : Gives off hydrogen by reaction with metals. Reacts exothermic with water

10.4. Conditions to avoid

Conditions to avoid : Reacts with the following substances:BasesWater
Thermal decomposition : ca.338 °C

10.5. Incompatible materials

Materials to avoid : Organic materials, Bases, Reducing agents, Metals

10.6. Hazardous decomposition products

Hazardous decomposition products : Sulphur oxides, Stable under recommended storage conditions.

Section 11: Toxicological information

11.1. Information on toxicological effects

Further information		
Other relevant toxicity information	:	If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach.

Component:	sulphuric acid	CAS-No. 7664-93-9
Acute toxicity		
Oral		
LD50 Oral	:	2140 mg/kg (rat, male and female) (OECD Test Guideline 401)
Inhalation		
		no data available
Dermal		
		no data available
Irritation		
Skin		
Result	:	Very corrosive (rabbit)
Eyes		
Result	:	Very corrosive (rabbit) Risk of serious damage to eyes.
Sensitisation		
Result	:	no data available
CMR effects		
CMR Properties		

Carcinogenicity	:	Animal testing did not show any carcinogenic effects.
Mutagenicity	:	It is not considered mutagenic.
Teratogenicity	:	Did not show teratogenic effects in animal experiments.
Reproductive toxicity	:	Animal testing did not show any effects on fertility.

Specific Target Organ Toxicity

Single exposure

remark	:	The substance or mixture is not classified as specific target organ toxicant, single exposure.

Repeated exposure

remark	:	The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Other toxic properties

Aspiration hazard

No aspiration toxicity classification

Section 12: Ecological information

12.1. Toxicity

Component:	**sulphuric acid**	**CAS-No. 7664-93-9**

Acute toxicity

Fish

LC50	:	42 mg/l (Gambusia affinis; 96 h)

Toxicity to daphnia and other aquatic invertebrates

EC50	:	29 mg/l (Daphnia magna; 24 h)
EC50	:	70 - 80 mg/l (Crangon crangon (shrimp); 48 h)

algae

no data available

Bacteria		
EC50	:	58 mg/l (activated sludge; 120 h)

12.2. Persistence and degradability

Component:	sulphuric acid	CAS-No. 7664-93-9
Persistence and degradability		
Persistence		
Result	:	no data available
Biodegradability		
Result	:	The methods for determining the biological degradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Component:	sulphuric acid	CAS-No. 7664-93-9
Bioaccumulation		
Result	:	no data available

12.4. Mobility in soil

Component:	sulphuric acid	CAS-No. 7664-93-9
Mobility		
	:	no data available

12.5. Results of PBT and vPvB assessment

Component:	sulphuric acid	CAS-No. 7664-93-9
Results of PBT and vPvB assessment		
Result	:	not applicable

12.6. Other adverse effects

Additional ecological information		
Result	:	Harmful effects to aquatic organisms due to pH-shift. Neutralization is normally necessary before waste water is discharged into water treatment plants. Do not flush into surface water or sanitary sewer system.

Section 13: Disposal considerations

13.1. Waste treatment methods

Product	:	Disposal together with normal waste is not allowed. Special disposal required according to local regulations. Do not let product enter drains. Contact waste disposal services.
Contaminated packaging	:	Empty contaminated packagings thoroughly. They can be recycled after thorough and proper cleaning. Packagings that cannot be cleaned are to be disposed of in the same manner as the product.
European Waste Catalogue Number	:	No waste code according to the European Waste Catalogue can be assigned for this product, as the intended use dictates the assignment. The waste code is established in consultation with the regional waste disposer.

Section 14: Transport information

14.1. UN number

1830

14.2. UN proper shipping name

ADR	:	SULPHURIC ACID with more than 51% acid
RID	:	SULPHURIC ACID with more than 51% acid
IMDG	:	SULPHURIC ACID WITH MORE THAN 51% ACID

14.3. Transport hazard class(es)

ADR-Class	:	8
(Labels; Classification Code; Hazard identification No; Tunnel restriction code)		8; C1; 80; (E)
RID-Class	:	8
(Labels; Classification Code; Hazard identification No)		8; C1; 80
IMDG-Class	:	8
(Labels; EmS)		8; F-A, S-B

14.4. Packaging group

ADR : II
RID : II
IMDG : II

14.5. Environmental hazards

Labeling according to 5.2.1.8 ADR : no
Labeling according to 5.2.1.8 RID : no
Labeling according to 5.2.1.6.3 IMDG : no
Classification as environmentally hazardous according to 2.9.3 IMDG : no
Classified as “P” according to 2.10 IMDG : no

14.6. Special precautions for user

Not applicable.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

IMDG : Not applicable.

Section 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

:

Notification status

sulphuric acid:

Regulatory List	Notification	Notification number
AICS	YES	
DSL	YES	
INV (CN)	YES	
ENCS (JP)	YES	(1)-430
ISHL (JP)	YES	(1)-430
TSCA	YES	
EINECS	YES	231-639-5
KECI (KR)	YES	97-1-405
KECI (KR)	YES	KE-32570
PICCS (PH)	YES	

15.2. Chemical Safety Assessment

A Chemical Safety Assessment has been carried out for this substance.

Section 16: Other information

Full text of R-phrases referred to under sections 2 and 3.

R35	Causes severe burns.

Full text of H-Statements referred to under sections 2 and 3.

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.

Further information

Other information	:	Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use.The information provided in this Safety Data Sheet is correct to our knowledge at the date of its revision. The information given only describes the products with regard to safety arrangements and is not to be considered as a warranty or quality specification and does not constitute a legal relationship. The information contained in this Safety Data Sheet relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text

|| Indicates updated section.

Sulphuric acid >51 - <96%

No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Article Category (AC)	Specified
1	Use as an intermediate	3	4, 6b, 8, 9, 14	19	1, 2, 3, 4, 8a, 8b, 9	6a	NA	ES679
2	Formulation & (re)packing of substances and mixtures	3	10	NA	1, 3, 5, 8a, 8b, 9	2	NA	ES689
3	Use in laboratories	22	NA	21	15	8a, 8b	NA	ES906
4	Use for extractions and processing of minerals, ores	3	2a, 14	20, 40	2, 3, 4	4, 6b	NA	ES784
5	Use as processing aid	3	4, 5, 6b, 8, 9, 11, 23	20	1, 2, 3, 4, 8a, 8b, 9, 13	6b	NA	ES782
6	Use in electrolytic processes	3	14, 15, 17	14, 20	1, 2, 8b, 9, 13	5, 6b	NA	ES788
7	Use in the process of surface treatments, purification and etching	3	2a, 14, 15, 16	14, 15	1, 2, 3, 4, 8a, 8b, 9, 13	6b	NA	ES786
8	Use in gas treatment	3	8	20	1, 2, 8b	7	NA	ES790
9	Use in production of sulphuric acid contained batteries	3	NA	NA	2, 3, 4, 9	2, 5	NA	ES792
10	Use in recycling of sulphuric acid contained batteries	3	NA	NA	2, 4, 5, 8a	1	NA	ES794
11	Use in maintenance of sulphuric acid contained batteries	22	NA	NA	19	8b, 9b	NA	ES798

Sulphuric acid >51 - <96%

1. Short title of Exposure Scenario 1: Use as an intermediate	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU4: Manufacture of food products SU6b: Manufacture of pulp, paper and paper products SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals SU14: Manufacture of basic metals, including alloys
Chemical product category	PC19: Intermediate
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Environmental Release Categories	ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)
Activity	Note: this Exposure Scenario is only relevant for an appropriated use according to the quality grade of the substance delivered

2.1 Contributing scenario controlling environmental exposure for: ERC6a		
Product characteristics	Concentration of the Substance in Mixture/Article	The substance is used up in the process
Amount used	Annual amount per site	300000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation
	Water	The wastewater neutralisation process is extremely efficient with almost total neutralisation achieved
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9		
Product characteristics	Concentration of the Substance in Mixture/Article	The substance is used up in the process

	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3, PROC4)	
	Indoors, any sized room, with good natural ventilation(PROC9)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2, PROC3, PROC4)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC8a)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC3, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6a	---	Fresh water	PEC	0.2µg/L	0.08
ERC6a	---	Marine water	PEC	0.03µg/L	0.12
ERC6a	---	Fresh water sediment	PEC	0.0018µg/kg	0.0009
ERC6a	---	Marine sediment	PEC	0.0026µg/kg	0.0013
ERC6a	---	Soil	PEC	0.92µg/kg	---
ERC6a	---	Air	PEC	0.0032µg/m³	---

Workers

Advanced REACH Tool (ART model)

Sulphuric acid >51 - <96%

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	Worker - inhalative, long-term - systemic	0.0094ng/m3	---
PROC2	90th percentile value	Worker - inhalative, long-term - systemic	0.092ng/m3	---
PROC3	90th percentile value	Worker - inhalative, long-term - systemic	0.42µg/m³	---
PROC4	90th percentile value	Worker - inhalative, long-term - systemic	14µg/m³	---
PROC8a	90th percentile value	Worker - inhalative, long-term - systemic	23µg/m³	---
PROC8b	90th percentile value	Worker - inhalative, long-term - systemic	0.0048µg/m³	---
PROC9	90th percentile value	Worker - inhalative, long-term - systemic	2.8µg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 2: Formulation & (re)packing of substances and mixtures		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU 10: Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC3: Use in closed batch process (synthesis or formulation) PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Environmental Release Categories	ERC2: Formulation of preparations	
2.1 Contributing scenario controlling environmental exposure for: ERC2		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	300000 ton(s)/year
	Annual amount used per region	3 Million tonnes/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation
	Water	The wastewater neutralisation process is extremely efficient with almost total neutralisation achieved
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC3, PROC5, PROC8a, PROC8b, PROC9		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	

Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3)	
	Indoors, any sized room, with good natural ventilation(PROC5, PROC9)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC3)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC5)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC3, PROC5, PROC8b)	
	Complete segregation(PROC1)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2	---	Fresh water	PEC	0.0443µg/L	0.01772
ERC2	---	Marine water	PEC	0.0064µg/L	0.02568
ERC2	---	Fresh water sediment	PEC	0.0038µg/kg	0.00192
ERC2	---	Marine sediment	PEC	0.0005µg/kg	0.00028
ERC2	---	Soil	PEC	0.2µg/kg	---
ERC2	---	Air	PEC	0.0007µg/m³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	Worker - inhalative, long-term - systemic	0.0009ng/m3	---
PROC3	90th percentile value	Worker - inhalative, long-term - systemic	0.42µg/m³	---

PROC5	90th percentile value	Worker - inhalative, long-term - systemic	0.016mg/m³	---
PROC8a	90th percentile value	Worker - inhalative, long-term - systemic	0.023mg/m³	---
PROC8b	90th percentile value	Worker - inhalative, long-term - systemic	0.0004µg/m³	---
PROC9	90th percentile value	Worker - inhalative, long-term - systemic	0.0028mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 3: Use in laboratories		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Chemical product category	PC21: Laboratory chemicals	
Process categories	PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8b: Wide dispersive indoor use of reactive substances in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	5000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill
2.2 Contributing scenario controlling worker exposure for: PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation	
	Due to the nature of the substance the process should be kept as contained as possible	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

and health evaluation	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8a	---	Fresh water	PEC	0.138µg/L	0.05520
ERC8a	---	Marine water	PEC	0.0074µg/L	0.02956
ERC8a	---	Fresh water sediment	PEC	0.011µg/kg	0.00580
ERC8a	---	Marine sediment	PEC	0.639ng/kg	0.00032
ERC8a	---	Soil	PEC	0.134µg/kg	---
ERC8a	---	Air	PEC	0.48ng/m3	---
ERC8b	---	Fresh water	PEC	2.12ng/L	0.00085
ERC8b	---	Marine water	PEC	0.0666ng/L	0.00026
ERC8b	---	Fresh water sediment	PEC	0.183ng/kg	0.00009
ERC8b	---	Marine sediment	PEC	0.0058ng/kg	0.00000
ERC8b	---	Soil	PEC	0.134ng/kg	---
ERC8b	---	Air	PEC	0.0048ng/m3	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC15	90th percentile value	Worker - inhalative, long-term - systemic	0.023µg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 4: Use for extractions and processing of minerals, ores		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU2a: Mining (without offshore industries) SU14: Manufacture of basic metals, including alloys	
Chemical product category	PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents PC40: Extraction agents	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises	
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles ERC6b: Industrial use of reactive processing aids	
2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC6b		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	438 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Metal recovery, incineration or landfill
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC4		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC2)	

	Outdoors near to buildings(PROC3, PROC4)
	Process may involve high temperature (50 - 150°C)
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.
	Due to the nature of the substance the process should be kept as contained as possible
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(PROC2, PROC4)
	Provide local exhaust ventilation (LEV).(PROC2)
	Complete segregation(PROC2)
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance
	Substance-handling procedures shall be well documented and strictly supervised
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4	---	Fresh water	PEC	0.025µg/L	0.01000
ERC4	---	Marine water	PEC	0.0036µg/L	0.01424
ERC4	---	Fresh water sediment	PEC	0.0021µg/kg	0.00106
ERC4	---	Marine sediment	PEC	0.0003µg/kg	0.00015
ERC4	---	Soil	PEC	0.112µg/kg	---
ERC4	---	Air	PEC	0.0004µg/m³	---
ERC6b	---	Fresh water	PEC	0.026ng/L	0.00001
ERC6b	---	Marine water	PEC	0.0037ng/L	0.00001
ERC6b	---	Fresh water sediment	PEC	0.0000µg/kg	0.00000
ERC6b	---	Marine sediment	PEC	0.0000µg/kg	0.00000
ERC6b	---	Soil	PEC	0.0001µg/kg	---
ERC6b	---	Air	PEC	0.0000µg/m³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	90th percentile value	Worker - inhalative, long-term - systemic	0.092ng/m3	---
PROC3	90th percentile value	Worker - inhalative, long-term - systemic	0.42µg/m³	---
PROC4	90th percentile value	Worker - inhalative, long-term - systemic	0.014mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 5: Use as processing aid	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU4: Manufacture of food products SU5: Manufacture of textiles, leather, fur SU6b: Manufacture of pulp, paper and paper products SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals SU11: Manufacture of rubber products SU23: Electricity, steam, gas water supply and sewage treatment
Chemical product category	PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC13: Treatment of articles by dipping and pouring
Environmental Release Categories	ERC6b: Industrial use of reactive processing aids
Activity	Note: this Exposure Scenario is only relevant for an appropriated use according to the quality grade of the substance delivered

2.1 Contributing scenario controlling environmental exposure for: ERC6b		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	100000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation
	Water	The wastewater neutralisation process is extremely efficient with almost total neutralisation achieved
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4,

PROC8a, PROC8b, PROC9, PROC13		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3, PROC4)	
	Indoors, any sized room, with good natural ventilation(PROC9, PROC13)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2, PROC3, PROC4)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC8a, PROC13)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC2, PROC3, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6b	---	Fresh water	PEC	0.0059µg/L	0.00236
ERC6b	---	Marine water	PEC	0.0009µg/L	0.00344
ERC6b	---	Fresh water sediment	PEC	0.0005µg/kg	0.00026
ERC6b	---	Marine sediment	PEC	0.074ng/kg	0.00004
ERC6b	---	Soil	PEC	0.027µg/kg	---

ERC6b	---	Air	PEC	0.0000µg/m³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	Worker - inhalative, long-term - systemic	0.0094ng/m3	---
PROC2	90th percentile value	Worker - inhalative, long-term - systemic	0.092ng/m3	---
PROC3	90th percentile value	Worker - inhalative, long-term - systemic	0.42µg/m³	---
PROC4	90th percentile value	Worker - inhalative, long-term - systemic	0.014mg/m³	---
PROC8a	90th percentile value	Worker - inhalative, long-term - systemic	0.023mg/m³	---
PROC8b	90th percentile value	Worker - inhalative, long-term - systemic	0.0048µg/m³	---
PROC9	90th percentile value	Worker - inhalative, long-term - systemic	0.0028mg/m³	---
PROC13	90th percentile value	Worker - inhalative, long-term - systemic	0.016mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 6: Use in electrolytic processes		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU14: Manufacture of basic metals, including alloys SU15: Manufacture of fabricated metal products, except machinery and equipment SU17: General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment	
Chemical product category	PC14: Metal surface treatment products, including galvanic and electroplating products PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC13: Treatment of articles by dipping and pouring	
Environmental Release Categories	ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6b: Industrial use of reactive processing aids	
2.1 Contributing scenario controlling environmental exposure for: ERC5, ERC6b		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 95-98%
Amount used	Annual amount per site	2306 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Metal recovery, incineration or landfill
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC8b, PROC9, PROC13		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 95-98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker exposure should be low and controlled	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day

	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Indoors, any sized room, with good natural ventilation(PROC9, PROC13)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC13)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	
	Wear respiratory protection (Efficiency: 90 %)(PROC13)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC5	---	Fresh water	PEC	0.0681µg/L	0.02724
ERC5	---	Marine water	PEC	0.0099µg/L	0.03948
ERC5	---	Fresh water sediment	PEC	0.0059µg/kg	0.00294
ERC5	---	Marine sediment	PEC	0.0008µg/kg	0.00043
ERC5	---	Soil	PEC	0.309µg/kg	---
ERC5	---	Air	PEC	0.0011µg/m³	---
ERC6b	---	Fresh water	PEC	0.136ng/L	0.00005
ERC6b	---	Marine water	PEC	0.0197ng/L	0.00008
ERC6b	---	Fresh water sediment	PEC	0.0118ng/kg	0.00001
ERC6b	---	Marine sediment	PEC	0.0017ng/kg	0.00000
ERC6b	---	Soil	PEC	0.618ng/kg	---
ERC6b	---	Air	PEC	0.0022ng/m3	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	Worker - inhalative, long-term - systemic	0.0094ng/m3	---

PROC2	90th percentile value	Worker - inhalative, long-term - systemic	0.092ng/m3	---
PROC8b	90th percentile value	Worker - inhalative, long-term - systemic	0.0048µg/m³	---
PROC9	90th percentile value	Worker - inhalative, long-term - systemic	0.0028mg/m³	---
PROC13	90th percentile value	Worker - inhalative, long-term - systemic	0.47mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 7: Use in the process of surface treatments, purification and etching	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU2a: Mining (without offshore industries) SU14: Manufacture of basic metals, including alloys SU15: Manufacture of fabricated metal products, except machinery and equipment SU16: Manufacture of computer, electronic and optical products, electrical equipment
Chemical product category	PC14: Metal surface treatment products, including galvanic and electroplating products PC15: Non-metal-surface treatment products
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC13: Treatment of articles by dipping and pouring
Environmental Release Categories	ERC6b: Industrial use of reactive processing aids

2.1 Contributing scenario controlling environmental exposure for: ERC6b		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	10000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC13		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems and closed nature of the production process	

Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3, PROC4)	
	Indoors, any sized room, with good natural ventilation(PROC9, PROC13)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2, PROC3, PROC4)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC8a, PROC13)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC2, PROC3, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6b	---	Fresh water	PEC	0.591ng/L	0.00024
ERC6b	---	Marine water	PEC	0.0856ng/L	0.00034
ERC6b	---	Fresh water sediment	PEC	0.051ng/kg	0.00003
ERC6b	---	Marine sediment	PEC	0.0074ng/kg	0.00000
ERC6b	---	Soil	PEC	2.68ng/kg	---
ERC6b	---	Air	PEC	0.0096ng/m3	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	Worker - inhalative, long-term - systemic	0.0094ng/m3	---
PROC2	90th percentile value	Worker - inhalative, long-	0.0920ng/m3	---

		term - systemic		
PROC3	90th percentile value	Worker - inhalative, long-term - systemic	0.42µg/m³	---
PROC4	90th percentile value	Worker - inhalative, long-term - systemic	0.014mg/m³	---
PROC8a	90th percentile value	Worker - inhalative, long-term - systemic	0.023mg/m³	---
PROC8b	90th percentile value	Worker - inhalative, long-term - systemic	0.0048µg/m³	---
PROC9	90th percentile value	Worker - inhalative, long-term - systemic	0.0028mg/m³	---
PROC13	90th percentile value	Worker - inhalative, long-term - systemic	0.016mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 8: Use in gas treatment		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products)	
Chemical product category	PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	
Environmental Release Categories	ERC7: Industrial use of substances in closed systems	
2.1 Contributing scenario controlling environmental exposure for: ERC7		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	30000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Spent acid solutions are neutralized to circumneutral pH prior to discharge
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker exposure should be low and controlled	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²

	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases
Other operational conditions affecting workers exposure	Outdoors not close to buildings
	Process may involve high temperature (50 - 150°C)
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.
	Due to the nature of the substance the process should be kept as contained as possible
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system
	Provide local exhaust ventilation (LEV).(PROC1, PROC8b)
	Complete segregation(PROC1, PROC2)
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance
	Substance-handling procedures shall be well documented and strictly supervised
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC7	---	Fresh water	PEC	0.0886µg/L	0.03544
ERC7	---	Marine water	PEC	0.0128µg/L	0.05120
ERC7	---	Fresh water sediment	PEC	0.0076µg/kg	0.00383
ERC7	---	Marine sediment	PEC	0.0011µg/kg	0.00056
ERC7	---	Soil	PEC	0.0029mg/kg	---
ERC7	---	Air	PEC	0.0014µg/m³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	Worker - inhalative, long-term - systemic	0.0094ng/m3	---
PROC2	90th percentile value	Worker - inhalative, long-term - systemic	0.092ng/m3	---
PROC8b	90th percentile value	Worker - inhalative, long-term - systemic	0.0048µg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Sulphuric acid >51 - <96%

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 9: Use in production of sulphuric acid contained batteries		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Environmental Release Categories	ERC2: Formulation of preparations ERC5: Industrial use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC5		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	2500 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC4, PROC9		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker exposure should be low and controlled	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Organisational measures to prevent /limit releases, dispersion	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly	

and exposure	supervised
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2	---	Fresh water	PEC	0.0369µg/L	0.01476
ERC2	---	Marine water	PEC	0.0054µg/L	0.02144
ERC2	---	Fresh water sediment	PEC	0.0032µg/kg	0.00160
ERC2	---	Marine sediment	PEC	0.0005µg/kg	0.00023
ERC2	---	Soil	PEC	0.166µg/kg	---
ERC2	---	Air	PEC	0.0006µg/m³	---
ERC5	---	Fresh water	PEC	0.0788µg/L	0.03152
ERC5	---	Marine water	PEC	0.0107µg/L	0.04280
ERC5	---	Fresh water sediment	PEC	0.0064µg/kg	0.00319
ERC5	---	Marine sediment	PEC	0.0009µg/kg	0.00046
ERC5	---	Soil	PEC	0.335µg/kg	---
ERC5	---	Air	PEC	0.0012µg/m³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	90th percentile value	Worker - inhalative, long-term - systemic	1.4µg/m³	---
PROC3	90th percentile value	Worker - inhalative, long-term - systemic	0.014mg/m³	---
PROC4	90th percentile value	Worker - inhalative, long-term - systemic	0.0012mg/m³	---
PROC9	90th percentile value	Worker - inhalative, long-term - systemic	0.0012mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that

risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 10: Use in recycling of sulphuric acid contained batteries		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	
Environmental Release Categories	ERC1: Manufacture of substances	
2.1 Contributing scenario controlling environmental exposure for: ERC1		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
Amount used	Annual amount per site	2500 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC4, PROC5, PROC8a		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
	Physical Form (at time of use)	liquid
	Vapour pressure	0.06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and	Provide local exhaust ventilation (LEV).	

measures to control dispersion from source towards the worker	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance
	Substance-handling procedures shall be well documented and strictly supervised
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0.0074µg/L	0.00295
ERC1	---	Marine water	PEC	0.0011µg/L	0.00428
ERC1	---	Fresh water sediment	PEC	0.0638ng/kg	0.00032
ERC1	---	Marine sediment	PEC	0.0093ng/kg	0.00005
ERC1	---	Soil	PEC	0.0335µg/kg	---
ERC1	---	Air	PEC	0.0001µg/m³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	90th percentile value	Worker - inhalative, long-term - systemic	0.0012mg/m³	---
PROC4	90th percentile value	Worker - inhalative, long-term - systemic	0.004mg/m³	---
PROC5	90th percentile value	Worker - inhalative, long-term - systemic	0.013mg/m³	---
PROC8a	90th percentile value	Worker - inhalative, long-term - systemic	0.006mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario 11: Use in maintenance of sulphuric acid contained batteries		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Process categories	PROC19: Hand-mixing with intimate contact and only PPE available	
Environmental Release Categories	ERC8b: Wide dispersive indoor use of reactive substances in open systems ERC9b: Wide dispersive outdoor use of substances in closed systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8b, ERC9b		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
Amount used	Annual amount per site	2500 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Incineration or in a landfill
2.2 Contributing scenario controlling worker exposure for: PROC19		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
	Physical Form (at time of use)	liquid
	Vapour pressure	2.14 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation	
	Due to the nature of the substance the process should be kept as contained as possible	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8b	---	Fresh water	PEC	0.001µg/L	0.00424
ERC8b	---	Marine water	PEC	0.333ng/L	0.00133
ERC8b	---	Fresh water sediment	PEC	0.914ng/kg	0.00046
ERC8b	---	Marine sediment	PEC	0.0288ng/kg	0.00001
ERC8b	---	Soil	PEC	0.671ng/kg	---
ERC8b	---	Air	PEC	0.002ng/m3	---
ERC9b	---	Fresh water	PEC	0.003µg/L	0.01340
ERC9b	---	Marine water	PEC	1.85ng/L	0.00740
ERC9b	---	Fresh water sediment	PEC	2.89ng/kg	0.00140
ERC9b	---	Marine sediment	PEC	0.16ng/kg	0.00008
ERC9b	---	Soil	PEC	0.003µg/kg	---
ERC9b	---	Air	PEC	0.12ng/m3	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
---	90th percentile value	Worker - inhalative, long-term - systemic	0.002mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.