Kepak Group

Spill Report Follow Up

Response to EPA CI Action C9.3.1

Site Address:

Kepak Clonee

Clonee

Co. Meath

IE Licence Number:

P0167-02

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Rowan Engineering Consultants Ltd.
Unit 1 Scurlockstown Business Park
Trim
Co. Meath
New Regional Office: N17 Business Park, Tuam, Co. Galway
Tel: 046-9030102
Web: www.rec.ie
Email: info@rec.ie

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Table of Contents

1. Introduction

Rowan Engineering Consultants Ltd (ROWAN) were contracted by Kepak Clonee to prepare a response to the Environmental Protection Agency (EPA) on CI Action C9.3.1 that follows a chemical spill that entered into the surface water network and discharged to the River Tolka at SW2 on 10 June 2019.

The EPA required the following to be addressed.

The licensee shall submit a report on the nature of the emission to the River Tolka. This report shall, as a minimum address the following:

- *Carry out a risk assessment on the behaviour of Topaz CL4 in the River Tolka*
- *Clarify the acute toxicity (as referenced in the safety data sheet) of an undiluted sample of Topaz CL4 on at least four aquatic species from different trophic levels*
- *Evaluate the River Tolka's ability to assimilate the volume of Topaz CL4 discharged; and*
- *Determine the point at which Topaz CL4 was not at a concentration, which after initial dilution in the River Tolka, caused an impact downstream of Industrial Emissions Licensed Discharge to water Ref. No. SW-2*
- *Confirm if the incident falls within the scope of the European Communities (Environmental Liability) Regulations 2008. The licensee shall have regard guidance issued by the EPA in relation to the Environmental Liability Regulations which is available on the EPA website at https://www.epa.ie/pubs/advice/general/environmentalliabilityregulations.html*

The following report is drafted to address these queries.

2. Risk Assessment of Topaz CL4 in the River Tolka

The EPA have requested that a risk assessment on the behaviour of Topaz CL4 in the River Tolka is submitted as part of the Report. We suggest the following sections all form part of an overall risk assessment that is concluded at the end of the report.

3. Clarify the acute toxicity of Topaz CL4

3.1 Introduction

The EPA requested that the Kepak Clonee "*clarify the acute toxicity (as referenced in the data sheet) of an undiluted sample of Topaz CL4 on at least four aquatic species from different tropic levels".* Instead of undertaking extensive laboratory trails for this purpose, it was discussed with the EPA that a desk based review would be undertaken.

The Material Safety Data Sheet (MSDS) was reviewed for Topaz CL4 and it did not present data on the toxicity of the product as a whole on aquatic species. Data was presented on the toxicity of the three main constituents of the Topaz CL4 product on varying species.

In order to ascertain if further information was available on the toxicity of the individual constituents, a literature review of published data was carried out and the details of the review are summarised below.

Where available, the literature review has identified the lowest published concentration of each constituent that was determined to produce a toxic effect on the aquatic species studied.

3.2 Topaz CL4 Overview

Topaz CL4 is the commercial name of a strong professional cleaning project, which is used by Kepak Ltd at their facility in Clonee. Under Regulation (EC) No 1272/2008 it is listed as having the following impacts and effects:

- Corrosive to metals, Category 1
- Skin corrosion, Sub-Category 1-A
- Serious eye damage, Category 1
- Acute aquatic toxicity, Category 1
- Chronic aquatic toxicity, Category 2

Topaz CL4 is a component mixture and its main constituents are:

- Sodium hypochlorite
- Sodium hydroxide
- Amines, C12-14, alkyldimethyl, N-oxides.

It is a clear liquid, with an odour of chlorine and with a pH of between 13.5 – 14.0. It is soluble in water and it is oxidizable.

The MSDS for Topaz CL4 outlines the toxicological information for this product, including information on the toxicity of this product on ecological receptors. Overall, it is described as being *"very toxic to aquatic life. Toxic to aquatic life with long lasting effects".*

There is no information or literature available citing the impacts of the final product on algae, fish, plankton (specifically Daphnia) or other aquatic invertebrates. However, where available, the MSDS does cite information pertaining to the toxicity of the individual components of the product, i.e., sodium hypochlorite, sodium hydroxide and amines, C12-14, alkyldimethyl N-oxides. This information as presented in the MSDS is summarised below:

<u>Toxicity to Fish</u>

- Sodium hypochlorite – 96h EC50: 0.14mg /l
- Amines, C12-14, alkyldimethyl, N-oxides – LC50: 2.67 mg/l

<u>Toxicity to Daphnia and Other Aquatic Invertebrates</u>

- Sodium hypochlorite – 48h EC50: 0.071 mg /l
- Sodium hydroxide – 48h EC50: 40mg/l
- Amines, C12-14, alkyldimethyl, N-oxides – EC50 *Daphnia magna*: 3.1 mg/l

<u>Toxicity to Algae</u>

- Amines, C12-14, alkyldimethyl, N-oxides – LC50: 0.143 mg/l and NOEC: 0.067 mg/l.

To explain the above figures, the EC50 (median effective concentration) refers to the concentration of a toxic substance in an environmental medium expected to produce a certain effect in 50% of the test organisms, in a given population under a defined set of conditions.

The LC50 (lethal concentration 50) is the concentration of a substance in water causing the death of 50% of the tested population after a certain length of time, indicated above in hours (96hours, 48hours).

The data present in the MSDS was confined to the above information. In order to gather more in-depth data or research on the toxicity of the individual constituents of Topaz C, a review of the available literature on the toxicology of these substances was initiated.

3.3 Literature Review

3.3.1 Aquatic Toxicology

Aquatic toxicity is defined as the study of the effects of a chemical substance to aquatic species which is usually determined on organisms representing the three trophic levels, i.e. vertebrates (fish), invertebrates (crustaceans such as Daphnia) and plants (algae).

Below there is a summary of how study results are given (LC50, NOEC), along with acute and chronic aquatic toxicity classification criteria. (*This information was obtained from www.chemsafetypro.com.)*.

Fish

- Acute toxicity to fish (96hrs, LC50 in mg/l): The acute toxicity is expressed as the median lethal concentration (LC 50) that is the concentration in water which kills 50% of a test batch of fish within a continuous period of exposure which is usually 96hrs.
- Long term toxicity (28days, NOEC in mg/l): The chronic toxicity is expressed as No Observed Effect Concentration (NOEC), i.e., the concentration in water which below an unacceptable effect is unlikely to be observed.

Daphnia

- Acute toxicity to Daphnia (48hrs, EC50 in mg/l): The acute toxicity is expressed as the median effective concentration (EC 50) for immobilization. This is the concentration which immobilizes 50% of the Daphnia in a test batch within a continuous period of exposure which is usually 48hrs.
- Long term toxicity to Daphnia (21days, NOEC in mg/l): This chronic eco-tox study assesses the effect of chemicals on the reproductive output of Daphnia magna. Sometimes, the lowest observed effect concentration (LOEC) is given.

Algae

- Acute toxicity to algae (72-96 hrs, EC50 in mg/l): EC50 is the concentration of test substance which results in a 50 percent reduction in either growth (EbC50) or growth rate (ErC50) relative to the control within 72hrs exposure.

Acute and chronic aquatic toxicity classification criteria under GHS

Acute aquatic toxicity data and chronic aquatic toxicity data are essential for determining the environmental hazard classification of a chemical substance under GHS (Globally Harmonized System of Classification and Labelling of Chemicals).

The tables a and b (in Figure 3.1(a) and (b)) below summarize acute and chronic aquatic toxicity classification criteria. Lower LC50/EC50/NOEC indicates higher toxicity.

(a) Acute (short-term) aquatic hazard

Category Acute 1: *(Note 2)*	
96 hr LC_{50} (for fish)	≤ 1 mg/l and/or
48 hr EC_{50} (for crustacea)	≤ 1 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	≤ 1 mg/l *(Note 3)*
Category Acute 1 may be subdivided for some regulatory systems to include a lower band at $L(E)C_{50}$ ≤ 0.1 mg/l	
Category Acute 2:	
96 hr LC_{50} (for fish)	> 1 but ≤ 10 mg/l and/or
48 hr EC_{50} (for crustacea)	>1 but ≤ 10 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	>1 but ≤ 10 mg/l *(Note 3)*
Category Acute 3:	
96 hr LC_{50} (for fish)	>10 but ≤ 100 mg/l and/or
48 hr EC_{50} (for crustacea)	>10 but ≤ 100 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	>10 but ≤ 100 mg/l *(Note 3)*
Some regulatory systems may extend this range beyond an $L(E)C_{50}$ of 100 mg/l through the introduction of another category.	

Figure 3.1(a): Risk Assessment and Aquatic Toxicity

(b) Long-term aquatic hazard *(see also figure 4.1.1)*

(i) Non-rapidly degradable substances (Note 4) for which there are adequate chronic toxicity data available

Category Chronic 1: *(Note 2)*	
Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l
Category Chronic 2:	
Chronic NOEC or EC_x (for fish)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 1 mg/l

(ii) Rapidly degradable substances for which there are adequate chronic toxicity data available

Category Chronic 1: *(Note 2)*	
Chronic NOEC or EC_x (for fish)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.01 mg/l
Category Chronic 2:	
Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l
Category Chronic 3:	
Chronic NOEC or EC_x (for fish)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 1 mg/l

(iii) Substances for which adequate chronic toxicity data are not available

Category Chronic 1: *(Note 2)*	
96 hr LC_{50} (for fish)	≤ 1 mg/l and/or
48 hr EC_{50} (for crustacea)	≤ 1 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	≤ 1 mg/l *(Note 3)*
and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent, the log K_{ow} ≥ 4). *(Notes 4 and 5)*	
Category Chronic 2:	
96 hr LC_{50} (for fish)	> 1 but ≤ 10 mg/l and/or
48 hr EC_{50} (for crustacea)	> 1 but ≤ 10 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	> 1 but ≤ 10 mg/l *(Note 3)*
and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent, the log K_{ow} ≥ 4). *(Notes 4 and 5)*	
Category Chronic 3:	
96 hr LC_{50} (for fish)	> 10 but ≤ 100 mg/l and/or
48 hr EC_{50} (for crustacea)	> 10 but ≤ 100 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	> 10 but ≤ 100 mg/l *(Note 3)*
and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent, the log K_{ow} ≥ 4). *(Notes 4 and 5).*	

Figure 3.1(b): Risk Assessment and Aquatic Toxicity

Under EU REACH (Registration Evaluation Authorisation and restriction of Chemicals) regulations, EC50/LC50/NOECs obtained via aquatic toxicity studies will be divided by various assessment factors (according to the table 3.1 below to calculate the Predicted No Effect concentrations (PNEC) for the aquatic environment.

The Predicted No Effect Concentration or PNEC is the concentration of a substance in any environment below which adverse effects will most likely not occur during long term or short term exposure. PNECs will then be compared to predicted environmental concentration (PEC) to determine if risk is controlled or not.

Available Data	Assessment Factor*
At least one short-term L(E)C50 from each of three trophic levels of the base-set (fish, daphnia or algae)	1000
One long-term NOEC (either fish or daphnia)	100
Two long-term NOECs from species representing two trophic levels (fish and/or daphnia and/or algae)	50
Long-term NOECs from at least three species (normally fish, daphnia and algae) representing three trophic levels	10
Species sensitivity distribution (SSD) method	5-1
Field data or model ecosystems	Reviewed on a case-by-case basis

Table 3.1 Assessment Factors relevant to REACH

3.4 Literature Review on Topaz CL4

As mentioned in the previous section, there is no toxicological infomation available regarding the effects of the final Topaz CL4 on aquatic ecology or on the organisms associated with various trophic levels.

A literature review pertaining to the toxicology of the individual components of Topaz CL4 was therefore initiated.

Sodium hypochlorite

Sodium hypochlorite (NaOClO) is a compound comprising a sodium cation (Na^+) and a hypochlorite anion (OCl^-). It is also referred to as bleach and it is widely used as a disinfectant and a bleaching agent. The compound in solution is unstable and it easily decomposes, liberating chlorine.

Various studies on the effects of sodium hypochlorite have been carried out. Sodium hypochlorite has been reported to be highly toxic to freshwater organisms e.g., fishes and invertebrates (USEPA, 1991). Sodium hypochlorite has been reported to cause significant mortality in the freshwater oligochaete *Lumbricus variegatus* Müller,1774 and the cladoceran *Daphnia magna*

Straus, 1820, with LC90<5mg/l at 24h of exposure (Stocks, O'Reilly, and McCracken2003; Sano et al.2004).

Research into the effect of sodium hypochlorite on a species of beetle in Nigeria (*Orectogyrus alluaudi*) was published by Hamzat, et.al (2017). Acute response of *Orectogyrus alluaudi* to sodium hypochlorite was reported after a 48-h acute toxicity test in animated field conditions. *O.alluaudi* belongs to the water beetle family Gyrinidae (whirligig beetles) which includes more than 700 species (including species found in Ireland). The test organisms were exposed to various concentrations of sodium hypochlorite ranging from 10 to 160 mg/l along with the control, and median lethal concentration (LC50) values at 24 and 48 h of exposure were assessed. Mortality increased with the concentration of exposure. The 24 and 48 h LC50 values estimated for sodium hypochlorite were 87.30 (73.21–107.06) and 72.32 (62.24–84.53) mg/l, respectively. A significant mortality ($P<0.001$) was observed at 40, 80 and 160 mg/l of sodium hypochlorite when compared with the control. Addition of sodium hypochlorite altered the alkalinity and pH of the test water. Behavioural responses such as agitation and disorientation were also observed.

Another study on the effect of sodium hypochlorite on Daphnia species was carried out by Sano *at al.* (2004). The organisms tested demonstrated varying sensitivity to hypochlorite based on the LC50 and LC90 The lowest LC50 value of 0.47 mg/l was for D. magna (95% C.I. 0.42–0.54), while *D. polymorpha* demonstrated the greatest resistance to hypochlorite, with an LC50 value of 23 mg/l (95% C.I. 17.1–29.4).

The discrepancies between the organisms were even more pronounced for the LC90 values: D. magna had an LC 90 value of 0.7mg/l (95% C.I. 0.6–0.9) and *D. polymorpha* had a value of 129.7 mg/l (95% C.I. 96.2–202.8).

The difference in LC values indicate that the concentration-response curve for D. magna is much steeper(greater) than that for *D. polymorpha*, signifying that lower incremental concentrations of hypochlorite result in larger increases in mortality rates for *D. magna* compared to *D. polymorpha*.

Results from the algal growth experiments indicated decreased growth in the algae *Pseudokirchneriella subcapitata* occurring at concentrations between $3.5^{\times 10}$ – 2 mg/l and $5^{\times 10}$ – 2 mg/l. Data indicated a decrease in growth at all concentrations greater than $1^{\times 10}$ – 2 mg/l, while all concentrations greater than $5^{\times 10}$ – 2 mg/l effectively eliminated all the algae (resulting in no growth).

<u>Sodium hydroxide</u>

Sodium hydroxide NaOH (also known as lye or caustic soda) is an inorganic compound consisting of sodium cations Na^+ and hydroxide anions OH^-. It is a highly caustic base and an alkali that decomposes proteins at ordinary ambient temperatures and may cause severe chemical burns. It is highly soluble in water and readily absorbs moisture and carbon dioxide from the air.

A MSDS for NaOH (Goudling, 2011), cites an LC50 of between 35 – 189mg/l for fish, and an EC50 of 40.4mg/l for Daphnia. A Summary Risk Assessment Report for NaOH prepared by the Joint Research Centre of the EC (2008) also cites these figures for fish. It states that the results for invertebrates are very similar, with a range of 33 to 450 mg / l. There is no data available for algae and higher aquatic species.

For chronic toxicity of NaOH only one limited study is available, with fish (guppy) *Lebistes reticulatus*. This study clearly showed effects on survival, growth and reproduction of fish at long-

term exposure to NaOH concentrations of 25 mg/l and higher. The available data indicate that NaOH concentrations of 20 to 40 mg/l may be acutely toxic to fish and invertebrates. Data on pH-increases due to the addition of these amounts of NaOH in the used test waters are lacking. In waters with a relatively low buffering capacity, NaOH concentrations of 20-40 mg/l may result in a pH increase with one to several pH units. The data on the pH tolerance of fish show that an increase in pH value from around 8.5 to 9.5-10.5. i.e. an increase with 1 to 2 pH units results in acute lethality in fish that were not acclimatized to intermediate values. The data further show that pH values of 9-10 may be toxic or lethal to some fish species and above a pH value of 10 mortalities may be expected for many species exposed for a prolonged period.

Amines, C12-14, alkyldimethyl, N-oxides

Amine oxides are surface-active agents and can be found in a wide range of products for use in both industrial and professional settings as well as by consumers. Typical uses of products containing amine oxides are detergents for laundry and dishwashing, hard surface cleaning products, car and boat washing products. Amine oxides are typically present in products at concentrations of 1-5% but may reach up to 15%, depending on the application.

The European Chemical Agency provides information on the ecotoxicology of this substance. It cites an LC50 (96 h) for fish as 2.67 mg/l, based on the lowest LC50 derived from four reliable studies available. Iwan *et al* (1981) exposed Fathead minnow (*Pimephales promelas*) to C12-14 AO (amine oxide) under static conditions for 96 hours. The LC50 (96 h) based on nominal concentrations of amine oxide ranged from 2.67 to 3.46 mg/l depending on the source and pH of the water used.

In a full life-cycle toxicity test (similar to EPA OPPTS 850.1500) fathead minnows (*Pimephales promelas*) were exposed to C12 -14 AO for 302 days under flow through conditions [Aquatic Environmental Services (1976)]. The NOEC was 0.42 mg/l (mean measured concentration), based on reduced fry survival, reduced egg hatch, and occluded eyes in test fish.

For *Daphnia*, the acute immobilisation (EC50) of C12-14 AO to *Daphnia magna* was determined according to OECD TG 202 and EC method C.2 under static conditions over a duration of 48 h (Noack, 2001). The 48 h EC50 value, based on nominal test concentrations, was 3.1 mg/l. A 21-day survival and reproduction test with *Daphnia magna* following OECD TG 211 is available for C12-14 AO (Maki, 1997). The 21 -day NOEC was 0.70 mg/l, based on both survival and reproduction.

For algae, Ginkel & Kroon (1990) exposed *Pseudokirchnerella subcapitata* to C12-14 AO under static conditions for 72 hours according to OECD TG 201. The EC50 (72 h) was 0.266 mg/l. The EC50 (72 h) based on the geometric mean of the four studies available with this species is 0.143 mg/l. The toxicity of C12-14 AO to algae was evaluated in a 28 -day freshwater periphyton microcosm assay (Belanger, 1997). The No-Observed Effect Concentration (NOEC) of the substance to the periphyton community was determined to be >67 ug/l, the highest test concentration evaluated (mean measured concentration).

For micro-organisms, Kolvenbach (1990) exposed *Pseudomonas putida* to C12 -14 AO for 18 hours in a Bringmann-Kohn test. The EC10, based on reduction in growth rate, was 24 mg/l. For sediment-dwelling organisms there are no studies available, however risk characterisation using

the equilibrium partitioning method indicates that the risk to sediment dwelling organisms is adequately controlled and there is no need for further refinement of the assessment through testing.

3.5 Literature Review Conclusions

The MSDS for Topaz CL4 does not present data on the toxicity of this product as a whole on aquatic species. Data was presented on the toxicity of the three main constituents of the product on varying species. In order to ascertain if further information was available on the toxicity of the individual constituents, a literature review of published data was carried out.

Table 3.2 below summarises the information gathered as part of this review. Where available, it presents the lowest published concentration of each constituent that produces a toxic effect on the aquatic taxa studied.

Table 3.2 Summary of Aquatic Toxicity Data

Taxon	Sodium hypochlorite	Sodium hydroxide	Amines, C12-14, alkyldimethyl, N-oxides.
Fish	96h EC50: 0.14mg/l	LC50: 35 -189mg/l. NaOH concentrations of 20-40mg.l may be acutely toxic to fish.	LC50: 2.67mg/l
Daphnia / Other Invertebrates	48h EC50: 0.071 mg /l	48h EC50: 40mg/l	48h EC50: 3.1 mg/l (Daphnia magma)
Daphnia magna	LC50: 0.47 mg/		
Daphnia polymorpha	LC50: 23 mg/l		
Algae			LC50: 0.143 mg/l and NOEC: 0.067 mg/l.
Pseudokirchneriella subcapitata (algae)	$5^{\times 10}$ – 2 mg/l (eliminates growth)		72h EC50: 0.143mg/l
*Pseudomonas putida (*bacteria*)*			EC10: 24 mg/l
Oligochaete (worm)	LC90<5mg/l at 24h of exposure		
Water beetle Family *Gyrinidae*	48h LC50: 72.32 mg/l		

Based on the above review, and taking a conservative approach, sodium hypochlorite can have effects on the most sensitive species in the river (Daphnia) in concentrations up to 0.071 mg/l.

On the basis of Predicted No Effect Concentration or PNEC (the concentration of a substance in any environment below which adverse effects will most likely not occur during long term or short term exposure), this could be as low as 0.07ug/l based on the above review. Kepak would have to explore if such a concentration could be accurately analysed for in the environment – and if so, how would this compare with background conditions.

4. River Tolka Assimilative Capacity and Downstream impacts

The site is located in the Eastern River Basin District within Hydrometric Area 09 in the Liffey catchment. The Tolka flows in a easterly direction and flows through urbanised areas of north Dublin city and ultimately into Dublin Bay.

4.1 Existing Tolka Water Quality

The Environmental Protection Agency (EPA) routinely monitors water quality in rivers across Ireland. The EPA online maps currently shows the Tolka WFD Status 2010-2015 as 'Bad Status' at station RS09T010700 in Clonee village

4.2 River Flow

Kepak discharge stormwater to the Tolka from their site. According to the EPA HydroTool website, the river has the following flows. The estimation of flow duration curve for the above locations are shown in Appendix 2

Table 4.1 Flows at various sections of the Tolka from EPA HydroTool

Receiving Waterbody	95%ile flow	50%ile flow
	m3/s	m3/s
Tolka (09-1457) – Adjacent to site – Figure 4.1	0.028	0.539
Tolka (09-1457) – between site and u/s of bridge M3 Services Figure 4.2	0.029	0.559
Tolka (09-1457) – d/s of M3 Services – Figure 4.3	0.036	0.696

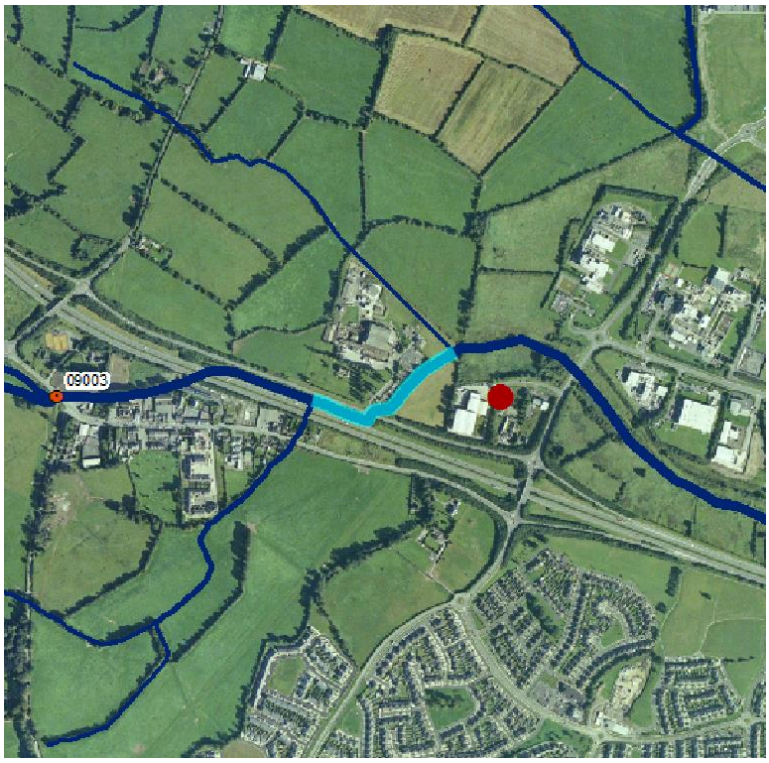

Figure 4.1 – Tolka River section 0.028 m3/s 95%ile **(note red dot is not Kepak site but a carryover from EPA mapping tool)**

Figure 4.2 – Tolka River section 0.029 m3/s 95%ile **(note red dot is not Kepak site but a carryover from EPA mapping tool)**

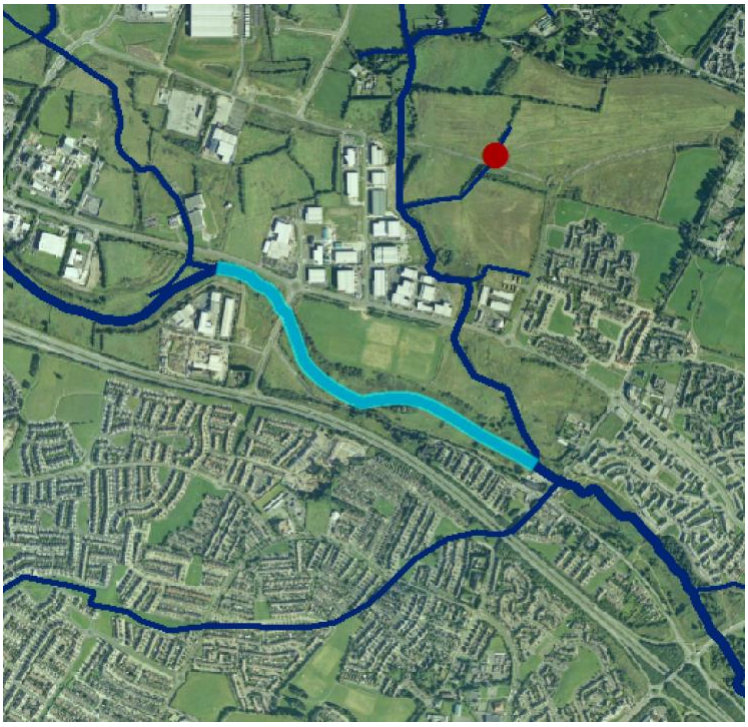

Figure 4.3 – Tolka River section 0.036 m3/s 95%ile **(note red dot is not Kepak site but a carryover from EPA mapping tool)**

4.3 Assimilation Capacity

Rainfall at Dublin Airport is shown below and it is apparent that June 2019 was a very month compared to what would be typical for that time of year. On this basis the flows experienced past the site will be higher than normal and we suggest the 50%ile flow is a reasonable starting point for any assessments related to dilution and / or mixing

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Annual
2019	26.8	30.5	92.5	74.6	33.4	82.9	41.0	89.6	471.3

Based on the known amount of material discharged (300lts / kgs) we have taken Sodium Hypochlorite to be the basis for the assessment as it is the main active ingredient in the product. We have noted the concentration of Sodium Hypochlorite in Topaz is 5 to 10% - we have taken 10% as a worst case. On this basis up to 30kg of Sodium Hypochlorite could have been discharged.

The previous report undertaken for Kepak by Whitehill Enviromental in July 2019 that looked at the quality of the stream concluded that, overall, based on a comparison of the results between

the upstream and downstream samples of the River Tolka, there does not seem to have been any apparent or obvious toxic effect arising from the chemical spill into the Tolka on the macroinvertebrate assemblages of the river. If a comparison is made of the fauna from Sample 1 (upstream) with Sample 2 (Downstream 1), there are no significant differences in the numbers or species composition between the two samples.

Water quality in the four samples is poor overall. There is no significant difference in the biological water quality in the upstream sample with the first downstream sample. Both received a Q3. Further downstream there is a deterioration however, and both samples 3 and 4 received a Q2-3, based on the dominance of Group D taxa. This deterioration may be influenced by other discharges into the Tolka from the industrial and urban areas of Clonee.

As noted in section 3 Sodium Hypochlorite can have effects on Daphnia species in concentrations up to 0.071 mg/l.

The fish kill was noted to have occurred up to 2km from the discharge location, but lower taxa where not examined at that distance. It is likely that effects will have reduced significantly as the chemical is diluted downstream It is noted that the material is soluble and not persistent and would not sink to the bottom of the river. The water samples taken after the spill in the river showed that COD was higher upstream than downstream of the Kepak discharge and pH and conductivity remained steady between both locations.

Based on high level calculations undertaken on the amount of material emitted and the volume of water in the Tolka at that point (based on basic dimensions) and assuming a 'slug flow' type scenario, and an average river depth of 3 meters and width of 9 meters, the distance downstream of discharge point to dilute to the 0.071mg/l Sodium Hypochlorite is c 15.5 km. It is noted that if the dimensions used were increased by only a small amount (say 3 meters with to 11 meters in width) the distance required is less than 13km – which demonstrates the high-level nature of this indicative estimate. We have also not included the influence of streams entering the main Tolka water course. On this basis, it is conservatively estimated that the 0.071mg/l concentration would be easily achieved before the River Tolka Estuary.

If the EPA required more indication as to at what point downstream the 0.017mg/l concentration is achieved, this could only reliability be achieved using dispersion modelling which we suggest, given the status of the river at the moment, and the concentrations of indicator pollutants we found post spill in this area might not be as definitive as might be expected. It is suggested that more in stream sampling on targeted indicators (like chlorides) may yield useful information.

5. European Communities (Environmental Liability) Regulations 2008

The EPA requested confirmation if the incident at the Kepak Clonee facility falls within the scope of the European Communities (Environmental Liability) Regulations 2008.

The purpose of the European Communities (Environmental Liability) Regulations 2008 is to transpose the EU Directive 2004/35/CE and to implement a framework of environmental liability, based on a 'polluter pays' principle.

The impacts of the incident resulted in damage to the River Tolka with a fish kill of c1000 fish (to be confirmed by Inland Fisheries), consisting of species including small trout and stickleback.

On review of the Regulations and the EPA Environmental Liability Regulations Guidance Document[1], environmental damage is defined as damage to natural habitats or species, water damage or land damage.

In reviewing the damage which occurred on the River Tolka, the objective (in line with EPA Guidance) was to determine if the damage could be viewed as *significant*.

Table 5.1 below provides the definition of what is considered as significant damage to water, habitats, species and land in line with the Regulations and Guidance, with a statement on whether the incident in the River Tolka resulted in such damage.

Table 5.1: Assessment of Damage

Definition of Environmental Damage	Statement
'"*water damage" means any damage that significantly adversely affects the ecological, chemical or quantitative status or ecological potential, as defined in the Water Framework Directive, of the waters concerned, with the exception of adverse effects where Article 4(7) of the Water Framework Directive applies'*	In the region of c. 1000 fish were killed as a result of the incident. Our understanding is that the species impacted included small trout and stickleback The current status of the Tolka River under the Water Framework Directive (WFD) is 'bad' at the Kepak Clonee section. A biological water assessment was undertaken following the incident in June 2019. The assessment took samples from the Tolka River (upstream and downstream of the Tolka CL4 discharge point). The assessment concluded that 'o*verall, based on a comparison of the results between the upstream and downstream samples of the River Tolka, there does not seem to have been any apparent or obvious toxic effect arising from the chemical spill into the Tolka on the macroinvertebrate assemblages of the river*.' The water quality in all of the samples was described as poor overall with no significant difference in the biological water quality in the upstream and first downstream samples. It is considered from the monitoring assessment that the incident has not impacted on the biological status of the river and thereby has not further impacted on the WFD bad status or

[1] Reference: EPA, Environmental Lability Regulations Guidance Document, 2011

Definition of Environmental Damage	Statement
	resulted in water damage as defined under the Regulations in this regard. In the Inland Fisheries Ireland, Fish in River Factsheet (Tolka River Catchment) (2017-2018), the fish status at the section of the Tolka River at Kepak Clonee was defined as poor status. Whilst there has been a loss of fish as a result of the incident and the River is already at poor fish status, depending on how the baseline conditions recover, the potential damage has not been fully determined at this stage.
"*damage to protected species and natural habitats" means any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species; the significance of such effects is to be assessed with reference to the baseline condition, taking account of the criteria set out in Schedule 1; this damage does not include previously identified adverse effects which result from an act by an operator which was expressly authorised by— (a) the relevant authorities in accordance with Article 6(3) and (4) of the Habitats Directive and Regulation 16, 25, 26 or 32 of the Natural Habitats Regulations, or (b) such enactments or rules of law (if any) that apply to habitats and species in the State, to which the Natural Habitats Regulations do not apply;*	In the region of c. 1000 fish were killed as a result of the incident. Our understanding is that the species impacted included small trout and stickleback. The main fish species present in the Tolka River, are widely distributed wild fish species in Ireland The feedback and mitigation measures specified by the IFI, will confirm if the loss in the Tolka River is considered more significant than a natural variation and that which would require specific IFI required interventions (such as restocking) to support the baseline to recover to its natural level.
'*Land damage is defined as any land contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction in or under the land of substances, preparations, organisms or micro-organisms'*	It is considered that the incident which discharged to the Tolka River has not created a significant risk to human health (based on required dilution rates to reduce harm to humans (workers) as noted in the MSDS) and thereby has not resulted in land damage as defined under the Regulations.

6. Conclusions and Recommendations

The EPA requested confirmation if the incident at the Kepak Clonee facility falls within the scope of the European Communities (Environmental Liability) Regulations 2008.

It is considered that for aspects such as biological water quality, chemical water quality and land damage, the incident has not resulted in significant damage as defined under the Regulations.

With regard to natural habitats, fish status and their overall conservation, the potential damage cannot yet be fully determined. This will be dependent on the measures specified by the IFI and whether the measures will include specific interventions or whether normal management and protection of the River Tolka will be sufficient in the recovery of the baseline conditions.

Kepak are also suggesting that a more intensive programme of instream monitoring (upstream and downstream of the Kepak site) in the coming 6-12 months based on a targeted set of parameters might be useful to assess for lingering or longer term effects (if any) from the incident. This could be reviewed and discussed with IFI / EPA.

Kepak wish to continue to actively engage with the EPA to close out all actions associated with the incident in June 2019 to reach a conclusion agreeable to all as soon as possible– even if this required commitments that might be longer term in nature.

Literature Review References

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Appendix A: Topaz CL4 Safety Data Sheet

Section: 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name	:	TOPAZ CL4
Product code	:	115847E
Use of the Substance/Mixture	:	Cleaning product
Substance type:	:	Mixture
		For professional users only.
Product dilution information	:	No dilution information provided.

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

Identified uses	:	General purpose cleaner. Manual process Foam cleaner. Semi-Automatic with venting process Foam cleaner. Semi-Automatic without venting process
Recommended restrictions on use	:	Reserved for industrial and professional use.

1.3 Details of the supplier of the safety data sheet

Company	:	Ecolab Ltd. PO Box 11; Winnington Avenue Northwich, Cheshire, United Kingdom CW8 4DX +353 (0)1 276 3500 ccs@ecolab.com

1.4 Emergency telephone number

Emergency telephone number	:	+353766805288 +32-(0)3-575-5555 Trans-European
Poison Information Centre telephone number	:	For medical professionals only: +353 (0)1 837 9964 (8am-10pm)

Date of Compilation/Revision : 25.03.2019
Version : 2.0

Section: 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

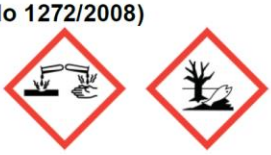
Classification (REGULATION (EC) No 1272/2008)

Corrosive to metals, Category 1	H290
Skin corrosion, Sub-category 1A	H314
Serious eye damage, Category 1	H318
Acute aquatic toxicity, Category 1	H400
Chronic aquatic toxicity, Category 2	H411

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal Word : Danger

Hazard Statements :

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

Supplemental Hazard Statements : EUH031 Contact with acids liberates toxic gas.

Precautionary Statements :

Prevention:

P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.

Response:

P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or 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/doctor.

Hazardous components which must be listed on the label:
sodium hypochlorite
sodium hydroxide

2.3 Other hazards

Mixing this product with acid or ammonia releases chlorine gas.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Hazardous components

Chemical Name	CAS-No. EC-No. REACH No.	Classification REGULATION (EC) No 1272/2008	Concentration: [%]
sodium hypochlorite	7681-52-9 231-668-3 01-2119488154-34	Nota B Skin corrosion Sub-category 1B; H314 Serious eye damage Category 1; H318 Acute aquatic toxicity Category 1; H400 Chronic aquatic toxicity Category 1; H410 Corrosive to metals Category 1; H290	>= 5 - < 10
sodium hydroxide	1310-73-2 215-185-5	Skin corrosion Category 1A; H314 Corrosive to metals Category 1; H290	>= 5 - < 10

	01-2119457892-27		
Amines, C12-14 alkyldimethyl, N-oxides	308062-28-4 01-2119490061-47	Acute toxicity Category 4; H302 Skin irritation Category 2; H315 Serious eye damage Category 1; H318 Acute aquatic toxicity Category 1; H400 Chronic aquatic toxicity Category 2; H411	>= 3 - < 5

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

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

In case of skin contact : Wash off immediately with plenty of water for at least 15 minutes. Use a mild soap if available. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

If swallowed : Rinse mouth with water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If conscious, give 2 glasses of water. Get medical attention immediately.

If inhaled : Remove to fresh air. Treat symptomatically. Get medical attention if symptoms occur.

4.2 Most important symptoms and effects, both acute and delayed

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

4.3 Indication of 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.

Unsuitable extinguishing media : None known.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Exposure to decomposition products may be a hazard to health.

Hazardous combustion products : Depending on combustion properties, decomposition products may include following materials:
Carbon oxides
nitrogen oxides (NOx)

5.3 Advice for firefighters

Special protective equipment for firefighters	:	Use personal protective equipment.
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.

Section: 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel	:	Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Avoid inhalation, ingestion and contact with skin and eyes. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Ensure clean-up is conducted by trained personnel only. Refer to protective measures listed in sections 7 and 8.
Advice for emergency responders	:	If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials.

6.2 Environmental precautions

Environmental precautions	:	Do not allow contact with soil, surface or ground water.

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up	:	Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Flush away traces with water. For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway.

6.4 Reference to other sections

See Section 1 for emergency contact information.
For personal protection see section 8.
See Section 13 for additional waste treatment information.

Section: 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling	:	Do not ingest. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation. Wash hands thoroughly after handling. Do not breathe spray, vapour. Mixing this product with acid or ammonia releases chlorine gas.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after handling. Provide suitable facilities for quick drenching or flushing of the eyes and body in case of contact or splash hazard.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers	:	Do not store near acids. Keep out of reach of children. Keep container tightly closed. Store in suitable labeled containers. Keep only in original container. Absorb spillage to prevent material damage.
Storage temperature	:	-15 °C to 30 °C
Packaging material	:	Suitable material: Plastic material, including expanded plastics material Unsuitable material: Aluminium, Mild steel

7.3 Specific end uses

Specific use(s)	:	General purpose cleaner. Manual process Foam cleaner. Semi-Automatic with venting process Foam cleaner. Semi-Automatic without venting process

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
sodium hydroxide	1310-73-2	OELV - 15 min (STEL)	2 mg/m3	IR_OEL
chlorine	7782-50-5	OELV - 15 min (STEL)	0.5 ppm 1.5 mg/m3	IR_OEL
Further information	IOELV	Indicative Occupational Exposure Limit Value		

DNEL

sodium hydroxide	:	End Use: Workers Exposure routes: Inhalation Potential health effects: Long-term local effects Value: 1 mg/m3 End Use: Consumers Exposure routes: Inhalation Potential health effects: Long-term local effects Value: 1 mg/m3

8.2 Exposure controls

Appropriate engineering controls

Engineering measures	:	Effective exhaust ventilation system. Maintain air concentrations below occupational exposure standards.

Individual protection measures

Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after

		handling. Provide suitable facilities for quick drenching or flushing of the eyes and body in case of contact or splash hazard.
Eye/face protection (EN 166)	:	Safety goggles Face-shield
Hand protection (EN 374)	:	Recommended preventive skin protection Gloves Nitrile rubber butyl-rubber Breakthrough time: 1 – 4 hours Minimum thickness for butyl-rubber 0.7 mm for nitrile rubber 0.4 mm or equivalent (please refer to the gloves manufacturer/distributor for advise). Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Skin and body protection (EN 14605)	:	Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing including appropriate safety shoes
Respiratory protection (EN 143, 14387)	:	None required if airborne concentrations are maintained below the exposure limit listed in Exposure Limit Information. Use certified respiratory protection equipment meeting EU requirements(89/656/EEC, (EU) 2016/425), or equivalent, when respiratory risks cannot be avoided or sufficiently limited by technical means of collective protection or by measures, methods or procedures of work organization.

Environmental exposure controls

General advice	:	Consider the provision of containment around storage vessels.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	:	liquid
Colour	:	clear, light yellow
Odour	:	Chlorine
pH	:	13.5 - 14.0, 100 %
Flash point	:	Not applicable.
Odour Threshold	:	Not applicable and/or not determined for the mixture
Melting point/freezing point	:	Not applicable and/or not determined for the mixture
Initial boiling point and boiling range	:	Not applicable and/or not determined for the mixture
Evaporation rate	:	Not applicable and/or not determined for the mixture
Flammability (solid, gas)	:	Not applicable and/or not determined for the mixture
Upper explosion limit	:	Not applicable and/or not determined for the mixture
Lower explosion limit	:	Not applicable and/or not determined for the mixture
Vapour pressure	:	Not applicable and/or not determined for the mixture

Relative vapour density	:	Not applicable and/or not determined for the mixture
Relative density	:	1.16 - 1.2
Water solubility	:	soluble
Solubility in other solvents	:	Not applicable and/or not determined for the mixture
Partition coefficient: n-octanol/water	:	Not applicable and/or not determined for the mixture
Auto-ignition temperature	:	Not applicable and/or not determined for the mixture
Thermal decomposition	:	Not applicable and/or not determined for the mixture
Viscosity, kinematic	:	Not applicable and/or not determined for the mixture
Explosive properties	:	Not applicable and/or not determined for the mixture
Oxidizing properties	:	Yes

9.2 Other information

Not applicable and/or not determined for the mixture

Section: 10. STABILITY AND REACTIVITY

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

Mixing this product with acid or ammonia releases chlorine gas.

10.4 Conditions to avoid

None known.

10.5 Incompatible materials

Acids

Aluminium
Mild steel

10.6 Hazardous decomposition products

Depending on combustion properties, decomposition products may include following materials:
Carbon oxides
nitrogen oxides (NOx)

Section: 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Product

Acute oral toxicity	:	Acute toxicity estimate : > 2,000 mg/kg
Acute inhalation toxicity	:	There is no data available for this product.
Acute dermal toxicity	:	There is no data available for this product.
Skin corrosion/irritation	:	There is no data available for this product.
Serious eye damage/eye irritation	:	There is no data available for this product.
Respiratory or skin sensitization	:	There is no data available for this product.
Carcinogenicity	:	There is no data available for this product.
Reproductive effects	:	There is no data available for this product.
Germ cell mutagenicity	:	There is no data available for this product.
Teratogenicity	:	There is no data available for this product.
STOT - single exposure	:	There is no data available for this product.
STOT - repeated exposure	:	There is no data available for this product.
Aspiration toxicity	:	There is no data available for this product.

Components

Acute oral toxicity	:	sodium hypochlorite LD50 rat: 5,230 mg/kg Amines, C12-14 alkyldimethyl, N-oxides LD50 rat: 1,064 mg/kg

Components

Acute dermal toxicity	:	sodium hypochlorite LD50 rabbit: > 10,000 mg/kg

Potential Health Effects

Eyes	:	Causes serious eye damage.
Skin	:	Causes severe skin burns.
Ingestion	:	Causes digestive tract burns.
Inhalation	:	May cause nose, throat, and lung irritation.
Chronic Exposure	:	Health injuries are not known or expected under normal use.

Experience with human exposure

Eye contact	:	Redness, Pain, Corrosion

Skin contact	:	Redness, Pain, Corrosion
Ingestion	:	Corrosion, Abdominal pain
Inhalation	:	Respiratory irritation, Cough

Section: 12. ECOLOGICAL INFORMATION

12.1 Ecotoxicity

Environmental Effects	:	Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Product

Toxicity to fish	:	no data available
Toxicity to daphnia and other aquatic invertebrates	:	no data available
Toxicity to algae	:	no data available

Components

Toxicity to fish	:	sodium hypochlorite 96 h EC50: 0.14 mg/l Amines, C12-14 alkyldimethyl, N-oxides LC50: 2.67 mg/l

Components

Toxicity to daphnia and other aquatic invertebrates	:	sodium hypochlorite 48 h EC50: 0.071 mg/l sodium hydroxide 48 h EC50: 40 mg/l Amines, C12-14 alkyldimethyl, N-oxides EC50 Daphnia magna (Water flea): 3.1 mg/l

Components

Toxicity to algae	:	Amines, C12-14 alkyldimethyl, N-oxides LC50: 0.143 mg/l NOEC: 0.067 mg/l

12.2 Persistence and degradability

Product

no data available

Components

Biodegradability	:	sodium hypochlorite Result: Not applicable - inorganic sodium hydroxide Result: Not applicable - inorganic

Amines, C12-14 alkyldimethyl, N-oxides
Result: Readily biodegradable.

12.3 Bioaccumulative potential

no data available

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

Product

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

no data available

Section: 13. DISPOSAL CONSIDERATIONS

Dispose of in accordance with the European Directives on waste and hazardous waste.Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.

13.1 Waste treatment methods

Product : The product should not be allowed to enter drains, water courses or the soil. Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.

Contaminated packaging : Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers. Dispose of in accordance with local, state, and federal regulations.

Guidance for Waste Code selection : Inorganic wastes containing dangerous substances. If this product is used in any further processes, the final user must redefine and assign the most appropriate European Waste Catalogue Code. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable European (EU Directive 2008/98/EC) and local regulations.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

Land transport (ADR/ADN/RID)

14.1 UN number	:	3266
14.2 UN proper shipping name	:	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S. (sodium hydroxide, sodium hypochlorite)
14.3 Transport hazard class(es)	:	8
14.4 Packing group	:	II
14.5 Environmental hazards	:	Yes
14.6 Special precautions for user	:	None

Air transport (IATA)

14.1 UN number	:	3266
14.2 UN proper shipping name	:	Corrosive liquid, basic, inorganic, n.o.s. (sodium hydroxide, sodium hypochlorite)
14.3 Transport hazard class(es)	:	8
14.4 Packing group	:	II
14.5 Environmental hazards	:	Yes
14.6 Special precautions for user	:	None

Sea transport (IMDG/IMO)

14.1 UN number	:	3266
14.2 UN proper shipping name	:	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S. (sodium hydroxide, sodium hypochlorite)
14.3 Transport hazard class(es)	:	8
14.4 Packing group	:	II
14.5 Environmental hazards	:	Yes
14.6 Special precautions for user	:	None
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	:	Not applicable.

Section: 15. REGULATORY INFORMATION

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

according to Detergents Regulation EC 648/2004	:	5 % or over but less than 15 %: Chlorine-based bleaching agents less than 5 %: Phosphonates

National Regulations

Take note of Dir 94/33/EC on the protection of young people at work.

Other regulations	:	Safety, Health and Welfare at Work Act, 2005 European Communities (Classification, Packaging, Labelling and Notification of Dangerous Preparations) Regulations 1995. (S.I. 272 of 1995) as amended

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out on the product.

Section: 16. OTHER INFORMATION

Procedure used to derive the classification according to REGULATION (EC) No 1272/2008

Classification	Justification
Corrosive to metals 1, H290	Based on product data or assessment
Skin corrosion 1A, H314	Based on product data or assessment
Serious eye damage 1, H318	Based on product data or assessment
Acute aquatic toxicity 1, H400	Calculation method
Chronic aquatic toxicity 2, H411	Calculation method

Full text of H-Statements

H290	May be corrosive to metals.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H411	Toxic to aquatic life with long lasting effects.

Full text of other abbreviations

ADN – European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS – Australian Inventory of Chemical Substances; ASTM – American Society for the Testing of Materials; bw – Body weight; CLP – Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR – Carcinogen, Mutagen or Reproductive Toxicant; DIN – Standard of the German Institute for Standardisation; DSL – Domestic Substances List (Canada); ECHA – European Chemicals Agency; EC-Number – European Community number; ECx – Concentration associated with x% response; ELx – Loading rate associated with x% response; EmS – Emergency Schedule; ENCS – Existing and New Chemical Substances (Japan); ErCx – Concentration associated with x% growth rate response; GHS – Globally Harmonized System; GLP – Good Laboratory Practice; IARC – International Agency for Research on Cancer; IATA – International Air Transport Association; IBC – International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 – Half maximal inhibitory concentration; ICAO – International Civil Aviation Organization; IECSC – Inventory of Existing Chemical Substances in China; IMDG – International Maritime Dangerous Goods; IMO – International Maritime Organization; ISHL – Industrial Safety and Health Law (Japan); ISO – International Organisation for Standardization; KECI – Korea Existing Chemicals Inventory; LC50 – Lethal Concentration to 50 % of a test population; LD50 – Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL – International Convention for the Prevention of Pollution from Ships; n.o.s. – Not Otherwise Specified; NO(A)EC – No Observed (Adverse) Effect Concentration; NO(A)EL – No Observed (Adverse) Effect Level; NOELR – No Observable Effect Loading Rate; NZIoC – New Zealand Inventory of Chemicals; OECD – Organization for Economic Co-operation and Development; OPPTS – Office of Chemical Safety and Pollution Prevention; PBT – Persistent, Bioaccumulative and Toxic substance; PICCS – Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR – (Quantitative) Structure Activity Relationship; REACH – Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID – Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT – Self-Accelerating Decomposition Temperature; SDS – Safety Data Sheet; TCSI – Taiwan Chemical Substance Inventory; TRGS – Technical Rule for Hazardous Substances; TSCA – Toxic Substances Control Act (United States); UN – United Nations; vPvB – Very Persistent and Very Bioaccumulative

Prepared by : Regulatory Affairs

Numbers quoted in the MSDS are given in the format: 1,000,000 = 1 million and 1,000 = 1 thousand. 0.1 = 1 tenth and 0.001 = 1 thousandth

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Annex: Exposure Scenarios

Exposure Scenario: Foam cleaner. Semi-Automatic with venting process

Life Cycle Stage	:	Use at industrial sites	
Product category	:	**PC35**	Washing and cleaning products (including solvent based products)

Contributing scenario controlling environmental exposure for:

Environmental release category	:	**ERC4**	Industrial use of processing aids in processes and products, not becoming part of articles
Daily amount per site	:	50 kg	
Type of Sewage Treatment Plant	:	Municipal sewage treatment plant	

Contributing scenario controlling worker exposure for:

Process category	:	**PROC7**	Industrial spraying
Exposure duration	:	240 min	
Operational conditions and risk management measures	:	Indoor	
		Local Exhaust Ventilation is not required	
General ventilation		Ventilation rate per hour	1
Skin Protection	:	Yes: See Section 8	
Respiratory Protection	:	Yes: See Section 8	

Contributing scenario controlling worker exposure for:

Process category	:	**PROC8b**	Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
Exposure duration	:	60 min	
Operational conditions and risk management measures	:	Indoor	
		Local Exhaust Ventilation is not required	
General ventilation		Ventilation rate per hour	1
Skin Protection	:	Yes: See Section 8	
Respiratory Protection	:	No	

Exposure Scenario: Foam cleaner. Semi-Automatic without venting process

Life Cycle Stage	:	Use at industrial sites	
Product category	:	**PC35**	Washing and cleaning products (including solvent based products)

Contributing scenario controlling environmental exposure for:

Environmental release category	:	**ERC4**	Industrial use of processing aids in processes and products, not becoming part of articles
Daily amount per site	:	50 kg	
Type of Sewage Treatment Plant	:	Municipal sewage treatment plant	

Contributing scenario controlling worker exposure for:

Process category	:	**PROC7**	Industrial spraying
Exposure duration	:	240 min	
Operational conditions and risk management measures	:	Indoor	
		Local Exhaust Ventilation is not required	
General ventilation		Ventilation rate per hour	1
Skin Protection	:	Yes: See Section 8	
Respiratory Protection	:	Yes: See Section 8	

Contributing scenario controlling worker exposure for:

Process category	:	**PROC8b**	Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
Exposure duration	:	60 min	

Operational conditions and risk management measures	:	Indoor	
		Local Exhaust Ventilation is not required	
General ventilation		Ventilation rate per hour	1
Skin Protection	:	Yes: See Section 8	
Respiratory Protection	:	No	

Appendix B: Flow Curves