SAFETY DATA SHEET

SODIUM HYPOCHLORITE > 10 % AVAILABLE CHLORINE

Compilation date: 30/11/10

Revision date: 05/02/13

Revision No: 6

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

1.1. Product identifier

Product name: SODIUM HYPOCHLORITE > 10 % AVAILABLE CHLORINE

REACH registered name: SODIUM HYPOCHLORITE

REACH registered number(s): 01-2119488154-34-XXXX

CAS number: 7681-52-9

EINECS number: 231-668-3

Index number: 017-011-00-1

Synonyms: BLEACH > 10 % AVAILABLE CHLORINE

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

Use of substance / mixture: Bleaching. Water Treatment. Biocides. Disinfectant. Chlorine Source. Chemical manufacturing. Pulp & paper applications.

1.3. Details of the supplier of the safety data sheet

Company name: Monarch Chemicals Limited
New Road
Sheerness
Kent
ME12 1LZ
United Kingdom

Tel: 01795 583333 (09:00 - 17:00 Mon-Fri)

Fax: 01795 583300

Email: sales@monarchchemicals.co.uk

1.4. Emergency telephone number

Emergency tel: 07711 009064 (Out of Hours)

Section 2: Hazards identification

2.1. Classification of the substance or mixture

Classification under CLP: Skin Corr. 1B: H314; Aquatic Acute 1: H400; Met. Corr. 1: H290; Eye Dam. 1: H318; -: EUH031

Most important adverse effects: Contact with acids liberates toxic gas. Causes burns. Very toxic to aquatic organisms.

2.2. Label elements

Label elements under CLP:

Hazard statements: * H290: May be corrosive to metals.

[cont...]

H314: Causes severe skin burns and eye damage.

H400: Very toxic to aquatic life.

EUH031: Contact with acids liberates toxic gas.

Signal words: Danger

Hazard pictograms: * GHS05: Corrosion

GHS09: Environmental

Precautionary statements: * P260: Do not breathe mist/vapour/spray.

P273: Avoid release to the environment.

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

P303+361+353: IF ON SKIN (or hair): Remove immediately all contaminated clothing. Rinse skin with water/shower.

P305+351+338: 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.

P403+233: Store in a well-ventilated place. Keep container tightly closed.

.

2.3. Other hazards

PBT: This substance is not identified as a PBT substance.

Section 3: Composition/information on ingredients

[cont...]

3.2. Mixtures

Hazardous ingredients:

SODIUM HYPOCHLORITE SOLUTION CL ACTIVE

EINECS	CAS		CLP Classification	Percent
231-668-3	7681-52-9		Skin Corr. 1B: H314; Aquatic Acute 1: H400; -: EUH031	10-30%

Section 4: First aid measures

4.1. Description of first aid measures

Skin contact: Remove all contaminated clothes and footwear immediately unless stuck to skin. Drench the affected skin with running water for 10 minutes or longer if substance is still on skin. Transfer to hospital if there are burns or symptoms of poisoning.

Eye contact: Bathe the eye with running water for 15 minutes. Transfer to hospital for specialist examination.

Ingestion: Do not induce vomiting. Wash out mouth with water. Give 1 cup of water to drink every 10 minutes. If unconscious, check for breathing and apply artificial respiration if necessary. If unconscious and breathing is OK, place in the recovery position. Transfer to hospital as soon as possible.

Inhalation: * Remove casualty from exposure ensuring one's own safety whilst doing so. If conscious, ensure the casualty sits or lies down. If unconscious and breathing is OK, place in the recovery position. If unconscious, check for breathing and apply artificial respiration if necessary. Move to fresh air in case of accidental inhalation of vapours. If symptoms develop seek medical attention.

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

Skin contact: There may be irritation and redness at the site of contact. Blistering may occur. Severe burns may occur.

Eye contact: There may be irritation and redness. There may be severe pain. Corneal burns may occur. Risk of serious damage to eyes.

Ingestion: There may be soreness and redness of the mouth and throat. May cause throat burns. Corrosive burns may appear around the lips. Nausea and stomach pain may occur. There may be vomiting. Blood may be vomited.

Inhalation: * There may be coughing and a sore throat. There may be congestion of the lungs causing severe shortness of breath. Corrosive to the mucous membrane. Prolonged inhalation of mists may cause lung inflamation. There may be loss of consciousness.

Delayed / immediate effects: Immediate effects can be expected after short-term exposure.

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

Immediate / special treatment: * Show this safety data sheet to the doctor in attendance. A decontamination shower should be available on the premises. Eye bathing equipment should be available on the premises.

[cont...]

Section 5: Fire-fighting measures

5.1. Extinguishing media

Extinguishing media: Suitable extinguishing media for the surrounding fire should be used. Use water spray to cool containers. Do not use water in a jet.

5.2. Special hazards arising from the substance or mixture

Exposure hazards: Non-combustible. Oxidising material, release of oxygen may support combustion. Corrosive. Keep containers exposed to fire cool with waterspray. May liberate toxic chlorine gas.

5.3. Advice for fire-fighters

Advice for fire-fighters: Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

Section 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Wear suitable protective clothing. Do not attempt to take action without suitable protective clothing - see section 8 of SDS.

6.2. Environmental precautions

Environmental precautions: Do not discharge into drains or rivers. Contain the spillage using bunding.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: * Absorb into dry earth or sand. Do not use combustible absorbant material. Transfer to a closable, labelled salvage container for disposal by an appropriate method. Wash down the drain with large amounts of water. Chlorine content can be reduced by the slow addition of sodium bisulphite with agitation.

6.4. Reference to other sections

Reference to other sections: * Refer to section 8 of SDS. Refer to section 13 of SDS.

Section 7: Handling and storage

7.1. Precautions for safe handling

Handling requirements: Wear suitable protective clothing. Ensure there is sufficient ventilation of the area. Avoid the formation or spread of mists in the air. Avoid direct contact with the substance.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in cool, well ventilated area. Keep container tightly closed. Avoid incompatible materials and conditions - see section 10 of SDS.

Suitable packaging: Must only be kept in original packaging. Plastic. Plastic-lined. Packages must have a pressure release system. Do not use metal containers. Some rubbers and plastics are attacked by the product.

[cont...]

7.3. Specific end use(s)

Specific end use(s): No data available.

Section 8: Exposure controls/personal protection

8.1. Control parameters

Workplace exposure limits: **Respirable dust**

State	8 hour TWA	15 min. STEL	8 hour TWA	15 min. STEL
UK	-	0.5 ppm (1.5 mg/m-3)	-	-

8.2. Exposure controls

Engineering measures: Ensure there is sufficient ventilation of the area. Ensure all engineering measures mentioned in section 7 of SDS are in place.

Respiratory protection: Gas/vapour filter, type B: inorganic vapours excl. CO (EN141). Particle filter class P3SL (EN143).

Hand protection: * Gloves (alkali-resistant). PVC gloves. Neoprene gloves. Butyl gloves. Nitrile gloves.

Eye protection: Safety goggles. Face-shield. Ensure eye bath is to hand.

Skin protection: Protective clothing. Wear full chemical suit. Wear wellingtons. Ensure safety shower is to hand.

Environmental: * No special requirement.

Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

State: Liquid

Colour: Yellow-green

Odour: Odour of chlorine.

Oxidising: Non-oxidising (by EC criteria)

Solubility in water: Miscible in all proportions

Viscosity: Non-viscous

Boiling point/range°C: 110

Melting point/range°C: - 17 for ~15 %

Part.coeff. n-octanol/water: -3.42

Relative density: ~ 1.26 g/ml for 14 %

pH: >11.5

9.2. Other information

Other information: No further information available at this time.

Section 10: Stability and reactivity

10.1. Reactivity

Reactivity: Stable under recommended transport or storage conditions.

[cont...]

10.2. Chemical stability

Chemical stability: Product will naturally degrade with time. Exposure to heat and light will accelerate the decomposition rate.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occur under normal transport or storage conditions. Decomposition may occur on exposure to conditions or materials listed below.

10.4. Conditions to avoid

Conditions to avoid: Heat. Direct sunlight. Extremes of temperature.

10.5. Incompatible materials

Materials to avoid: Acids. Ammonia & ammonia solutions. Amines. Can react violently with Methanol. Copper. Nickel. Iron.

10.6. Hazardous decomposition products

Haz. decomp. products: In combustion emits toxic fumes. May liberate toxic fumes of Chlorine when heated above decomposition temperature.

Section 11: Toxicological information

11.1. Information on toxicological effects

Toxicity values:

Route	Species	Test	Value	Units
DERMAL	RAT	LD50	> 2000	mg/kg
VAPOURS	RAT	1H LC50	> 10500	mg/m3
ORAL	RAT	LD50	1100	mg/kg

Relevant effects for mixture:

Effect	Route	Basis
Corrosivity	OPT INH DRM	Hazardous: calculated

Symptoms / routes of exposure

Skin contact: There may be irritation and redness at the site of contact. Blistering may occur. Severe burns may occur.

Eye contact: There may be irritation and redness. There may be severe pain. Corneal burns may occur. Risk of serious damage to eyes.

Ingestion: There may be soreness and redness of the mouth and throat. May cause throat burns. Corrosive burns may appear around the lips. Nausea and stomach pain may occur. There may be vomiting. Blood may be vomited.

Inhalation: * There may be coughing and a sore throat. There may be congestion of the lungs causing severe shortness of breath. Corrosive to the mucous membrane. Prolonged inhalation of mists may cause lung inflamation. There may be loss of consciousness.

[cont...]

Delayed / immediate effects: Immediate effects can be expected after short-term exposure.

Other information: * There is no further information at this time.

Section 12: Ecological information

12.1. Toxicity

Ecotoxicity values:

Species	Test	Value	Units
DAPHNIA	96H LC50	0.01 - 0.1	mg/l
FISH	48H EC50	0.01 - 0.1	mg/l

12.2. Persistence and degradability

Persistence and degradability: The product will degrade to its elemental form.

12.3. Bioaccumulative potential

Bioaccumulative potential: Low potential to bioaccumulate.

12.4. Mobility in soil

Mobility: Soluble in water. Non-volatile.

12.5. Results of PBT and vPvB assessment

Persistence (P-):

Persistence result: not P-

Bioaccumulation (B-):

Bioaccumulation result: not B-

Toxicity (T-):

mg/l

NOEC for marine or freshwater organisms: <=1

Toxicity result: not T-

PBT identification: This substance is not identified as a PBT substance.

12.6. Other adverse effects

Other adverse effects: Toxic to aquatic organisms. Toxic to flora. Do not allow to enter watercourses or soils. Spillage in sewers or waterways must be avoided. Large doses causes high/low pH which may affect effluent and sewage treatment processes. Discharge of large quantities may kill fish and other aquatic life due to increase/decrease in pH. The product is substantially removed in biological treatment processes. There is evidence of inhibition to the aerobic treatment process at low concentrations.

Section 13: Disposal considerations

[cont...]

13.1. Waste treatment methods

Disposal operations: Transfer to a suitable container and arrange for collection by specialised disposal company.

Recovery operations: No information available at this time.

Disposal of packaging: Contaminated containers must not be treated as household waste. Where practical, containers and packaging should be recycled by a licenced contactor.

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

Section 14: Transport information

14.1. UN number

UN number: UN1791

14.2. UN proper shipping name

Shipping name: HYPOCHLORITE SOLUTION
(SODIUM HYPOCHLORITE SOLUTION)

14.3. Transport hazard class(es)

Transport class: 8

14.4. Packing group

Packing group: II

14.5. Environmental hazards

Environmentally hazardous: Yes **Marine pollutant:** Yes

14.6. Special precautions for user

Special precautions: No special precautions.

Tunnel code: E

Transport category: 2

Section 15: Regulatory information

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

Specific regulations: * This product is a Seveso category/named substance in Annex I of Council Directive 96/82/EC.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has been carried out for the substance or the mixture by the supplier.

Section 16: Other information

[cont...]

Other information

Other information: * This safety data sheet is prepared in accordance with Commission Regulation (EU) No 453/2010.

* indicates text in the SDS which has changed since the last revision.

WARNING: For professional use only.

According to Regulation (EC) No. 1272/2008 (CLP), an 'M' factor of 10 should be applied to sodium hypochlorite, based on its acute toxicity to aquatic organisms.

Phrases used in s.2 and 3: EUH031: Contact with acids liberates toxic gas.

H290: May be corrosive to metals.

H314: Causes severe skin burns and eye damage.

H400: Very toxic to aquatic life.

Legal disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any damage resulting from handling or from contact with the above product.

APPENDIX: EXPOSURE SCENARIOS

List of Exposure Scenarios
Manufacturing
Formulation
Industrial use as intermediate
Industrial use in textile industry
Industrial use in sewage and cooling or heating water treatment
Industrial use in pulp and paper
Industrial cleaning use
Professional cleaning use
Consumer use

1 – Title of Exposure Scenario : Manufacturing

Name of contributing environmental scenario and corresponding ERC

ERC1 Manufacture of substances

Name(s) of contributing worker scenarios and corresponding PROCs

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 chemicals from/to vessels/large containers at non dedicated facilities
PROC8b	Transfer of chemicals from/to vessels/large containers at dedicated facilities
PROC9	Transfer of chemicals into small containers (dedicated filling line)

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC2

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation.
European tonnage	1195.23 kt/y 24% active chlorine (286.85 kt/year Cl2 equivalent)
Maximum regional tonnage	342.58 kt/y 24% active chlorine (82.22) kt/year Cl2 equivalent)
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Indoor/Outdoor use. Product applied in aqueous process solution with negligible volatilization. Free available chlorine in effluent is measured as total residual chlorine (TRC) and is calculated to be below 1.0E-13 mg/L No release to air from process expected because hypochlorite solution is non volatile. No release to soil from process expected.
Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites but releases expected are negligible to waste water and soil (sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.

Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirements.
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 8a, 8b, 9.

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G12 - Covers percentage substance in the product up to 25 % (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Measures
PROC1 - Use in closed process, no likelihood of exposure	n.s.c.	n.s.c.	Handle substance within a closed system [E47].
PROC2 - Use in closed, continuous process with occasional controlled exposure	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC3 - Use in closed batch process (synthesis or formulation)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8a - Transfer of chemicals from/to vessels/large containers at non dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8b - Transfer of chemicals from/to vessels/large containers at dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 "Qualitative assessment - environment", end of Extended SDS)

Predicted environmental concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. (Detailed inputs available on request)

Route of exposure	**Concentrations**		**Risk Characterisation Ratio (RCR)**		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalative – PROC1	0.02	mg/m³	0.01	n.a	n.a
Long-term exposure, local, inhalative – PROC2	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalative – PROC3	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalative – PROC4	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalative – PROC8a	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalative – PROC8b	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalative – PROC9	0.91	mg/m³	0.59	n.a	n.a

n.a = non adapted

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 could be necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use, additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario : Formulation

List of all use descriptors related to the life cycle stage

SU 3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU 10 Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

Name of contributing environmental scenario and corresponding ERC

ERC2 Formulation of preparations

Name(s) of contributing worker scenarios and corresponding PROCs

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
PROC5	Mixing or blending in batch processes (multistage and/or significant contact)
PROC8a	Transfer of chemicals from/to vessels/large containers at non dedicated facilities
PROC8b	Transfer of chemicals from/to vessels/large containers at dedicated facilities
PROC9	Transfer of chemicals into small containers (dedicated filling line)
PROC14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation
PROC15	Use as laboratory reagent

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC2

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: < 25 % (typically 12 – 14 %)
European tonnage	1195.23 kt/y 24% active chlorine (286.85 kt/year Cl2 equivalent) Number of European production and formulation sites > 63
Maximum regional tonnage	342.58 kt/y 24% active chlorine (82.22) kt/year Cl2 equivalent)
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Indoor/Outdoor use. Product applied in aqueous process solution with negligible volatilization. Free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L No release in air from process expected because hypochlorite solution is non volatile. No release in soil from process expected.

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites but releases expected are negligible to waste water and soil (sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9. 14, 15

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G12 - Covers percentage substance in the product up to 25 % (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Measures
PROC1 - Use in closed process, no likelihood of exposure	n.s.c.	n.s.c.	Handle substance within a closed system [E47].
PROC2 - Use in closed, continuous process with occasional controlled exposure	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC3 - Use in closed batch process (synthesis or formulation)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC5 - Mixing or blending in batch processes (multistage and/or significant contact)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

PROC8a - Transfer of chemicals from/to vessels/large containers at non dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8b - Transfer of chemicals from/to vessels/large containers at dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC14 - Production of preparations or articles by tabletting, compression, extrusion, pelletisation	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under medium containment.
PROC 15 – Use as laboratory reagent	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54].

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 "Qualitative assessment - environment", end of Extended SDS)

Predicted environmental concentrations (PECs)

According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. (Detailed inputs available on request)

Route of exposure	**Concentrations of sodium hypochlorite**		**Risk Characterisation Ratio (RCR)**		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalation – PROC1	0.02	mg/m³	0.01	n.a	n.a
Long-term exposure, local, inhalation – PROC2	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC3	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC4	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalation – PROC5	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8a	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8b	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC9	0.91	mg/m³	0.59	n.a	n.a
Long-term exposure, local, inhalation – PROC 14	0.23	mg/m^3	0.15	n.a	n.a
Long-term exposure, local, inhalation – PROC 15	0.70	mg/m^3	0.45	n.a	n.a

n.a = not applicable

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 is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario : Industrial use as intermediate

List of all use descriptors related to the life cycle stage

SU 3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU 8 Manufacture of bulk, large scale chemicals (including petroleum products)
SU 9 Manufacture of fine chemicals
PC19 Intermediate

Name of contributing environmental scenario and corresponding ERC

ERC6a Industrial use resulting in manufacture of another substance (use of intermediates)

Name(s) of contributing worker scenarios and corresponding PROCs

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 chemicals from/to vessels/large containers at non dedicated facilities
PROC8b Transfer of chemicals from/to vessels/large containers at dedicated facilities
PROC9 Transfer of chemicals into small containers (dedicated filling line)

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC6a

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: <25%
European tonnage	26 % of the total consumption was estimated to be used as a chemical intermediate (75.96 kt/year chlorine equivalent).
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Reactions with organic intermediates in controlled closed systems. Sodium hypochlorite solution is filled into the reaction vessels through closed systems. No release in environment is expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L
Technical conditions and measures at process level (source) to prevent release	Common release control mechanisms (all sites fall under IPPC BREF) and specific local regulations respected to minimize risk. Common practices vary across sites but no releases are expected. Off-gas from the reactor is usually treated in a thermal exhaust air decontaminator before release into the atmosphere.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 8a, 8b, 9.

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G12 - Covers percentage substance in the product up to 25 % (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Measures
PROC1 - Use in closed process, no likelihood of exposure	n.s.c.	n.s.c.	Handle substance within a closed system [E47].
PROC2 - Use in closed, continuous process with occasional controlled exposure	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC3 - Use in closed batch process (synthesis or formulation)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8a - Transfer of chemicals from/to vessels/large containers at non dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8b - Transfer of chemicals from/to vessels/large containers at dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 "Qualitative assessment - environment", end of Extended SDS)

Predicted environmental concentrations (PECs)
Emissions to the environment will not occur as NaClO either reacts or is reduced completely to sodium chloride during the process. The waste water is usually treated because of the organic compounds and at the same time any left available chlorine is destroyed.

According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not required, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. (Detailed inputs available on request)

Route of exposure	**Concentrations of sodium hypochlorite**		**Risk Characterisation Ratio (RCR)**		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalation – PROC1	0.02	mg/m³	0.01	n.a	n.a
Long-term exposure, local, inhalation – PROC2	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC3	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC4	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalation – PROC8a	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8b	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC9	0.91	mg/m³	0.59	n.a	n.a

n.a = not applicable

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 is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario : Industrial use in textile industry

List of all use descriptors related to the life cycle stage

SU 3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU 5 Manufacture of textiles, leather, fur
PC 34 Textile dyes, finishing and impregnating products; including bleaches and other processing aids

Name of contributing environmental scenario and corresponding ERC

ERC6b Industrial use of reactive processing aids

Name(s) of contributing worker scenarios and corresponding PROCs

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
PROC5	Mixing or blending in batch processes (multistage and/or significant contact)
PROC8a	Transfer of chemicals from/to vessels/large containers at non dedicated facilities
PROC8b	Transfer of chemicals from/to vessels/large containers at dedicated facilities
PROC9	Transfer of chemicals into small containers (dedicated filling line)
PROC13	Treatment of articles by dipping and pouring

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC6b

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: < 25 %
European tonnage	12.05 kt of Cl_2 equivalent have been used in Europe in 1994 (300 t as chlorine gas and 11.75 kt as bleach).
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Sulphite must be use in part of dechlorination process leading to negligible releases of NaClO in water. No release in environment is expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L
Technical conditions and measures at process level (source) to prevent release	Common release control mechanisms (all sites fall under IPPC BREF) and specific local regulations respected to minimize risk. Common practices vary across sites but no releases are expected. Off-gas from the reactor is usually treated in a thermal exhaust air decontaminator before release into the atmosphere.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Wool chlorination is performed in an acidic environment, in which gaseous chlorine formation is unavoidable. This requires a high degree of enclosure of the plants, the presence of abatement system of gaseous emission and a neutralisation stage
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and remaining available chlorine
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9. 13

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G12 - Covers percentage substance in the product up to 25 % (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Mesures
PROC1 - Use in closed process, no likelihood of exposure	n.s.c.	n.s.c.	Handle substance within a closed system [E47].
PROC2 - Use in closed, continuous process with occasional controlled exposure	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC3 - Use in closed batch process (synthesis or formulation)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC5 - Mixing or blending in batch processes (multistage and/or significant contact)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8a - Transfer of chemicals from/to vessels/large containers at non dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

PROC8b - Transfer of chemicals from/to vessels/large containers at dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC13 - Treatment of articles by dipping and pouring	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under medium containment. Minimise exposure by ventilated partial enclosure of the operator or equipment.

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 "Qualitative assessment - environment", end of Extended SDS)

Predicted environmental concentrations (PECs)

For use in textile industry, the releases of sodium hypochlorite are expected to be low due to the operational conditions put in place in the different process (for example, a dechlorination stage in wool treatment) and also, due to the rapid decay of hypochlorite.

According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not required, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. (Detailed inputs available on request)

Route of exposure	**Concentrations of sodium hypochlorite**		**Risk Characterisation Ratio (RCR)**		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalation – PROC1	0.02	mg/m³	0.01	n.a	n.a
Long-term exposure, local, inhalation – PROC2	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC3	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC4	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalation – PROC5	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8a	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8b	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC9	0.91	mg/m³	0.59	n.a	n.a
Long-term exposure, local, inhalation – PROC13	0.70	mg/m³	0.45	n.a	n.a

n.a = not applicable

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 is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario: Industrial use in sewage and cooling or heating water treatment

List of all use descriptors related to the life cycle stage

SU 3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU 23 Electricity, steam, gas water supply and sewage treatment
PC 20 Products such as ph-regulators, flocculants, precipitants, neutralization agents
PC 37 Water treatment chemicals

Name of contributing environmental scenario and corresponding ERC

ERC6b Industrial use of reactive processing aids

Name(s) of contributing worker scenarios and corresponding PROCs

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
PROC5	Mixing or blending in batch processes (multistage and/or significant contact)
PROC8a	Transfer of chemicals from/to vessels/large containers at non dedicated facilities
PROC8b	Transfer of chemicals from/to vessels/large containers at dedicated facilities
PROC9	Transfer of chemicals into small containers (dedicated filling line)

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC6b

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: < 25 %
European tonnage	Sewage treatment: 15.18 kt/year and 9.55 kt/year chlorine equivalent have been used in Europe in 1994 Cooling water: The consumption of hypochlorite produced by the chemical industry for cooling water applications is estimated at 5.58 kt/year chlorine equivalent. The use of gaseous chlorine is rather similar with 4.80 kt/year chlorine equivalent for the year 1994
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Cooling water process must follow IPPC reference document on the application of best available techniques (BAT) to industrial cooling systems (European Commission, 2001). Site-specific operational conditions to be applied are determined for both

	chlorine and hypochlorite in the BAT document. Chlorination processes used for disinfection of wastewater in sewage treatment require a chlorine dose of 5 – 40 mg Cl2/L. The chlorine dosages are designed in order to minimise the chlorine discharges to the environment.
Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites but no releases are expected.
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G12 - Covers percentage substance in the product up to 25 % (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Mesures
PROC1 - Use in closed process, no likelihood of exposure	n.s.c.	n.s.c.	Handle substance within a closed system [E47].
PROC2 - Use in closed, continuous process with occasional controlled exposure	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC3 - Use in closed batch process (synthesis or formulation)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

PROC5 - Mixing or blending in batch processes (multistage and/or significant contact)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8a - Transfer of chemicals from/to vessels/large containers at non dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8b - Transfer of chemicals from/to vessels/large containers at dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 “Qualitative assessment - environment”, end of Extended SDS)

Predicted environmental concentrations (PECs)

The releases of sodium hypochlorite to the aquatic compartment are generally low due to the rapid decay of hypochlorite. Indeed, due to immediate further reaction upon encountering oxidisable matter in the receiving water, any remaining free available chlorine will be eliminated upon discharge, with rates of decay increasing with discharged concentrations.

According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not required, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. Detailed inputs available on request)

Route of exposure	Concentrations of sodium hypochlorite		Risk Characterisation Ratio (RCR)		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalation – PROC1	0.02	mg/m³	0.01	n.a	n.a
Long-term exposure, local, inhalation – PROC2	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC3	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC4	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalation – PROC5	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8a	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8b	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC9	0.91	mg/m³	0.59	n.a	n.a

n.a = not applicable

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 is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario : Industrial use in pulp and paper

List of all use descriptors related to the life cycle stage

SU 3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU 6b Manufacture of pulp, paper and paper products
PC 26 Paper and board dye, finishing and impregnation products: including bleaches and other processing aids

Name of contributing environmental scenario and corresponding ERC

ERC6b Industrial use of reactive processing aids

Name(s) of contributing worker scenarios and corresponding PROCs

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
PROC5	Mixing or blending in batch processes (multistage and/or significant contact)
PROC8a	Transfer of chemicals from/to vessels/large containers at non dedicated facilities
PROC8b	Transfer of chemicals from/to vessels/large containers at dedicated facilities
PROC9	Transfer of chemicals into small containers (dedicated filling line)

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC6b

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: < 25 %
European tonnage	Consumption for the year 1994 was 17.43 and 8.53 kt/year chlorine equivalent for chlorine and hypochlorite, respectively
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	The concentration of hypochlorite in the system is low, and quantities are determined so that there is negligible residual free hypochlorite at the end of the cleaning process. No release in environment is expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L
Technical conditions and measures at process level (source) to prevent release	Only two specific applications are considered acceptable in pulp and paper industry: - disinfection of the paper machine system - break down of the wet strength resins Common practices vary across sites but no releases are expected.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirements.
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and remaining available chlorine..
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G12 - Covers percentage substance in the product up to 25 % (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Mesures
PROC1 - Use in closed process, no likelihood of exposure	n.s.c.	n.s.c.	Handle substance within a closed system [E47].
PROC2 - Use in closed, continuous process with occasional controlled exposure	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC3 - Use in closed batch process (synthesis or formulation)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC5 - Mixing or blending in batch processes (multistage and/or significant contact)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC8a - Transfer of chemicals from/to vessels/large containers at non dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

PROC8b - Transfer of chemicals from/to vessels/large containers at dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 "Qualitative assessment - environment", end of Extended SDS)

Predicted environmental concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not required, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. (Detailed inputs available on request)

Route of exposure	**Concentrations of sodium hypochlorite**		**Risk Characterisation Ratio (RCR)**		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalation – PROC1	0.02	mg/m³	0.01	n.a	n.a
Long-term exposure, local, inhalation – PROC2	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC3	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC4	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalation – PROC5	1.25	mg/m³	0.81	n.a	n.a

Long-term exposure, local, inhalation – PROC8a	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC8b	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC9	0.91	mg/m³	0.59	n.a	n.a

n.a = not applicable

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 is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario : Industrial cleaning use

List of all use descriptors related to the life cycle stage

SU 3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU 4 Manufacture of food products
PC 35 Washing and cleaning products (including solvent based products)

Name of contributing environmental scenario and corresponding ERC

ERC6b Industrial use of reactive processing aids

Name(s) of contributing worker scenarios and corresponding PROCs

PROC5	Mixing or blending in batch processes (multistage and/or significant contact)
PROC7	Industrial spraying
PROC8a	Transfer of chemicals from/to vessels/large containers at non dedicated facilities
PROC9	Transfer of chemicals into small containers (dedicated filling line)
PROC10	Roller application or brushing
PROC13	Treatment of articles by dipping and pouring

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC6b

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: < 25%
European tonnage	250-450,000 tonnes per year of solution of sodium hypochlorite (5% solution).
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Avoid releases to the environment (surface waters or soil) or to wastewaters. However sodium hypochlorite is shown to disappear rapidly from all use scenarios presented, by either rapid reduction in factory effluent or in the sewer. Thus, no releases in environment are expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L.
Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites and should comply with Biocide Directive No 98/8/EC.
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.

Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement.
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 5, 7, 8a, 9, 10, 13

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G12 - Covers percentage substance in the product up to 25 % (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Mesures
PROC5 - Mixing or blending in batch processes (multistage and/or significant contact)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC 7 - Industrial spraying	OC28 - Avoid carrying out activities involving exposure for more than 4 hours.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under medium containment; Minimise exposure by ventilated complete enclosure of the operator or equipment.
PROC8a - Transfer of chemicals from/to vessels/large containers at non dedicated facilities	Avoid carrying out activities involving exposure for more than 6 h.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under low containment.
PROC 10: Roller application or brushing	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under medium containment.
PROC 13: Treatment of articles by dipping and pouring	n.s.c.	n.s.c.	Provide extract ventilation to points where emissions occur. [E54]. Process under medium containment. Minimise exposure by ventilated partial enclosure of the operator or equipment.

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 "Qualitative assessment - environment", end of Extended SDS)

Predicted environmental concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not required, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. (Detailed inputs available on request)

Route of exposure	**Concentrations of sodium hypochlorite**		**Risk Characterisation Ratio (RCR)**		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalation – PROC5	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC7	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalation – PROC8a	1.25	mg/m³	0.81	n.a	n.a
Long-term exposure, local, inhalation – PROC9	0.91	mg/m³	0.59	n.a	n.a
Long-term exposure, local, inhalation – PROC10	1.00	mg/m³	0.65	n.a	n.a
Long-term exposure, local, inhalation – PROC13	0.70	mg/m³	0.45	n.a	n.a

n.a = not applicable

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 is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario : Professional cleaning use

List of all use descriptors related to the life cycle stage

SU 22 Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

PC 35 Washing and cleaning products (including solvent based products)

Name of contributing environmental scenario and corresponding ERC

ERC8a Wide dispersive indoor use of processing aids in open systems

ERC8b Wide dispersive indoor use of reactive substances in open systems

ERC8d Wide dispersive outdoor use of processing aids in open systems

ERC8e Wide dispersive outdoor use of reactive substances in open systems

Name(s) of contributing worker scenarios and corresponding PROCs

PROC5	Mixing or blending in batch processes (multistage and/or significant contact)
PROC9	Transfer of chemicals into small containers (dedicated filling line)
PROC10	Roller application or brushing
PROC11	Non industrial spraying
PROC13	Treatment of articles by dipping and pouring
PROC15	Use as laboratory reagent

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC8a, 8b, 8d, 8e

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: < 5%
European tonnage	250-450,000 tonnes per year of solution of sodium hypochlorite.
Frequency and duration of use	Continuous release. Emission Days: 365 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Avoid releases to the environment (surface waters or soil) or to wastewaters. However Hypochlorite is shown to disappear rapidly from all use scenarios presented, by either rapid reduction in factory effluent or in the sewer. Thus, no releases in environment are expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L.
Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites and should comply with Biocide Directive No 98/8/EC.
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	NaClO must be reduced completely to sodium chloride during the process avoiding critical releases in environment.

Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement.
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of worker exposure

Contributing exposure scenario controlling worker exposure for PROC 5, 9, 10, 11, 13, 15

GENERAL CONDITIONS APPLICABLE TO ALL ACTIVITIES

- G11 - Covers percentage substance in the product up to 5% (unless stated differently).
- G2 - Covers daily exposures up to 8 hours (unless stated differently).
- OC8 – Indoor

- Risk Management Measures and measures related to personal protection, hygiene and health evaluation: Cross reference to tab. General Risk Management Measures (Qualitative Exposure Assessment, see additional document 1, end of extended SDS)

SPECIFIC CONDITIONS APPLICABLE TO SPECIFIC ACTIVITIES

Contributing Scenario	Duration of use	Concent° of substance	Risk Management Mesures
PROC5 - Mixing or blending in batch processes (multistage and/or significant contact)	n.s.c.	n.s.c.	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.[E1] Process under low containment.
PROC9 - Transfer of chemicals into small containers (dedicated filling line)	n.s.c.	n.s.c.	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.[E1] Process under low containment.
PROC 10: Roller application or brushing	OC28 - Avoid carrying out activities involving exposure for more than 4 hours.	n.s.c.	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.[E1] Process under low containment.
PROC 11: Non industrial spraying	OC27 - Avoid carrying out activities involving exposure for more than 1 hour.	n.s.c.	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.[E1] Process under low containment.

PROC 13: Treatment of articles by dipping and pouring	OC28 - Avoid carrying out activities involving exposure for more than 4 hours.	n.s.c.	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.[E1] Process under low containment.
PROC 15: Use as laboratory reagent	n.s.c.	n.s.c.	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.[E1]

nsc : no specific conditions

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 "Qualitative assessment - environment", end of Extended SDS)

Predicted environmental concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not required, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Used Advanced Reach Tool model. (Detailed inputs available on request)

Route of exposure	**Concentrations of sodium hypochlorite**		**Risk Characterisation Ratio (RCR)**		
	Value	Unit	inhalation	dermal	combined
Long-term exposure, local, inhalation – PROC5	1.00	mg/m³	0.65	n.a	n.a
Long-term exposure, local, inhalation – PROC9	1.10	mg/m³	0.71	n.a	n.a
Long-term exposure, local, inhalation – PROC10	1.20	mg/m³	0.77	n.a	n.a

Long-term exposure, local, inhalation – PROC11	1.00	mg/m³	0.65	n.a	n.a
Long-term exposure, local, inhalation – PROC13	1.20	mg/m³	0.77	n.a	n.a
Long-term exposure, local, inhalation – PROC15	0.85	mg/m³	0.55	n.a	n.a

n.a = not applicable

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 is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

1 – Title of Exposure Scenario : Consumer use

List of all use descriptors related to the life cycle stage

SU 21 Consumer uses: Private households (= general public = consumers)

Name of contributing environmental scenario and corresponding ERC

ERC8a Wide dispersive indoor use of processing aids in open systems
ERC8b Wide dispersive indoor use of reactive substances in open systems
ERC8d Wide dispersive outdoor use of processing aids in open systems
ERC8e Wide dispersive outdoor use of reactive substances in open systems

Name(s) of contributing consumer scenarios and corresponding PCs

PC 34: Textile dyes, finishing and impregnating products; including bleaches and other processing aids
PC 35: Washing and cleaning products (including solvent based products)
PC 37: Water treatment chemicals

2 – Operational Conditions and Risk Management Measures

2.1 – Control of Environmental exposure

Contributing exposure scenario controlling environmental exposure for ERC8a, 8b, 8d, 8e

Product characteristics	Substance is a unique structure. Non-hydrophobic. Sodium hypochlorite has low potential for bioaccumulation. Concentration: < 15 % (typically 3 – 5 %)
European tonnage	118.57 kt per year in Cl_2 equivalent
Frequency and duration of use	Continuous release. Emission Days: 365 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Avoid direct releases to the environment (surface waters or soil). However hypochlorite is shown to disappear rapidly from all use scenarios presented, by either rapid degradation in factory effluent or in the sewer. Thus, no releases to the environment are expected. In a worst case assessment the free available chlorine in effluent is measured as total residual chlorine (TRC) and should be below 1.0E-13 mg/L.
Technical conditions and measures at process level (source) to prevent release	Common practices vary and should comply with instructions on package labels.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with product label instructions.
Conditions and measures related to industrial or municipal sewage treatment plant	Household wastewater is treated in municipal sewage treatment which leads to the removal of any remaining available chlorine through reaction with organic and inorganic substances present in wastewater.

Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 – Control of consumer exposure

Contributing exposure scenario controlling consumer exposure for PC 34, 35, 37

Product characteristic
Concentration: <= 12.5 % (typically 3 – 5 %) Physical state: liquid Vapour pressure: 2.5 kPa at 20 °C
Amounts used
NA
Frequency and duration of use/exposure
Duration [for contact]: < 30 min. (cleaning and bleaching) Frequency [for one person cleaning]: 2/7 days a week Frequency [for one person bleaching]: 1/7 days a week (laundry bleaching) and 4/day (spraying) Uptake [oral]: as NaClO 0.003 mg/kg/day for a 60 kg person and 0.0033 mg/kg/day for children weighing 30 kg
Human factors not influenced by risk management
Consumers may be exposed to the formulation when dosing the product into water and to the preparation (cleaning solution; inhalation, dermal, oral). Exposure to the solution predominantly occurs through misuse, such as poor rinsing, spilling on skin or drinking of the cleaning solution.
Other given operational conditions affecting consumers exposure
Indoor air volume: min. 4 m^3, ventilation rate: min. 0.5/h
Conditions and measures related to information and behavioural advice to consumers
Safety and application notes on product label and/or package insert.
Conditions and measures related to personal protection and hygiene
None

3 – Exposure estimation and reference to its source

3.1 - Environment

EE8 - Qualitative approach used to conclude safe use. (see Additional document 2 “Qualitative assessment - environment”, end of Extended SDS)

Predicted environmental concentrations (PECs)

According the previous qualitative assessment, the worst case exposure concentration used as PEC in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the

applied hypochlorite (as free available chlorine, FAC) in the sewage system assures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

3.2 – Human health

Short term (acute) oral exposure values were calculated for relevant scenarios consumer use scenarios (drinking water). Estimates were based on most conservative assumptions. Thus, values represent worst-case scenarios.

Conclusions of the consumer short term exposure assessment for sodium hypochlorite

Scenario	Inhalation		Dermal		Oral	
	Unit mg/m3	Method	Unit mg/kg	Method	Unit mg/kg	Method
Drinking water (adult)	--	--	--	--	0.0003	Calculated
Drinking water (child 10 year)	--	--	--	--	0.0007	Calculated

Consumer use short and long term exposure values were calculated for all relevant scenarios. The inhalation route was not relevant for any of the scenarios. Highest exposure values were obtained for the drinking water scenario, resulting in oral exposure of 0.0007 mg/kg bw and a total exposure of 0.012 mg/kg bw (0.011 as av. Cl_2). The total value is calculated assuming 2 L drinking water consumption per day.

The following table shows the summary of consumer use long term exposure concentrations for all relevant exposure scenarios. Estimates were based on most conservative assumptions. Thus, values represent worst-case scenarios.

Conclusions of the consumer exposure assessment for sodium hypochlorite

Scenario	Inhalation		Dermal		Oral		Total	
	Unit $mg/m^3/day$	Method	Unit mg/kg/day	Method	Unit mg/kg/day	Unit $mg/m^3/d$	Unit mg/kg	Justification
Household use total							0.037 (0.035 as av. Cl_2)	EASE
Laundry Bleaching/ Pre-treatment	--	--	0.002	EASE/ Calculated	--	--	0.002	EASE
Hard surface cleaning	--	--	0.035	EASE/ Calculated			0.035	EASE
Inhalation exposure	0.00168	EASE/ Calculated	--	--	--	--	3.05E-06	EASE

For Consumer use highest long term exposure concentrations were calculated for household use hard surface cleaning with 0.002 mg/kg bw/day and 0.035 mg/m^3/day dermal exposures and 03.05E-03 mg/kg bw/day inhalation exposure, resulting in 0.037 mg/kg bw/day combined total exposure.

4 – Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario
Not applicable.

ADDITIONAL DOCUMENTS OF eSDS (for all Exposure Scenarios)

ADDITIONAL DOCUMENT 1 – Qualitative assessment – Human Health (for all Exposure Scenarios)

Qualitative Exposure Assessment link to substance classified R34 (Causes burns) and R37 (Irritating to respiratory system), or H314 (Cause severe skin burns and eye damages) and H335 (May cause respiratory respiration)

In absence of dose-response data regarding corrosion (R34 or H314) and irritating to respiratory system (R37 or H335), in accordance with R8 (R.8.6), a qualitative approach is followed to assess exposure to corrosive substances. Therefore, exposure should be minimised by using the appropriate general risk management measures below (ECHA Technical Guidance Part E, Table E.3-1). When these risk management measures and operational conditions are applied, the risk for exposure to corrosive and respiratory irritant substance is controlled.

Tab. General Risk Management Measures for substances classified R34 and R37, or H314 and H335 (ECHA Technical Guidance Part E - Table E3-1)

Risk Management Measures and Operational Conditions	
General	**Personal Protective Equipment**
- Containment as appropriate; - Minimise number of staff exposed; - Segregation of the emitting process; - Effective contaminant extraction; - Good standard of general ventilation; - Minimisation of manual phases; - Avoidance of contact with contaminated tools and objects; - Regular cleaning of equipment and work area; - Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed; - Training for staff on good practice; - Good standard of personal hygiene.	- Substance/task appropriate gloves; - Skin coverage with appropriate barrier material based on potential for contact with the chemicals; - Substance/task appropriate respirator; - Optional face shield; - Eye protection.

ADDITIONAL DOCUMENT 2 – Qualitative assessment – Environment (for all Exposure Scenarios)

Water and sediments compartments
The emissions of hypochlorite to the environment from manufacturing processes are minor. Generally, free available chlorine (FAC) in effluent is measured as total residual chlorine (TRC), but it cannot be distinguished to what extent this TRC value in the final effluent is related to hypochlorite or to other oxidative compounds that are present in the same effluent. TRC is the sum of free available chlorine (HOCl, FAC) and combined available chlorine (RH2Cl, CAC). For the sites that reported levels of TRC in the effluent as well as dilution factor information for the receiving surface waters tentative initial PEClocal values ranging from < 0.000006 to 0.07 mg/L were measured. However, TRC values were considered not applicable due to immediate further reaction upon encountering oxidisable matter in the receiving water, any remaining FAC will be eliminated immediately upon discharge, with rates of decay increasing with discharged concentrations. Thus, the measured TRC values are not directly applicable for hypochlorite exposure assessment. Instead of using measured TRC values modelled, FAC values were used for determination of predicted environmental concentrations (PEC).

Essentially no hypochlorous acid/hypochlorite (below 10-35 mg/L as FAC, Vandepitte and Schowanek, 2007) will remain in the sewer after 1 hour following disposal of a bottle of neat bleach to sewer. Volatilisation of hypochlorous acid/hypochlorite is not expected during sewage treatment. The FAC concentration estimated at the end of sewers was reasonably estimated to be negligible, with worst case PEC-values of 1.0E-13 mg/L (Vandepitte and Schowanek, 2007). (NB: these estimated concentrations carry a large uncertainty margin, but even then, they are considerably below than the aquatic PNEC). Even though hypochlorite decay rates in rivers and marine environments are lower than in sewage treatment plants, FAC PEC-values for direct emissions were not considered to differ significantly from the worst case estimate.

As hypochlorite is destroyed rapidly in contact with organic as well as inorganic material no exposures are expected in sediments.

Terrestrial compartment (including secondary poisoning)
The possible exposure routes of soils to HOCl are via contaminated sludge or via direct application of chlorinated water. As can be calculated with the model of Vandepitte and Schowanek (for more information, please refer to the EU risk assessment on sodium hypochlorite), 1997 it becomes clear that HOCl concentrations available in domestic discharges are completely eliminated in the sewer system before entering the activated sludge system. In addition HOCl is a highly soluble molecule not likely to sorb onto activated sludge. Therefore, there is no evidence that HOCl has the potential to contaminate activated sludge. And as a consequence, contamination of soils due to dumping of with HOCl polluted sludge can be excluded.

No secondary poisoning exposure is thought to occur with hypochlorite as it is destroyed rapidly in contact with organic as well as inorganic species.

Atmospheric compartment
Hypochlorite solutions are non-volatile, thus there is no significant potential for dispersion in air. Further, methods for the determination of effects of chemicals on species arising from atmospheric contamination have not yet been fully developed, except for inhalation studies with mammals. Therefore, the methodology used for hazard assessment (and subsequently the risk characterisation) of chemicals in water and soil cannot be applied to the atmosphere (ECHA CSA Part B, 2008).