Safety Data Sheet
Algal PU Foam: Isocyanate

SECTION 1: Identification

1.1 GHS Product identifier

Product name	Algal PU Foam: Isocyanate Product codes: 1070-001 1070-094

1.2 Other means of identification

Isocyanate

1.3 Recommended use of the chemical and restrictions on use

Recommended use: Research purposes only.
Restrictions on use: The product must not be used in applications other than those identified above, without first seeking advice of the supplier.

1.4 Supplier's details

Name	Checkerspot, Inc.
Address	1250 Marina Village Pkwy Alameda CA 94501 USA
Telephone	(510) 842-0557
email	EHS@checkerspot.com

1.5 Emergency phone number

CHEMTREC (USA)	1-800-424-9300
CHEMTREC (International)	+1-703-527-3887

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

GHS classification in accordance with: OSHA (29 CFR 1910.1200)

- Acute toxicity, inhalation, Cat. 4
- Skin corrosion/irritation, Cat. 2
- Eye damage/irritation, Cat. 2B
- Sensitization, respiratory, Cat. 1
- Sensitization, skin, Cat. 1
- Specific target organ toxicity (single exposure), Cat. 3

2.2 GHS label elements, including precautionary statements

Pictograms

Signal word **Danger**

Hazard statement(s)

H315+H320	Causes skin and eye irritation
H317	May cause an allergic skin reaction
H332	Harmful if inhaled
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335	May cause respiratory irritation

Precautionary statement(s)

P261	Avoid breathing dust/fume/gas/mist/vapors/spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing must not be allowed out of the workplace.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P285	In case of inadequate ventilation wear respiratory protection.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER/doctor if you feel unwell.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P342+P311	If experiencing respiratory symptoms: Call a POISON CENTER/doctor.
P362	Take off contaminated clothing and wash it before reuse.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/container to an approved facility in accordance with local, regional, national, and international regulations.

SECTION 3: Composition/information on ingredients

3.1 Substances

Components

1. 4,4’ Diphenylmethanediisocyanate, isomere, homologe and mixtures (pMDI)

Concentration	50 - 70 % (weight)
EC no.	618-498-9
CAS no.	9016-87-9

2. 4,4'-Methylenediphenyl diisocyanate (MDI)

Concentration	30 - 50 % (weight)
EC no.	202-966-0
CAS no.	101-68-8

Trade secret statement (OSHA 1910.1200(i))
The specific chemical identity and/or exact percentage (concentration) of composition may be withheld as a trade secret.

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

General advice	Get medical attention immediately if symptoms occur. Have a product container or label with you when calling a poison control center or doctor.
If inhaled	Remove to fresh air. Extreme asthmatic reactions that may occur in sensitized persons can be life threatening. Get medical attention immediately. Administer oxygen or artificial respiration as needed. Asthmatic symptoms may develop and may be immediate or delayed up to several hours.
In case of skin contact	In case of contact, immediately flush skin with soap and plenty of water. Take off contaminated clothing and shoes immediately and wash contaminated clothing before reuse. Call a physician if irritation develops or persists. If readily available, apply a polyglycol-based cleanser (e.g. SKC, Inc. (SKC) D-TAM™ Skin Cleanser) or corn oil.
In case of eye contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If easy to do, remove contact lens, if worn. Seek medical advice.
If swallowed	Do NOT induce vomiting. Wash mouth out with water. Do not give anything by mouth to an unconscious person. Get medical attention.

4.2 Most important symptoms/effects, acute and delayed
Severe allergic skin reactions, bronchiospasm and anaphylactic shock. This product is a respiratory irritant and potential respiratory sensitizer: repeated inhalation of vapor or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include irritation to the eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons.

4.3 Indication of immediate medical attention and special treatment needed, if necessary
Symptomatic and supportive therapy as needed. Following severe exposure medical follow-up should be monitored for at least 48 hours. The first aid procedure should be established in consultation with the doctor responsible for industrial medicine.

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment:
Foam
Carbon dioxide (CO2)
Dry powder

Unsuitable extinguishing media:
Water may be used if no other available and then in copious quantities. Reaction between water and hot isocyanate may be vigorous.

5.2 Specific hazards arising from the chemical

Do not allow run-off from fire fighting to enter drains or water courses. The pressure in sealed containers can increase under the influence of heat. Combustion products may include: carbon oxides, nitrogen oxides, hydrocarbons and HCN. In the event of extreme heat (> 932 °F / 500 °C), aniline is suspected of being formed.

5.3 Special protective actions for fire-fighters

Wear an approved positive pressure self-contained breathing apparatus in addition to standard fire-fighting gear.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate non-emergency personnel. For suitable personal protective equipment refer to Section 8. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Only qualified personnel equipped with suitable protective equipment may intervene.

6.2 Environmental precautions

Do not allow uncontrolled discharge of product into the environment. Local authorities should be advised if significant spillages cannot be contained. If the product contaminates rivers and lakes or drains, inform respective authorities.

6.3 Methods and materials for containment and cleaning up

Small spill:
Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local/national regulations. Clean contaminated surface thoroughly. Sweep up or vacuum up spillage and collect in suitable container for disposal.

Large spill:
Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Leave to react for at least 30 minutes. Shovel into open-top drums for further decontamination. Wash the spillage area with water. Test atmosphere for MDI vapor. Keep in suitable, closed containers for disposal.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

For personal protection see section 8.

Avoid formation of aerosol. Do not breathe vapors/dust. Do not swallow. Do not get in eyes or mouth or on skin. Smoking, eating and drinking should be prohibited in the application area. Provide sufficient air exchange and/or exhaust in work rooms. Keep container closed when not in use. Open drum carefully as contents may be under pressure. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

7.2 Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep in properly labelled containers. Protect from moisture. Material should be stored between 60-90 °F (15-32 °C).

Materials to avoid:
For incompatible materials please refer to Section 10 of this SDS.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

4,4'-Methylenediphenyl diisocyanate (MDI) (CAS: 101-68-8)
PEL (Inhalation): (C) 0.02 ppm, (C) 0.2 mg/m^3 (OSHA)
OSHA Annotated Table Z-1, www.osha.gov

PEL (Inhalation): 0.005 ppm (Cal/OSHA)
OSHA Annotated Table Z-1, www.osha.gov

REL (Inhalation): 0.05 mg/m^3, (C) 0.2 mg/m^3 [10-min] (NIOSH)
OSHA Annotated Table Z-1, www.osha.gov

TLV® (Inhalation): 0.005 ppm, 0.051 mg/m^3 (ACGIH)
Respiratory sensitizer

8.2 Appropriate engineering controls

Proper ventilation is required when handling or using this product to avoid the generation of dust, fume, or mist. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Pictograms

Eye/face protection
Chemical safety goggles or glasses with side shields.

Skin protection
CLOTHING - Long-sleeved shirt and long pants, chemical-resistant footwear, plus socks.
GLOVES - The following protective materials are recommended: chemical-resistant gloves, such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyvinyl chloride (PVC), viton.

Respiratory protection

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. In emergency, non-routine and unknown exposure situations, including confined space entries, a NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA)or a full facepiece pressure demand supplied air respirator (SAR) with auxiliary self-contained air supply, should be used.

SECTION 9: Physical and chemical properties

Basic physical and chemical properties

Physical state	Liquid
Appearance	Liquid
Color	Brown, clear
Odor	Slight, musty
Odor threshold	No data available
Melting point/freezing point	No data available
Boiling point	No data available
Flammability	No data available
Lower and upper explosion limit/flammability limit	No data available
Flash point	>302 °F / 150 °C
Auto-ignition temperature	No data available
Decomposition temperature	No data available
pH	No data available
Kinematic viscosity	162.602 mm^2/s (77 °F / 25 °C)
Solubility	Decomposes in contact with water (68 °F / 20 °C)
Partition coefficient n-octanol/water (log value)	No data available
Vapor pressure	<0.00001 hPa (68 °F / 20 °C)
Evaporation rate	No data available
Density and/or relative density	1.23 g/cm^3 (77 °F / 25 °C)
Relative vapor density	No data available

Particle characteristics
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No dangerous reaction known under conditions of normal use.

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Reaction with water (moisture) produces CO2-gas. Exothermic reaction with materials containing active hydrogen groups. The reaction becomes progressively more vigorous and can be violent at higher temperatures if the miscibility of the reaction partners is good or is supported by stirring or by the presence of solvents. MDI is insoluble with, and heavier than water and sinks to the bottom but reacts slowly at the interface. A solid water-insoluble layer of polyurea is formed at the interface by liberating carbon dioxide gas.

10.4 Conditions to avoid
Extremes of temperature and direct sunlight. Exposure to air or moisture over prolonged periods.

10.5 Incompatible materials
Acids
Amines
Bases
Metals
Water

10.6 Hazardous decomposition products
Combustion products may include: carbon oxides, nitrogen oxides, hydrocarbons and HCN. In the event of extreme heat (> 932 °F / 500 °C), aniline is suspected of being formed.

SECTION 11: Toxicological information

Information on toxicological effects

Acute toxicity
Acute oral toxicity:
LD50 (Rat, male): > 10,000 mg/kg
Method: OECD Test Guideline 401

Acute inhalation toxicity:
Assessment: The substance/mixture is not toxic on inhalation as defined by dangerous goods regulations.
Acute toxicity estimate: 1.36 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: Calculation method

Remarks: Methods used to generate the exposure concentrations in the animal studies use extreme laboratory conditions and does not represent actual exposure conditions of the material in the workplace, storage, transportation or expected use on the market due to the very low vapor pressure. Therefore, these test results cannot be used to for hazard classification of the material. Rather, an acute toxicity estimate is calculated based on weight of evidence and expert judgement and is used to justify a modified classification for acute inhalation toxicity.

Acute dermal toxicity:
LD50 (Rabbit, male and female): > 9,400 mg/kg
Method: OECD Test Guideline 402

Skin corrosion/irritation
Components:
Diphenylmethanediisocyanate:
Species: Rabbit
Assessment: Irritating to skin.
Method: OECD Test Guideline 404
Result: Skin irritation

4,4'-methylenediphenyl diisocyanate:
Species: Rabbit

Method: OECD Test Guideline 404
Result: Irritating to skin.

Serious eye damage/irritation
Components:
Diphenylmethanediisocyanate:
Species: Rabbit
Result: Irritation to eyes, reversing within 7 days
Assessment: Mild eye irritant
Method: OECD Test Guideline 405

4,4'-methylenediphenyl diisocyanate:
Species: Rabbit
Result: Mild eye irritation

Respiratory or skin sensitization
Components:
Diphenylmethanediisocyanate:
Exposure routes: Skin
Species: Guinea pig
Method: OECD Test Guideline 406
Result: May cause sensitization by skin contact.
Exposure routes: Respiratory Tract
Species: Rat
Result: May cause sensitization by inhalation.

4,4'-methylenediphenyl diisocyanate:
Exposure routes: Skin
Species: Mouse
Method: OECD Test Guideline 429
Result: May cause sensitization by skin contact.
Exposure routes: Respiratory Tract
Species: Guinea pig
Result: May cause sensitization by inhalation.
Assessment: May cause an allergic skin reaction., May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Germ cell mutagenicity
Genotoxicity in vitro:
Concentration: 200 ug/plate
Metabolic activation: with and without metabolic activation
Method: Directive 67/548/EEC, Annex, B.13/14
Result: negative

Genotoxicity in vivo:
Application Route: Inhalation
Result: Not classified due to inconclusive data.
Application Route: Inhalation
Exposure time: 3 Weeks
Dose: 113 mg/m^3
Method: OECD Test Guideline 474
Result: negative

Germ cell mutagenicity- Assessment:
Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Carcinogenicity
Remarks: Rats have been exposed for two years to a respirable aerosol of polymeric MDI which resulted in a chronic pulmonary irritation at high concentrations. Only at the top level (6 mg/m^3), there was a significant incidence of a benign tumor of the lung (adenoma) and one malignant tumor (adenocarcinoma). There were no lung tumors at 1 mg/m^3 and no effects at 0.2 mg/m^3. Overall, the tumor incidence, both benign and malignant, and the number of animals with the tumors were not different from controls. The increased incidence of lung tumors is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumor formation will occur.

Remarks: Industrial use of aprotic polar solvents for cleaning can release hazardous primary aromatic amines (>0.1%) Based on animal studies, primary aromatic amines are considered as potential carcinogen to humans. Some of those chemicals are proven carcinogens to humans. Provided the recommended personal protective equipment and hygiene measures are applied, no adverse effects to human health are to be expected

Species: Rat, male and female
Application Route: Inhalation
Exposure time: 24 month(s)
Dose: 1 mg/m³
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 453
Result: positive

Species: Rat, male and female
Application Route: Inhalation
Exposure time: 24 month(s)
Dose: 1 mg/m³
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 453
Result: positive
Carcinogenicity - Assessment: No data available

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP

Reproductive toxicity
Effects on fertility:
Species: Rat, male and female
Application Route: Inhalation
Method: OECD Test Guideline 414
Remarks: No significant adverse effects were reported

Effects on fetal development:
Species: Rat, male and female
Application Route: Inhalation
General Toxicity Maternal: 4 mg/m³
Method: OECD Test Guideline 414
Result: No teratogenic effects

Reproductive toxicity - Assessment:
No toxicity to reproduction
No evidence of adverse effects on sexual function and fertility, or on development, based on animal experiments.

Specific target organ toxicity (STOT) - single exposure
Exposure routes: Inhalation
Target Organs: Respiratory Tract
Assessment: May cause respiratory irritation.

Specific target organ toxicity (STOT) - repeated exposure
Assessment: The substance or mixture is not classified as specific target organ toxicant, repeated exposure.
Remarks: Lung decrement has been reported in some studies as a consequence of repeated exposure to MDI. However, this effect can only be observed after inhalation exposure in the tissue at the point of contact and does not represent systemic toxicity. It is a local effect that is already covered by respiratory irritation (STOT single exposure, Cat. 3) and respiratory sensitization (Category 1).

In some humans, but not all, epidemiological studies have found long term decreases in ventilatory function and respiratory symptoms (EU RA 2005). However, there is generally co-exposure to other materials and sometimes also to toluene diisocyanate which may have contributed to lung decrement. Therefore, it is concluded that possible lung effects do not qualify as specific target organ toxicity after repeated exposure in accordance to chapter 3.9.1.6 of the GHS (UNECE 2003). In addition, all warning and safety measures for local effects as well as for acute inhalation toxicity already provide for a protection of workers and professional users that are involved in the handling of MDI.

Repeated dose toxicity:
Species: Rat, male and female
NOEC: 0.2 mg/m³
Exposure time: 17,520 h
Number of exposures: 5 d
Method: OECD Test Guideline 453

Repeated dose toxicity - Assessment:
No data available

Aspiration hazard
No data available.

SECTION 12: Ecological information

Toxicity
Toxicity to fish:
LC50 (Brachydanio rerio (zebrafish)): > 1,000 mg/l

Exposure time: 96 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 203
LC50: > 1,000 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates:
EC50 (Daphnia magna (Water flea)): > 1,000 mg/l
Exposure time: 24 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants:
EC50 (Desmodesmus subspicatus (green algae)): > 1,640 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 201

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity):
NOEC (Daphnia magna (Water flea)): >= 10 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

Toxicity to microorganisms:
EC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209

Toxicity to soil dwelling organisms:
EC50 (Eisenia fetida (earthworms)): > 1,000 mg/kg
Exposure time: 336 h
Method: OECD Test Guideline 207

Persistence and degradability
Biodegradability:
Inoculum: Domestic sewage
Concentration: 30 mg/l
Result: Not biodegradable
Biodegradation: 0 %
Exposure time: 28 d
Method: Inherent Biodegradability: Modified MITI Test (II)

Components:
Diphenylmethanediisocyanate:
Stability in water:
Degradation half life (DT50): 0.8 d (77 °F / 25 °C)

Method: No information available.
Remarks: Fresh water

4,4'-methylenediphenyl diisocyanate:
Stability in water:
Degradation half life (DT50): 20 hrs (77 °F / 25 °C)
Remarks: Fresh water

Bioaccumulative potential
Bioaccumulation:
Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 200
Remarks: Bioaccumulation is unlikely.

Components:
4,4'-methylenediphenyl diisocyanate:
Partition coefficient: n-octanol/water:
log Pow: 4.51 (68 °F / 20 °C)
pH: 7
Method: OECD Test Guideline 117

Mobility in soil
No data available

SECTION 13: Disposal considerations

Disposal methods

Product disposal
This product, solutions and any by-products must be disposed of in accordance with federal, state and local environmental control regulations. Do not contaminate water, food or feed by storage or disposal.

Packaging disposal
This material and its container must be disposed of in a safe way via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Do not reuse containers.

Waste treatment
Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.

Sewage disposal
Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Other disposal recommendations
No additional information available.

SECTION 14: Transport information

DOT (US)
UN/ID/NA number: NA 3082

Proper shipping name: OTHER REGULATED SUBSTANCES, LIQUID, N.O.S. (Methylene Diphenyl Diisocyanate)
Class: 9
Packing group: III
Labels: Class 9 - Miscellaneous dangerous substances and articles
ERG Code: 171
Marine pollutant: no

IMDG
Not regulated as dangerous goods.

IATA
Not regulated as dangerous goods.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Toxic Substances Control Act (TSCA) Inventory
On the inventory, or in compliance with the inventory.

Canadian Domestic Substances List (DSL)
All components of this product are listed on the Canadian DSL

SARA 311/312 Hazards
Refer to hazard classification information in Section 2.

SARA 313 Components
Diphenylmethanediisocyanate CAS number: 9016-87-9
4,4'-methylenediphenyl diisocyanate CAS number: 101-68-8

Massachusetts Right To Know Components
Not listed

New Jersey Right To Know Components
Methylene bisphenyl isocyanate CAS number: 101-68-8
Methylene diphenyl diisocyanate (polymeric) CAS number: 9016-87-9

Pennsylvania Right To Know Components
Benzene, 1,1'-methylenebis[4-isocyanato- CAS number: 101-68-8

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Version: 2.0

Revision Date: 08/02/2023

16.1 Further information/disclaimer

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Checkerspot, Inc. be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Checkerspot, Inc. has been advised of the possibility of such damages.

16.2 Preparation information

Abbreviations and acronyms
ACGIH: American Conference of Governmental Industrial Hygienists
(C): Ceiling
CAS no.: Chemical Abstracts Service Number
Cat.: Category
CFR: Code of Federal Regulations
DOT: Department of Transportation
EC50: Half maximal effective concentration
EC no.: European Community Number
EEC: European Economic Community
ERG: Emergency Response Guidebook
GHS: Globally Harmonized System
IARC: International Agency for Research on Cancer
IATA: International Air Transport Association
IMDG: International Maritime Dangerous Goods Code
LC50: Lethal Concentration, 50%
LD50: Median Lethal Dose
MITI: Ministry of International Trade and Industry, Japan
NIOSH: National Institute for Occupational Safety & Health
NOEC: No Observed Effect Concentration
NTP: National Toxicology Program
OECD: Organisation for Economic Co-operation and Development
OSHA: Occupational Safety and Health Administration
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
SARA: Superfund Amendments and Reauthorization Act
TLV: Threshold Limit Value
UNECE: United Nations Economic Commission for Europe