# SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

## Product Identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>Cummins Aqueous Urea Solution Diesel Exhaust Fluid (NZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms</td>
<td>CSP04901, CSP04902, CSP04903, CSP04904</td>
</tr>
<tr>
<td>Other means of identification</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

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

| Relevant identified uses | Stabilized urea premix for use in reducing nitrogen oxides in diesel engines. |

## Details of the supplier of the safety data sheet

<table>
<thead>
<tr>
<th>Registered company name</th>
<th>Cummins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>2 Carribean Drive Scoresby VIC 3179 Australia</td>
</tr>
<tr>
<td>Telephone</td>
<td>+61 3 9765 3222</td>
</tr>
<tr>
<td>Fax</td>
<td>+61 3 9763 0079</td>
</tr>
<tr>
<td>Website</td>
<td>Not Available</td>
</tr>
<tr>
<td>Email</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

## Emergency telephone number

| Association / Organisation | Not Available |
| Emergency telephone numbers | Not Available |
| Other emergency telephone numbers | Not Available |

## CHEMWATCH EMERGENCY RESPONSE

<table>
<thead>
<tr>
<th>Primary Number</th>
<th>Alternative Number 1</th>
<th>Alternative Number 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800 039 008</td>
<td>1800 039 008</td>
<td>+612 9186 1132</td>
</tr>
</tbody>
</table>

Once connected and if the message is not in your preferred language then please dial 01

# SECTION 2 HAZARDS IDENTIFICATION

## Classification of the substance or mixture

<table>
<thead>
<tr>
<th>Poisons Schedule</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Acute Toxicity (Oral) Category 4, Skin Corrosion/Irritation Category 2, Eye Irritation Category 2A</td>
</tr>
</tbody>
</table>

**Legend:**


## Label elements

| Hazard pictogram(s) | ! |
Hazard statement(s)

<table>
<thead>
<tr>
<th>H302</th>
<th>Harmful if swallowed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>H315</td>
<td>Causes skin irritation.</td>
</tr>
<tr>
<td>H319</td>
<td>Causes serious eye irritation.</td>
</tr>
</tbody>
</table>

Precautionary statement(s) Prevention

<table>
<thead>
<tr>
<th>P270</th>
<th>Do not eat, drink or smoke when using this product.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P280</td>
<td>Wear protective gloves/protective clothing/eye protection/face protection.</td>
</tr>
</tbody>
</table>

Precautionary statement(s) Response

<table>
<thead>
<tr>
<th>P362</th>
<th>Take off contaminated clothing and wash before reuse.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P305+P351+P338</td>
<td>IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</td>
</tr>
<tr>
<td>P337+P313</td>
<td>If eye irritation persists: Get medical advice/attention.</td>
</tr>
<tr>
<td>P301+P312</td>
<td>IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.</td>
</tr>
<tr>
<td>P302+P352</td>
<td>IF ON SKIN: Wash with plenty of soap and water.</td>
</tr>
<tr>
<td>P330</td>
<td>Rinse mouth.</td>
</tr>
<tr>
<td>P332+P313</td>
<td>If skin irritation occurs: Get medical advice/attention.</td>
</tr>
</tbody>
</table>

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

| P501  | Dispose of contents/container in accordance with local regulations. |

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

<table>
<thead>
<tr>
<th>CAS No</th>
<th>% [weight]</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>57-13-6</td>
<td>30-50</td>
<td>urea</td>
</tr>
</tbody>
</table>

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact

If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact

If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

Inhalation

If fumes or combustion products are inhaled remove from contaminated area.

- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

Ingestion

| If swallowed do NOT induce vomiting. |
| If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. |
Observe the patient carefully.
Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
Seek medical advice.

Indication of any immediate medical attention and special treatment needed
Treat symptomatically.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

<table>
<thead>
<tr>
<th>Fire Incompatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result</td>
</tr>
</tbody>
</table>

Advice for firefighters

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves in the event of a fire.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

Fire/Explosion Hazard

- Non combustible.
- Not considered a significant fire risk, however containers may burn. Decomposition may produce toxic fumes of:
  - carbon dioxide (CO2)
  - nitrogen oxides (NOx)
  - other pyrolysis products typical of burning organic material.
  - May emit poisonous fumes.
- In fire situation urea melts and flows, on further heating it decomposes giving off ammonia gas. Thermal and oxidative degradation products can include ammonia, biuret, and cyanuric acid.

HAZCHEM

Not Applicable

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

<table>
<thead>
<tr>
<th>Minor Spills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean up all spills immediately.</td>
</tr>
<tr>
<td>Avoid breathing vapours and contact with skin and eyes.</td>
</tr>
<tr>
<td>Control personal contact with the substance, by using protective equipment.</td>
</tr>
<tr>
<td>Contain and absorb spill with sand, earth, inert material or vermiculite.</td>
</tr>
<tr>
<td>Wipe up.</td>
</tr>
<tr>
<td>Place in a suitable, labelled container for waste disposal.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Major Spills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate hazard.</td>
</tr>
<tr>
<td>Clear area of personnel and move upwind.</td>
</tr>
<tr>
<td>Alert Fire Brigade and tell them location and nature of hazard.</td>
</tr>
<tr>
<td>Wear breathing apparatus plus protective gloves.</td>
</tr>
<tr>
<td>Prevent, by any means available, spillage from entering drains or water course.</td>
</tr>
<tr>
<td>Stop leak if safe to do so.</td>
</tr>
<tr>
<td>Contain spill with sand, earth or vermiculite.</td>
</tr>
<tr>
<td>Collect recoverable product into labelled containers for recycling.</td>
</tr>
<tr>
<td>Neutralise/decontaminate residue (see Section 13 for specific agent).</td>
</tr>
</tbody>
</table>
Collect solid residues and seal in labelled drums for disposal.
Wash area and prevent runoff into drains.
After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with moisture.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storage and handling recommendations contained within this SDS.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- DO NOT allow clothing wet with material to stay in contact with skin

Other information

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

<table>
<thead>
<tr>
<th>Suitable container</th>
<th>Urea:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- forms anhydrous ammonia and nitrous vapours on contact with hot surfaces</td>
<td></td>
</tr>
<tr>
<td>- reacts violently with strong oxidisers, chlorine, inorganic chlorides, chlorites, chromyl chloride, dichromates, dicyanoferrazan, fluorn, gallium perchlorate, hydrogen peroxide, lead dioxide, nitrates, nitriles, permanganates, perchlorates, titanium tetrachloride, triethylene tetramine</td>
<td></td>
</tr>
<tr>
<td>- ignites or explodes on reaction with ammonium nitrate, chromyl chloride, nitrosyl perchlorate, phosphorus pentachloride</td>
<td></td>
</tr>
<tr>
<td>- may form highly explosive nitrogen trichloride on contact with hexanitroethane, perchloryl fluoride, sodium perchlorate, trichloroisocyanuric acid, hypochlorites and other chlorinating agents</td>
<td></td>
</tr>
<tr>
<td>- is incompatible with oxalic acid, sodium dichlorocyanurate</td>
<td></td>
</tr>
<tr>
<td>- Avoid reaction with oxidising agents</td>
<td></td>
</tr>
</tbody>
</table>

Storage incompatibility

<table>
<thead>
<tr>
<th>Material name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
</tr>
</tbody>
</table>

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA
Not Available

EMERGENCY LIMITS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Material name</th>
<th>TEEL-1</th>
<th>TEEL-2</th>
<th>TEEL-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>Urea</td>
<td>30 mg/m3</td>
<td>280 mg/m3</td>
<td>1,700 mg/m3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Original IDLH</th>
<th>Revised IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

MATERIAL DATA

For urea:
CEL TWA: 10 mg/m3 (compare WEEL-TWA)
(CEL = Chemwatch Exposure Limit)

Continued...
Even if individuals inhaled 10 mg/m³ of urea through the whole workday, they would only inhale 100 mg/day. This increment, even if totally absorbed, would be insignificant when compared to the 30 g/day normal excretion rate. The workplace environmental exposure limit (WEEL) established by the AIHA is protective against the effects of urea as a nuisance dust.

Exposure controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are:

Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.

Employers may need to use multiple types of controls to prevent employee overexposure.

General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in special circumstances. If risk of overexposure exists, wear approved respirator. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection. Provide adequate ventilation in warehouses and enclosed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

<table>
<thead>
<tr>
<th>Type of Contaminant</th>
<th>Air Speed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>solvent, vapours, degreasing etc., evaporating from tank (in still air)</td>
<td>0.25-0.5 m/s (50-100 f/min)</td>
</tr>
<tr>
<td>aerosols, fumes from pouring operations, intermittent container filling, low speed conveyor transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)</td>
<td>0.5-1 m/s (100-200 f/min.)</td>
</tr>
<tr>
<td>direct spray, spray painting in shallow booths, drum filling, conveyor loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td>
<td>1-2.5 m/s (200-500 f/min.)</td>
</tr>
<tr>
<td>grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)</td>
<td>2.5-10 m/s (500-2000 f/min.)</td>
</tr>
</tbody>
</table>

Within each range the appropriate value depends on:

<table>
<thead>
<tr>
<th>Lower end of the range</th>
<th>Upper end of the range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Room air currents minimal or favourable to capture</td>
<td>1: Disturbing room air currents</td>
</tr>
<tr>
<td>2: Contaminants of low toxicity or of nuisance value only.</td>
<td>2: Contaminants of high toxicity</td>
</tr>
<tr>
<td>3: Intermittent, low production.</td>
<td>3: High production, heavy use</td>
</tr>
<tr>
<td>4: Large hood or large air mass in motion</td>
<td>4: Small hood-local control only</td>
</tr>
</tbody>
</table>

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air velocity at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Personal protection

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

Eye and face protection

- Wear chemical protective gloves, e.g. PVC.
- Wear safety footwear or safety gumboots, e.g. Rubber

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary...
from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the
glove material can not be calculated in advance and has therefore to be checked prior to the application.
The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has
to be observed when making a final choice.
Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves,
hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).
- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher
  (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is
  recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time
greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- Some glove polymer types are less affected by movement and this should be taken into account when
  considering gloves for long-term use.
- Contaminated gloves should be replaced.
For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.
It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific
chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material.
Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough
times.
Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the
manufacturers’ technical data should always be taken into account to ensure selection of the most appropriate glove for
the task.
Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For
example:
- Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is
  needed. However, these gloves are only likely to give short duration protection and would normally be just for
  single use applications, then disposed of.
- Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical)
risk i.e. where there is abrasion or puncture potential
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application
of a non-perfumed moisturiser is recommended.

Body protection  | See Other protection below
--- | ---
Other protection  |
- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

Thermal hazards  | Not Available

Respiratory protection
Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content. The wearer must be
warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not
functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of
cartridge respirators is considered appropriate.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

| Information on basic physical and chemical properties |
| --- | --- | --- |
| Appearance  | Clear colourless slightly alkaline liquid with an ammoniacal odour; mixes with water. |
| Physical state  | Liquid |
| Relative density (Water = 1)  | 1.094 |
| Odour  | Not Available |
| Partition coefficient n-octanol / water  | Not Available |
| Odour threshold  | Not Available |
| Auto-ignition temperature (°C)  | Not Applicable |
| pH (as supplied)  | 9.5 |
| Decomposition temperature  | Not Available |
| Melting point / freezing point (°C)  | Not Available |
| Viscosity (cSt)  | Not Available |
### Initial boiling point and boiling range (°C)
Not Available

### Molecular weight (g/mol)
Not Applicable

### Flash point (°C)
Not Applicable

### Taste
Not Available

### Evaporation rate
Not Available

### Explosive properties
Not Available

### Flammability
Not Applicable

### Oxidising properties
Not Available

### Upper Explosive Limit (%)
Not Applicable

### Surface Tension (dyn/cm or mN/m)
Not Available

### Lower Explosive Limit (%)
Not Applicable

### Volatile Component (%vol)
Not Available

### Vapour pressure (kPa)
Not Available

### Gas group
Not Available

### Solubility in water (g/L)
Miscible

### pH as a solution (1%)
Not Available

### Vapour density (Air = 1)
Not Available

### VOC g/L
Not Available

### SECTION 10 STABILITY AND REACTIVITY

**Reactivity**
See section 7

**Chemical stability**
- Unstable in the presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

**Possibility of hazardous reactions**
See section 7

**Conditions to avoid**
See section 7

**Incompatible materials**
See section 7

**Hazardous decomposition products**
See section 5

### SECTION 11 TOXICOLOGICAL INFORMATION

**Information on toxicological effects**

**Inhaled**
Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.

Urea in small quantities is considered to be practically non-harmful by all exposure routes. The dust should be regarded as a nuisance dust and exposure should be kept as low as practical. Confirmed asthmatics should avoid prolonged contact with urea dust. Urea may cause irritation of the respiratory tract. Symptoms may include coughing, shortness of breath.

**Ingestion**
Urea may cause irritation the gastrointestinal tract. Symptoms of ingestion may include nausea, vomiting and diarrhea. Urea may also cause headache, confusion and electrolyte depletion.

**Skin Contact**
The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

Urea ointment acts to soften dry scaly skin, promotes skin absorption of other chemicals and is a common ingredient (2-20%) of skin ointments. Adverse reactions to clinical use of high doses of urea solution include nausea and vomiting. Prolonged skin contact may cause stinging sensation and mild irritation and may result in dermatitis. Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

**Eye**
The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

**Chronic**
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. High levels of exposure to urea in the Russian workplace have been reported to produce emphysema, a high incidence of protein metabolism disturbances and chronic weight loss.

The backs of rats were treated by dermal application with 10%, 20%, 40% urea ointment daily for 4 to 24 weeks. No erythema or other responses were noted at the application site. At 25 weeks there was a decrease, in the 40% urea ointment group, of brain and prostate weights.

In medicine, avoid urea in cases of renal or hepatic impairment. Urea is excreted as a product of normal body metabolic...
### Cummins Aqueous Urea Solution Diesel Exhaust Fluid (NZ)

<table>
<thead>
<tr>
<th>Process</th>
<th>Toxicity</th>
<th>Irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

#### Acute Toxicity

- **Toxicity**: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.
- **Irritation**: Acute toxicity by urea is well delineated by the oral route. Toxicity is low in mammals other than ruminants, especially cattle, and sheep, in which the rumen micro-organisms contain urease activity and metabolise urea to ammonia at a high rate. In mice and rats, urea is of low toxicity even by the subcutaneous and intravenous route.

#### Carcinogenicity

- **Toxicity**: Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

#### Reproductivity

- **Toxicity**: The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling of epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

- **Irritation**: For urea:
  - There is little data that relates urea to human health other than its use in dermatology and some more limited applications in clinical medicine. The use of urea (at 10% concentration or less) in ointments and creams to treat dry skin has been widespread, and long term follow-up studies have indicated that the substance is nonallergic and virtually free from side effects. Among other clinical therapeutic uses, the treatment of inappropriate secretion of antidiuretic hormone (SIADH) should be noted, because its chronic form has involved long term oral administration of large amounts of urea. Most patients have tolerated urea well, although diarrohoea is sometimes reported after ingestion of 60-90 g/day. The possibility exists that infection of H. pylori in human stomach may aggravate local effects by urea because of ammonia generation.

- **Acute Toxicity**: The acute toxicity by urea is well delineated by the oral route. Toxicity is low in mammals other than ruminants, especially cattle, and sheep, in which the rumen micro-organisms contain urease activity and metabolise urea to ammonia at a high rate. In mice and rats, urea is of low toxicity even by the subcutaneous and intravenous route.

- **Repeated dose toxicity**: No well-conducted repeated dose toxicity studies on urea were located. Chronic toxicity and carcinogenicity screening studies in mice and rats fed with 4500, 9000 or 45000 ppm in diet (up to about 6750 mg/kg body weight/day for mice and about 2250 mg/kg body weight/day for rats) did not uncover any treatment-related toxic syndromes in the various organs studied. Neither was any weight depression noted at terminal necropsy for animals of either sex or species at any dose levels. Thus the NOAELs were about 6750 mg/kg body weight/day for mice and about 2250 mg/kg body weight/day for rats.

- **Reproducitve developmental toxicity**: The studies cited under repeated dose toxicity did not indicate any toxic effects on the reproductive organs of mice and rats. No adequate teratogenicity/developmental toxicity studies of urea with mammals were located. According to one rat study, 50 g/kg body weight/day administered by gavage in two doses 12 hours apart for an average of 14 days did not cause outstanding (external) teratogenicity; the mean birthweight of the newborn was lower but the litter size greater. Injection of urea into the air sack of eggs shows that urea is toxic to the development of chick embryo.

No NOAEL can be given for the reproductive/developmental toxicity of urea because appropriate studies are lacking.

#### Genetic Toxicity

- **Toxicity**: Urea has been negative in several appropriately conducted bacterial mutagenicity tests. Urea caused DNA single strand breaks in mammalian cells in vitro and was clastogenic for mammalian cells in vitro and in vivo but only at concentrations much beyond the physiological range (about 50-100 higher concentrations than found in human blood). The mechanism of genotoxicity is probably non-specific (e.g. difference in osmotic pressure across the cell membrane).

### Legend

1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS.

### Processes

1. Chemical processes
2. Cummins Aqueous Urea Solution Diesel Exhaust Fluid (NZ)

### Related Products

1. Diesel Exhaust Fluid (NZ) & UREA

### Carcinogenicity

- **Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.**

- **No NOAEL can be given for the reproductive/developmental toxicity of urea because appropriate studies are lacking.**

### Reproductivity

- **No NOAEL can be given for the reproductive/developmental toxicity of urea because appropriate studies are lacking.**

### Acute Toxicity

- **Toxicity**: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

### Skin Irritation/Corrosion

- **Toxicity**: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

### Carcinogenicity

- **Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.**

### Reproductivity

- **No NOAEL can be given for the reproductive/developmental toxicity of urea because appropriate studies are lacking.**

### Genetic Toxicity

- **Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.**

### Legend

1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS.

Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of Chemical Substances.
SECTION 12 ECOLOGICAL INFORMATION

Toxicity

<table>
<thead>
<tr>
<th>Cummins Aqueous Urea Solution Diesel Exhaust Fluid (NZ)</th>
<th>ENDPOINT</th>
<th>TEST DURATION (HR)</th>
<th>SPECIES</th>
<th>VALUE</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENDPOINT</th>
<th>TEST DURATION (HR)</th>
<th>SPECIES</th>
<th>VALUE</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50</td>
<td>96</td>
<td>Fish</td>
<td>5mg/L</td>
<td>4</td>
</tr>
<tr>
<td>EC50</td>
<td>48</td>
<td>Crustacea</td>
<td>3910mg/L</td>
<td>4</td>
</tr>
<tr>
<td>BCF</td>
<td>24</td>
<td>Algae or other aquatic plants</td>
<td>0.05mg/L</td>
<td>4</td>
</tr>
<tr>
<td>EC100</td>
<td>24</td>
<td>Crustacea</td>
<td>&gt;10000mg/L</td>
<td>1</td>
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<tr>
<td>NOEC</td>
<td>96</td>
<td>Crustacea</td>
<td>1000mg/L</td>
<td>4</td>
</tr>
</tbody>
</table>

Legend: Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

DO NOT discharge into sewer or waterways.

Persistence and degradability

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>

Bioaccumulative potential

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Bioaccumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>LOW (BCF = 10)</td>
</tr>
</tbody>
</table>

Mobility in soil

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>LOW (KOC = 4.191)</td>
</tr>
</tbody>
</table>

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Legislation addressing waste disposal requirements may differ by country, state and/or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. Where in doubt contact the responsible authority. Recycle wherever possible. Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified. Dispose of by: burial in a land-fill specifically licensed to accept chemical and/or pharmaceutical wastes or incineration in a licensed apparatus (after admixture with suitable combustible material). Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

SECTION 14 TRANSPORT INFORMATION

Labels Required

<table>
<thead>
<tr>
<th>Marine Pollutant</th>
<th>HAZCHEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Land transport (ADG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

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

UREA(57-13-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

<table>
<thead>
<tr>
<th>Australia Inventory of Chemical Substances (AICS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Inventory</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Australia - AICS</td>
</tr>
<tr>
<td>Canada - DSL</td>
</tr>
<tr>
<td>Canada - NDSL</td>
</tr>
<tr>
<td>China - IECSC</td>
</tr>
<tr>
<td>Europe - EINEC / ELINCS / NLP</td>
</tr>
<tr>
<td>Japan - ENCS</td>
</tr>
<tr>
<td>Korea - KECI</td>
</tr>
<tr>
<td>New Zealand - NZIoC</td>
</tr>
<tr>
<td>Philippines - PICCS</td>
</tr>
<tr>
<td>USA - TSCA</td>
</tr>
</tbody>
</table>

Legend:

Y = All ingredients are on the inventory
N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing (see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit

Continued...
TEEL: Temporary Emergency Exposure Limit
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL: No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

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