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 (DEF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms</td>
<td>Aqueous Urea Solution Diesel Exhaust Fluid (DEF), 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 Caribbean 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

<table>
<thead>
<tr>
<th>Association / Organisation</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency telephone numbers</td>
<td>Not Available</td>
</tr>
<tr>
<td>Other emergency telephone numbers</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

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>Not Applicable</td>
</tr>
</tbody>
</table>

Label elements

<table>
<thead>
<tr>
<th>GHS label elements</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNAL WORD</td>
<td>NOT APPLICABLE</td>
</tr>
</tbody>
</table>
Hazard statement(s)
Not Applicable

Precautionary statement(s) Prevention
Not Applicable

Precautionary statement(s) Response
Not Applicable

Precautionary statement(s) Storage
Not Applicable

Precautionary statement(s) Disposal
Not Applicable

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

**Fire Incompatibility**
- Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result
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.

Fire Fighting

- 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.

Fire/Explosion Hazard

| 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

  Minor Spills
  - Clean up all spills immediately.
  - Avoid breathing vapours and contact with skin and eyes.
  - Control personal contact with the substance, by using protective equipment.
  - Contain and absorb spill with sand, earth, inert material or vermiculite.

  Major Spills
  - Moderate hazard.
  - Clear area of personnel and move upwind.
  - Alert Fire Brigade and tell them location and nature of hazard.
  - Wear breathing apparatus plus protective gloves.

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

SECTION 7 HANDLING AND STORAGE

- Precautions for safe handling

  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.
  - **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.

- Conditions for safe storage, including any incompatibilities

  Suitable container
  - Polyethylene or polypropylene container.
  - Packing as recommended by manufacturer.
  - Check all containers are clearly labelled and free from leaks.

  Storage incompatibility
  - Urea:
    - forms anhydrous ammonia and nitrous vapours on contact with hot surfaces
    - reacts violently with strong oxidisers, chlorine, inorganic chlorides, chlorites, chromyl chloride, dichromates, dicyanofurazan, fluorine, gallium perchlorate, hydrogen peroxide, lead dioxide, nitrates, nitrates, permanganates, perchlorates, titanium tetrachloride, triethylentetramine
    - ignites or explodes on reaction with ammonium nitrate, chromyl chloride, nitrilyl perchlorate, phosphorus pentachloride
    - may form highly explosive nitrogen trichloride on contact with hexanitroethane, perchloryl fluoride, sodium perchlorate, trichloroisocyanuric acid, hypochlorites and other chlorinating agents
    - is incompatible with oxalic acid, sodium dichloroacyanurate
    - Avoid reaction with oxidising agents

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

- Control parameters

Continued...
Exposure controls

**Appropriate engineering 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.

**Personal protection**

- **Eye and face 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.

- **Skin 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.

**Hands/feet protection**

See Hand protection below

**Body protection**

See Other protection below

**Other protection**

- Overalls.
- P.V.C. apron.
- Barrier cream.

**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 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Clear colourless slightly alkaline liquid with an ammoniacal odour; mixes with water.</td>
</tr>
<tr>
<td><strong>Physical state</strong></td>
<td>Liquid</td>
</tr>
<tr>
<td><strong>Relative density</strong></td>
<td>1.094</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Partition coefficient</strong></td>
<td>n-octanol / water</td>
</tr>
<tr>
<td><strong>Odour threshold</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Auto-ignition temperature (°C)</strong></td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
SECTION 10 STABILITY AND REACTIVITY

Reactivity

Chemical stability

Possibility of hazardous reactions

Conditions to avoid

Incompatible materials

Hazardous decomposition products

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled

Urea is generally regarded as non-harmful in small amounts. However, exposure should be kept as low as practicable. People with asthma should avoid prolonged contact with urea dust. Urea may cause irritation of the respiratory tract, causing coughing and shortness of breath.

Ingestion

Skin Contact

Eye

Chronic

Cummins Aqueous Urea Solution Diesel Exhaust Fluid (DEF)


### Cummins Aqueous Urea Solution Diesel Exhaust Fluid (DEF)

#### TOXICITY

<table>
<thead>
<tr>
<th>Ingredient</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>LC50</td>
<td>96</td>
<td>Fish</td>
<td>5mg/L</td>
<td>4</td>
</tr>
<tr>
<td>urea</td>
<td>EC50</td>
<td>48</td>
<td>Crustacea</td>
<td>3910mg/L</td>
<td>4</td>
</tr>
<tr>
<td>urea</td>
<td>EC50</td>
<td>96</td>
<td>Algae or other aquatic plants</td>
<td>42184.758mg/L</td>
<td>3</td>
</tr>
<tr>
<td>urea</td>
<td>BCF</td>
<td>24</td>
<td>Algae or other aquatic plants</td>
<td>0.05mg/L</td>
<td>4</td>
</tr>
<tr>
<td>urea</td>
<td>EC50</td>
<td>384</td>
<td>Crustacea</td>
<td>894.861mg/L</td>
<td>3</td>
</tr>
<tr>
<td>urea</td>
<td>NOEC</td>
<td>168</td>
<td>Fish</td>
<td>200mg/L</td>
<td>2</td>
</tr>
</tbody>
</table>

**Legend:**
- `X` – Data available but does not fill the criteria for classification
- `+` – Data required to make classification available
- `-` – Data Not Available to make classification

**Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - 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**

### Persistence and degradability

**Ingredient**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
</tr>
</thead>
</table>

**Legend:**
- `DO NOT` discharge into sewer or waterways.

**SECTION 12 ECOLOGICAL INFORMATION**

### Acute Toxicity

### Skin Irritation/Corrosion

### Serious Eye Damage/Irritation

### Respiratory or Skin Sensitisation

### Mutagenicity

### Carcinogenicity

### Reproductivity

### STOT - Single Exposure

### STOT - Repeated Exposure

### Aspiration Hazard

**Legend:**
- `X` – Data available but does not fill the criteria for classification
- `+` – Data required to make classification available
- `-` – Data Not Available to make classification

**Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - 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**
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

<table>
<thead>
<tr>
<th>Product / Packaging disposal</th>
<th>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:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Reduction</td>
</tr>
<tr>
<td></td>
<td>- Reuse</td>
</tr>
<tr>
<td></td>
<td>- Recycling</td>
</tr>
<tr>
<td></td>
<td>- Disposal (if all else fails)</td>
</tr>
<tr>
<td></td>
<td>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use.</td>
</tr>
<tr>
<td></td>
<td>- DO NOT allow wash water from cleaning or process equipment to enter drains.</td>
</tr>
<tr>
<td></td>
<td>- It may be necessary to collect all wash water for treatment before disposal.</td>
</tr>
<tr>
<td></td>
<td>- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</td>
</tr>
<tr>
<td></td>
<td>- Where in doubt contact the responsible authority.</td>
</tr>
<tr>
<td></td>
<td>- Recycle wherever possible.</td>
</tr>
<tr>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td></td>
<td>- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or incineration in a licenced apparatus (after admixture with suitable combustible material).</td>
</tr>
<tr>
<td></td>
<td>- Decontaminate empty containers.</td>
</tr>
</tbody>
</table>

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>National Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - AICS</td>
<td>Y</td>
</tr>
<tr>
<td>Canada - DSL</td>
<td>Y</td>
</tr>
<tr>
<td>Canada - NDSL</td>
<td>N (urea)</td>
</tr>
<tr>
<td>China - IECSC</td>
<td>Y</td>
</tr>
</tbody>
</table>
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. A list of reference resources used to assist the committee may be found at:

www.chemwatch.net

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
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

This document is copyright.
Apart from any fair dealing for the purposes of private study, research, review or criticism, as permitted under the Copyright Act, no part may be reproduced by any process without written permission from CHEMWATCH.
TEL (+61 3) 9572 4700.