Material Safety Data Sheet

Section I. Chemical Product and Company Identification

PRODUCT NAME/TRADE NAME: Urea, Fertilizer Grade, Granular 46-0-0

SYNONYM: This Material Safety Data Sheet applies to the following Agrium products:
Granular Urea - Borger Production
Granular Urea - Carseland Production
Granular Urea - Fort Saskatchewan Production
Granular Urea - Kenai Production
Granular Urea - Redwater Production

Please refer to the appropriate Product Specification Sheet for technical information on each product.

CHEMICAL NAME: Carbamide

CHEMICAL FAMILY: Aliphatic amide

CHEMICAL FORMULA: CO(NH$_2$)$_2$

MATERIAL USES: Agricultural use: Fertilizer. Industrial applications: Manufacture of specialty fertilizers.

MANUFACTURER:
Agrium
North American Wholesale
13131 Lake Fraser Drive, S.E.
Calgary, Alberta, Canada, T2J 7E8

Agrium U.S. Inc.
Suite 1700, 4582 South Ulster St.
Denver, Colorado, U.S.A., 80237

SUPPLIER:
Agrium
North American Wholesale
13131 Lake Fraser Drive, S.E.
Calgary, Alberta, Canada, T2J 7E8

Agrium U.S. Inc.
Suite 1700, 4582 South Ulster St.
Denver, Colorado, U.S.A., 80237

Section II. Hazardous Ingredients

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS #</th>
<th>TLV-TWA</th>
<th>TLV-TWA</th>
<th>STEL</th>
<th>STEL</th>
<th>CEIL</th>
<th>CEIL</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>57-13-6</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>96-98</td>
<td>&lt;3</td>
<td>96-98</td>
</tr>
<tr>
<td>Urea reaction products with</td>
<td>68611-64-3</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>&lt;3</td>
<td>~1</td>
<td>~1</td>
</tr>
<tr>
<td>formaldehyde</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imidodicarbonic diamide (biuret)</td>
<td>108-19-0</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ACGIH TLV notations:

--- No assigned TLV
(C) - Ceiling - the concentration not to be exceeded at any time
(I) - measured as the Inhalable fraction of the aerosol
(R) - measured as the Respirable fraction of the aerosol
(T) - measured as the Thoracic fraction of the aerosol
TOXICOLOGICAL DATA ON INGREDIENTS

As formulated above:
Acute oral toxicity: 14,300 mg/kg rat; 11,500 mg/kg mouse; 510 mg/kg cattle
Chronic oral toxicity, NOAEL: 6,750 mg/kg mouse; 2,250 mg/kg rat

Ecotoxicity:
Acute toxicity to fish, Barillius barna, LC$_{50}$, 96hr: >9,100 mg/L
Acute toxicity to invertibrates, Daphnia, EC$_{50}$ (24hr) >10,000 mg/L
Acute toxicity to birds, pigeon, LDLo = 16,000 mg/kg subcutaneous
Toxicity to algae, Scenedesmus quadricauda, cell multiplication inhibition, TT(192 hr) > 10,000 mg/L

Section III. Hazards Identification.

POTENTIAL ACUTE HEALTH EFFECTS

Not considered to be toxic for humans under normal conditions of use. However, in keeping with good industrial hygiene practices, exposure to any chemical should be kept to a minimum. This product may cause irritation to the eyes and skin due to mechanical action.

POTENTIAL CHRONIC HEALTH EFFECTS

CARCINOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, OSHA.
MUTAGENIC EFFECTS: NONE by ACGIH, EPA, IARC, OSHA.
TERATOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, OSHA.

There is no known effect from chronic exposure to this product. Urea is approved as a food and cosmetic additive, is an ingredient in clinical preparations, and is a normal human metabolite found in urine.

Section IV. First Aid Measures

EYE CONTACT
May cause eye irritation by mechanical action. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Obtain medical attention if irritation persists.

MINOR SKIN CONTACT
May cause skin irritation due to drying (salt effect). Wash contaminated skin with soap and water. Cover dry or irritated skin with a good quality skin lotion. If irritation persists, seek medical attention.

EXTENSIVE SKIN CONTACT
No additional information.

MINOR INHALATION
Repeated or prolonged inhalation of dust may lead to respiratory irritation. Allow the person to rest in a well ventilated area. Obtain medical attention if irritation persists.

SEVERE INHALATION
No additional information.

SLIGHT INGESTION
Do not induce vomiting. Low toxicity. May cause digestive tract irritation, with accompanying nausea, vomiting and diarrhea. If spontaneous vomiting does occur, lower the head so that the vomit will not reenter the mouth and throat.

If tolerated, give no more than 1 cup of milk or water for adults or 1/2 cup for children to rinse the mouth and throat, dilute the stomach contents, and minimize irritation. Obtain medical attention if irritation persists.

EXTENSIVE INGESTION
No additional information.

Section V. Fire and Explosion Data

THE PRODUCT IS
Non-flammable.

AUTO-IGNITION TEMPERATURE
Not applicable.

FLASH POINT
Not applicable.

FLAMMABILITY LIMITS
Not applicable.

Continued on Next Page
### PRODUCTS OF COMBUSTION
Material will not burn. Undergoes thermal decomposition at elevated temperatures to produce solid cyanuric acid and release toxic and combustible gases (ammonia, carbon dioxide, and oxides of nitrogen).

### FIRE HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES
Not applicable.

### EXPLOSION HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES
May be explosive on contact with halogens such as chlorine. Non-explosive from open flames and sparks, shocks, heat, oxidizing materials, combustible materials, organic materials, metals, acids, alkalis, or moisture.

### FIRE FIGHTING MEDIA AND INSTRUCTIONS
Non-flammable. Material will not burn. Undergoes thermal decomposition at elevated temperatures to release toxic and combustible gases (ammonia, carbon dioxide, and oxides of nitrogen). If fumes or gases are present, fire fighters should wear self-contained breathing apparatus. Use extinguishing media suitable for surrounding materials.

### SPECIAL REMARKS ON FIRE HAZARDS
Flammable/toxic gases will form at elevated temperatures by thermal decomposition. When exposed to heat, ammonia is released.

### SPECIAL REMARKS ON EXPLOSION HAZARDS
May be explosive when mixed with hypochlorites due to the formation of nitrogen trichloride which explodes spontaneously in air.

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### Section VI. Accidental Release Measures

<table>
<thead>
<tr>
<th>Small Spill</th>
<th>Large Spill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use appropriate tools to put the spilled solid in a suitable container for intended use or disposal.</td>
<td>Prevent additional discharge of material, if possible to do so without hazard. Prevent spills from entering sewers, watercourses, wells, etc. Product will promote algae growth which may degrade water quality and taste. Notify downstream water users. Recover and place material in suitable containers for recycle, reuse, or disposal.</td>
</tr>
</tbody>
</table>

### Section VII. Handling and Storage

<table>
<thead>
<tr>
<th>Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit. Keep out of reach of children.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store in a dry, cool and well ventilated area. Keep away from incompatible materials such as reducing agents. Do not blend or store in contact with ammonium nitrate. Dry urea and dry ammonium nitrate will react together to produce a slurry.</td>
</tr>
</tbody>
</table>

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### Section VIII. Exposure Controls/Personal Protection

<table>
<thead>
<tr>
<th>Engineering Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, use ventilation to keep exposure to airborne contaminants below the exposure limit.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>The selection of personal protective equipment varies, depending upon conditions of use. Under well controlled conditions where contact with the substance is limited and exposures are below the occupational exposure limit, normal work clothing may suffice. Where skin and eye contact may occur as a result of brief periodic exposures, wear long sleeved clothing or coveralls and safety glasses with side shields.</td>
</tr>
</tbody>
</table>

| Wear appropriate respirator when ventilation is inadequate. A filtering facepiece dust mask is adequate for most applications. A NIOSH approved full facepiece or half mask dust respirator with N-100 or P-100 filters should be used under conditions where airborne concentrations may exceed occupational exposure limits. For U.S facilities, a respiratory protection program that meets OSHA 29 CFR 1910.134 requirements must be followed whenever workplace conditions warrant a respirator’s use. |

<table>
<thead>
<tr>
<th>Personal Protection in Case of Large Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>No additional recommendations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIHA Workplace Environmental Exposure Limits: 10 mg/m³ TWA for Urea as inhalable dust. OSHA PEL: 15 mg/m³ for Particulates Not Otherwise Regulated.</td>
</tr>
</tbody>
</table>

| Federal, State or Provincial exposure limits may vary by jurisdiction. Consult local authorities for acceptable exposure limits in your area. |

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*Continued on Next Page*
**Section IX. Physical and Chemical Properties**

<table>
<thead>
<tr>
<th>Physical State and Appearance</th>
<th>Granular solid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>60.06</td>
</tr>
<tr>
<td>pH (10% Soln/Water)</td>
<td>8</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>Decomposes at 135°C</td>
</tr>
<tr>
<td>Melting Point</td>
<td>132.7°C (270.9°F)</td>
</tr>
<tr>
<td>Critical Temperature</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Specific Gravity g/cc</td>
<td>0.74 (Water = 1)</td>
</tr>
<tr>
<td>Bulk Density kg/m³ ; lbs/ft³</td>
<td>Loose: 721-770 kg/m³; 45-48 lbs/ft³</td>
</tr>
<tr>
<td></td>
<td>Tapped: 800-809 kg/m³; 49-51 lbs/ft³</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>0.08 kPa</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Color</td>
<td>White.</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless to slightly ammoniacal.</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>17 PPM as ammonia.</td>
</tr>
<tr>
<td>Taste</td>
<td>Saline.</td>
</tr>
<tr>
<td>Volatility</td>
<td>Not available.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Easily soluble in hot water. Soluble in cold water. Partially soluble in methanol, diethyl ether. Insoluble in n-octanol.</td>
</tr>
<tr>
<td>Dispersion Properties</td>
<td>See solubility in water, methanol, diethyl ether.</td>
</tr>
</tbody>
</table>

**Section X. Stability and Reactivity Data**

| Stability                        | The product is stable. |
| Stability Temperature            | Not available. |
| Conditions of Instability        | No additional remark. |
| Incompatibility with Various Substances | Reactive with halogens. Slightly reactive with oxidizing agents, reducing agents, acids, alkalis, moisture. Non-reactive with combustible materials, organic materials, most metals. |
| Corrosivity                      | Corrosive to mild steel. Slightly corrosive to aluminum, zinc, or copper. Non-corrosive to glass, 304 or 316 stainless steel. |
| Special Remarks on Reactivity    | Absorbs moisture from the air. Hygroscopic; keep container tightly closed. |
| Special Remarks on Corrosivity   | Avoid contact with moisture. Slow hydrolysis may produce acids corrosive to metals. Contact your sales representative or a metallurgical specialist to ensure compatibility with system equipment. |

**Section XI. Toxicological Information**

<table>
<thead>
<tr>
<th>Significant Routes of Exposure</th>
<th>Ingestion. Inhalation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxicity to Animals</td>
<td>See Section II. Under controlled feeding conditions, urea is used as a nutritional supplement in cattle and other animals. The toxic dose in cattle given urea for the first time is considered to be 0.45 g/kg or a total of 100-200 g. Mature bulls can digest as much as 400 g a day without ill effect. As little as 50 g may cause adverse effects in cattle not accustomed to it.</td>
</tr>
</tbody>
</table>

Animal Antidote and Emergency Treatment:
In animals, the cold water - acetic acid treatment may work. The adult cow is given 19-38 liters cold water and 3.8 liters of 5% acetic acid (vinegar) orally. This treatment limits absorption of ammonia from the rumen by diluting the rumen contents and slowing the rate of hydrolysis of urea by decreasing rumen pH and temperature. The treatment also promotes urine flow that, if maintained by fluid therapy, may assure recovery from urea toxicity. Gaseous or fluid bloat should be relieved before pumping water into the rumen. Consult your veterinarian immediately.
**Section XII. Ecological Information**

**ECOTOXICITY**
Will slowly release ammonia and degrade to nitrate. Ammonia is a toxic hazard to fish. However, ammonia release is slow making urea much less toxic than ammonium salts. Aquatic toxicity tests indicate 24 Hr exposure at 16,000 mg/L of urea did not kill Creek Chubs. Urea is added in small quantities as a feed supplement for cattle. Urea ingestion may be harmful to mammals and birds at body burdens of several thousands of mg/kg. Ensure that livestock and wildlife do not ingest urea unless adequately mixed with feed rations. Non-persistent. Non-cumulative when applied using normal agricultural practices. The product itself and its products of degradation are not harmful under normal conditions of careful and responsible use. U.S. D.O.T.: This material is NOT listed as a Marine pollutant.

**BOD and COD**
Not available.

**PRODUCTS OF DEGRADATION**
Ammonia, carbon dioxide and water.

**TOXICITY OF THE PRODUCTS OF DEGRADATION**
The product itself and its products of degradation are not harmful under normal conditions of use. Avoid spills or releases to watercourses.

**SPECIAL REMARKS ON THE PRODUCTS OF DEGRADATION**
Urea will promote algae growth which may degrade water quality and taste. Notify downstream water users. Will dissolve and disperse in water. Reclaiming material may not be viable.

**Section XIII. Disposal Considerations**

**WASTE DISPOSAL OR RECYCLING**
Recover and place material in a suitable container for intended use or disposal. Ensure disposal complies with government requirements and local regulations.

**Section XIV. Transport Information**

**DOT / TDG CLASSIFICATION**
Not controlled under DOT (US) or TDG (Canada).

**PIN and Shipping Name**
Not applicable.

**SPECIAL PROVISIONS FOR TRANSPORT**
Not applicable.

**DOT (U.S.A) (Pictograms)**

*Continued on Next Page*
Section XV. Other Regulatory Information and Pictograms

OTHER REGULATIONS

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): This product and all its components are on the Domestic Substances List (DSL) and acceptable for use under the provisions of CEPA.

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

CERCL/SUPERFUND, 40 CFR 117,302: This product contains no Reportable Quantity (RQ) Substances.

This product does not contain Section 313 reportable ingredients.

This product is not considered as a priority pollutant as regulated under the Clean Water Act.

TSCA (Toxic Substance Control Act): This product and all its components are listed on the TSCA Inventory.

CALIFORNIA PROPOSITION 65: This product contains no chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and is not subject to control under WHMIS (Canada), or the Hazcom Standard (US).

OTHER CLASSIFICATIONS

HCS (U.S.A.)
Not controlled under the HCS (United States). Exempt under 1910.1200(b)(6)(x).

DSCL (EEC)
Not controlled under DSCL (Europe).

National Fire Protection Association (U.S.A.)
Hazards presented under acute emergency conditions only:

- Fire Hazard
- Health
- Reactivity
- Specific Hazard

TDG (Pictograms - Canada)

DSCL (Europe) (Pictograms)

ADR (Europe) (Pictograms)

Section XVI. Other Information

REFERENCES

- Domestic Substances List, Canadian Environmental Protection Act.
- 29 CFR Part 1910
- 33 CFR Parts 151, 153, 154, 156
- 40 CFR Parts 1-799
- 46 CFR Part 153
- 49 CFR Parts 1-199
- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances, 2006.
- TOMES® System: Heitland G & Hurlbut KM (Eds) (electronic version); MICROMEDEX, Greenwood Village, Colorado, USA. Available at: http://csi.micromedex.com (2006). The TOMES® System includes MEDITEXT® Medical Management; HAZARDTEXT® Hazard Management; INFOTEXT® Documents; ERG2000 Emergency Response Guidebook Documents; REPROTEXT®: Heitland G & Hurlbut KM (Eds); CHRIS Hazardous Chemical Data:
Urea, Fertilizer Grade, Granular 46-0-0

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**OTHER SPECIAL CONSIDERATIONS**

Not applicable.

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**FOR FURTHER SAFETY, HEALTH, OR ENVIRONMENTAL INFORMATION ON THIS PRODUCT, CONTACT**

<table>
<thead>
<tr>
<th>AGRIUM</th>
<th>Wholesale Environment, Health and Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone (780) 998-6906 or Fax (780) 998-6677</td>
<td></td>
</tr>
</tbody>
</table>

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**NOTICE TO READER**

*The buyer assumes all risk in connection with the use of this material. The buyer assumes all responsibility for ensuring this material is used in a safe manner in compliance with applicable environmental, health and safety laws, policies and guidelines. Agrium Inc. assumes no responsibility or liability for the information supplied on this sheet, including any damages or injury caused thereby. Agrium Inc. does not warrant the fitness of this material for any particular use and assumes no responsibility for injury or damage caused directly or indirectly by or related to the use of the material. The information contained in this sheet is developed from what Agrium Inc. believes to be accurate and reliable sources, and is based on the opinions and facts available on the date of preparation.*