## Section I. Chemical Product and Company Identification

**PRODUCT NAME/TRADE NAME**
Ultra Yield Manganese Oxy-Sulfate 27%

**SYNONYM**
Not available

**CHEMICAL NAME**
Not applicable; a complex mixture of essential plant micronutrients.

**CHEMICAL FAMILY**
An inorganic metal salt.

**CHEMICAL FORMULA**
Not available.

**MATERIAL USES**
Agricultural use: Fertilizer ingredient.

**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

**MSDS NUMBER:** 14173

**REVISION NUMBER:** 4.7

**MSDS prepared by the Environment, Health and Safety Department on:** January 25, 2007

**24 HR EMERGENCY TELEPHONE NUMBER:**
Transportation Emergency: 1 (800) 792-8311
Medical Emergency: 1 (888) 670-8123

## Section II. Hazardous Ingredients

### Exposure Limits (ACGIH)

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS #</th>
<th>TLV-TWA mg/m³</th>
<th>TLV-TWA ppm</th>
<th>STEL ppm</th>
<th>CEIL mg/m³</th>
<th>CEIL ppm</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese oxide</td>
<td>1317-35-7</td>
<td>0.2 as MN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10-30 as Mn</td>
</tr>
<tr>
<td>Manganese sulfate</td>
<td>7785-87-7</td>
<td>0.2 as Mn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7-13 as Mn</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**

Manganese sulfate:
LD50, Acute: 2330 mg/kg Mouse oral, RTECS

Manganese oxide:
LDLo, 375 mg/kg Rat intratracheal, RTECS
Section III. Hazards Identification.

### POTENTIAL ACUTE HEALTH EFFECTS
Acute systemic intoxication rarely occurs as it is poorly absorbed from the lungs or the gut. Systemic poisoning may result from chronic inhalation or chronic ingestion; chronic exposure to low concentrations may lead to the accumulation of toxic concentrations in critical organs. May cause eye and skin irritation.

### POTENTIAL CHRONIC HEALTH EFFECTS
The usual form of chronic manganese poisoning primarily involves the CNS. The brain appears to sustain permanent cellular damage at exposure levels which do not otherwise affect a person. The characteristic pathological lesion in man is destruction of the ganglion cells of the basal ganglia, although symptoms appear before damage becomes discernible. Onset of chronic poisoning is insidious. Early symptoms include languor, sleepiness, tremors and weakness in legs. A stolid mask like appearance of face, slurred speech, emotional disturbances such as anorexia, apathy, and inability to concentrate, uncontrollable laughter, and loss of balance with a spastic gait and a tendency to fall while walking are findings in more advanced cases.

While high levels of manganese may increase anemia by interfering with iron absorption, iron deficiency may increase an individual's susceptibility to manganese. Experimental studies suggest that populations at greatest risk of adverse effects due to manganese exposure are the very young and those with iron deficiency. Effects have been reported in the scientific literature at or below the U.S. OSHA Permissible Exposure Limit of 5 mg/m$^3$ as a ceiling value.

Although permanently disabled unless treated; chronic manganese poisoning is not a fatal disease. Not classifiable as a human or animal carcinogen, teratogen or mutagen.

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

Section IV. First Aid Measures

#### EYE CONTACT
May cause eye irritation due to mechanical action. Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Obtain medical attention if irritation persists.

#### MINOR SKIN CONTACT
May cause skin irritation. Wash contaminated skin with soap and water. Cover irritated skin with a good quality skin cream. If irritation persists, obtain medical attention. Wash contaminated clothing before reusing.

#### EXTENSIVE SKIN CONTACT
No additional information.

#### MINOR INHALATION
Allow to rest in a well ventilated area. Seek medical attention, if not feeling well.

#### SEVERE INHALATION
Over-exposure by inhalation may cause respiratory irritation. Rescuers should put on appropriate protective gear. Remove from area of exposure. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep warm. Get immediate medical attention.

#### SLIGHT INGESTION
Do not induce vomiting. 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.

#### EXTENSIVE INGESTION
No additional information.
**Section V. Fire and Explosion Data**

<table>
<thead>
<tr>
<th>THE PRODUCT IS</th>
<th>Non-flammable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO-IGNITION TEMPERATURE</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>FLASH POINT</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>FLAMMABILITY LIMITS</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>PRODUCTS OF COMBUSTION</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>FIRE HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>EXPLOSION HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES</td>
<td>This substance is non-explosive.</td>
</tr>
<tr>
<td>FIRE FIGHTING MEDIA AND INSTRUCTIONS</td>
<td>Non-flammable.</td>
</tr>
<tr>
<td>SPECIAL REMARKS ON FIRE HAZARDS</td>
<td>No additional remark.</td>
</tr>
<tr>
<td>SPECIAL REMARKS ON EXPLOSION HAZARDS</td>
<td>No additional remark.</td>
</tr>
</tbody>
</table>

**Section VI. Accidental Release Measures**

| SMALL SPILL | Use appropriate tools to put spilled solid in a suitable container for intended use or disposal. Clean up spills immediately, observing precautions in the Protective Equipment section. |
| LARGE SPILL | No additional information. |

**Section VII. Handling and Storage**

| PRECAUTIONS | DO NOT breathe dust or ingest product. After handling, always wash hands thoroughly with soap and water. Keep container tightly closed and dry. Keep out of reach of children. Use only in well ventilated areas. |
| STORAGE | Keep container tightly closed. Contains moisture sensitive material; store in a dry place. Product will absorb moisture and will cake when dried. Keep away from food, drink and animal feed. |

**Section VIII. Exposure Controls/Personal Protection**

| ENGINEERING CONTROLS | Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit. |
| PERSONAL PROTECTION | The selection of personal protective equipment varies, depending upon conditions of use. Under well controlled conditions where no direct contact with the substance exists and exposures are below the occupational exposure limit, normal work clothing may suffice. However, protective clothing and appropriate respiratory protection must be available in the area in the event of emergency. |
| PERSONAL PROTECTION IN CASE OF LARGE RELEASE | Wear a NIOSH approved dust respirator if engineering, work practises or other control measures are not adequate to prevent overexposure. Where skin and eye contact may occur as a result of prolonged or repeated exposures, wear long sleeved clothing, coveralls, leather gloves, and safety glasses with side shields. For U.S. work sites where respiratory protection is required, ensure that a respiratory protection meeting 29 CFR 1910.134 is in place. |
| EXPOSURE LIMITS | |

**Continued on Next Page**
Manganese and Inorganic Compounds:
ACGIH TLV-TWA: 0.2 mg/m³ as Mn
Fed OSHA Permissible Exposure Limit: 5 mg/m³ Ceiling
MI OSHA Permissible Exposure Limit: 1 mg/m³ (fume), 5 mg/m³ Ceiling

Federal, State, and Provincial exposure limits may vary. Consult local officials for acceptable exposure limits in your jurisdiction.

## 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>Not applicable.</td>
</tr>
<tr>
<td>pH (10% SOLN/WATER)</td>
<td>5.0 - 6.0</td>
</tr>
<tr>
<td>BOILING POINT</td>
<td>Decomposes.</td>
</tr>
<tr>
<td>MELTING POINT</td>
<td>700°C (1292°F)</td>
</tr>
<tr>
<td>CRITICAL TEMPERATURE</td>
<td>Not available.</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY g/cc</td>
<td>1.44 particle density (Water = 1)</td>
</tr>
<tr>
<td>BULK DENSITY kg/m³ ; lbs/ft³</td>
<td>1444 kg/m³; 90 lbs/ft³</td>
</tr>
<tr>
<td>VAPOR PRESSURE</td>
<td>Not available.</td>
</tr>
<tr>
<td>VAPOR DENSITY</td>
<td>Not available.</td>
</tr>
<tr>
<td>pH (10% SOLN/WATER)</td>
<td>5.0 - 6.0</td>
</tr>
<tr>
<td>ODOR</td>
<td>Odorless.</td>
</tr>
<tr>
<td>ODOR THRESHOLD</td>
<td>Not available.</td>
</tr>
<tr>
<td>TASTE</td>
<td>Not available.</td>
</tr>
<tr>
<td>VOLATILITY</td>
<td>Not available.</td>
</tr>
<tr>
<td>SOLUBILITY</td>
<td>Soluble in hot or cold water.</td>
</tr>
<tr>
<td>WATER/OIL DIST. COEFF.</td>
<td>Not available.</td>
</tr>
</tbody>
</table>

## Section X. Stability and Reactivity Data

| STABILITY                      | The product is stable. |
| INSTABILITY TEMPERATURE        | Not available.         |
| CONDITIONS OF INSTABILITY      | No additional remark.  |
| INCOMPATABILITY WITH VARIOUS SUBSTANCES | Highly reactive with oxidizing agents. |
| CORROSIVITY                    | No specific information is available in our data base regarding the corrosivity of this product in presence of various materials. Slightly corrosive to copper, iron, and steel. |
| SPECIAL REMARKS ON REACTIVITY  | Avoid strong oxidizing agents |
| SPECIAL REMARKS ON CORROSIVITY | Contact your sales representative or metallurgical specialist to ensure compatibility with your equipment. |

## Section XI. Toxicological Information

| SIGNIFICANT ROUTES OF EXPOSURE | Ingestion. |
| TOXICITY TO ANIMALS            | See Section II. |
| SPECIAL REMARKS ON TOXICITY TO ANIMALS | Low toxicity for humans or animals under normal conditions of use. May be harmful to livestock and wildlife if ingested. Clean up all spilled material, especially where bulk fertilizer loading of equipment occurs to prevent animal exposure. Aquatic/Marine Toxicity: Avoid spills or release to watercourses. Will disperse with current. Release to watercourses may cause effects down stream from the point of release. U.S. D.O.T.: This material NOT listed as a Marine pollutant. |
OTHER EFFECTS ON HUMANS
No additional information is available in our database regarding other toxic effects of this material.

SPECIAL REMARKS ON CHRONIC EFFECTS ON HUMANS
No additional remark.

SPECIAL REMARKS ON OTHER EFFECTS ON HUMANS
No additional remark.

Section XII. Ecological Information

ECOTOXICITY
No additional information.

BOD and COD
Not available.

PRODUCTS OF DEGRADATION
Some metallic oxides. Sulfur oxides (SO₂, SO₃ ...).

TOXICITY OF THE PRODUCTS OF DEGRADATION
The products of degradation are as toxic as the original product.

SPECIAL REMARKS ON THE PRODUCTS OF DEGRADATION
Oxides of sulfur and manganese

Section XIII. Disposal Considerations

WASTE DISPOSAL OR RECYCLING
Recover spilled material and use for intended purpose. Consult your environmental advisor for information on recycling or disposal alternatives.

Section XIV. Transport Information

DOT / TDG CLASSIFICATION
Not controlled under TDG (Canada) or D.O.T. (U.S.A.)

PIN and Shipping Name
Not applicable.

SPECIAL PROVISIONS FOR TRANSPORT
No additional remark.

DOT (U.S.A) (Pictograms)

Section XV. Other Regulatory Information and Pictograms

OTHER REGULATIONS
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): This product is on the Domestic Substances List (DSL), and acceptable for use under the provisions of CEPA.
TSCA (Toxic Substance Control Act): This product is listed on the TSCA Inventory.
CERCLA/SUPERFUND, 40 CFR 117,302: This product contains no Reportable Quantity (RQ) Substances.
This product is not considered as a priority pollutant as regulated under the Clean Water Act.
This product contains the following chemicals subject to the reporting requirements of SARA Section 313 and 40 CFR 372:
   a) Manganese compounds, chemical category N450, 20% of total product weight is Mn.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by the Controlled Products Regulations.

OTHER CLASSIFICATIONS
HCS (U.S.A.)
HCS CLASS: Target organ effects. May be toxic for the nervous system.

DSCL (EEC)
Not available.

Continued on Next Page
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.
- The Fertilizer Institute Product Testing Program Results, March 2003
- Michigan Office of Regulatory Reform R325.51108

OTHER SPECIAL CONSIDERATIONS

HMIS information added in this revision.

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

AGRIUM
Wholesale Environment, Health and Safety
Telephone (780) 998-6906 or Fax (780) 998-6677

Continued on Next Page
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