SECTION 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

<table>
<thead>
<tr>
<th>Product name</th>
<th>WOLVERINE® HERBICIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSDS Number</td>
<td>102000018340</td>
</tr>
<tr>
<td>Product code (UVP)</td>
<td>79290268</td>
</tr>
<tr>
<td>EPA Registration No.</td>
<td>264-1075</td>
</tr>
<tr>
<td>Product Use</td>
<td>Herbicide</td>
</tr>
</tbody>
</table>

Bayer CropScience
2 T.W. Alexander Drive
Research Triangle PK, NC 27709
USA

For MEDICAL, TRANSPORTATION or other EMERGENCY call: 1-800-334-7577 (24 hours/day)
For Product Information call: 1-866-99BAYER (1-866-992-2937)

SECTION 2. HAZARDS IDENTIFICATION

NOTE: Please refer to Section 11 for detailed toxicological information.

**Emergency Overview**
Danger! Harmful if swallowed. Causes irreversible eye damage. Do not get in eyes or on clothing. Harmful if inhaled or absorbed through skin. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Avoid contact with skin.

**Physical State**
liquid, clear

**Odor**
aromatic

**Appearance**
beige to brown

**Exposure routes**
Eye contact, Skin Absorption, Inhalation, Ingestion

**Immediate Effects**

**Eye**
Corrosive - causes irreversible eye damage. Do not get in eyes.

**skin**
Harmful if absorbed through skin. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Avoid contact with skin. May cause skin irritation.

**Ingestion**
Harmful if swallowed. Do not take internally.

**Inhalation**
Harmful if inhaled. Do not breathe vapours or spray mist.
Chronic or Delayed Long-Term This product or its components may have target organ effects. This product contains ingredients that are considered to be probable or suspected human carcinogens (see Section 11 - Chronic). This product is not listed by NTP, IARC or regulated as a carcinogen by OSHA.

Medical Conditions Aggravated by Exposure Individuals with allergic history or pre-existing dermatitis should use extra care in handling this product.

Potential Environmental Effect Toxic to fish and aquatic invertebrates. This product may cause adverse effects on non-target plants.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Component Name</th>
<th>CAS-No.</th>
<th>Average % by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromoxynil octanoate</td>
<td>1689-99-2</td>
<td>4.95</td>
</tr>
<tr>
<td>Bromoxynil heptanoate</td>
<td>56634-95-8</td>
<td>4.79</td>
</tr>
<tr>
<td>Fenoxaprop-P-ethyl</td>
<td>71283-80-2</td>
<td>4.47</td>
</tr>
<tr>
<td>Pyrasulfotole</td>
<td>365400-11-9</td>
<td>1.94</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>4.34</td>
</tr>
<tr>
<td>Solvent Naphtha (petroleum), heavy aromatic</td>
<td>64742-94-5</td>
<td>32.23</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

General When possible, have the product container or label with you when calling a poison control center or doctor or going for treatment.

Eye Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a physician or poison control center immediately.

skin Take off contaminated clothing and shoes immediately. Wash off immediately with plenty of water for at least 15 minutes. Call a physician or poison control center immediately.

Ingestion Call a physician or poison control center immediately. Rinse out mouth and give water in small sips to drink. DO NOT induce vomiting unless directed to do so by a physician or poison control center. Never give anything by mouth to an unconscious person. Do not leave victim unattended.

Inhalation Move to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a physician or poison control center immediately.

Notes to physician Hazards Contains hydrocarbon solvents. May pose an aspiration pneumonia hazard.

Treatment Appropriate supportive and symptomatic treatment as indicated by the patient's condition.
condition is recommended. There is no specific antidote.

SECTION 5. FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point</td>
<td>104.4 °C / 219.9 °F</td>
</tr>
<tr>
<td>Test type: closed cup</td>
<td></td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>Lower Flammability Limit</td>
<td>no data available</td>
</tr>
<tr>
<td>Upper Flammability Limit</td>
<td>no data available</td>
</tr>
<tr>
<td>Explosiveness</td>
<td>no data available</td>
</tr>
<tr>
<td>Suitable extinguishing media</td>
<td>Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.</td>
</tr>
<tr>
<td>Fire Fighting Instructions</td>
<td>Avoid contact with spilled product or contaminated surfaces. Evacuate personnel to safe areas. Keep out of smoke. Fight fire from upwind position. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Firefighters should wear NIOSH approved self-contained breathing apparatus and full protective clothing.</td>
</tr>
</tbody>
</table>

Dust explosion class Not applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

<table>
<thead>
<tr>
<th>Personal precautions</th>
<th>Keep unauthorized people away. Isolate hazard area. Avoid contact with spilled product or contaminated surfaces. Use personal protective equipment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods for cleaning up</td>
<td>Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Clean contaminated floors and objects thoroughly, observing environmental regulations. Decontaminate tools and equipment following cleanup.</td>
</tr>
<tr>
<td>Additional advice</td>
<td>Do not allow to enter soil, waterways or waste water canal. Do not allow product to contact non-target plants.</td>
</tr>
</tbody>
</table>

SECTION 7. HANDLING AND STORAGE

| Handling procedures | Avoid contact with skin, eyes and clothing. Handle and open container in a manner as to prevent spillage. Maintain exposure levels below the exposure limit through the use of general and local exhaust ventilation. |
Keep away from heat and sources of ignition.

**Storing Procedures**

Store in original container. Keep containers tightly closed in a dry, cool and well-ventilated place. Store in a cool, dry place and in such a manner as to prevent cross contamination with other crop protection products, fertilizers, food, and feed. Protect from freezing.

**Work/Hygienic Procedures**

Handle in accordance with good industrial hygiene and safety practice. Wash hands thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, using the toilet or applying cosmetics.

Remove soiled clothing immediately and clean thoroughly before using again. Wash thoroughly and put on clean clothing.

---

**SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION**

**General Protection**

Follow all label instructions. Train employees in safe use of the product.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and warm/tepid water. Keep and wash PPE separately from other laundry.

**Eye/Face Protection**

Chemical resistant goggles must be worn.

**Hand protection**

Chemical resistant nitrile rubber gloves

**Body Protection**

Wear long-sleeved shirt and long pants and shoes plus socks.

**Respiratory protection**

When respirators are required, select NIOSH approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industry recommendations.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>OES BCS*</th>
<th>TWA</th>
<th>TWA Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromoxynil octanoate</td>
<td>1689-99-2</td>
<td>OES BCS*</td>
<td>TWA</td>
<td>0.31 mg/m3</td>
</tr>
<tr>
<td>Fenoxaprop-P-ethyl</td>
<td>71283-80-2</td>
<td>OES BCS*</td>
<td>TWA</td>
<td>2.6 mg/m3</td>
</tr>
<tr>
<td>Pyrasulfotole</td>
<td>365400-11-9</td>
<td>OES BCS*</td>
<td>TWA</td>
<td>0.3 mg/m3</td>
</tr>
<tr>
<td>Solvent Naphtha (petroleum), heavy aromatic</td>
<td>64742-94-5</td>
<td>TX ESL</td>
<td>ST ESL</td>
<td>460 ppm</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>TX ESL</td>
<td>AN ESL</td>
<td>46 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACGIH</td>
<td>TWA</td>
<td>10 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACGIH</td>
<td>STEL</td>
<td>15 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIOSH</td>
<td>REL</td>
<td>10 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIOSH</td>
<td>STEL</td>
<td>15 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OSHA Z1</td>
<td>PEL</td>
<td>10 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OSHA Z1A</td>
<td>TWA</td>
<td>10 ppm</td>
</tr>
</tbody>
</table>
OSHA Z1A STEL 15 ppm
US CA OEL TWA PEL 10 ppm
US CA OEL STEL 15 ppm
TX ESL ST ESL 440 ug/m3
TX ESL AN ESL 50 ug/m3
OES BCS* TWA 10 ppm
TX ESL ST ESL 90 ppb
TX ESL AN ESL 10 ppb
TN OEL TWA 10 ppm
TN OEL STEL 15 ppm
ACGIH NIC TWA 2 ppm

*OES BCS: Internal Bayer CropScience "Occupational Exposure Standard"

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>beige to brown</td>
</tr>
<tr>
<td>Physical State</td>
<td>liquid, clear</td>
</tr>
<tr>
<td>Odor</td>
<td>aromatic</td>
</tr>
<tr>
<td>pH</td>
<td>6.3 - 6.5 (10 %)</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>no data available</td>
</tr>
<tr>
<td>Vapor Density (Air = 1)</td>
<td>no data available</td>
</tr>
<tr>
<td>Density</td>
<td>1.03 g/cm³ at 20 °C</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>no data available</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>no data available</td>
</tr>
<tr>
<td>Melting / Freezing Point</td>
<td>no data available</td>
</tr>
<tr>
<td>Water solubility</td>
<td>emulsifiable</td>
</tr>
<tr>
<td>Minimum Ignition Energy</td>
<td>no data available</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>no data available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>no data available</td>
</tr>
</tbody>
</table>

**SECTION 10. STABILITY AND REACTIVITY**
Conditions to avoid freezing
Heat, flames and sparks.

Incompatibility no data available

Hazardous no data available

Decomposition Products no data available

Hazardous reactions No hazardous reactions known.

Chemical Stability Stable under recommended storage conditions.

SECTION 11. TOXICOLOGICAL INFORMATION

Only acute toxicity studies have been performed on the formulated product. The non-acute information pertains to the technical-grade active ingredients.

Acute oral toxicity female rat: LD50: 1,105 mg/kg

Acute dermal toxicity rat: LD50: > 2,000 mg/kg

Acute inhalation toxicity rat: LC50: > 2.02 mg/l
Exposure time: 4 h
Determined in the form of liquid aerosol.
Highest concentration tested
Deaths: 1/5 males; 0/5 females

rat: LC50: > 8.08 mg/l
Exposure time: 1 h
Determined in the form of liquid aerosol.
Extrapolated from the 4 hr LC50.

Skin irritation rabbit: Moderate skin irritation.

Eye irritation rabbit: Corrosive - causes irreversible eye damage.

Sensitisation guinea pig: Sensitising

Chronic toxicity Bromoxynil caused clinical signs of toxicity and/or liver effects in chronic studies in rats and dogs.

Pyrasulfotole caused liver, kidney, thyroid and/or eye effects in chronic dietary studies in rats and dogs.

Fenoxaprop-p-ethyl caused liver and/or adrenal effects in long-term dietary studies in rats, mice and dogs.

Assessment Carcinogenicity Bromoxynil has been classified by EPA as a Group C, possible human carcinogen, based on an increased
incidence of liver tumors observed in mice.

Pyrasulfotole caused secondary tumors in rats (corneal) and mice (urinary bladder) at the highest dose tested in oncogenicity studies. Based on these studies, pyrasulfotole did not demonstrate any oncogenic potential relevant for human risk assessment.

Fenoxaprop-p-ethyl caused liver and adrenal gland tumors at the highest dose tested in mice. However, there was no evidence of carcinogenicity in a combined chronic/carcinogenicity study in rats treated with fenoxaprop-p-ethyl.

<table>
<thead>
<tr>
<th>ACGIH</th>
<th>Naphthalene</th>
<th>91-20-3</th>
<th>Group A4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTP</td>
<td>Naphthalene</td>
<td>91-20-3</td>
<td></td>
</tr>
<tr>
<td>IARC</td>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>Overall evaluation: 2B</td>
</tr>
<tr>
<td>OSHA</td>
<td>None.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reproductive toxicity

Bromoxynil did not cause reproductive toxicity in multi-generation studies in rats via the oral and dermal route of exposure.

Pyrasulfotole was not a reproductive toxicant in a two-generation study in rats.

Fenoxaprop-p-ethyl was not a reproductive toxicant in a two-generation study in rats.

DEVELOPMENTAL TOXICITY

Bromoxynil is considered a developmental toxicant based on the results of developmental toxicity studies in rats and rabbits.

Pyrasulfotole is not a primary developmental toxicant, however, secondary effects were observed in rats and rabbits.

Fenoxaprop-p-ethyl is not a primary developmental toxicant in rats and rabbits. Developmental effects were observed in both species but were considered secondary to maternal toxicity.

Assessment neurotoxicity

Bromoxynil did not demonstrate the potential to cause neurotoxicity in standard toxicity studies using laboratory animals.

Pyrasulfotole was not a neurotoxicant in acute, subschronic and developmental neurotoxicity screening studies in rats.

Fenoxaprop-p-ethyl neurotoxicity studies are not required at this time.

Mutagenicity

Bromoxynil was not mutagenic or genotoxic based on the collective data from a battery of in vitro and in vivo tests.
Pyrasulfotole was not genotoxic in a battery of in vitro and in vivo tests.

Fenoxaprop-p-ethyl was not mutagenic or genotoxic in a battery of in vitro and in vivo tests.

### SECTION 12. ECOLOGICAL INFORMATION

#### Toxicity to fish

<table>
<thead>
<tr>
<th>Species</th>
<th>EC$_{50}$</th>
<th>Exposure time</th>
<th>Value related to</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Oncorhynchus mykiss</em> (rainbow trout)</td>
<td>0.39 mg/l</td>
<td>96 h</td>
<td>active ingredient fenoxaprop-P-ethyl</td>
</tr>
<tr>
<td><em>Lepomis macrochirus</em> (Bluegill sunfish)</td>
<td>0.029 mg/l</td>
<td>96 h</td>
<td>active ingredient bromoxynil octanoate</td>
</tr>
<tr>
<td><em>Lepomis macrochirus</em> (Bluegill sunfish)</td>
<td>0.029 mg/l</td>
<td>96 h</td>
<td>active ingredient bromoxynil heptanoate</td>
</tr>
</tbody>
</table>

#### Toxicity to aquatic plants

<table>
<thead>
<tr>
<th>Species</th>
<th>EC$_{50}$</th>
<th>Exposure time</th>
<th>Value related to</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pseudokirchneriella subcapitata</em></td>
<td>0.54 mg/l</td>
<td>72 h</td>
<td>active ingredient fenoxaprop-P-ethyl</td>
</tr>
<tr>
<td><em>Navicula pelliculosa</em></td>
<td>0.043 mg/l</td>
<td>120 h</td>
<td>active ingredient bromoxynil octanoate</td>
</tr>
<tr>
<td><em>Selenastrum capricornutum</em></td>
<td>0.083 mg/l</td>
<td>120 h</td>
<td>active ingredient bromoxynil heptanoate</td>
</tr>
</tbody>
</table>

#### Acute Toxicity to Aquatic Invertebrates

<table>
<thead>
<tr>
<th>Species</th>
<th>EC$_{50}$</th>
<th>Exposure time</th>
<th>Value related to</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Water flea (Daphnia magna)</em></td>
<td>&gt; 1,058 mg/l</td>
<td>48 h</td>
<td>active ingredient fenoxaprop-P-ethyl</td>
</tr>
<tr>
<td><em>Water flea (Daphnia magna)</em></td>
<td>0.046 mg/l</td>
<td>48 h</td>
<td>active ingredient bromoxynil octanoate</td>
</tr>
<tr>
<td><em>Water flea (Daphnia magna)</em></td>
<td>0.031 mg/l</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exposure time: 48 h
The value mentioned relates to the active ingredient bromoxynil heptanoate.

Environmental precautions
Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate surface or ground water by cleaning equipment or disposal of wastes, including equipment wash water.

SECTION 13. DISPOSAL CONSIDERATIONS

General Disposal Guidance
Do not contaminate water, food, or feed by disposal. Dispose in accordance with all local, state/provincial and federal regulations. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. Follow advice on product label and/or leaflet.

Container Disposal
Triple rinse containers. Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill or incineration, or if allowed by State and Local authorities, by burning. If burned, stay out of smoke. Follow advice on product label and/or leaflet.

RCRA Information
Characterization and proper disposal of this material as a special or hazardous waste is dependent upon Federal, State and local laws and are the user's responsibility. RCRA classification may apply.

SECTION 14. TRANSPORT INFORMATION

49CFR
UN-Number: 3082
Class: 9
Packaging group: III
Marine pollutant: Marine pollutant
Description of the goods: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (FENOXAPROP-P-ETHYL, NAPHTHALENE)
RQ: Reportable Quantity is reached with 2,304 lb of product.

IMDG
UN-Number: 3082
Class: 9
Packaging group: III
Marine pollutant: YES
Description of the goods: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (FENOXAPROP-P-ETHYL SOLUTION)
IATA
UN-Number  3082
Class  9
Packaging group  III
Environm. Hazardous Mark  YES
Description of the goods  ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (FENOXAPROP-P-ETHYL SOLUTION)

This transportation information is not intended to convey all specific regulatory information relating to this product. It does not address regulatory variations due to package size or special transportation requirements.

### SECTION 15. REGULATORY INFORMATION

**EPA Registration No.**  264-1075

**US Federal Regulations**

**TSCA list**

- Bromoxynil octanoate  1689-99-2
- Naphthalene  91-20-3
- Solvent Naphtha (petroleum), heavy aromatic  64742-94-5

**US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)**

- Naphthalene  91-20-3

**SARA Title III - Section 302 - Notification and Information**

None.

**SARA Title III - Section 313 - Toxic Chemical Release Reporting**

- Bromoxynil octanoate  1689-99-2  1.0%
- Naphthalene  91-20-3  0.1%

**US States Regulatory Reporting**

**CA Prop65**

This product contains a chemical known to the State of California to cause cancer.

- Naphthalene  91-20-3

This product does not contain any substances known to the State of California to cause reproductive harm.

**US State Right-To-Know Ingredients**

- Bromoxynil octanoate  1689-99-2  NJ
- Naphthalene  91-20-3  CA, CT, IL, MN, NJ, RI

**Canadian Regulations**

**Canadian Domestic Substance List**

- Naphthalene  91-20-3
- Solvent Naphtha (petroleum), heavy aromatic  64742-94-5

**Environmental**

**CERCLA**

- Naphthalene  91-20-3  100 lbs

**Clean Water Section 307 Priority Pollutants**
Safe Drinking Water Act Maximum Contaminant Levels
None.

International Regulations
European Inventory of Existing Commercial Substances (EINECS)
- Bromoxynil octanoate: 1689-99-2
- Bromoxynil heptanoate: 56634-95-8
- Naphthalene: 91-20-3
- Solvent Naphtha (petroleum), heavy aromatic: 64742-94-5

SECTION 16. OTHER INFORMATION

NFPA 704 (National Fire Protection Association):
- Health: 3
- Flammability: 1
- Instability: 0
- Others: none

- Health: 3
- Flammability: 1
- Physical Hazard: 0
- PPE: -

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard

Reason for Revision: Reviewed and updated for general editorial purposes. Section 3: Composition / Information on Ingredients. Section 9: Physical and Chemical Properties. Section 14: Transport Information. Section 16: Other Information.

Revision Date: 04/05/2012

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