SECTION 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: PUMA® 1EC HERBICIDE
MSDS Number: 102000000828
EPA Registration No.: 264-666

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
Warning! Causes substantial but temporary eye injury. Harmful if swallowed. Do not get in eyes, on skin, or on clothing. Wash thoroughly with soap and water after handling.

Physical State
liquid

Odor
aromatic

Appearance
yellowish

Exposure routes
Eye contact, Skin contact, Inhalation, Ingestion

Immediate Effects
Eye
Severe eye irritation Do not get in eyes.

Skin
Severe skin irritation Do not get on skin or clothing.

Ingestion
Harmful if swallowed. Do not take internally.

Inhalation
Do not breathe vapours or spray mist.

Chronic or Delayed
Long-Term
This product or its components may have target organ effects. This product is not listed by NTP, IARC or regulated as a carcinogen by OSHA.

Potential Environmental Effect
Toxic to fish and aquatic organisms.
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>Fenoxaprop-P-ethyl</td>
<td>71283-80-2</td>
<td>11.53</td>
</tr>
<tr>
<td>Mefenpyr-diethyl</td>
<td>135590-91-9</td>
<td>3.39</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>7.37</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**

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Hazards</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Irritation</td>
<td>Risk of pneumonia.</td>
<td>There is no specific antidote. Appropriate supportive and symptomatic treatment as indicated by the patient's condition is recommended.</td>
</tr>
</tbody>
</table>

Systemic:
Gastrointestinal disturbance

SECTION 5. FIRE FIGHTING MEASURES

**Flash point**
108 °C / 226 °F

**Explosiveness**
Not explosive
Fire and Explosion Hazards

In the event of fire the following may be released:
- Carbon monoxide (CO)
- Nitrogen oxides (NOx)
- Sulphur oxides
- Hydrogen chloride (HCl)

Suitable extinguishing media

Water spray, Alcohol-resistant foam, Carbon dioxide (CO2), Dry powder

Fire Fighting Instructions

Evacuate personnel to safe areas. Avoid contact with spilled product or contaminated surfaces. 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.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Keep unauthorized people away. Evacuate and isolate spill area. Avoid contact with spilled product or contaminated surfaces. Use personal protective equipment. Remove all sources of ignition.

Methods for cleaning up

Dike area to prevent runoff. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Collect and transfer the product into a properly labelled and tightly closed container. Contaminated soil may have to be removed and disposed. Clean contaminated floors and objects thoroughly, observing environmental regulations.

Additional advice

Information regarding safe handling, see section 7. Information regarding personal protective equipment, see section 8. Information regarding waste disposal, see section 13.

Do not allow to enter soil, waterways or waste water canal. Do not allow product to contact vegetation.

SECTION 7. HANDLING AND STORAGE

Handling procedures

Handle and open container in a manner as to prevent spillage. Use only in area provided with appropriate exhaust ventilation. 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 away from direct sunlight. Keep containers tightly closed in a dry, cool and well-ventilated place.
Protect from freezing.

Keep away from food, drink and animal feedingstuffs.

**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.

**Min/Max Storage Temperatures**

Recommended minimum transport/storage temperature: 0 °C / 32 °F

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## 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

Wear goggles conforming to EN166 (Field of Use 5 or equivalent).

### 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>ACGIH</th>
<th>NIOSH</th>
<th>OSHA Z1</th>
<th>OSHA Z1A</th>
<th>US CA OEL</th>
<th>TX ESL</th>
<th>TX ESL</th>
<th>Naphthalene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenoxaprop-P-ethyl</td>
<td>71283-80-2</td>
<td>TWA</td>
<td>TWA</td>
<td>REL</td>
<td>PEL</td>
<td>TWA</td>
<td>TWA PEL</td>
<td>ST ESL</td>
<td>AN ESL</td>
<td>91-20-3</td>
</tr>
<tr>
<td>2-Methylpropan-1-ol</td>
<td>78-83-1</td>
<td></td>
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</tbody>
</table>

**Notes:**
- OES: Occupational Exposure Standards
- BCS: Biological Exposure Criteria
- TWA: Time Weighted Average
- REL: Recommended Exposure Limit
- STEL: Short Term Exposure Limit
- ACGIH: American Conference of Governmental Industrial Hygienists
- NIOSH: National Institute for Occupational Safety and Health
- OSHA: Occupational Safety and Health Administration
- TX ESL: Texas Exposure Standard Limit
- US CA OEL: California Occupational Exposure Limit
- AN ESL: Arizona Exposure Standard Limit
- TX ESL ST: Texas Standard Exposure Limit
- TX ESL AN: Texas Arizona Exposure Standard Limit

**Exposure Limits:**

- **Fenoxaprop-P-ethyl:**
  - OES BCS*: TWA 2.6 mg/m³
  - ACGIH: TWA 50 ppm
  - NIOSH: REL 50 ppm
  - OSHA Z1: PEL 100 ppm
  - OSHA Z1A: TWA 50 ppm
  - US CA OEL: TWA PEL 50 ppm
  - TX ESL: STEL 500 ppm
  - TX ESL: AN ESL 50 ppm

- **2-Methylpropan-1-ol:**
  - 78-83-1: TWA 50 ppm

- **Naphthalene:**
  - 91-20-3: ACGIH: TWA 10 ppm
  - ACGIH: STEL 15 ppm
  - NIOSH: REL 10 ppm
  - NIOSH: STEL 15 ppm
  - OSHA Z1: PEL 10 ppm
  - OSHA Z1A: TWA 10 ppm
SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: yellowish
Physical State: liquid
Odor: aromatic
pH: 6.7 (1 %) emulsion in water
Density: 1.03 g/cm³ at 20 °C
Water solubility: emulsifiable
Decomposition temperature: no data available

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid: freezing, Heat, flames and sparks.
Incompatibility: no data available
Hazardous 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 in the formulated product. The non-acute information pertains to the technical-grade active ingredient, fenoxaprop-p ethyl, as well as the herbicide safener, mefenpyr-diethyl.
Acute oral toxicity  
rat: LD50: 3,254 mg/kg  
Test conducted with a similar formulation.

Acute dermal toxicity  
rat: LD50: > 5,000 mg/kg  
Test conducted with a similar formulation.

Acute inhalation toxicity  
rat: LC50: > 5.4 mg/l  
Exposure time: 4 h  
Determined in the form of liquid aerosol.

rat: LC50: > 21.6 mg/l  
Exposure time: 1 h  
Determined in the form of liquid aerosol.  
Extrapolated from the 4 hr LC50.

Skin irritation  
rabbit: Severe skin irritation

Eye irritation  
rabbit: Severe eye irritation

Sensitisation  
guinea pig: Non-sensitizing. Test conducted with a similar formulation.

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

Mefenpyr-diethyl affected the liver and/or red blood cells in chronic dietary studies in rats and dogs.

Assessment Carcinogenicity  
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.

Mefenpyr-diethyl was not carcinogenic in lifetime feeding studies in rats and mice.

ACGIH  
Naphthalene  
91-20-3  
Group A4

NTP  
Naphthalene  
91-20-3

IARC  
Naphthalene  
91-20-3  
Overall evaluation: 2B

OSHA  
None.

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

Mefenpyr-diethyl was not a reproductive toxicant at non-maternally toxic dose levels in a two-generation study in rats.
DEVELOPMENTAL TOXICITY
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.

Mefenpyr-diethyl was not a primary developmental toxicant in rats and rabbits. Developmental effects were observed in rabbits but were considered secondary to maternal toxicity.

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

Mefenpyr-diethyl neurotoxicity studies are not required at this time.

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

Mefenpyr-diethyl was not mutagenic or genotoxic in a battery of in vitro and in vivo tests.

<table>
<thead>
<tr>
<th>SECTION 12. ECOLOGICAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toxicity to fish</strong></td>
</tr>
<tr>
<td>Rainbow trout (Oncorhynchus mykiss)</td>
</tr>
<tr>
<td>LC50: 1.9 mg/l</td>
</tr>
<tr>
<td>Exposure time: 96 h</td>
</tr>
<tr>
<td>Test conducted with a similar formulation.</td>
</tr>
<tr>
<td>Lepomis macrochirus (Bluegill sunfish)</td>
</tr>
<tr>
<td>LC50: 1.9 mg/l</td>
</tr>
<tr>
<td>Exposure time: 96 h</td>
</tr>
</tbody>
</table>

| **Toxicity to Aquatic Plants**      |
| Pseudokirchneriella subcapitata     |
| EC50: 1.47 mg/l                     |
| Exposure time: 72 h                 |
| Test conducted with a similar formulation. |

| **Acute Toxicity to Aquatic Invertebrates** |
| Water flea (Daphnia magna)              |
| EC50: 4.2 mg/l                          |
| Exposure time: 48 h                     |
| Test conducted with a similar formulation. |

| **Environmental precautions**         |
| Drift or runoff from treated areas may adversely affect non-target plants. 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
Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. Dispose in accordance with all local, state/provincial and federal regulations. Follow advice on product label and/or leaflet.

Container Disposal
Triple rinse containers. Puncture container to avoid re-use. Do not re-use empty containers. Follow advice on product label and/or leaflet.

SECTION 14. TRANSPORT INFORMATION

DOT / TDG CLASSIFICATION:
NON-BULK::
Not regulated for road or rail

BULK: (Packages larger than 119 gallons)
DOT
RQ, UN3082, Environmentally Hazardous Substances, Liquid, N.O.S. (Naphthalene), 9, PG III
RQ for Naphthalene is 100 LBS and is reached at 158 gallons of product

TDG:
Not regulated for road or rail

FREIGHT CLASSIFICATION:
Compounds Tree or Weedkilling, N.O.I., other than poison; Having a density of greater than 20 LBS. per cubic foot.

SECTION 15. REGULATORY INFORMATION

EPA Registration No. 264-666

US Federal Regulations
TSCA list
Naphthalene 91-20-3
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
Naphthalene 91-20-3

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
US State Right-To-Know Ingredients
Naphthalene 91-20-3 CA, CT, IL, MN, NJ, PA, RI
None.

Canadian Regulations
Canadian Domestic Substance List
Naphthalene

Environmental
CERCLA
Naphthalene 91-20-3 100 lbs

Clean Water Section 307 Priority Pollutants
None.

Safe Drinking Water Act Maximum Contaminant Levels
None.

International Regulations
European Inventory of Existing Commercial Substances (EINECS)
Naphthalene 91-20-3

SECTION 16. OTHER INFORMATION

NFPA 704 (National Fire Protection Association):
Health - 2 Flammability - 1 Reactivity - 0 Others - none
0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard

Reason to Revise: Updated for general editorial purposes.

Revision Date: 02/04/2010

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