Dow AgroSciences LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name
STARANE* Flex Herbicide

COMPANY IDENTIFICATION
Dow AgroSciences LLC
A Subsidiary of The Dow Chemical Company
9330 Zionsville Road
Indianapolis, IN  46268-1189
USA

Customer Information Number: 800-992-5994

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 800-992-5994
Local Emergency Contact: 800-992-5994

2. Hazards Identification

Emergency Overview
Color: White
Physical State: Liquid.
Odor: Gasoline-like

Hazard of product:
WARNING! Causes eye irritation. May cause allergic skin reaction.

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects
Eye Contact: May cause moderate eye irritation which may be slow to heal. May cause slight corneal injury.
Skin Contact: Brief contact may cause slight skin irritation with local redness. May cause drying and flaking of the skin. Effects may be slow to heal.
Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.
Skin Sensitization: Has caused allergic skin reactions when tested in mice.

Inhalation: Prolonged exposure is not expected to cause adverse effects.

Ingestion: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

Aspiration hazard: Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia.

Effects of Repeated Exposure: For the active ingredient(s): Florasulam. In animals, effects have been reported on the following organs: Kidney. Liver. For the solvent(s): In animals, effects have been reported on the following organs: Liver. Kidney. Respiratory tract. Blood. Cataracts were observed in rats exposed to cumene vapors.

Cancer Information: For the minor component(s): Cumene. Has caused cancer in laboratory animals. However, the relevance of this to humans is unknown.

Birth Defects/Developmental Effects: For the active ingredient(s): Fluroxypyr 1-methylheptyl ester. Has been toxic to the fetus in laboratory animals at doses toxic to the mother. For the major component(s): Solvent naphtha (petroleum), light arom. Has caused birth defects in lab animals only at doses producing severe toxicity in the mother.

Reproductive Effects: For the solvent(s): For the component(s) tested: In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

### Component Information

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florasulam</td>
<td>145701-23-1</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Fluroxypyr 1-methylheptyl ester</td>
<td>81406-37-3</td>
<td>14.45 %</td>
</tr>
<tr>
<td>Solvent naphtha (petroleum), light aromatic</td>
<td>64742-95-6</td>
<td>31.0 %</td>
</tr>
<tr>
<td>1,2,4-Trimethylbenzene</td>
<td>95-63-6</td>
<td>9.3 %</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>57-55-6</td>
<td>3.4 %</td>
</tr>
<tr>
<td>1,3,5-Trimethylbenzene</td>
<td>108-67-8</td>
<td>2.5 %</td>
</tr>
<tr>
<td>Cumene</td>
<td>98-82-8</td>
<td>1.2 %</td>
</tr>
<tr>
<td>Balance</td>
<td></td>
<td>37.65 %</td>
</tr>
</tbody>
</table>

### First-aid measures

**Eye Contact:** Hold eyes 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 eyes. Call a poison control center or doctor for treatment advice. Eye wash fountain should be located in immediate work area.

**Skin Contact:** Take off contaminated clothing. Wash skin with soap and plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. Wash clothing before reuse. Shoes and other leather items which cannot be decontaminated should be disposed of properly.

**Inhalation:** Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice.

**Ingestion:** Immediately call a poison control center or doctor. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give any liquid to the person. Do not give anything by mouth to an unconscious person.

**Notes to Physician:** If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. The decision of whether to induce vomiting or not should be made by a physician. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

**Medical Conditions Aggravated by Exposure:** Skin contact may aggravate preexisting dermatitis.

**Emergency Personnel Protection:** First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.
5. Fire Fighting Measures

Extinguishing Media: To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Eliminate ignition sources. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn. May produce flash fire. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. If exposed to fire from another source and water is evaporated, exposure to high temperatures may cause toxic fumes. Dense smoke is produced when product burns.

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen fluoride. Hydrogen chloride. Carbon monoxide. Carbon dioxide.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Pump with explosion-proof equipment. If available, use foam to smother or suppress. Contain spilled material if possible. Small spills: Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact Dow AgroSciences for clean-up assistance.

Personal Precautions: Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling

General Handling: No smoking, open flames or sources of ignition in handling and storage area. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Electrically ground and bond all equipment. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Keep out of reach of children. Do not swallow. Avoid breathing vapor or mist. Avoid contact with eyes, skin, and clothing. Use with adequate ventilation. Wash thoroughly after handling. This product is a poor conductor of electricity and can become electrostatically charged, even in bonded or grounded equipment. If sufficient charge is accumulated, ignition of flammable mixtures can occur. Handling operations that can promote accumulation of static charges include but are not limited to mixing, filtering, pumping at high flow rates, splash filling.
creating mists or sprays, tank and container filling, tank cleaning, sampling, gauging, switch loading, vacuum truck operations.

**Storage**
Minimize sources of ignition, such as static build-up, heat, spark or flame. Store in a dry place. Store in original container. Keep container tightly closed. Do not store near food, foodstuffs, drugs or potable water supplies.

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### 8. Exposure Controls / Personal Protection

#### Exposure Limits

<table>
<thead>
<tr>
<th>Component</th>
<th>List</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluroxypyr 1-methylheptyl ester</td>
<td>Dow IHG</td>
<td>TWA</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>1,2,4-Trimethylbenzene</td>
<td>ACGIH</td>
<td>TWA</td>
<td>25 ppm</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>WEEL</td>
<td>TWA</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aerosol.</td>
<td></td>
</tr>
<tr>
<td>1,3,5-Trimethylbenzene</td>
<td>ACGIH</td>
<td>TWA</td>
<td>25 ppm</td>
</tr>
<tr>
<td>Cumene</td>
<td>ACGIH</td>
<td>TWA</td>
<td>50 ppm</td>
</tr>
<tr>
<td></td>
<td>OSHA Table Z-1</td>
<td>PEL</td>
<td>245 mg/m³ 50 ppm</td>
</tr>
</tbody>
</table>

A "skin" notation following the inhalation exposure guideline refers to the potential for dermal absorption of the material including mucous membranes and the eyes either by contact with vapors or by direct skin contact.

It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimize dermal exposures should be considered.

**RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.**

#### Personal Protection

**Eye/Face Protection:** Use chemical goggles.

**Skin Protection:** Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

**Hand protection:** Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Polyethylene. Ethyl vinyl alcohol laminate (“EVAL”). Styrene/butadiene rubber. Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber (“latex”). Nitrile/butadiene rubber (“nitrile” or “NBR”). Polyvinyl chloride (“PVC” or “vinyl”). Chlorinated polyethylene. Neoprene. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

**Respiratory Protection:** Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

**Ingestion:** Avoid ingestion of even very small amounts; do not consume or store food or tobacco in the work area; wash hands and face before smoking or eating.
Engineering Controls
Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.

9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid.</td>
</tr>
<tr>
<td>Color</td>
<td>White</td>
</tr>
<tr>
<td>Odor</td>
<td>Gasoline-like</td>
</tr>
<tr>
<td>Flash Point - Closed Cup</td>
<td>57.8 °C (136.0 °F) Closed Cup</td>
</tr>
<tr>
<td>Flammable Limits In Air</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>No test data available</td>
</tr>
<tr>
<td>Upper</td>
<td>No test data available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>No test data available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>No test data available</td>
</tr>
<tr>
<td>Boiling Point (760 mmHg)</td>
<td>No test data available</td>
</tr>
<tr>
<td>Vapor Density (air = 1)</td>
<td>No test data available</td>
</tr>
<tr>
<td>Specific Gravity (H2O = 1)</td>
<td>No test data available</td>
</tr>
<tr>
<td>Liquid Density</td>
<td>0.9861 g/cm³ @ 20 °C OECD 109</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>No test data available</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Solubility in water (by weight)</td>
<td>Emulsion</td>
</tr>
<tr>
<td>pH</td>
<td>4.5 (@ 1 %) pH Electrode</td>
</tr>
<tr>
<td>Decomposition</td>
<td>No test data available</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
</tr>
</tbody>
</table>

10. Stability and Reactivity

Stability/Instability
Thermally stable at typical use temperatures.

Conditions to Avoid:
- Can coagulate if frozen. Active ingredient decomposes at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.
- Incompatible Materials: Avoid contact with: Strong oxidizers. Addition of chemicals may cause phase separation.

11. Toxicological Information

Acute Toxicity
Ingestion
As product. LD50, Rat, female > 5,000 mg/kg

Dermal
As product. LD50, Rat > 5,000 mg/kg

Inhalation
As product. LC50, 4 h, Aerosol, Rat > 5.52 mg/l
No deaths occurred at this concentration.

**Serious eye damage/eye irritation**
May cause moderate eye irritation which may be slow to heal. May cause slight corneal injury.

**Skin corrosion/irritation**
Brief contact may cause slight skin irritation with local redness. May cause drying and flaking of the skin. Effects may be slow to heal.

**Sensitization**

- **Skin**
  Has caused allergic skin reactions when tested in mice.

- **Respiratory**
  No relevant information found.

**Repeated Dose Toxicity**
For the active ingredient(s): Florasulam. In animals, effects have been reported on the following organs: Kidney. Liver. For the solvent(s): In animals, effects have been reported on the following organs: Liver. Kidney. Respiratory tract. Blood. Cataracts were observed in rats exposed to cumene vapors.

**Chronic Toxicity and Carcinogenicity**
For the minor component(s): Cumene. Has caused cancer in laboratory animals. However, the relevance of this to humans is unknown. For the active ingredient(s): Florasulam. For similar active ingredient(s). Did not cause cancer in laboratory animals.

**Developmental Toxicity**
For the active ingredient(s): Fluroxypyr 1-methylheptyl ester. Has been toxic to the fetus in laboratory animals at doses toxic to the mother. For the major component(s): Solvent naphta (petroleum), light arom. Has caused birth defects in laboratory animals only at doses producing severe toxicity in the mother.

**Reproductive Toxicity**
For the solvent(s): For the component(s) tested: In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. For the active ingredient(s): In animal studies, did not interfere with reproduction.

**Genetic Toxicology**
For the component(s) tested: In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

### 12. Ecological Information

#### ENVIRONMENTAL FATE

**Data for Component: Florasulam**

**Movement & Partitioning**
Bioconcentration potential is low (BCF less than 100 or log Pow less than 3).

- **Partition coefficient, n-octanol/water (log Pow):** No test data available.
- **Bioconcentration Factor (BCF):** 0.8 - 2.2; fish; Measured

**Persistence and Degradability**
Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

<table>
<thead>
<tr>
<th>OECD Biodegradation Tests:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodegradation</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>2 %</td>
</tr>
</tbody>
</table>

**Data for Component: Fluroxypyr 1-methylheptyl ester**

**Movement & Partitioning**
Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Expected to be relatively immobile in soil (Koc > 5000).

- **Henry's Law Constant (H):** 5.42E-08 atm*m3/mole; 25 ºC Measured
- **Partition coefficient, n-octanol/water (log Pow):** 4.5 Measured
- **Partition coefficient, soil organic carbon/water (Koc):** 6,200
- **Bioconcentration Factor (BCF):** 26; rainbow trout (Oncorhynchus mykiss); Measured
Persistence and Degradability
Material is not readily biodegradable according to OECD/EEC guidelines.

Stability in Water (1/2-life):
12.8 - 16.5 h

Data for Component: Solvent naphtha (petroleum), light aromatic

Movement & Partitioning
For the major component(s): Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000). For the minor component(s): Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient, n-octanol/water (log Pow): No test data available:

Persistence and Degradability
For the major component(s): Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%). For some component(s): Biodegradation under aerobic static laboratory conditions is low (BOD20 or BOD28/ThOD between 2.5 and 10%).

Data for Component: 1,2,4-Trimethylbenzene

Movement & Partitioning
Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000).

Henry’s Law Constant (H): 6.16E-03 atm*m3/mole; 25 °C  Measured
Partition coefficient, n-octanol/water (log Pow): 3.63  Measured
Partition coefficient, soil organic carbon/water (Koc): 720  Estimated.
Bioconcentration Factor (BCF): 33 - 275; common carp (Cyprinus carpio); Measured

Persistence and Degradability
Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

Indirect Photodegradation with OH Radicals

<table>
<thead>
<tr>
<th>Rate Constant</th>
<th>Atmospheric Half-life</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.670E-11 cm3/s</td>
<td>0.641 d</td>
<td>Estimated.</td>
</tr>
</tbody>
</table>

OECD Biodegradation Tests:

<table>
<thead>
<tr>
<th>Biodegradation</th>
<th>Exposure Time</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 18 %</td>
<td>28 d</td>
<td>OECD 301C Test</td>
</tr>
</tbody>
</table>

Theoretical Oxygen Demand: 3.19 mg/mg

Data for Component: Propylene glycol

Movement & Partitioning
Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50). Given its very low Henry’s constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Henry’s Law Constant (H): 1.2E-08 atm*m3/mole  Measured
Partition coefficient, n-octanol/water (log Pow): -0.92  Measured
Partition coefficient, soil organic carbon/water (Koc): < 1  Estimated.

Persistence and Degradability
Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

Indirect Photodegradation with OH Radicals

<table>
<thead>
<tr>
<th>Rate Constant</th>
<th>Atmospheric Half-life</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.28E-11 cm3/s</td>
<td>10 h</td>
<td>Estimated.</td>
</tr>
</tbody>
</table>

OECD Biodegradation Tests:

<table>
<thead>
<tr>
<th>Biodegradation</th>
<th>Exposure Time</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>81 %</td>
<td>28 d</td>
<td>OECD 301F Test</td>
</tr>
<tr>
<td>96 %</td>
<td>64 d</td>
<td>OECD 306 Test</td>
</tr>
</tbody>
</table>

Biological oxygen demand (BOD):
**Product Name:** STARANE® Flex Herbicide  
**Issue Date:** 02/02/2010

### Chemical Oxygen Demand

<table>
<thead>
<tr>
<th>BOD 5</th>
<th>BOD 10</th>
<th>BOD 20</th>
<th>BOD 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>69 %</td>
<td>70 %</td>
<td>86 %</td>
<td></td>
</tr>
</tbody>
</table>

**Theoretical Oxygen Demand:** 1.53 mg/mg

**Data for Component:** 1,3,5-Trimethylbenzene

### Movement & Partitioning

- **Bioconcentration potential** is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000).
- **Henry’s Law Constant (H):** 1.97E-02 atm*m3/mole; 25 °C Estimated.
- **Partition coefficient, n-octanol/water (log Pow):** 3.42 Measured
- **Partition coefficient, soil organic carbon/water (Koc):** 700 Estimated.
- **Bioconcentration Factor (BCF):** 23 - 342; fish; Measured

### Distribution in Environment: Mackay Level 1 Fugacity Model:

<table>
<thead>
<tr>
<th>Air</th>
<th>Water.</th>
<th>Biota</th>
<th>Soil</th>
<th>Sediment</th>
</tr>
</thead>
<tbody>
<tr>
<td>97.26 %</td>
<td>0.62 %</td>
<td>&lt; 0.01 %</td>
<td>2.08 %</td>
<td>0.05 %</td>
</tr>
</tbody>
</table>

### Persistence and Degradability

- **Material is not readily biodegradable according to OECD/EEC guidelines.**

### Indirect Photodegradation with OH Radicals

- **Rate Constant:** 3.51E-11 cm3/s
- **Atmospheric Half-life:** 3.7 h
- **OECD Biodegradation Tests: Biodegradation:** 0 %  
  - **Exposure Time:** 28 d  
  - **Method:** OECD 301C Test

### Theoretical Oxygen Demand: 3.19 mg/mg

**Data for Component:** Cumene

### Movement & Partitioning

- **Bioconcentration potential** is low (BCF less than 100 or Log Pow less than 3). Potential for mobility in soil is low (Koc between 500 and 2000).
- **Henry’s Law Constant (H):** 1.15E-02 atm*m3/mole; 25 °C Measured
- **Partition coefficient, n-octanol/water (log Pow):** 3.4 - 3.7 Measured
- **Partition coefficient, soil organic carbon/water (Koc):** 800 - 2,800 Estimated.
- **Bioconcentration Factor (BCF):** 35.5; fish; Measured

### Distribution in Environment: Mackay Level 1 Fugacity Model:

<table>
<thead>
<tr>
<th>Air</th>
<th>Water.</th>
<th>Biota</th>
<th>Soil</th>
<th>Sediment</th>
</tr>
</thead>
<tbody>
<tr>
<td>98.38 %</td>
<td>0.33 %</td>
<td>&lt; 0.01 %</td>
<td>1.26 %</td>
<td>0.03 %</td>
</tr>
</tbody>
</table>

### Persistence and Degradability

- **Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.**

### Indirect Photodegradation with OH Radicals

- **Rate Constant:** 6.90E-12 cm3/s
- **Atmospheric Half-life:** 1.55 d
- **OECD Biodegradation Tests: Biodegradation:** 86 %  
  - **Exposure Time:** 28 d  
  - **Method:** OECD 301D Test

### Biological oxygen demand (BOD):

<table>
<thead>
<tr>
<th>BOD 5</th>
<th>BOD 10</th>
<th>BOD 20</th>
<th>BOD 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 %</td>
<td>62 %</td>
<td>70 %</td>
<td></td>
</tr>
</tbody>
</table>

**Theoretical Oxygen Demand:** 3.20 mg/mg

### ECOTOXICITY

**Data for Component:** Florasulam

- **Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested). Material is slightly toxic to birds on an acute basis (LD50 between 501 and 2000 mg/kg). Material is practically non-toxic to birds on a dietary basis (LC50 > 5000 ppm).**

**Fish Acute & Prolonged Toxicity**
LC50, rainbow trout (Oncorhynchus mykiss), 96 h: > 100 mg/l

**Aquatic Invertebrate Acute Toxicity**
EC50, water flea Daphnia magna, 48 h, immobilization: 180 - 292 mg/l

**Aquatic Plant Toxicity**
EC50, green alga Pseudokirchneriella subcapitata (formerly known as Selenastrum capricornutum), Growth inhibition (cell density reduction), 72 h: 8.94 mg/l
EC50, duckweed Lemna sp., Number of fronds, 14 d: 0.00118 mg/l

**Toxicity to Above Ground Organisms**
oral LD50, Japanese quail (Coturnix coturnix japonica): 1047 mg/kg bodyweight.
dietary LC50, mallard (Anas platyrhynchos): > 5000 mg/kg diet.
contact LD50, Honey bee (Apis mellifera): > 100 micrograms/bee

**Toxicity to Soil Dwelling Organisms**
LC50, Earthworm Eisenia foetida, adult, 14 d: > 1,320 mg/kg

**Data for Component: Fluroxypyr 1-methylheptyl ester**
Material is very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species). Material is practically non-toxic to birds on an acute basis (LD50 >2000 mg/kg). Material is practically non-toxic to birds on a dietary basis (LC50 >5000 ppm).

**Fish Acute & Prolonged Toxicity**
LC50, rainbow trout (Oncorhynchus mykiss), static renewal, 96 h: > 0.225 mg/l
The LC50 value is above the water solubility.

**Aquatic Invertebrate Acute Toxicity**
EC50, water flea Daphnia magna, static renewal, 48 h: > 0.183 mg/l
The EC50 value is above the water solubility.

**Aquatic Plant Toxicity**
EC50, alga Scenedesmus sp., 96 h: > 0.47 mg/l
The EC50 value is above the water solubility.
The EC50 value is above the water solubility. EC50, diatom Navicula sp., Growth inhibition (cell density reduction), 120 h: 0.96 mg/l

**Toxicity to Above Ground Organisms**
oral LD50, bobwhite (Colinus virginianus): > 2000 mg/kg bodyweight.
dietary LC50, bobwhite (Colinus virginianus): > 2000 mg/kg diet.
oral LD50, Honey bee (Apis mellifera): > 100 micrograms/bee
contact LD50, Honey bee (Apis mellifera): > 100 micrograms/bee

**Toxicity to Soil Dwelling Organisms**
LC50, Earthworm, Lumbricus terrestris: > 1,000 mg/kg

**Data for Component: Solvent naphtha (petroleum), light aromatic**
Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**
LC50, rainbow trout (Oncorhynchus mykiss), 96 h: 9.22 mg/l

**Toxicity to Above Ground Organisms**
dietary LC50, bobwhite (Colinus virginianus): > 6,500 ppm
oral LD50, bobwhite (Colinus virginianus): > 2,250 mg/kg

**Data for Component: 1,2,4-Trimethylbenzene**
Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**
LC50, fathead minnow (Pimephales promelas), flow-through, 96 h: 7.7 mg/l

**Aquatic Invertebrate Acute Toxicity**
EC50, water flea Daphnia magna, 48 h: 3.6 mg/l

**Data for Component: Propylene glycol**
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**
LC50, rainbow trout (Oncorhynchus mykiss), 96 h: 44,000 - 51,600 mg/l

**Aquatic Invertebrate Acute Toxicity**
EC50, water flea Daphnia magna, 48 h, immobilization: 4,850 - 34,000 mg/l
Aquatic Plant Toxicity
EC50, green alga Pseudokirchneriella subcapitatata (formerly known as Selenastrum capricornutum), biomass growth inhibition: 19,000 mg/l

Toxicity to Micro-organisms
EC50: bacteria, Growth inhibition, 16 h: 26,000 mg/l
EC50, OECD 209 Test; activated sludge, respiration inhibition, 3 h: > 1,000 mg/l

Data for Component: **1,3,5-Trimethylbenzene**
Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

Fish Acute & Prolonged Toxicity
LC50, Japanese medaka (Oryzias latipes), static, 48 h: 8.6 mg/l

Aquatic Invertebrate Acute Toxicity
LC50, water flea Daphnia magna, 24 h, immobilization: 50 mg/l

Aquatic Plant Toxicity
EC50, alga Scenedesmus sp., biomass growth inhibition, 48 h: 25 mg/l
EC50, alga Scenedesmus sp., Growth rate inhibition, 48 h: 53 mg/l

Data for Component: **Cumene**
Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested).
Material is toxic to aquatic organisms (LC50/EC50/IC50 between 1 and 10 mg/L in the most sensitive species).

Fish Acute & Prolonged Toxicity
LC50, rainbow trout (Oncorhynchus mykiss), static renewal, 96 h: 3.6 mg/l

Aquatic Invertebrate Acute Toxicity
EC50, water flea Daphnia magna, 48 h, immobilization: 4.0 mg/l

Aquatic Plant Toxicity
EC50, green alga Pseudokirchneriella subcapitata (formerly known as Selenastrum capricornutum), biomass growth inhibition, 72 h: 2.6 mg/l

Toxicity to Above Ground Organisms
oral LD50, redwing blackbird (Agelaius phoeniceus): > 98 mg/kg

### 13. Disposal Considerations

If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

### 14. Transport Information

**DOT Non-Bulk**
NOT REGULATED

**DOT Bulk**

**Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.
**Technical Name:** PETROLEUM NAPHTHA, 1,2,4-TRIMETHYLBENZENE
**Hazard Class:** 3  **ID Number:** UN1993  **Packing Group:** PG III

**IMDG**

**Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.
**Technical Name:** PETROLEUM NAPHTHA, 1,2,4-TRIMETHYLBENZENE
Hazard Class: 3   ID Number: UN1993   Packing Group: PG III
EMS Number: F-E,S-E
Marine pollutant.: Yes

ICAO/IATA
Proper Shipping Name: FLAMMABLE LIQUID, N.O.S.
Technical Name: PETROLEUM NAPHTHA, 1,2,4-TRIMETHYLBENZENE
Hazard Class: 3   ID Number: UN1993   Packing Group: PG III
Cargo Packing Instruction: 303
Passenger Packing Instruction: 302
Additional Information
MARINE POLLUTANT

Fluroxypyr

FLORASULAM

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard
This product is a “Hazardous Chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312
Immediate (Acute) Health Hazard Yes
Delayed (Chronic) Health Hazard Yes
Fire Hazard Yes
Reactive Hazard No
Sudden Release of Pressure Hazard No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

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<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Amount</th>
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<tbody>
<tr>
<td>1,2,4-Trimethylbenzene</td>
<td>95-63-6</td>
<td>9.3%</td>
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<tr>
<td>Cumene</td>
<td>98-82-8</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:
The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,4-Trimethylbenzene</td>
<td>95-63-6</td>
<td>9.3%</td>
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<tr>
<td>Propylene glycol</td>
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<td>1,3,5-Trimethylbenzene</td>
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<tr>
<td>Cumene</td>
<td>98-82-8</td>
<td>1.3%</td>
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</table>

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

**Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**

Section 103

This product contains the following substances which are subject to CERCLA Section 103 reporting requirements and which are listed in 40 CFR 302.4.

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<tr>
<th>Component</th>
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<th>Amount</th>
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<tr>
<td>Cumene</td>
<td>98-82-8</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

**California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)**

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

**Toxic Substances Control Act (TSCA)**

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

### 16. Other Information

**Hazard Rating System**

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health</th>
<th>Fire</th>
<th>Reactivity</th>
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**Revision**

Identification Number: 1018110 / 1016 / Issue Date 02/02/2010 / Version: 2.0

DAS Code: GF-2257

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

**Legend**

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<td>STEL</td>
<td>Short Term Exposure Limit</td>
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<tr>
<td>TWA</td>
<td>Time Weighted Average</td>
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<tr>
<td>ACGIH</td>
<td>American Conference of Governmental Industrial Hygienists, Inc.</td>
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<tr>
<td>DOW IHG</td>
<td>Dow Industrial Hygiene Guideline</td>
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<tr>
<td>WEEL</td>
<td>Workplace Environmental Exposure Level</td>
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<tr>
<td>HAZ DES</td>
<td>Hazard Designation</td>
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<tr>
<td>Action Level</td>
<td>A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.</td>
</tr>
</tbody>
</table>

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