Dow AgroSciences

# Material Safety Data Sheet

**DOW AGROSCIENCES CANADA INC.**

**Product name: FRONTLINE™ 2,4 DXCA Herbicide**

**Issue Date:** 03/16/2015
**Print Date:** 03/16/2015

DOW AGROSCIENCES CANADA INC. 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:** FRONTLINE™ 2,4 DXCA Herbicide

**Recommended use of the chemical and restrictions on use**
**Identified uses:** End use herbicide product Herbicide for use in manufacturing, formulating or repackaging

**COMPANY IDENTIFICATION**
DOW AGROSCIENCES CANADA INC.
2100 450 1$^{ST}$ STREET SW
CALGARY AB T2P 5H1
CANADA

**For MSDS Updates and Product Information:** 800-667-3852
**Prepared by:** Prepared for use in Canada by EH&S, Hazard Communications.
**Revision Date:** 03/16/2015
**Print Date:** 03/16/2015

**Customer Information Number:** 800-667-3852
solutions@dow.com

**EMERGENCY TELEPHONE NUMBER**
**24-Hour Emergency Contact:** 613-996-6666
**Local Emergency Contact:** 613-996-6666

## 2. HAZARDS IDENTIFICATION

**Emergency Overview**

**Appearance**

| | |
|---|---|
| Physical state | Liquid. |
| Color | White to off-white |
| **Odor** | Mild |

**Hazard Summary**
Highly toxic to fish and/or other aquatic organisms.

**Potential Health Effects**

**Ingestion:** Based on physical properties, not likely to be an aspiration hazard.

**Inhalation:** Vapors are primarily water; single exposure is not likely to be hazardous.
No adverse effects are anticipated from single exposure to mist.
Excessive exposure may cause irritation to upper respiratory tract (nose and throat).
Based on the available data, narcotic effects were not observed.

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

**Eyes:** Essentially nonirritating to eyes.

**Skin:** Prolonged skin contact is unlikely to result in absorption of harmful amounts.

**Skin:** Brief contact is essentially nonirritating to skin.

**Chronic Exposure:** For the active ingredient(s):
In animals, effects have been reported on the following organs:
Kidney.
Liver.
For the minor component(s):
In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

| Component | CASRN | Weight percent |
|---|---|---|
| Florasulam | 145701-23-1 | 4.8% |
| Propylene glycol | 57-55-6 | 8.6% |
| Balance | Not available | 86.6% |

## 4. FIRST AID MEASURES

**Description of first aid measures**
**General advice:** If potential for exposure exists refer to Section 8 for specific personal protective equipment.

**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.

**Skin contact:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

**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.

**Ingestion:** No emergency medical treatment necessary.

**Most important symptoms and effects, both acute and delayed:** Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

**Indication of any immediate medical attention and special treatment needed**
**Notes to physician:** No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

## 5. FIREFIGHTING MEASURES

**Suitable extinguishing media:** This material does not burn. If exposed to fire from another source, use suitable extinguishing agent for that fire.

**Unsuitable extinguishing media:** no data available

**Special hazards arising from the substance or mixture**
**Hazardous combustion products:** Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include trace amounts of: Sulfur oxides. Nitrogen oxides. Hydrogen halides.

**Unusual Fire and Explosion Hazards:** If exposed to fire from another source and water is evaporated, exposure to high temperatures may cause toxic fumes.

**Advice for firefighters**
**Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry. This material does not burn. Fight fire for other material that is burning. 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). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures:** 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.

**Methods and materials for containment and cleaning up:** 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. See Section 13, Disposal Considerations, for additional information.

## 7. HANDLING AND STORAGE

**Precautions for safe handling:** Keep out of reach of children. Do not swallow. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Wash thoroughly after handling. Use with adequate ventilation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

**Conditions for safe storage:** Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies.

**Storage stability**
**To maintain product quality, recommended storage temperature is** > -5 °C

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**
Exposure limits are listed below, if they exist.

| Component | Regulation | Type of listing | Value/Notation |
|---|---|---|---|
| Propylene glycol | US WEEL | TWA | 10 mg/m3 |
| | CA ON OEL | TWAEV Total | 155 mg/m3 50 ppm |
| | CA ON OEL | TWAEV | 10 mg/m3 |
| | CA ON OEL | TWA | 155 mg/m3 50 ppm |
| | CA ON OEL | TWA | 10 mg/m3 |

Consult local authorities for recommended exposure limits.

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.

**Exposure controls**
**Engineering controls:** 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. Local exhaust ventilation may be necessary for some operations.

**Individual protection measures**

**Eye/face protection:** Use safety glasses (with side shields).

**Skin protection**

**Hand protection:** Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Polyethylene. Ethyl vinyl alcohol laminate (“EVAL”). Natural rubber (“latex”). Neoprene. Nitrile/butadiene rubber (“nitrile” or “NBR”). Polyvinyl chloride (“PVC” or “vinyl”). 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.
**Other protection:** Wear clean, body-covering clothing.

**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.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Appearance** | |
| **Physical state** | Liquid. |
| **Color** | White to off-white |
| **Odor** | Mild |
| **Odor Threshold** | No test data available |
| **pH** | 4.36 1% |
| **Melting point/range** | Not applicable |
| **Freezing point** | No test data available |
| **Boiling point (760 mmHg)** | No test data available |
| **Flash point** | **closed cup** *Pensky-Martens Closed Cup ASTM D 93* none below boiling point |
| **Evaporation Rate (Butyl Acetate = 1)** | No test data available |
| **Flammability (solid, gas)** | Not Applicable |
| **Lower explosion limit** | No test data available |
| **Upper explosion limit** | No test data available |
| **Vapor Pressure** | Not applicable |
| **Relative Vapor Density (air = 1)** | No test data available |
| **Relative Density (water = 1)** | 1.0318 at 20 °C *Digital Density Meter (Oscillating Coil)* |
| **Water solubility** | No test data available |
| **Partition coefficient: n-octanol/water** | no data available |
| **Auto-ignition temperature** | *EC Method A15* none below 400 degC |
| **Decomposition temperature** | No test data available |
| **Kinematic Viscosity** | No test data available |
| **Explosive properties** | Not explosive |
| **Oxidizing properties** | No significant increase (>5C) in temperature. |
| **Liquid Density** | 1.0318 g/cm3 at 20 °C *Digital density meter* |

**Molecular weight** no data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

## 10. STABILITY AND REACTIVITY

**Reactivity:** No dangerous reaction known under conditions of normal use.

**Chemical stability:** Thermally stable at typical use temperatures.

**Possibility of hazardous reactions:** Polymerization will not occur.

**Conditions to avoid:** Active ingredient decomposes at elevated temperatures.

**Incompatible materials:** None known.

**Hazardous decomposition products:** Decomposition products depend upon temperature, air supply and the presence of other materials.

## 11. TOXICOLOGICAL INFORMATION

*Toxicological information on this product or its components appear in this section when such data is available.*

**Acute toxicity**

**Acute oral toxicity**
Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

As product:
LD50, Rat, male and female, > 5,000 mg/kg

**Acute dermal toxicity**
Prolonged skin contact is unlikely to result in absorption of harmful amounts.

As product:
LD50, Rat, male and female, > 2,000 mg/kg No deaths occurred at this concentration.

**Acute inhalation toxicity**
Vapors are primarily water; single exposure is not likely to be hazardous. No adverse effects are anticipated from single exposure to mist. Excessive exposure may cause irritation to upper respiratory tract (nose and throat). Based on the available data, narcotic effects were not observed.

As product: The LC50 has not been determined. Based on information for component(s):
LC50, Rat, 4 Hour, Mist, > 5 mg/l Estimated.

**Skin corrosion/irritation**
Brief contact is essentially nonirritating to skin.

**Serious eye damage/eye irritation**
Essentially nonirritating to eyes.

**Sensitization**
Did not demonstrate the potential for contact allergy in mice.

For respiratory sensitization:
No relevant data found.

**Specific Target Organ Systemic Toxicity (Single Exposure)**
Evaluation of available data suggests that this material is not an STOT-SE toxicant.

**Specific Target Organ Systemic Toxicity (Repeated Exposure)**
Repeated skin application to laboratory animals did not produce systemic toxicity.

For the active ingredient(s):
In animals, effects have been reported on the following organs:
Kidney.

**Carcinogenicity**
For the active ingredient(s): Did not cause cancer in laboratory animals.

**Teratogenicity**
For the active ingredient(s): Did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother.

**Reproductive toxicity**
For the active ingredient(s): In animal studies, did not interfere with reproduction.

**Mutagenicity**
For the active ingredient(s): In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

**Aspiration Hazard**
Based on physical properties, not likely to be an aspiration hazard.

## 12. ECOLOGICAL INFORMATION

*Ecotoxicological information on this product or its components appear in this section when such data is available.*

**Toxicity**

**Acute toxicity to fish**
Material is very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species).

LC50, Oncorhynchus mykiss (rainbow trout), semi-static test, 96 Hour, > 100 mg/l

**Acute toxicity to aquatic invertebrates**
EC50, Daphnia magna (Water flea), 48 Hour, > 100 mg/l

**Acute toxicity to algae/aquatic plants**
EC50, Lemna minor (duckweed), 14 d, Growth inhibition (cell density reduction), 0.0413 mg/l, OECD Test Guideline 201 or Equivalent

EbC50, Pseudokirchneriella subcapitata (green algae), static test, 72 Hour, Biomass, 0.0611 mg/l, OECD Test Guideline 201

**Toxicity to Above Ground Organisms**
Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg).

oral LD50, Anas platyrhynchos (Mallard duck), mortality, > 2250mg/kg bodyweight.

oral LD50, Apis mellifera (bees), 24 Hour, mortality, > 70.25µg/bee

contact LD50, Apis mellifera (bees), 24 Hour, mortality, > 100µg/bee

**Toxicity to soil-dwelling organisms**
LC50, Eisenia fetida (earthworms), mortality, > 1,033 mg/kg

**Persistence and degradability**

**Florasulam**

**Biodegradability:** Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.
10-day Window: Fail
**Biodegradation:** 2 %
**Exposure time:** 28 d
**Method:** OECD Test Guideline 301B or Equivalent

**Theoretical Oxygen Demand:** 0.85 mg/mg

**Biological oxygen demand (BOD)**

| Incubation Time | BOD |
|---|---|
| | 0.012 mg/mg |

**Stability in Water (1/2-life)**
, > 30 d

**Photodegradation**
**Atmospheric half-life:** 1.82 Hour
**Method:** Estimated.

**Propylene glycol**

**Biodegradability:** Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation may occur under anaerobic conditions (in the absence of oxygen).
10-day Window: Pass
**Biodegradation:** 81 %
**Exposure time:** 28 d
**Method:** OECD Test Guideline 301F or Equivalent
10-day Window: Not applicable
**Biodegradation:** 96 %
**Exposure time:** 64 d
**Method:** OECD Test Guideline 306 or Equivalent

**Theoretical Oxygen Demand:** 1.68 mg/mg

**Chemical Oxygen Demand:** 1.53 mg/mg

**Biological oxygen demand (BOD)**

| Incubation Time | BOD |
|---|---|
| 5 d | 69.000 % |
| 10 d | 70.000 % |
| 20 d | 86.000 % |

**Photodegradation**
**Atmospheric half-life:** 10 Hour
**Method:** Estimated.

**Balance**
**Biodegradability:** No relevant data found.

**Bioaccumulative potential**

**Florasulam**
**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
**Partition coefficient: n-octanol/water(log Pow):** -1.22
**Bioconcentration factor (BCF):** 0.8 Fish. 28 d Measured

**Propylene glycol**
**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
**Partition coefficient: n-octanol/water(log Pow):** -1.07 Measured
**Bioconcentration factor (BCF):** 0.09 Estimated.

**Balance**
**Bioaccumulation:** No relevant data found.

**Mobility in soil**

**Florasulam**
Potential for mobility in soil is very high (Koc between 0 and 50).
**Partition coefficient(Koc):** 4 - 54

**Propylene glycol**

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.
Potential for mobility in soil is very high (Koc between 0 and 50).
**Partition coefficient(Koc):** < 1 Estimated.

**Balance**

No relevant data found.

## 13. DISPOSAL CONSIDERATIONS

**Disposal methods:** 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

**TDG**

| | |
|---|---|
| **Proper shipping name** | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(Florasulam) |
| **UN number** | UN 3082 |
| **Class** | 9 |
| **Packing group** | III |
| **Marine pollutant** | Florasulam |

**Classification for SEA transport (IMO-IMDG):**

| | |
|---|---|
| **Proper shipping name** | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(Florasulam) |
| **UN number** | UN 3082 |
| **Class** | 9 |
| **Packing group** | III |
| **Marine pollutant** | Florasulam |
| **Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code** | Consult IMO regulations before transporting ocean bulk |

**Classification for AIR transport (IATA/ICAO):**

| | |
|---|---|
| **Proper shipping name** | Environmentally hazardous substance, liquid, n.o.s.(Florasulam) |
| **UN number** | UN 3082 |
| **Class** | 9 |
| **Packing group** | III |

**Further information:**
NOT REGULATED PER TDG EXEMPTION 1.45.1 FOR ROAD OR RAIL

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. 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

**Hazardous Products Act Information: CPR Compliance**
This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**Hazardous Products Act Information: WHMIS Classification**
This product is exempt under WHMIS.

**National Fire Code of Canada**
Not applicable

**Canadian Domestic Substances List (DSL) (DSL)**
This product contains chemical substance(s) exempt from CEPA DSL Inventory requirements. It is regulated as a pesticide subject to Pest Control Products Act (PCPA) requirements.

Pest Control Products Act Registration Number: 30060

## 16. OTHER INFORMATION

**Hazard Rating System**
**NFPA**

| Health | Fire | Reactivity |
|---|---|---|
| 1 | 0 | 0 |

**Revision**
Identification Number: 101202483 / A215 / Issue Date: 03/16/2015 / Version: 7.8
DAS Code: EF-1343
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

**Legend**

| | |
|---|---|
| CA ON OEL | Canada. Ontario OELs |
| TWA | 8-hr TWA |

| | |
|---|---|
| TWAEV | time-weighted average exposure value |
| US WEEL | USA. Workplace Environmental Exposure Levels (WEEL) |

**Information Source and References**
This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DOW AGROSCIENCES CANADA INC. urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

# Material Safety Data Sheet

**Dow AgroSciences Canada Inc.**

**Product Name:** Frontline* 2,4-D B Emulsifiable Concentrate Herbicide **Issue Date:** 2010.09.23

Dow AgroSciences Canada Inc. 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**

Frontline* 2,4-D B Emulsifiable Concentrate Herbicide

**COMPANY IDENTIFICATION**

Dow AgroSciences Canada Inc.
A Subsidiary of The Dow Chemical Company
Suite 2100, 450 1st Street SW,
Calgary, AB T2P 5H1
Canada

**For MSDS updates and Product Information:** 800-667-3852

**Prepared By:** Prepared for use in Canada by EH&S, Hazard Communications.
**Revision** 2010.09.23

Customer Information Number: 800-667-3852

**EMERGENCY TELEPHONE NUMBER**

**24-Hour Emergency Contact:** 613-996-6666
**Local Emergency Contact:** 613-996-6666

## 2. Hazards Identification

**Emergency Overview**

**Color:** Yellow
**Physical State:** Liquid
**Odor:** Ester
**Hazards of product:**

DANGER! Combustible liquid and vapor. Causes eye burns. Harmful or fatal if swallowed; can enter lungs and cause damage. Evacuate area. Keep upwind of spill. Toxic fumes may be released in fire situations.

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### Potential Health Effects

**Eye Contact:** May cause permanent impairment of vision, even blindness.
**Skin Contact:** Brief contact may cause slight skin irritation with local redness. May cause drying and flaking of the skin.
**Skin Absorption:** Prolonged skin contact is unlikely to result in absorption of harmful amounts.
**Inhalation:** Vapor may cause irritation of the upper respiratory tract (nose and throat). Mist may cause irritation of upper respiratory tract (nose and throat).
**Ingestion:** Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.
**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 kerosene: In animals, effects have been reported on the following organs after exposure to aerosols: Central nervous system. Respiratory tract. Observations in animals include: Anesthetic or narcotic effects.
**Cancer Information:** For the solvent(s): In a lifetime animal dermal carcinogenicity study, an increased incidence of skin tumors was observed when kerosene was applied at doses that also produced skin irritation. This response was similar to that produced in skin by other types of chronic chemical/physical irritation. No increase in tumors was observed when non-irritating dilutions of kerosene were applied at equivalent doses, indicating that kerosene is unlikely to cause skin cancer in the absence of long-term continued skin irritation.
**Birth Defects/Developmental Effects:** For the active ingredient(s): 2,4-D 2-ethylhexyl ester. Has been toxic to the fetus in lab animals at doses nontoxic to the mother.
**Reproductive Effects:** For similar active ingredient(s). 2,4-Dichlorophenoxyacetic acid. In laboratory animals, excessive doses toxic to the parent animals caused decreased weight and survival of offspring.

## 3. Composition/information on ingredients

| Component | CAS # | Amount W/W |
|---|---|---|
| 2,4-D 2-ethylhexyl ester | 1928-43-4 | 77.19 % |
| Kerosene (petroleum) | 8008-20-6 | >= 7.5 - <= 12.5 % |
| Balance | | >= 10.4 - <= 15.4 % |

**Amounts are presented as percentages by weight.**

## 4. First-aid measures

**Eye Contact:** Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.
**Skin Contact:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.
**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:** Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. The decision of whether to induce vomiting or not should be made by a 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. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.
**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:** Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.
**Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. 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). If protective equipment is not available or not used, fight fire from a protected location or safe distance.
**Unusual Fire and Explosion Hazards:** Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. 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: Hydrogen chloride. Carbon monoxide. Carbon dioxide.

See Section 9 for related Physical Properties

## 6. Accidental Release Measures

**Steps to be Taken if Material is Released or Spilled:** 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. See Section 13, Disposal Considerations, for additional information.
**Personal Precautions:** Evacuate area. Refer to Section 7, Handling, for additional precautionary measures. Only trained and properly protected personnel must be involved in clean-up operations. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area.
**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:** 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. Keep container closed. 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. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. Keep away from heat, sparks and flame.

### Storage
Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies.

## 8. Exposure Controls / Personal Protection

**Exposure Limits**

| Component | List | Type | Value |
|---|---|---|---|
| **2,4-D 2-ethylhexyl ester** | CAD BC OEL | TWA | 10 mg/m3 |
| | CAD BC OEL | STEL | 20 mg/m3 |
| | CAD ON OEL | TWAEV as 2,4-D | 10 mg/m3 |
| **Kerosene (petroleum)** | Dow IHG | TWA as total hydrocarbon vapor | 10 mg/m3 SKIN |
| | CAD BC OEL | TWA Non-aerosol. as total hydrocarbon vapor | 200 mg/m3 SKIN |
| | ACGIH | TWA Non-aerosol. as total hydrocarbon vapor | 200 mg/m3<br>P: Application restricted to conditions in which there are negligible aerosol exposures. |
| | CAD ON OEL | TWAEV as total hydrocarbon vapor | 200 mg/m3 SKIN |
| | CAD AB OEL | TWA Vapor. as total hydrocarbon vapor | 200 mg/m3 |
| | CAD AB OEL | SKIN_DES Vapor. as total hydrocarbon vapor | Can be absorbed through the skin. |

*Consult local authorities for recommended exposure limits.*
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.
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.

### 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: Chlorinated polyethylene. Neoprene. Polyethylene. Ethyl

vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Nitrile/butadiene rubber ("nitrile" or "NBR"). 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. In misty atmospheres, use an approved particulate 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 engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations.

## 9. Physical and Chemical Properties

| | |
|---|---|
| **Physical State** | Liquid |
| **Color** | Yellow |
| **Odor** | Ester |
| **Odor Threshold** | No test data available |
| **Flash Point - Closed Cup** | 60 °C *Pensky-Martens Closed Cup ASTM D 93* |
| **Flammable Limits In Air** | **Lower**: No test data available<br>**Upper**: No test data available |
| **Autoignition Temperature** | No test data available |
| **Vapor Pressure** | No test data available |
| **Boiling Point (760 mmHg)** | No test data available. |
| **Vapor Density (air = 1)** | No test data available |
| **Specific Gravity (H2O = 1)** | 1.08 *Digital Density Meter (Oscillating Coil)* |
| **Liquid Density** | 1.080 g/cm3 @ 20 °C *Calculated* |
| **Freezing Point** | No test data available |
| **Melting Point** | Not applicable |
| **Solubility in water (by weight)** | emulsifiable |
| **pH** | 3.7 (@ 1 %) *pH Electrode* (1% aqueous suspension) |
| **Decomposition Temperature** | No test data available |
| **Partition coefficient, n-octanol/water (log Pow)** | No data available for this product |
| **Evaporation Rate (Butyl Acetate = 1)** | No test data available |
| **Dynamic Viscosity** | 27.2 mPa.s @ 20 °C |
| **Kinematic Viscosity** | No test data available |

## 10. Stability and Reactivity

### Stability/Instability

Thermally stable at recommended temperatures and pressures.

**Conditions to Avoid:** Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

**Incompatible Materials:** Avoid contact with: Acids. Oxidizers.

### Hazardous Polymerization
Will not occur.

### Thermal Decomposition
Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon monoxide. Carbon dioxide. Hydrogen chloride.

## 11. Toxicological Information

### Acute Toxicity
**Ingestion**
As product. LD50, Rat, female 982 mg/kg
**Dermal**
As product. LD50, Rat > 2,000 mg/kg
No deaths occurred at this concentration.
**Inhalation**
As product. The LC50 has not been determined.
For the active ingredient(s): LC50, Aerosol, Rat > 5.39 mg/l

### Eye damage/eye irritation
May cause permanent impairment of vision, even blindness.

### Skin corrosion/irritation
Brief contact may cause slight skin irritation with local redness. May cause drying and flaking of the skin.

### Sensitization
**Skin**
Did not cause allergic skin reactions when tested in guinea pigs.
**Respiratory**
No relevant information found.

### Repeated Dose Toxicity
For the active ingredient(s): Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects. For kerosene: In animals, effects have been reported on the following organs after exposure to aerosols: Central nervous system. Respiratory tract. Observations in animals include: Anesthetic or narcotic effects.

### Chronic Toxicity and Carcinogenicity
For the active ingredient(s): 2,4-D 2-ethylhexyl ester. Did not cause cancer in laboratory animals. For the solvent(s): In a lifetime animal dermal carcinogenicity study, an increased incidence of skin tumors was observed when kerosene was applied at doses that also produced skin irritation. This response was similar to that produced in skin by other types of chronic chemical/physical irritation. No increase in tumors was observed when non-irritating dilutions of kerosene were applied at equivalent doses, indicating that kerosene is unlikely to cause skin cancer in the absence of long-term continued skin irritation.

**Carcinogenicity Classifications:**

| Component | List | Classification |
|---|---|---|
| **Kerosene (petroleum)** | ACGIH | Confirmed animal carcinogen with unknown relevance to humans.; Group A3 |

### Developmental Toxicity
For the active ingredient(s): 2,4-D 2-ethylhexyl ester. Has been toxic to the fetus in lab animals at doses nontoxic to the mother. Did not cause birth defects in laboratory animals.

### Reproductive Toxicity
For similar active ingredient(s). 2,4-Dichlorophenoxyacetic acid. In laboratory animals, excessive doses toxic to the parent animals caused decreased weight and survival of offspring.

### Genetic Toxicology
For the active ingredient(s): In vitro genetic toxicity studies were negative.

# 12. Ecological Information

ENVIRONMENTAL FATE

Data for Component: **2,4-D 2-ethylhexyl ester**

### Movement & Partitioning

Bioconcentration potential is high (BCF > 3000 or Log Pow between 5 and 7).
**Henry's Law Constant (H):** 4.4E-05 atm*m3/mole; 25 °C Estimated.
**Partition coefficient, n-octanol/water (log Pow):** 5.78 Measured
**Partition coefficient, soil organic carbon/water (Koc):** 25,000 - 68,000 Estimated.

### Persistence and Degradability

Biodegradation under aerobic laboratory conditions is below detectable limits (BOD20 or BOD28/ThOD < 2.5%). Biodegradation may occur under aerobic conditions (in the presence of oxygen).
**Stability in Water (1/2-life):**
48.3 d; 25 °C; pH 7
**OECD Biodegradation Tests:**

| Biodegradation | Exposure Time | Method |
|---|---|---|
| 77 % | 29 d | OECD 301B Test |

**Biological oxygen demand (BOD):**

| BOD 5 | BOD 10 | BOD 20 | BOD 28 |
|---|---|---|---|
| 0.84 % | 0.92 % | 1.32 % | |

**Theoretical Oxygen Demand:** 1.87 mg/g

Data for Component: **Kerosene (petroleum)**

### Movement & Partitioning

Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Expected to be relatively immobile in soil (Koc > 5000).
**Henry's Law Constant (H):** 8.24E+00 atm*m3/mole; 25 °C Measured
**Partition coefficient, n-octanol/water (log Pow):** 6.1 Measured
**Partition coefficient, soil organic carbon/water (Koc):** 5,900 Estimated.
**Bioconcentration Factor (BCF):** 314; fish; Estimated.
61 - 159; fish

### Persistence and Degradability

Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%).
**Indirect Photodegradation with OH Radicals**

| Rate Constant | Atmospheric Half-life | Method |
|---|---|---|
| 1.393E-11 cm3/s | 0.767 d | Estimated. |

**Biological oxygen demand (BOD):**

| BOD 5 | BOD 10 | BOD 20 | BOD 28 |
|---|---|---|---|
| 31.000 % | 39.700 % | 58.600 % | |

**Chemical Oxygen Demand:** 1.16 mg/mg

ECOTOXICITY

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: > 100 mg/l
**Aquatic Invertebrate Acute Toxicity**
EC50, water flea Daphnia magna, 48 h, immobilization: > 100 mg/l
**Aquatic Plant Toxicity**
EbC50, green alga Pseudokirchneriella subcapitata (formerly known as Selenastrum capricornutum), biomass growth inhibition, 72 h: > 100 mg/l

## 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

**TDG Small container**
NOT REGULATED

**TDG Large container**
**Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.
**Technical Name:** KEROSENE
**Hazard Class:** 3 **ID Number:** UN1993 **Packing Group:** PG III

**IMDG**
**Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.
**Technical Name:** KEROSENE
**Hazard Class:** 3 **ID Number:** UN1993 **Packing Group:** PG III

**ICAO/IATA**
**Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.
**Technical Name:** KEROSENE
**Hazard Class:** 3 **ID Number:** UN1993 **Packing Group:** PG III

## 15. Regulatory Information

**CEPA - Domestic Substances List (DSL)**
All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

**Hazardous Products Act Information: CPR Compliance**
This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**Hazardous Products Act Information: WHMIS Classification**
This product is exempt under WHMIS.

**Pest Control Products Act Registration number:** 27243

**National Fire Code of Canada**
Class IIIA

## 16. Other Information

### Hazard Rating System

| NFPA | Health | Fire | Reactivity |
|---|---|---|---|
| | 2 | 2 | 0 |

### Recommended Uses and Restrictions

Product use: End use herbicide product

### Revision

Identification Number: 50239 / 1023 / Issue Date 2010.09.23 / Version: 5.1
DAS Code: EF-1418
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

### Legend

| | |
|---|---|
| N/A | Not available |
| W/W | Weight/Weight |
| OEL | Occupational Exposure Limit |
| STEL | Short Term Exposure Limit |
| TWA | Time Weighted Average |
| ACGIH | American Conference of Governmental Industrial Hygienists, Inc. |
| DOW IHG | Dow Industrial Hygiene Guideline |
| WEEL | Workplace Environmental Exposure Level |
| HAZ_DES | Hazard Designation |
| VOL/VOL | Volume/Volume |

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