

Product Name: Frontline* XL Herbicide**Issue Date:** 2013.05.07

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* XL 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 2013.05.07**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**Color:** Tan**Physical State:** Liquid**Odor:** Mild**Hazards of product:****WARNING!** May cause allergic skin reaction. May cause skin irritation.

Potential Health Effects

Eye Contact: Essentially nonirritating to eyes.

Skin Contact: Brief contact may cause moderate skin irritation with local redness.

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

Skin Sensitization: Has demonstrated the potential for contact allergy in mice.

Inhalation: No adverse effects are anticipated from single exposure to mist. Based on the available data, respiratory irritation was not observed.

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

Effects of Repeated Exposure: For similar active ingredient(s). 2-methyl-4-chlorophenoxyacetic acid (MCPA). In animals, effects have been reported on the following organs: Blood. Kidney. Liver. Testes.

Birth Defects/Developmental Effects: For the active ingredient(s): MCPA-2-ethylhexyl. Has caused birth defects in laboratory animals only at doses toxic to the mother. Has been toxic to the fetus in laboratory animals at doses toxic to the mother.

3. Composition/information on ingredients

Component	CAS #	Amount W/W
MCPA 2-EHE: 2-Methyl-4-Chlorophenoxyacetic Acid 2-Ethylhexyl Ester	29450-45-1	42.25 %
Florasulam	145701-23-1	0.39 %
Propylene glycol	57-55-6	4.8 %
Linseed oil	8001-26-1	4.3 %
Balance	Not available	48.26 %

Amounts are presented as percentages by weight.

4. First-aid measures**Description of first aid measures**

General advice: 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.

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. 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. Suitable emergency safety shower facility should be available in work area.

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: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never give anything by mouth to an unconscious person.

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), no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

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. Fire Fighting Measures**Suitable extinguishing media**

To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

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 and are not limited to: Hydrogen chloride. Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. 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.

See Section 9 for related Physical Properties

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**Handling**

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

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
Propylene glycol	WEEL	TWA Aerosol.	10 mg/m ³
	CAD ON OEL	TWAEV Total vapor and aerosol.	155 mg/m ³ 50 ppm
Linseed oil	CAD AB OEL	TWA Mist.	10 mg/m ³
	CAD BC OEL	TWA Mist.	10 mg/m ³
	CAD BC OEL	TWA Respirable mist.	3 mg/m ³
	CAD ON OEL	TWAEV Mist.	10 mg/m ³
	OEL (QUE)	TWA Mist.	10 mg/m ³

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.

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields).

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: Butyl rubber. Chlorinated polyethylene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl chloride ("PVC" or "vinyl"). Viton. 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: Use good personal hygiene. Do not consume or store food in the work area. Wash hands 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. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Appearance

Physical State	Liquid
Color	Tan
Odor	Mild
pH	No test data available
Melting Point	No test data available
Freezing Point	No test data available
Boiling Point (760 mmHg)	No test data available
Flash Point - Closed Cup	> 100 °C <i>Closed Cup</i>
Flammability (solid, gas)	No data available
Flammable Limits In Air	Lower: No test data available Upper: No test data available
Vapor Pressure	No test data available
Vapor Density (air = 1)	No test data available
Specific Gravity (H2O = 1)	No test data available
Solubility in water (by weight)	No test data available
Partition coefficient, n-octanol/water (log Pow)	No data available for this product. See Section 12 for individual component data.
Autoignition Temperature	No test data available
Decomposition Temperature	No test data available
Explosive properties	no data available
Oxidizing properties	no data available
Liquid Density	1.034 g/cm ³ <i>Literature</i>

10. Stability and Reactivity

Reactivity

No dangerous reaction known under conditions of normal use.

Chemical stability

Stable under recommended storage conditions. See Storage, Section 7.

Possibility of hazardous reactions

Polymerization will not occur.

Conditions to Avoid: Active ingredient decomposes at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

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

Hazardous decomposition products

Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Hydrogen chloride. Toxic gases are released during decomposition.

11. Toxicological Information

Acute Toxicity

Ingestion

As product: LD50, rat, female 3,129 mg/kg

Dermal

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

Inhalation

As product: LC50, 4 h, Aerosol, rat, male and female > 5.64 mg/l

Eye damage/eye irritation

Essentially nonirritating to eyes.

Skin corrosion/irritation

Brief contact may cause moderate skin irritation with local redness.

Sensitization**Skin**

Has demonstrated the potential for contact allergy in mice. Did not cause allergic skin reactions when tested in guinea pigs.

Respiratory

No relevant data found.

Repeated Dose Toxicity

For similar active ingredient(s). 2-methyl-4-chlorophenoxyacetic acid (MCPA). In animals, effects have been reported on the following organs: Blood. Kidney. Liver. Testes.

Chronic Toxicity and Carcinogenicity

For similar active ingredient(s). 2-methyl-4-chlorophenoxyacetic acid (MCPA). Did not cause cancer in laboratory animals.

Developmental Toxicity

For the active ingredient(s): MCPA-2-ethylhexyl. Has caused birth defects in laboratory animals only at doses toxic to the mother. Has been toxic to the fetus in laboratory animals at doses toxic to the mother.

Reproductive Toxicity

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

Genetic Toxicology

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

12. Ecological Information

Toxicity

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

Fish Acute & Prolonged Toxicity

LC50, *Oncorhynchus mykiss* (rainbow trout), semi-static test, 96 h: > 81 mg/l

Aquatic Plant Toxicity

ErC50, *Pseudokirchneriella subcapitata* (green algae), 72 h: 3.2 mg/l

Toxicity to Above Ground Organisms

oral LD50, *Colinus virginianus* (Bobwhite quail): > 2000 mg/kg bodyweight.

oral LD50, *Apis mellifera* (bees): > 112 ug/bee

contact LD50, *Apis mellifera* (bees): > 200 ug/bee

Toxicity to Soil Dwelling Organisms

LC50, *Eisenia fetida* (earthworms), 14 d: > 1,000 mg/kg

Persistence and Degradability

Data for Component: **MCPA 2-EHE: 2-Methyl-4-Chlorophenoxyacetic Acid 2-Ethylhexyl Ester**

|| No relevant information found.

Stability in Water (1/2-life):

|| 76 d; 25 °C; pH 7; Measured

Data for Component: **Florasulam**

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

Stability in Water (1/2-life):

|| > 30 d

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method	10 Day Window
2 %	28 d	OECD 301B Test	fail

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
7.04E-11 cm ³ /s	1.82 h	Estimated.

Theoretical Oxygen Demand: 0.85 mg/mg

Data for Component: Propylene glycol

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

Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method	10 Day Window
81 %	28 d	OECD 301F Test	pass
96 %	64 d	OECD 306 Test	Not applicable

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
1.28E-11 cm ³ /s	10 h	Estimated.

Biological oxygen demand (BOD):

BOD 5	BOD 10	BOD 20	BOD 28
69.0 %	70.0 %	86.0 %	

Chemical Oxygen Demand: 1.53 mg/mg

Theoretical Oxygen Demand: 1.68 mg/mg

Data for Component: Linseed oil

Material is expected to be readily biodegradable.

Bioaccumulative potential**Data for Component: MCPA 2-EHE: 2-Methyl-4-Chlorophenoxyacetic Acid 2-Ethylhexyl Ester**

Partition coefficient, n-octanol/water (log Pow): 6.17 Estimated.

Bioconcentration Factor (BCF): 11,250

Data for Component: 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; Measured

Data for Component: 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.

Data for Component: Linseed oil

Bioaccumulation: No relevant data found.

Mobility in soil**Data for Component: MCPA 2-EHE: 2-Methyl-4-Chlorophenoxyacetic Acid 2-Ethylhexyl Ester**

Partition coefficient, soil organic carbon/water (Koc): 10,500 Estimated.

Henry's Law Constant (H): 6.253E-05 atm*m³/mole; 25 °C Estimated.

Data for Component: Florasulam

Mobility in soil: Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient, soil organic carbon/water (Koc): 4 - 54 **Henry's Law Constant (H):**

4.35E-07 Pa*m³/mole.; 20 °C

Data for Component: Propylene glycol

Mobility in soil: 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, soil organic carbon/water (Koc): < 1 Estimated.

Henry's Law Constant (H): 1.2E-08 atm*m³/mole Measured

Data for Component: Linseed oil

Mobility in soil: No relevant data found.

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
NOT REGULATED

IMDG

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Technical Name: Florasulam and MCPA

Hazard Class: CLASS 9 **ID Number:** UN3082 **Packing Group:** PG III

EMS Number: F-A,S-F

Marine pollutant.: Yes

ICAO/IATA

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Technical Name: Florasulam and MCPA

Hazard Class: CLASS 9 **ID Number:** UN3082 **Packing Group:** PG III

Cargo Packing Instruction: 964

Passenger Packing Instruction: 964

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: 28804

National Fire Code of Canada

Not applicable

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	1	0

Recommended Uses and Restrictions

Identified uses

Product use: End use herbicide product

Revision

Identification Number: 1003412 / 1023 / Issue Date 2013.05.07 / Version: 2.0

DAS Code: GF-1727

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

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.