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**In Case of Emergency, Call
1-800-327-8633 (FAST MED)**

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MSDS prepared by:
Department of Regulatory & Biological Assessment
Syngenta Canada Inc.

Supersedes Date (Y/M/D) : NEW
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1-87-SYNGENTA (1-877-964-3682)

SECTION – 1: PRODUCT IDENTIFICATION

Product Identifier: BOUNDARY® LQD Herbicide Formulation No.: A12831A
Registration Number: 30812 (Pest Control Products Act)
Chemical Classes: A mixture of a triazinone and a chloroacetanilide herbicide.

Active Ingredient (%): Metribuzin (13.8%) CAS No.: 21087-64-9
Chemical Name: 4-amino-6-(1,1-dimethyl)-3-(methylthio)-1,2,4-triazin-5 (4H)-one
Chemical Class: Triazinone Herbicide

Active Ingredient (%): S-metolachlor (58.1%) CAS No.: 87392-12-9
Chemical Name: Acetamide, 2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)-(S)
Chemical Class: Chloroacetanilide Herbicide

Product Use: A herbicide for weed control . For further details please refer to product label.

SECTION – 2 : COMPOSITION/INFORMATION ON INGREDIENTS

Material	OSHA PEL	ACGIH TLV	Other	NTP/IARC/OSHA Carcinogen	WHMIS†
Petroleum Solvent	Not Established	Not Established	50 mg/m ³ (8 ppm) TWA*	No	
1,2,4-Trimethyl- benzene (< 5%)	Not Established	25 ppm TWA	25 ppm TWA**	No	
Naphthalene (<5.0%)	10 ppm TWA	10 ppm TWA (skin)	10 ppm TWA**	See “Toxicity”, Sec. 11	
S-metolachlor (58.1 %)	Not Established	Not Established	10 mg/m ³ TWA***	No	Not Established
Metribuzin (13.8%)	Not Established	5 mg/m ³ TWA	5 mg/m ³ TWA**	No	

- * Recommended by Manufacturer
- ** Recommended by NIOSH
- *** Syngenta Occupational Exposure Limit (OEL)
- **** Recommended by AIHA (American Industrial Hygiene Association)
- † Material listed in Ingredient Disclosure List under Hazardous Products Act.

Ingredients not precisely identified are proprietary or non-hazardous. Values are not product specifications.
Syngenta Hazards Category: B, S

SECTION – 3: HAZARDS IDENTIFICATION

Symptoms of Acute Exposure

Harmful if swallowed. Irritating to eyes and skin. Vapours may cause drowsiness and dizziness. May be harmful if swallowed and enters airways.

Hazardous Decomposition Products

None known.

Physical Properties

Appearance: Transparent amber liquid.

Odour: Aromatic sulfur-like.

Unusual Fire, Explosion and Reactivity Hazards

Combustible liquid. Can release vapours that form explosive mixtures at temperatures at or above the flash point. Heavy vapours can flow along surfaces to distant ignition sources and flash back.

During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion.

Potential Health Effects

Relevant routes of exposure: Skin, eyes, mouth, lungs.

SECTION – 4: FIRST AID MEASURES

IF POISONING IS SUSPECTED, immediately contact the poison information centre, doctor or nearest hospital. Have the product container, label or Material Safety Data Sheet with you when calling Syngenta, a poison control centre or doctor, or going for treatment. Tell the person contacted the complete product name, and the type and amount of exposure. Describe any symptoms and follow the advice given. Call the Syngenta Emergency Line [**1-800-327-8633 (1-800-FASTMED)**], for further information.

EYE CONTACT: Flush eyes with clean water, holding eyelids apart for a minimum of 1520 minutes. Remove contact lenses, if present, after 5 minutes, then continue rinsing eye. Call Syngenta, a poison control centre or doctor for treatment advice. Obtain medical attention immediately if irritation persists.

SKIN CONTACT: Immediately remove contaminated clothing and wash skin, hair and fingernails thoroughly with soap and water. Flush skin with running water for a minimum of 20 minutes. Obtain medical attention if irritation occurs.

INHALATION: Move victim to fresh air. If not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call Syngenta, a poison control centre or doctor for treatment advice.

INGESTION: If swallowed, immediately contact Syngenta, a poison control centre, doctor or nearest hospital for treatment advice. Do not induce vomiting unless directed by a physician or a poison control centre. Do not give any liquid to the person. Do not give anything by mouth to an unconscious person. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth.

NOTES TO PHYSICIAN:

There is no specific antidote if this product is ingested. Treat symptomatically.

Contains petroleum distillate – vomiting may cause aspiration pneumonia.

MEDICAL CONDITIONS KNOWN TO BE AGGRAVATED:

None known.

SECTION – 5: FIRE FIGHTING MEASURES

Flash point and method: > 86.7°C.

Upper and lower flammable (explosive) limits in air: Not applicable.

Auto-ignition temperature: Not available.

Flammability: Combustible liquid.

Hazardous combustion products: Combustible liquid. Can release vapours that form explosive mixtures at temperatures at or above the flash point. Heavy vapours can flow along surfaces to distant ignition sources and flash back.

During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion.

Conditions under which flammability could occur:

Extinguishing media: Use foam, carbon dioxide, dry powder or halon extinguishant or an appropriate extinguishant for combustibles. Wear full protective clothing and self-contained breathing apparatus. Evacuate nonessential personnel from the area to prevent human exposure to fire, smoke, fumes or products of combustion. Prevent use of contaminated buildings, area, and equipment until decontaminated. Water runoff can cause environmental damage. Contain run-off water with, for example, temporary earth barriers.

Sensitivity to explosion by mechanical impact:

Sensitivity to explosion by static discharge:

SECTION – 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: Make sure all personnel involved in the spill cleanup follow good industrial hygiene practices. A small spill can be handled routinely. Wear suitable protective equipment and clothing as described in Section 8 and/or the product label.

Procedures for dealing with release or spill: Control the spill at its source. Contain the spill to prevent from spreading or contaminating soil or from entering sewage and drainage systems or any body of water. Clean up spills immediately, observing precautions outlined in Sections 7 and 8. Pump or scoop large amounts of liquid into a disposable container. Absorb remaining liquid or smaller spills with clay, sand or vermiculite. Scoop or sweep up material and place into a disposal container. Wash area with detergent and water. Pick up wash liquid with additional absorbent and place into compatible disposal container. On soils, small amounts will naturally decompose. For large amounts, skim off the upper contaminated layer and collect for disposal. Once all material is cleaned up and placed in a disposal container, seal container and arrange for disposition. Spillages or uncontrolled discharges into watercourses must be reported to the appropriate regulatory body.

SECTION – 7: HANDLING AND STORAGE

Handling practices: KEEP OUT OF REACH OF CHILDREN. Prevent eating, drinking, tobacco use, and cosmetic application in areas where there is a potential for exposure to the material. Avoid breathing vapours or spray mist. Wear full protective clothing and equipment (see Section 8). After work, rinse gloves and remove protective equipment, and wash hands thoroughly with soap and water after handling, and before eating, tobacco use, drinking, applying cosmetics or using the toilet. Wash contaminated clothing before re-use and separate from household laundry. Keep containers closed when not in use. Protect product, wash or rinse water, and contaminated materials from uncontrolled release into the environment, or from access by animals, birds or unauthorized people.

Appropriate storage practices/requirements: Store in original container only in a well-ventilated, cool, dry, secure area. Protect from heat, sparks and flame. Do not expose sealed containers to temperatures above 40 °C and prevent product from freezing. Keep separate from other products to prevent cross contamination. Rotate stock. Clean up spilled material immediately. Avoid storage below -10°C.

National Fire Code classification: IIIA

SECTION – 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Applicable control measures, including engineering controls: This product is intended for use outdoors where engineering controls are not necessary. If necessary, ensure work areas have ventilation, containment, and procedures sufficient to maintain airborne levels below the TLV. Warehouses, production area, parking lots and waste holding facilities must have adequate containment to prevent environmental contamination. Provide separate shower and eating facilities.

THE FOLLOWING RECOMMENDATIONS FOR EXPOSURE CONTROLS/PERSONAL PROTECTION ARE INTENDED FOR THE MANUFACTURE, FORMULATION, PACKAGING AND USE OF THIS PRODUCT.

CONSULT THE PRODUCT LABEL FOR COMMERCIAL APPLICATIONS AND/OR ON-FARM APPLICATIONS.

Personal protective equipment for each exposure route:

General: Avoid breathing dust, vapours or aerosols. Avoid contact with eye, skin and clothing. Wash thoroughly after handling and before eating, drinking, applying cosmetics or handling tobacco.

INGESTION: Do not eat, drink, handle tobacco, or apply cosmetics in areas where there is a potential for exposure to this material. Always wash thoroughly after handling.

EYES: Where eye contact is likely, use chemical splash goggles. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

SKIN: Where contact is likely, wear chemical-resistant (such as nitrile or butyl) gloves, coveralls, socks and chemical-resistant footwear. For overhead exposure, wear chemical-resistant headgear.

INHALATION:

A respirator is not normally required when handling this substance. Use effective engineering controls to comply with occupational exposure limits. In case of emergency spills, use a NIOSH approved respirator with any N, R, P or HE filter.

Use a self-contained breathing apparatus in cases of emergency spills, when exposure levels are unknown, or under any circumstances where air-purifying respirators may not provide adequate protection..

SECTION – 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Transparent amber liquid.

Formulation Type: Emulsifiable concentrate

Odour: Aromatic sulphur-like.

pH: 3 - 5 (1% solution in H₂O @ 25°C).

Vapour pressure and reference temperature:

Metribuzin:	1.2 x 10 ⁻⁷ mmHg @ 20°C
S-metolachlor:	2.8 x 10 ⁻⁵ mmHg @ 25°C

Vapour density: Not available.

Boiling point: Not available.

Melting point: Not applicable.

Freezing point: Not available.

Specific gravity or density: 1.08 g/mL @ 20°C.

Evaporation Rate: Not available.

Water/oil partition coefficient (log Kow): Metribuzin Technical: 1.6
S-Metolachlor Technical; 3.1

Odour threshold: Not available.

Viscosity: 62 mPas

Solubility in Water:

Metribuzin:	1.05 g/L @ 20°C
S-metolachlor:	0.48 g/L @ 25°C

SECTION – 10: STABILITY AND REACTIVITY

Chemical stability: Stable under normal use and storage conditions.

Conditions to avoid: None known.

Incompatibility with other materials: None known.

Hazardous decomposition products: None known.

Hazardous polymerization: Will not occur.

SECTION – 11: TOXICOLOGICAL INFORMATION

Acute toxicity/Irritation Studies (Finished Product):

Ingestion:	<u>Low Acute Toxicity</u> Oral (LD50 Rat):	1,805 mg/kg body weight
Dermal:	<u>Low Acute Toxicity</u> Dermal (LD50 Rat):	> 5,000 mg/kg body weight
Inhalation:	<u>Low Acute Toxicity</u> Inhalation (LC50 Rat):	> 2.53 mg/L air - 4 hours
Eye Contact:	<u>Moderately Irritating (Rabbit)</u>	
Skin Contact:	<u>Slightly Irritating (Rabbit)</u>	
Skin Sensitization:	<u>Not a Sensitizer (Guinea Pig)</u>	

Reproductive/Developmental Effects

Metribuzin:	Developmental toxicity studies in rats showed both developmental and maternal effects. A reproductive toxicity feeding study in rats showed reduced offspring weights at the highest dose level.
S-metolachlor:	None observed.

Chronic/Subchronic Toxicity Studies

Metribuzin:	Dog and rat feeding studies showed decreases in body weight and food consumption, anemia, liver effects, kidney effects, testicular effects and mortality. A dermal toxicity study in rabbits showed effects on cholesterol levels and liver function. A rat inhalation study showed behavioral changes, decreased body weight gains, liver enzyme induction and organ weight effects. Neurotoxicity: Animal studies showed evidence of transient neurobehavioral effects after single oral dosing at 5 mg/kg and above. Other screening studies showed no evidence of neurotoxicity at dietary concentrations up to 900 ppm.
S-metolachlor:	None observed.

Carcinogenicity

Metribuzin:	Metribuzin was investigated for carcinogenicity in chronic feeding studies using rats and mice at maximum levels of 900 and 3200 ppm, respectively. There was no evidence of a carcinogenic potential observed in either species.
S-metolachlor:	Benign liver tumors at high dose levels (female rats).

Other Toxicity Information:

None

Toxicity of Other Components

1,2,4-Trimethylbenzene (<5.0%):	Test results reported in Section 11 for the finished product take into account any acute hazards related to the 1,2,4-trimethylbenzene in the formulation.
Naphthalene (<5.0%):	Test results reported in Section 11 for the final product take into account any acute hazards related to the naphthalene in the formulation. Chronic overexposure to naphthalene can affect the liver, kidney, respiratory tract and blood.

Carcinogen Status:
NTP: Anticipated Carcinogen
IARC: Group 2B Possible Human Carcinogen.

Petroleum Solvent:

Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage. May be irritating to the eyes, nose, throat and lungs. Breathing of high vapor concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination.

Other materials that show synergistic toxic effects together with the product:

Target Organs

Active Ingredient

Metribuzin: Liver, kidney, thyroid, testes.

S-metolachlor : Liver.

Inert Ingredients

1,2,4-Trimethylbenzene: Not Applicable.

Naphthalene: Liver, kidney, respiratory tract, blood.

Petroleum Solvent: Respiratory tract, stomach, liver, thyroid, urinary bladder, CNS, skin.

SECTION – 12: ECOLOGICAL INFORMATION

Summary of Effects

Eco-Acute Toxicity

S-Metolachlor:

Invertebrates (Water Flea) LC ₅₀ /EC ₅₀	26 ppm
Fish (Rainbow Trout) 96-hr LC ₅₀ /EC ₅₀	11.9 ppm
Birds (Bobwhite Quail) LD ₅₀	>2,510 ppm

Metribuzin:

Invertebrates (Water Flea) 48-hr LC ₅₀	49.6 ppm
Fish (Rainbow Trout) 96-hr LC ₅₀	74.6 ppm
Birds (Mallard Duck) LD ₅₀	460 ppm

Environmental Fate

The active ingredient metribuzin is not persistent in soil and stable in water. It has moderate mobility in soil.

The active ingredient, S-metolachlor, has a low bioaccumulation potential, slight to moderate mobility in soil, and low to moderate persistence in soil and water. The dissipation half-life in soil is 14-30 days. The main route of degradation is by microbial degradation and formation of bound residues.

SECTION – 13: DISPOSAL CONSIDERATIONS

Waste disposal information: Do not reuse empty containers unless they are specifically designed to be re-filled. Empty container retains product residue. Dispose of empty containers in accordance with local regulations. Consult provincial environment ministry for advice on waste disposal. Industrial/commercial waste may be handled at licensed facilities only. Waste shipments must be securely packaged and properly labelled. Only licensed carriers may be used, and proper documents must accompany the shipment.

SECTION – 14 : TRANSPORT INFORMATION

Shipping information such as shipping classification:

TRANSPORTATION OF DANGEROUS GOODS CLASSIFICATION - ROAD/RAIL.

Not Regulated.

SECTION – 15: REGULATORY INFORMATION

WHMIS classification for product: Exempt

This MSDS has been prepared in accordance with WHMIS requirements, but the data are presented under 16 headings.

Pest Control Products (PCP) Act Registration No.: 30812

SECTION – 16: OTHER INFORMATION

The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Syngenta will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years. This product is under the jurisdiction of the Pest Control Products Act and is exempt from the requirements for a WHMIS compliant MSDS. Hazardous properties of all ingredients have been considered in the preparation of this MSDS. Read the entire MSDS for the complete hazard evaluation of this product.

Prepared by: Syngenta Canada Inc.
1-87-SYNGENTA (1-877-964-3682)

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