MATERIAL SAFETY DATA SHEET

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Date of MSDS Preparation (Y/M/D): 2015-01-30

In Case of Emergency from Spill Call 1-613-996-6666 (CANUTEC)
For further information contact: 1-877-362-3276

SECTION – 1: PRODUCT IDENTIFICATION

Product Identifier: MPOWER Aurora® Clodinafop Herbicide
Chemical Class: Carboxylic acid derivative herbicide.

Active Ingredient (%): Clodinafop-Propargyl (22.3%)
CAS NO.: 105512-06-9
Chemical Name: Propanoic acid, 2-[4-[(5-chloro-3-fluoro-2-pyridinyl)oxy]-phenoxy]-2-propynyl ester.
Product Use: Post-emergence herbicide for use in wheat. Please refer to product label for further details.

SECTION – 2: COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS #	Concentration
Naphthalene	91-20-3	Variable - based on suppliers formulation
1-methylnaphthalene	90-12-0	Variable - based on suppliers formulation
2-methylnaphthalene	91-57-6	Variable - based on suppliers formulation
n-Methylpyrrolidone	872-50-4	< 12%
Petroleum Solvent	Proprietary,	< 60%
Cloquintocet-Mexyl	658-88-1	< 8%
Clodinafop-Propargyl	105512-06-9	22.3%

SECTION – 3: HAZARDS IDENTIFICATION

Symptoms of Acute Exposure

Causes irritation to the eyes, skin and respiratory tract. Skin allergies are possible.

Exposure to high vapor levels may cause headache, dizziness, numbness, nausea, in-coordination, or other central nervous system effects.

Hazardous Decomposition Products

Product likely to decompose at high temperatures resulting in formation of toxic gases.

Physical Properties

Light to dark brown liquid.
Aromatic solvent odour.

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.

SECTION – 4: FIRST AID MEASURES

IF POISONING IS SUSPECTED, immediately contact the poison control centre, doctor or local hospital. When possible have the product label or MSDS with you when calling for assistance, a poison control center or doctor, or obtaining treatment. Provide details of product and exposure to emergency personnel. Describe possible symptoms and follow instructions provided.

IN CASE OF EYE CONTACT: Flush eyes immediately with cold running clean water, holding eyelids apart for a minimum of 15 minutes. If present, remove contact lenses after 5 minutes. Obtain medical attention immediately if irritation persists.

IN CASE OF SKIN CONTACT: Remove contaminated clothing. Thoroughly wash skin, hair and hands with soap and water. Flush with running water for a minimum of 15 minutes. Obtain medical attention immediately if irritation occurs or persists.

IN CASE OF INHALATION: Remove individual to fresh air. If not breathing, provide artificial respiration, preferably mouth-to-mouth. If breathing is laboured, give oxygen. Call for immediate medical attention.

IN CASE OF INGESTION: Immediately contact a poison control centre, doctor or local hospital for treatment advice. If individual is conscious, wash out mouth with fresh water. Do not administer anything by mouth to an unconscious person. Do not induce vomiting unless directed by a physician or a poison control center. If vomiting occurs, lean the individual forward with head down to avoid inhalation of vomitus. Rinse mouth and continue to administer water.

NOTES TO PHYSICIAN: There is no specific antidote if product is ingested. Treat symptomatically. Contains petroleum distillate - vomiting may cause aspiration pneumonia.

MEDICAL CONDITIONS KNOWN TO BE AGGRAVATED: Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.

SECTION – 5: FIRE FIGHTING MEASURES

Flash point and method: 62 ºC (PM CC).
Upper and lower flammable (explosive) limits in air:
LEL: 1.0%
UEL: 7.0%
Auto-ignition temperature: 510 ºC.
Flammability: Flammable liquid.

Hazardous combustion products: Carbon and nitrogen oxides or carbon and smoke are likely. Toxic fumes of Cl- and NOx from active ingredient decomposition may also develop.

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.

Conditions under which flammability could occur: This product contains aromatic hydrocarbon. Temperatures above the flash point. Keep fire exposed containers cool by spraying with water.

Extinguishing media: Use water fog or mist, (avoid excess water), foam, carbon dioxide, dry powder or halon extinguishant. 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: Not sensitive.
Sensitivity to explosion by static discharge: Low.

SECTION – 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: All personnel involved in the spill cleanup should follow good industrial hygiene practices. Small spills may be handled routinely. Don suitable eye protection and clothing to prevent eye and skin exposure. Use adequate ventilation and if necessary wear an air-supplied respirator to prevent inhalation.

Release or spill procedures: Control the spill at its source. Contain the spill to prevent spread, contamination of soil or from entering sewage and drainage systems or any body of water. Immediately clean up spills and observe precautions identified for storage and handling and exposure reduction. 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. For contaminated soil, skim off the upper contaminated layer and collect for disposal. Seal all recovered materials in a

disposal container and arrange for disposition. Spillages or uncontrolled discharges into watercourses must be alerted to the appropriate provincial (Environment) or federal (DFO) regulatory body.

SECTION – 7: HANDLING AND STORAGE

KEEP OUT OF REACH OF CHILDREN and animals.
Handling: Prevent eating, drinking, and tobacco use in areas where there is a potential for exposure to the material. Rinse gloves and remove personal protective equipment when completed working with product. Thoroughly wash hands with soap and water after use, and before eating, tobacco use, drinking, or using the restroom. Prior to re-use of work clothes wash separately from household laundry. Containers not in use should remain closed. Prevent unauthorized access to product and rinse water to reduce contamination. Prevent product from contaminating bodies of water, crops, and animals and birds.

Storage: Store in original container only, and in a well-ventilated, cool, dry, secure area. Protect from heat, sparks and flame. Maintain storage at temperatures below 40 °C. Prevent cross contamination among products. Clean up spilled material immediately. National Fire Code classification: IIIA (Min. 70 ºC) Comb.Liq.

SECTION – 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Applicable control measures, including engineering controls: Work areas should have appropriate 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. Options for separate shower and eating facilities may be provided.

		Limit/Standard			
Source	**OSHA PEL**	**ACGIH TLV**	**Other**	**NTP/IARC/OSHA Carcingen**	**WHMIS†**
Naphthalene (variable) (CAS No. 91-20-3)	10 ppm TWA	10 ppm TWA (skin)	10 ppm TWA**	Possible Human Carcinogen – See Section 11	Yes
1-methylnaphthalene (variable)	Not Established	Not Established	Not Established	Possible	Not Established
2-methylnaphthalene (variable)	Not Established	Not Established	Not Established	Possible	Not Established
n-Methylpyrrolidone (variable)	Not Established	Not Established	10 ppm TWA****	No	Not Established
Petroleum Solvent	Not Established	Not Established	100 mg/m3 (15 ppm) TWA*	No	Not Established
Cloquintocet-Mexyl (variable)	Not Established	Not Established	10 ppm TWA***	No	Not Established
Clodinafop-Propargyl (22.3%)	Not Established	Not Established	Not Established	No	Not Established

* Recommended by manufacturer
** Recommended by NIOSH

*** Manufacturer Suggested 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.

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

CONSULT AND READ THE ENTIRE PRODUCT LABEL BEFORE COMMERCIAL APPLICATIONS AND/OR ON-FARM APPLICATIONS.

Personal protective equipment for each exposure route:
Avoid breathing vapours or aerosols. Avoid contact with eye, skin and clothing. Wash thoroughly after handling and before eating, drinking, or using tobacco.

INGESTION: Do not eat, drink, or handle tobacco in areas where there is a potential for exposure to this material. Always wash thoroughly after handling.
EYES: Use chemical splash goggles if eye contact is likely. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
SKIN: 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 process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below exposure limits.

SECTION – 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Light to dark brown liquid.
Formulation Type: Emulsifiable concentrate.
Odour: Aromatic solvent.
pH: 4 – 7 (1% aqueous solution).
Vapour pressure and reference temperature:
4.0×10^{-8} mmHg @ 20 °C (Clodinafop-Propargyl Technical).
Vapour density: Not available.
Boiling point: 177 – 210 °C.
Melting point: Not applicable.
Freezing point: -31 °C.
Specific gravity or density: 1.06 – 1.10 g/cm^3.
Evaporation Rate: Aromatic hydrocarbon 0.03 (BuAc = 1).
Water/oil partition coefficient: Not available.
Odour threshold: Not available.
Viscosity: 26.3 cps @ 21 °C.
Solubility in Water: 4 mg/L @ 25 °C (Clodinafop-Propargyl technical).

SECTION – 10: STABILITY AND REACTIVITY

Stability: Stable at room temperature.
Avoid: Ignition sources. Temperatures below -17 °C (2 °F) or above 62 °C (144 °F).
Material incompatibility: Strong oxidizers, strong acids, alkalies.
Hazardous decomposition products: May decompose at high temperatures to form toxic gases.
Hazardous polymerization: Will not occur.

SECTION – 11: TOXICOLOGICAL INFORMATION

Acute toxicity/Irritation Studies (Finished Product):

Ingestion:	Slightly Toxic	Oral (LD50 Rat): > 2,276 mg/kg body weight
Dermal:	Slightly Toxic	Dermal (LD50 Rat): > 4,000 mg/kg body weight
Inhalation:	Slightly Toxic	Inhalation (LC50 Rat): > 3.5 mg/L air - 4 hours

Eye Contact: Moderately Irritating (Rabbit)
Skin Contact: Moderately Irritating (Rabbit)
Skin Sensitization: Sensitizer (Guinea Pig)

Reproductive/Developmental Effects:	Clodinafop-Propargyl: None Observed.
Chronic/Subchronic Toxicity Studies	Clodinafop-Propargyl: Liver changes, anemia and skin reactions.
Carcinogenicity Clodinafop-Propargyl:	Increased incidences of benign tumors in mice (liver) and rats (ovary, prostate).

Other Toxicity Information: None.
Toxicity of Other Components

The acute toxicity test results for the finished product take into account any acutely related hazards to other components in the marketed formulation.

Cloquintocet-Mexyl

Causes mild eye and skin irritation. Toxic if inhaled or swallowed. Allergic skin reactions are possible.

Naphthalene (< 6%)

Exposure to naphthalene can cause cataracts, liver damage, kidney failure, respiratory failure, hematuria, anemia, damage to red blood cells, leukocytosis, or coma.
Carcinogen Status: NTP:
Anticipated Carcinogen IARC: Group 2B Possible Human Carcinogen

Petroleum Solvent

Inhalation of vapors at high concentrations can cause central nervous system (CNS) effects (e.g. dizziness, headache, etc.), irritation to eyes or respiratory tract.

n-Methylpyrrolidone (< 9%)

May cause respiratory tract irritation. Repeated or prolonged exposure may cause drying and cracking of the skin.

Other materials that show synergistic toxic effects together with the product: None known.

Target Organs
Active Ingredient
Clodinafop-Propargyl: Liver, skin, bone marrow.

Inert Ingredients
Cloquintocet-Mexyl: Eye, skin, lung, digestive tract.
Naphthalene: Eye, liver, kidney, respiratory tract, blood, CNS.
Petroleum Solvent: Respiratory tract, stomach, liver, thyroid, urinary bladder, CNS, skin.
n-Methylpyrrolidone: Eye, skin.

SECTION – 12: ECOLOGICAL INFORMATION

Summary of Effects:
MPOWER Aurora® Clodinafop Herbicide selectively kills certain grass weeds in cereal crops. Sufficient exposure may be harmful to certain grass species. The active ingredient clodinafop propargyl is highly toxic to fish, but has low toxicity to birds and mammals and practically no toxicity to insects (bees).

Eco-Acute Toxicity Clodinafop-Propargyl:
- Bees LC50/EC50 > 100 µg/bee
- Invertebrates (Water Flea) LC50/EC50 > 2 ppm
- Fish (Trout) LC50/EC50 0.39 ppm
- Fish (Bluegill) LC50/EC50 0.21 ppm
- Birds (8-day dietary - Bobwhite Quail) LC50/EC50 > 5,200 ppm
- Birds (8-day dietary - Mallard Duck) LC50/EC50 > 5,200 ppm

Eco-Chronic Toxicity Clodinafop-Propargyl:
- Invertebrate (Daphnia magna) 21-Day Reproduction EC50 0.14 mg./L
- Fish (Rainbow Trout): 21 Day NOEC 0.15 mg./L

Environmental Fate
Clodinafop-propargyl is sensitive to soil and water microbial degradation, in addition to soil hydrolysis and photolysis. Potential for bioaccumulation is low. It does not persist in the environment (DT_{50} < 1 day in soil or natural water). Mobility in soil is low to moderate. MPOWER Aurora® Clodinafop Herbicide as a bulk liquid sinks in water and eventually disperses as an emulsion.

SECTION – 13: DISPOSAL CONSIDERATIONS

Waste disposal information:
Do not reuse empty containers. Triple rinse empty container, and return rinse water to dilution mixture. Dispose of dilution mixture as a hazardous waste if it cannot be disposed of by use through normal application as indicated on label instructions. 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.

Other regulations; restrictions and prohibitions

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

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 NewAgco 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.

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