NUFARM AGRICULTURE INC.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

SUPPLIED BY:
Nufarm Agriculture Inc.
5507 1st Street, SE
Calgary, AB. T2H 1H9

Phone Number: (403)-253-8471
Fax Number: (403)-253-8478

MANUFACTURED BY:
Nufarm Agriculture Inc.
5507 1st Street, SE
Calgary, AB T2H 1H9

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PRODUCT: **Nufarm Fluroxypyr 180 Herbicide**
PCP NUMBER: 30028
DATE PREPARED: March 25, 2011
PREPARER: Nufarm Agriculture Inc.; Regulatory Affairs & Research Department
CHEMICAL FAMILY/USE: Herbicide
FORMULA: $C_{15}H_{21}Cl_2FN_2O_3$
CHEMICAL SYNONYMS: fluroxypyr 1-methylheptyl ester; fluroxypyr-meptyl; 1-methylheptyl [(4-amino-3,5-dichloro-6-fluoro-2-pyridinyl)oxy]acetate; fluroxypyr MHE

2. COMPOSITION/INFORMATION ON INGREDIENTS

Values are not product specifications.

Hazardous Ingredients	% w/w	CAS NO.
Fluroxypyr 1-methylheptyl ester	26.2	81406-37-3
Other ingredients	73.8	
Including:		
Proprietary aromatic solvent		64742-94-5
Naphthalene[1]	>1.0%[2]	91-20-3
1,2.4-Trimethylbenzene[1]	>0.1%[2]	95-63-6
Proprietary emulsifiers		NA
1-Methyl-2-pyrrolidinone		872-50-4

[1]contained in proprietary aromatic solvent
[2]as a component of entire formulation
Other ingredients are non-hazardous and/or proprietary.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: WARNING - EYE IRRITANT, CAUTION - SKIN IRRITANT, DANGER - CAUSES SUBSTANTIAL BUT TEMPORARY EYE INJURY, HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN, MAY CAUSE SKIN IRRITATION, KEEP OUT OF REACH OF CHILDREN

EFFECTS OF ACUTE EXPOSURE:
INGESTION: Small amounts swallowed incidental to normal handling operations are not likely to cause injury. Swallowing large amounts may cause injury. If the liquid enters the lungs, this product may cause lung damage or death due to chemical pneumonia.
SKIN CONTACT: A short single exposure is not likely to cause skin irritation. Prolonged or repeated exposure may cause skin irritation, even a burn. Repeated contact may cause drying or flaking of skin.

INHALATION: A single exposure to vapors is not likely to be hazardous. Excessive exposure to the solvents contained in this formulation may cause respiratory irritation and central nervous system depression. Signs and symptoms of excessive exposure may be nausea and/or vomiting.
EYE CONTACT: This product may cause moderate eye irritation and slight temporary corneal injury. Vapors may cause eye irritation experienced as mild discomfort and local redness.

CHRONIC EFFECTS/CARCINOGENICITY: Effect have been reported on the following organs: bone marrow, kidney, liver and respiratory tract. Fluroxypyr did not cause cancer in laboratory animals. An NTP report states that a lifetime inhalation exposure to naphthalene increased lung tumors in female mouse. Active ingredient did not cause cancer in laboratory animals.
REPRODUCTIVE TOXICITY: In animal studies, fluroxypyr has been shown not to interfere with reproduction.
DEVELOPMENTAL TOXICITY: 1-Methyl-2-pyrrolidinone caused toxic effects to the fetus in laboratory animals at high dose levels with either mild or undetectable maternal toxicity. Fluroxypyr did not cause birth defect; however, in laboratory animals, other toxic effects to the fetus have been seen.
MUTAGENICITY: For the solvent: *in vitro* mutagenicity studies were negative in some cases and positive in other cases. For fluroxypyr: *in vitro* and animal mutagenicity studies were negative.
SUBCHRONIC (TARGET ORGAN) EFFECTS: For the solvent(s): Excessive exposure to solvent(s) may cause respiratory irritation and central nervous system depression. For the minor component(s): In animals, effects have been reported on the following organs: liver, kidney. Blood-forming organs (bone marrow & spleen). Blood. Respiratory tract.
MEDICAL CONDITIONS AGGRAVATED: None known.
PRINCIPLE ROUTES OF EXPOSURE: Skin, eyes, mouth, lungs.
TOXICOLOGICALLY SYNERGISTIC MATERIALS: None known.
OTHER: See Section 11.

4. FIRST AID MEASURES

If swallowed, call a poison control centre 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 a poison control centre or doctor. Do not give anything by mouth to an unconscious person.
If on skin or clothing, take off contaminated clothing. Rinse skin immediately with plenty of water for 15–20 minutes. Call a poison control centre or doctor for treatment advice.
If in eyes, hold eye 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 eye. Call a poison control centre or doctor for treatment advice.
If inhaled, move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control centre or doctor for further treatment advice.

NOTE TO PHYSICIAN:
This product contains a petroleum-based solvent. The decision of whether to induce vomiting or not should be made by the attending physician. If lavage is performed, endotracheal control is suggested. The danger of lung aspiration must be weighed against toxicity when considering emptying the stomach. If a burn is present, treat as any thermal burn, after decontamination. There is no specific antidote.

5. FIRE FIGHTING MEASURES

FLASH POINT:.....63 C *(PMCC)*
CONDITIONS OF FLAMMABILITY: .....Flammable liquid
FLAMMABLE LIMITS IN AIR - Upper (%):.....NA
FLAMMABLE LIMITS IN AIR - Lower (%):. .....NA
AUTOIGNITION TEMPERATURE: .....NA
SENSITIVITY TO MECHANICAL IMPACT (Y/N): NA
SENSITIVITY TO STATIC DISCHARGE: .....NA

EXTINGUISHING MEDIA: .....Foam (alcohol resistant AFFF at 3% or 6%), C02, dry chemical. Foam is preferred.

SPECIAL FIRE FIGHTING PROCEDURES: Toxic irritating gases and fumes will be formed under fire conditions. Contain fire-fighting water for future disposal. Wear positive-pressure self-contained breathing apparatus and full turnout gear.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Use safety equipment and procedures appropriate to the size of the spill. Keep unnecessary people away. Avoid runoff to natural waters and sewers. Surround and absorb spills with inert material such as perlite, sawdust, clay granules, vermiculite, sand or dirt. (Soak up small amounts of spill with absorbent clays.) Contain all affected material in a closed, labeled container for proper disposal. Isolate from other waste materials. Clean contaminated area such as hard surfaces with detergent and water, collecting cleaning solution for proper disposal. Large spills to soil or similar surfaces may necessitate removal of top soil.

See Section 13 for disposal information.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Handling: Keep this product out of reach of children or animals. Do not use or store near heat or open flame. Do not swallow. Avoid breathing mist or vapors. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling and before eating, drinking, chewing gum or using tobacco or the toilet. Use with adequate ventilation.

Storage: Store in original containers in secure, dry heated storage with the container(s) tightly 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. Keep away from heat, sparks and flame. Do not ship or store this product with foodstuffs, feed, seed, drugs or clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS:

Hazardous Ingredients	TWA*	ACGIH TLV®	STEL	Units
Fluroxypyr	10 mg/m^3 **	N/E	N/E	mg/m^3
Aromatic solvent	15 ppm TWA **	NA	NA	ppm
Naphthalene	10 ppm	NA	15 ppm	ppm
trimethylbenzene	NA	25 ppm	NA	ppm
1-Methyl-2-pyrrolidinone	10 ppm TWA ***	NA	NA	ppm

*8-hour TWA unless otherwise noted
** Recommended by manufacturer
*** Recommended by AIHA (American Industrial Hygiene Association)

ENGINEERING CONTROLS: Ensure work areas have ventilation, containment, and procedures sufficient to maintain airborne levels below the threshold limit value (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

GENERAL: Avoid breathing vapours or aerosols. Avoid contact with eye, skin and clothing. Wash thoroughly after handling and before eating, drinking, or using tobacco.
RESPIRATORY PROTECTION EQUIPMENT: 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. A NIOSH-certified combination air-purifying respirator with an N, P or R 95 or HE class filter and an organic vapor cartridge may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a pressure demand atmosphere-supplying respirator if there is any potential for uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection.
PROTECTIVE GLOVES: Wear chemical-resistant (such as nitrile or butyl) gloves.
EYE AND FACE PROTECTION: 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. For overhead exposure, wear chemical-resistant headgear.
OTHER PROTECTIVE EQUIPMENT: Where contact is likely, wear coveralls, socks and chemical-resistant footwear.
VENTILATION: Use only in well ventilated area.

9. PHYSICAL AND CHEMICAL PROPERTIES

NOTE: Physical data are typical values, but may vary from sample to sample. A typical value should not be construed as a guaranteed analysis or as a specification.
BOILING POINT:..... 202˚ C
VAPOR PRESSURE:..... NA
VOLATILITY: ..... NA
VAPOR DENSITY (air = 1): ..... NA
FREEZING POINT: ..... -10˚ C
MELTING POINT:..... NA
PHYSICAL STATE: ..... Liquid
ODOUR:..... Odorless
COLOUR: ..... Dark brown liquid
ODOR THRESHOLD (ppm): ..... None
EVAPORATION RATE (butyl acetate = 1): NA
SPECIFIC GRAVITY (water = 1):..... 0.984 to 0.995 at 20˚C
DENSITY @ 25°C:..... 0.99 g/cm3 @ 25˚C *Calculated*
pH: ..... 5.5 (as 1% aqueous solution)
SOLUBILITY IN WATER (20°C): ..... Emulsifiable
COEFFICIENT OF WATER/OIL DISTRIBUTION: NA

10. STABILITY AND REACTIVITY

STABILITY: This product is stable under normal use and storage conditions.
HAZARDOUS POLYMERIZATION: Will not occur.
HAZARDOUS THERMAL DECOMPOSITION/COMBUSTION PRODUCTS: 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. Hydrogen fluoride. Nitrogen oxides. Toxic gases are released during decomposition.
INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with strong: Acids. Bases. Oxidizing agents.

CONDITIONS TO AVOID: Active ingredient decomposes at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

11. TOXICOLOGICAL INFORMATION

ACUTE ORAL LD_{50} (mg/kg):.....Rat, Male 3,738 mg/kg
ACUTE ORAL LD_{50} (mg/kg):.....Rat, Female 3,162 mg/kg
ACUTE DERMAL LD_{50} (mg/kg):.. .....Rabbit > 2,000 mg/kg
ACUTE INHALATION LC_{50} (mg/l): .....4 h, Rat Male & Female > 6.2 mg/l
OTHER:
Inhalation: The maximum practically – attainable concentration of this product in the tests (6.2 mg/L for four house) produces no ill effects in test animals.
Eye Irritation: May cause moderate eye irritation which may be slow to heal. May cause slight corneal injury. Vapor may cause eye irritation experienced as mild discomfort and redness.
Skin Irritation: Brief contact may cause slight skin irritation with local redness.
Did not cause allergic skin reactions when tested in guinea pigs.

Toxicity of Other Components

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

Naphthalene (≤ 1%)

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.

1-Methyl-2-pyrrolidinone (8-10%)

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

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:
Material is practically non-toxic to birds on an acute or dietary basis (LD_{50}>2000 mg/kg)
Fluroxypyr-meptyl is not toxic to bees.
Fluroxypyr is slightly toxic to aquatic organisms on an acute basis.
Bio-concentration potential of fluroxypyr is low.

DEGRADATION AND METABOLISM:
In soil: In laboratory soils, the ester is rapidly converted to fluroxypyr in all soil types with a half-life of less than seven days. Fluroxypyr is then rapidly degraded by micro-organism in aerobic conditions to 4-amino-3,,4-dichloro-6-fluoropyridin-2-ol, 4-amino-3, 5-dichloro-2-methoxypyridine, and C)2. The half-life in laboratory studies is five to nine days at about 23˚C. Lysimeter and field studies demonstrate that there is no evidence of any significant leaching in soil.
In Plants: Fluroxypyr-meptyl is first hydrolyzed to the parent acid, fluroxypyr, which is not metabolized, but is bio-transformed into conjugates similar to those occurring in soil degradation.
In Animals: Following oral administration, fluroxypyr-meptyl is rapidly hydrolyzed to the parent acid, which is rapidly excreted unchanged, principally in the urine.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Disposal should be made in accordance with federal, provincial and local regulations. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean up of spills.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed. DO NOT CUT OR WELD ON OR NEAR THIS CONTAINER.
Do not reuse this container for any purpose. If applicable, return container in accordance with return program. If a recyclable container, dispose of at a container collection site. Contact local distributor, dealer or municipality for the location of the nearest collection site.
Before taking the container to the collection site, triple or pressure rinse the empty container adding rinsings to spray tank, and make container unsuitable for further use. If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

14. TRANSPORT INFORMATION

CANADIAN TDG DESCRIPTION (Road & Rail): Not regulated. Not dangerous for transport by road/rail in Canada. Contact manufacturer for updates to transport information.

15. REGULATORY INFORMATION

WHMIS HAZARD CLASS: Exempt
WHMIS TRADE SECRET: Exempt. (This product is regulated under the Pest Control Products Act - WHMIS exempt.)

HAZARD RATING SYSTEMS:
National Fire Code classification: IIIA
National Fire Protection Association (NFPA) Hazard Rating:

Rating for this product:	**Health: 2**	**Flammability: 1**	**Reactivity: 1**	
Hazards Scale:	0 = Minimal	1 = Slight	2 = Moderate	3 = Serious	4 = Severe

16. OTHER INFORMATION

REVISIONS:
The following has been revised since the last issue of this MSDS: New.

ADDITIONAL INFORMATION:
Abbreviations used throughout the MSDS are: NA = Not available
NAp = Not applicable
N/E = None Established.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.
Company references and data on substantially similar products utilized in preparation of the MSDS.

*****END OF MSDS*****