Nufarm

NUFARM AGRICULTURE INC.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

SUPPLIED BY:
Nufarm Agriculture Inc.
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Calgary, AB. T2H 1H9

Phone Number: (403)-253-8471
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MANUFACTURED BY:
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PRODUCT: **Approve Herbicide**
PCP NUMBER: 28123
DATE PREPARED: January 6, 2009
PREPARER: Brent R. McLennan
CHEMICAL FAMILY/USE: Herbicide.
FORMULA: $C_{15}H_{17}Br_2NO_2$ and $C_{16}H_{22}Cl_2O_3$
CHEMICAL SYNONYMS: Bromoxynil octanoate ester; 3,5-dibromo-4-hydroxybenzonitrile, octanoate ester; octanoic acid ester of bromoxynil; 2,6-dibromo-4-cyanophenyl octanoate.
2,4-D 2 ethylhexyl ester (2-EHE); 2,4-Dichlorophenoxyacetic acid, 2-ethylhexyl ester.
Note: The 2-ethylhexyl ester is one of several esters that have been previously known under the broader term "isooctyl ester".

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients	Wt. %	CAS NO.
Bromoxynil octanoate ester	28-32	1689-99-2
2,4-D, 2-ethylhexyl ester	28-32	25168-26-7
Aromatic hydrocarbon solvent	30-34	64742-94-5
Naphthalene	< 1	91-20-3
Emulsifiers and other proprietary ingredients	< 10	NA

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: WARNING - POISON. Keep out of reach of children. Combustible. Do not get into eyes, on skin, or on clothing. Do not inhale spray mist (e.g., during herbicide application). Eye and skin irritant.

EFFECTS OF ACUTE EXPOSURE:

INGESTION: Harmful or fatal if swallowed. May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation, weakness, central nervous system depression, unconsciousness, respiratory failure, or in extreme cases, death. Small amounts of liquid aspirated into the respiratory system during ingestion or from vomiting may cause mild to severe pulmonary injury and possibly death.
SKIN CONTACT: Causes moderate skin irritation. Harmful if absorbed through the skin. Overexposure by skin absorption may cause symptoms similar to those for ingestion. May cause allergic reaction in sensitive individuals.
INHALATION: Low to moderate inhalation toxicity based on laboratory animal testing of a similar formulation as a mist. Inhalation toxicity by vapour is unlikely under normal conditions, however, high concentrations of vapours from undiluted product may cause headache, dizziness, respiratory tract irritation and symptoms similar to those from ingestion.
EYE CONTACT: Causes moderate eye irritation.

MEDICAL CONDITIONS AGGRAVATED: Skin exposure may aggravate preexisting skin conditions. Inhalation of spray mist may aggravate preexisting respiratory conditions.
SUBCHRONIC (TARGET ORGAN) EFFECTS: (An adverse effect with symptoms that develop slowly over a long period of time): Repeated overexposure may cause effects to liver, kidneys, blood chemistry, testes and gross motor function. Rare cases of peripheral nerve damage have been reported, but extensive animal studies have failed to substantiate these observations, even at high doses of 2,4-D for prolonged periods. Repeated overexposure may also cause chronic dermatitis and developmental effects. See below.
CHRONIC EFFECTS/CARCINOGENICITY: Bromoxynil phenol has been classified by U.S. EPA in Group C, limited evidence of carcinogenicity in animals. The International Agency for Research on Cancer (IARC) lists exposure to chlorophenoxy herbicides as a class 2B carcinogen, the category for limited evidence for carcinogenicity in humans. However, more current 2,4-D lifetime feeding studies in rats and mice did not show carcinogenic potential. A minor ingredient in this product, naphthalene, has been reported by the U.S. National Toxicology Program to be associated with increased nose/lung tumors in laboratory animals via inhalation exposure.
REPRODUCTIVE TOXICITY: Animal studies on bromoxynil phenol did not indicate a pattern of reproductive toxicity, but a study on bromoxynil octanoate indicated possible mild male reproductive toxicity at high doses. No impairment of reproductive function attributable to 2,4-D has been noted in laboratory animal studies.
DEVELOPMENTAL TOXICITY: Based on the results of studies in laboratory animals, bromoxynil phenol is considered to be a developmental toxicant. Women of childbearing age should avoid excessive exposure. Studies in laboratory animals with 2,4-D have shown decreased fetal body weights and delayed development in the offspring at doses toxic to mother animals.
GENOTOXICTY: There have been some positive and some negative studies, but the weight of evidence is that bromoxynil and 2,4-D are not mutagenic.
PRINCIPLE ROUTES OF EXPOSURE: Eye contact. Skin absorption. Inhalation. Oral.
TOXICOLOGICALLY SYNERGISTIC MATERIALS: None known.
OTHER: None known.

4. FIRST AID MEASURES

Remove person from contaminated area, remove contaminated clothing. Keep patient warm, comfortable, at rest.
INGESTION: In case of accidental swallowing, DO NOT induce vomiting. This product contains a petroleum distillate--aromatic hydrocarbon solvent. Wash out mouth if product was ingested. Obtain immediate medical attention or contact a Poison Control Centre.
SKIN: Remove contaminated clothing, then wash the exposed skin with soap and water.
INHALATION: Remove individual to fresh air. Loosen constricting clothing. Obtain immediate medical attention or contact a Poison Control Centre. If breathing has ceased, start artificial respiration.
EYES: Flush with water for 15 minutes. Obtain immediate medical assistance or contact a Poison Control Centre.
NOTE TO PHYSICIAN: This product contains petroleum distillates. If large amounts have been ingested, empty the stomach by gastric intubation with the aid of a cuffed endotracheal tube to prevent aspiration and possible chemical pneumonia.
No specific antidote. Treatment based on sound judgment of physician and individual reactions of patient. Overexposure to materials

other than this product may have occurred.

5. FIRE FIGHTING MEASURES

FLASH POINT: .....> 100°C.
CONDITIONS OF FLAMMABILITY: .....Combustible mixture. When heated above the flash point, this material emits vapours which, when mixed with air, can burn or be explosive. Heavier than air vapours may travel to an ignition source.
FLAMMABLE LIMITS IN AIR - Upper (%):.....NA. Approximately 11-13 for hydrocarbon component.
FLAMMABLE LIMITS IN AIR - Lower (%):.....NA. Approximately 1.5-2.1 for hydrocarbon component.
AUTOIGNITION TEMPERATURE: .....NA.
SENSITIVITY TO MECHANICAL IMPACT (Y/N):.....NA. No sensitivity expected based on similar products.
SENSITIVITY TO STATIC DISCHARGE:.....NA. Sensitivity possible based on solvent data.
EXTINGUISHING MEDIA: .....Water fog, alcohol foam, carbon dioxide, dry chemical.
SPECIAL FIREFIGHTING PROCEDURES: Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires. Minimize and contain water runoff.

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 potential ignition sources and unnecessary people away. Avoid runoff to natural waters and sewers. Surround and absorb spills with inert material such as perlite, clay granules, vermiculite, sand or dirt. 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.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: This product is not extremely combustible, but it is suggested to handle as a combustible liquid. Keep away from potential ignition sources. This material may accumulate a static charge that can discharge violently. Empty, unrinsed containers can retain combustible liquid product or vapours. Improper handling of these may cause injury, or in extreme cases, death. Keep away from food and feed products. Avoid storage in close proximity to insecticides, fungicides, fertilizers, plants and seeds. Avoid contact with eyes, skin and clothing. Keep container tightly closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS:

Hazardous Ingredients	TWA*	ACGIH TLV®	STEL	Units
2,4-D EHE	10**	10**	N/E	mg/M^3
Naphthalene	10	N/E	15	ppm
Total hydrocarbons	15***	N/E	N/E	ppm

*8-hour TWA unless otherwise noted.
**Based on adopted limit for 2,4-D.

***Unofficial recommendation of solvent manufacturer.

ENGINEERING CONTROLS: Use in a well ventilated area. General ventilation with a good source of make-up air recommended as minimum for indoor situations. Ventilation should be adequate to maintain air concentrations below flammable limits.
RESPIRATORY PROTECTION EQUIPMENT: Use an approved pesticide respirator if ventilation is not adequate or exposure to sprays, mists or concentrated vapours is likely.
PROTECTIVE GLOVES: Chemical-resistant gloves such as nitrile.
EYE AND FACE PROTECTION: Goggles or face shield when handling concentrate.
OTHER PROTECTIVE EQUIPMENT: Long sleeved shirt, long pants, socks and shoes suggested as minimum work clothing. Coveralls or a chemical-resistant apron should also be worn when open pouring from containers greater than 5L. Use other equipment appropriate to specific situation.
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:.....NA. Hydrocarbon solvent 235-278° C.
VAPOR PRESSURE:.....NA. Hydrocarbon solvent < 0.1 kPa @ 20° C.
VAPOR DENSITY (air = 1): .....NA. Hydrocarbon solvent > 5.
FREEZING POINT:.....Approximately -20° C.
MELTING POINT: .....Approximately 0° C.
PHYSICAL STATE: .....Liquid.
ODOUR:.....Characteristic phenolic and hydrocarbon.
COLOUR: .....Amber to brown.
ODOR THRESHOLD (ppm): .....NA.
EVAPORATION RATE (butyl acetate = 1): .....NA.
SPECIFIC GRAVITY (water = 1):.....1.16
DENSITY @ 25°C:.....1.16
pH:.....3.3 (1% dilution)
SOLUBILITY IN WATER (20°C):.....Product is emulsifiable in water.
COEFFICIENT OF WATER/OIL DISTRIBUTION:.....NA. Product is oil soluble.

10. STABILITY AND REACTIVITY

STABILITY: Stable.
HAZARDOUS POLYMERIZATION: Will not occur.
HAZARDOUS THERMAL DECOMPOSITION/COMBUSTION PRODUCTS: Hydrogen bromide, other bromine compounds, hydrogen chloride, other chlorine compounds, carbon dioxide, carbon monoxide, oxides of nitrogen, oxides of sulfur and other potentially toxic combustion products may be present.
INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with strong acidic, basic or oxidizing agents.
CONDITIONS TO AVOID: None known.

11. TOXICOLOGICAL INFORMATION

Values are based on studies conducted on similar formulations:

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ACUTE ORAL LD_{50} (mg/kg): .....606 (Rat)
ACUTE DERMAL LD_{50} (mg/kg):.....> 2000 (Rat)
ACUTE INHALATION LC_{50} (mg/l):.....2.04 mg/l (4-Hour Rat)
OTHER: Moderate skin and eye irritant (Rabbit).

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:
Data on bromoxynil octanoate:
96-HOUR LC_{50} (mg/L): 0.1 (Rainbow Trout)
96-HOUR LC_{50} (mg/L): 0.053 (Bluegill)
48-HOUR EC_{50} (mg/L): 0.096 (Daphnia)
DIETARY LC_{50} (ppm): 1150 (Bobwhite Quail)
DIETARY LC_{50} (ppm): 1880 (Mallard Duck)

Data on 2,4-D 2EHE or emulsifiable concentrate formulation:
96-HOUR LC_{50} (mg/L): 7.2 (Rainbow Trout)
96-HOUR LC_{50} (mg/L): > 5 (Bluegill)
48-HOUR EC_{50} (mg/L): > 5 (Daphnia)
DIETARY LC_{50} (ppm): >5620 (Bobwhite Quail)
DIETARY LC_{50} (ppm): >5620 (Mallard Duck)

CHEMICAL FATE INFORMATION: Bromoxynil octanoate ester degrades readily to bromoxynil phenol in the environment. Representative soil half-lives are 2 days for the octanoate and 14 days for the phenol. In representative laboratory and field studies, 2,4-D 2-EHE rapidly hydrolyzed to parent acid. The typical half-life of the resultant 2,4-D acid ranged from a few days to a few weeks.

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 reuse 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): PESTICIDE, LIQUID, TOXIC, N.O.S. (BROMOXYNIL), 6.1, UN2902, PG III. Contact manufacturer for updates to transport information.

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15. REGULATORY INFORMATION

WHMIS HAZARD CLASS: D1B and D2B Toxic Materials.
WHMIS TRADE SECRET: Exempt. (This product is regulated under the Pest Control Products Act - WHMIS exempt.)
CANADIAN INVENTORY: This product is currently exempt from CEPA.
HAZARD RATING SYSTEMS:
HMIS: Not Available
National Fire Protection Association (NFPA®) Hazard Ratings:

Ratings for This Product		Key to Ratings	
NA	Health Hazard	0	Minimal
NA	Flammability	1	Slight
NA	Instability	2	Moderate
		3	Serious
		4	Severe

16. OTHER INFORMATION

REVISIONS:
The following has been revised since the last issue of this MSDS: Section 1 revision.

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 and published references utilized in preparation of the MSDS.

END OF MSDS