1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: **Maestro® 4EC Selective Herbicide**
EPA Reg. No.: 71368-78
Synonyms: Mixture of Bromoxynil Octanoate and Bromoxynil Heptanoate
Product Type: Herbicide

Company Name: Nufarm, Inc.
150 Harvester Drive, Suite 200
Burr Ridge, IL 60527

Telephone Numbers: **For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident, Call CHEMTREC Day or Night: 1-800-424-9300**
For Medical Emergencies Only, Call 1-877-325-1840

Date of Issue: June 21, 2012 **Supersedes:** January 5, 2009
Sections Revised: 2, 4, 13

2. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance and Odor: Clear brown colored liquid with an aromatic odor.
Warning Statements: Keep out of reach of children. WARNING. Harmful if swallowed. Causes skin irritation and moderate eye irritation. Do not get on skin or on clothing. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

Potential Health Effects:
Likely Routes of Exposure: Inhalation, eye and skin contact.
Eye Contact: Mildly irritating based on toxicity studies.
Skin Contact: Slightly toxic and severely irritating based on toxicity studies. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.
Ingestion: Harmful if swallowed. The petroleum hydrocarbon component, if aspirated into the respiratory system during ingestion or vomiting may cause mild or severe pulmonary injury, possibly progressing to death.
Inhalation: Low inhalation toxicity. Overexposure to petroleum hydrocarbon component may cause irritation to respiratory tract, headaches, anaesthesia, drowsiness, unconsciousness and other central nervous system effects, possibly including death.
Medical Conditions Aggravated by Exposure: Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis. Skin contact may aggravate existing skin disease.

See Section 11: TOXICOLOGICAL INFORMATION for more information.

Potential Environmental Effects:
This product is toxic to wildlife and fish.

See Section 12: ECOLOGICAL INFORMATION for more information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS NO.	% BY WEIGHT
Octanoic acid ester of bromoxynil	1689-99-2	28.0
Heptanoic acid ester of bromoxynil	56634-95-8	27.0
Other Ingredients Including:		45.0
Aromatic Solvent (may contain)	64742-94-5	
Naphthalene	91-20-3	
1-Methylnaphthalene	90-12-0	
2-Methylnaphthalene	91-57-6	

4. FIRST AID MEASURES

If Swallowed: Immediately call a poison control center or doctor for treatment advice. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give any liquid to the person. 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 to 20 minutes. Call a poison control center or doctor for treatment advice.
If in Eyes: Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center 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 center or doctor for further treatment advice.
Note to Physician: Contains petroleum distillate. Vomiting may cause aspiration pneumonia.

5. FIRE FIGHTING MEASURES

Flash Point: >212° F (>100° C) (Estimated)
Autoignition Temperature: Not determined **Flammability Limits:** Not determined

Extinguishing Media: Recommended for large fires: foam or water spray. Recommended for small fires: dry chemical or carbon dioxide.
Special Fire Fighting Procedures: Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full fire-fighting turn out gear. Dike area to prevent runoff and contamination of water sources. Dispose of fire control water later.
Unusual Fire and Explosion Hazards: If water is used to fight fire or cool containers, dike to prevent runoff contamination of municipal sewers and waterways.
Hazardous Decomposition Materials (Under Fire Conditions): May produce gases such as hydrogen chloride, other chlorine compounds, hydrogen bromide, oxides of nitrogen and carbon.

National Fire Protection Association (NFPA) Hazard Rating:
Rating for this product: Health: 2 **Flammability:** 1 **Reactivity:** 0
Hazards Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Wear appropriate protective gear for the situation. See Personal Protection information in Section 8.
Environmental Precautions: Prevent material from entering public sewer systems or any waterways. Do not flush to drain. Large spills to soil or similar surfaces may necessitate removal of topsoil. The affected area should be removed and placed in an appropriate container for disposal.

Methods for Containment: Dike spill using absorbent or impervious materials such as earth, sand or clay. Collect and contain contaminated absorbent and dike material for disposal.
Methods for Cleanup and Disposal: Pump any free liquid into an appropriate closed container. Collect washings for disposal. Decontaminate tools and equipment following cleanup. See Section 13: DISPOSAL CONSIDERATIONS for more information.
Other Information: Large spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies.

7. HANDLING AND STORAGE

Handling:
Do not get on skin or on clothing. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove clothing/Personal Protective Equipment (PPE) immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. If pesticide gets on skin, wash immediately with soap and water. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Storage:
Always store pesticides in a secured warehouse or storage building. Do not store near seeds, fertilizers, insecticides or fungicides. Do not contaminate water, food, or feed by storage, disposal or cleaning of equipment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls:
Where engineering controls are indicated by specific use conditions or a potential for excessive exposure, use local exhaust ventilation at the point of generation.

Personal Protective Equipment:
Eye/Face Protection: To avoid contact with eyes, wear chemical goggles or shielded safety glasses. An emergency eyewash or water supply should be readily accessible to the work area.
Skin Protection: To avoid contact with skin, wear long pants, long-sleeved shirt, socks, shoes and chemical-resistant gloves. When cleaning equipment, mixing, or loading, also wear a chemical-resistant apron. An emergency shower or water supply should be readily accessible to the work area.
Respiratory Protection: Not normally required. If vapors or mists exceed acceptable levels, wear NIOSH approved air-purifying respirator with cartridges/canisters approved for use against pesticides.
General Hygiene Considerations: Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material: 1) do not store, use and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored; 2) wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics or using the toilet.

Exposure Guidelines:

	OSHA		ACGIH		
Component	TWA	STEL	TWA	STEL	Unit
Bromoxynil octanoate	NE	NE	NE	NE	
Bromoxynil heptanoate	NE	NE	NE	NE	
Naphthalene	10	NE	10 (Skin)	15 (Skin)	ppm
1-Methylnaphthalene	NE	NE	0.5 (Skin)	NE	ppm
2-Methylnaphthalene	NE	NE	0.5 (Skin)	NE	ppm

NE = Not Established

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear brown colored liquid with an aromatic odor.

Boiling Point:	Not determined	**Solubility in Water:**	Emulsifiable
Density:	10.3 pounds/gallon	**Specific Gravity:**	1.238 @ 20°C
Evaporation Rate:	Not determined	**Vapor Density:**	Not determined
Freezing Point:	Not determined	**Vapor Pressure:**	Not determined
pH:	4 - 6	**Viscosity:**	23.295 cst @ 20°C

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.

10. STABILITY AND REACTIVITY

Chemical Stability: This material is stable under normal handling and storage conditions.
Conditions to Avoid: Excessive heat. Do not store near heat or flame.
Incompatible Materials: Strong oxidizing agents: bases and acids.
Hazardous Decomposition Products: Under fire conditions may produce gases such as hydrogen chloride, other chlorine compounds, hydrogen bromide, oxides of nitrogen and carbon.
Hazardous Reactions: Hazardous polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Toxicological Data:
Data from laboratory studies on this product are summarized below:

Oral: Rat LD_{50}: 550 mg/kg (female) (estimated based on mortalities for doses tested)
Dermal: Rat LD_{50}: >5,000 mg/kg
Inhalation: Rat 4-hr LC_{50}: >2.04 mg/L
Eye Irritation: Rabbit: Mildly irritating
Skin Irritation: Rabbit: Severely irritating
Skin Sensitization: Guinea Pigs: Sensitizing

Subchronic (Target Organ) Effects: Repeated overexposure to bromoxynil may cause effects to liver, kidneys and central nervous system.
Carcinogenicity / Chronic Health Effects: The U.S. EPA has classified bromoxynil as a Class C carcinogen (a possible human carcinogen), based on an increased incidence of liver tumors observed in mice. The hydrocarbon component may contain naphthalene, which is listed by IARC as a class 2B and the U.S. National Toxicology Program as reasonably anticipated to be a human carcinogen.
Reproductive Toxicity: Animal tests with bromoxynil have not demonstrated reproductive effects.
Developmental Toxicity: Based upon the results of rat and rabbit teratogenicity studies, bromoxynil is considered to be a developmental toxicant. Women of childbearing age should be particularly careful when handling this product to avoid ingestion and skin contact.
Genotoxicity: There have been some positive and negative studies, but the weight of evidence is that bromoxynil is not mutagenic. Neither *in vitro* nor *in vivo* tests on bromoxynil octanoate demonstrated mutagenic effects.

Assessment Carcinogenicity:
This product contains substances that are considered to be probable or suspected human carcinogens as follows:

	Regulatory Agency Listing As Carcinogen			
Component	**ACGIH**	**IARC**	**NTP**	**OSHA**
Naphthalene	No	2B	Yes*	No

*Reasonably anticipated to be a human carcinogen

See Section 2: HAZARDS IDENTIFICATION for more information.

12. ECOLOGICAL INFORMATION

Ecotoxicity:

Data on Bromoxynil Octanoate

96-hour LC_{50} Bluegill:	0.53 mg/l	Bobwhite Quail Acute Oral LD_{50}:	148 mg/kg
96-hour LC_{50} Rainbow Trout:	0.1 mg/l	Mallard Duck Acute Oral LD_{50}:	2,050 mg/kg
48-hour EC_{50} Daphnia:	0.096 mg/l		

Data on Bromoxynil Heptanoate:

96-hour LC_{50} Bluegill:	29 ppb	Bobwhite Quail 8-day Dietary LC_{50}:	4,350 ppm
48-hour EC_{50} Daphnia:	31 ppb	Bobwhite Quail Acute Oral LD_{50}:	359 mg/kg

Environmental Fate:

Bromoxynil octanoate and bromoxynil heptanoate rapidly degrade to bromoxynil phenol. The typical half-life of bromoxynil phenol ranged from a few days to a few weeks.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Open dumping is prohibited. Waste or rinse water than cannot be used according to label instructions must be disposed of according to applicable Federal, State or local procedures. Place in closed, labeled container for proper disposal.

Container Handling and Disposal:

Nonrefillable Containers 5 Gallons or Less: Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by State and local authorities. Plastic containers are also disposable by incineration, or, if allowed by State and local authorities, by burning. If burned stay out of smoke.

Nonrefillable containers larger than 5 gallons: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse as follows**: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. **Pressure rinse as follows:** Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Refillable containers larger than 5 gallons: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this

container into application equipment or a mix tank. Fill the container about 10% full with water and, if possible, spray all sides while adding water. If practical, agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

14. TRANSPORTATION INFORMATION

Follow the precautions indicated in Section 7: HANDLING AND STORAGE of this MSDS.

DOT

≤ 119 gallons per complete package
Non Regulated – See 49 CFR 173.132(b)(3) & 171.4(c)

>119 gallons per complete package
UN 3082, Environmentally hazardous substance, liquid, n.o.s.,
(Bromoxynil octanoate, heptanoate), 9, III, MARINE POLLUTANT

IMDG

UN 3082, Environmentally hazardous substance, liquid, n.o.s.,
(Bromoxynil octanoate, heptanoate), 9, III, MARINE POLLUTANT

IATA

Non Regulated - See IATA 3.6.1.5.3

15. REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA Inventory: This product is exempted from TSCA because it is solely for FIFRA regulated use.

SARA Hazard Notification/Reporting:
Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370):
Immediate and Delayed

Section 313 Toxic Chemical(s):
Bromoxynil octanoate (CAS No. 1689-99-2), 28.0% by weight in product
Naphthalene (CAS No. 91-20-3), <4.3% by weight in product

Reportable Quantity (RQ) under U.S. CERCLA:
Naphthalene (CAS No. 91-20-3) 100 pounds

RCRA Waste Code:
Naphthalene (CAS No. 91-20-3) U165

State Information:
The following product components are cited on certain state lists. Check individual state requirements.

1-Methylnaphthalene (CAS No. 90-12-0)	>1.0%
2-Methylnaphthalene (CAS No. 91-57-6)	>1.0%

California Proposition 65: WARNING. This product contains chemicals known to the State of California to cause cancer or birth defects or other reproductive harm.

16. OTHER INFORMATION

This Material Safety Data Sheet (MSDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-ACCEPTED PRODUCT LABELING (attached to and accompanying the product container). This MSDS provides important health, safety and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.
Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of Federal law to use a pesticide product in any manner not prescribed on the EPA-accepted label.

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