1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: **Nufarm Double O™ SPC Herbicide**
EPA Reg. No.: 228-632
Synonyms: Mixture of Oxyfluorfen and Oxadiazon
Product Type: Herbicide

Company Name: Nufarm Americas 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 2, 2010 **Supersedes:** December 22, 2009
Sections Revised: All

2. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance and Odor: Yellow colored granules.
Warning Statements: Caution. Keep out of reach of children. Causes moderate eye irritation. Avoid contact with eyes or clothing.

Potential Health Effects:
Likely Routes of Exposure: Inhalation, eye and skin contact.
Eye Contact: Moderately irritating based on toxicity studies.
Skin Contact: Mildly toxic and slightly irritating based on toxicity studies.
Ingestion: Slightly toxic if ingested based on toxicity studies.
Inhalation: Low inhalation toxicity based on toxicity studies.
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 aquatic invertebrates and wildlife. Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas.

See Section 12: ECOLOGICAL INFORMATION for more information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS NO.	% BY WEIGHT
Oxyfluorfen	42874-03-3	2.0
Oryzalin	19044-88-3	1.0
Other Ingredients Including:		97.0
Crystalline silica as quartz	14808-60-7	
N Methyl Pyrrolidone	872-50-4	

4. FIRST AID MEASURES

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 on Skin: 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 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.
If Swallowed: Call a poison control center 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 the poison control center or doctor. Do not give anything by mouth to an unconscious person.

5. FIRE FIGHTING MEASURES

Flash Point: Not applicable
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, contain runoff, using dikes to prevent contamination of water supplies. Dispose of fire control water later.
Hazardous Decomposition Materials (Under Fire Conditions): May produce gases such as hydrogen chloride and oxides of carbon and nitrogen.

National Fire Protection Association (NFPA) Hazard Rating:
Rating for this product: Health: 1 **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: Avoid creation of dusty conditions. If dry, sweep or scoop up material and place into container for disposal. If wet, pump any free liquid into an appropriate closed container. 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:
Avoid contact with skin, eyes or clothing. 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. 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:
Store in a clean dry place. Protect from water and extreme heat. Do not contaminate water, fertilizer, other pesticides, food or feed by storage and disposal

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: Not normally required. 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 coveralls over long-sleeved shirt and long pants, chemical-resistant footwear plus socks, and chemical resistant gloves. Wear a chemical-resistant apron when mixing or loading. 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
Oxyfluorfen	NE	NE	NE	NE	
Oryzalin	NE	NE	NE	NE	
Crystalline silica as quartz	10 (R)	NE	0.025 (R)	NE	mg/m^3
N-Methyl-2-pyrrolidinone	NE	NE	NE	NE	

R = Respirable Fraction NE = Not Established

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Yellow colored granules.

Boiling Point:	Not applicable	**Solubility in Water:**	Negligible
Density:	0.70 g/ml (tapped)	**Specific Gravity:**	Not applicable
Evaporation Rate:	Not applicable	**Vapor Density:**	Not applicable
Freezing Point:	Not applicable	**Vapor Pressure:**	Not applicable
pH:	8.5 – 9.5	**Viscosity:**	Not applicable

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 and oxides of carbon and nitrogen.
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}: >5,000 mg/kg
Dermal: Rat LD_{50}: >5,000 mg/kg
Inhalation: Rat 4-hr LC_{50}: > 2.03 mg/L
Eye Irritation: Rabbit: Moderately irritating
Skin Irritation: Rabbit: Slightly irritating
Skin Sensitization: Not a contact sensitizer in guinea pigs following repeated skin exposure.

Subchronic (Target Organ) Effects: Repeated high dose exposure to oxyfluorfen may affect blood, kidney, liver, spleen and adrenals. For oryzalin, repeated high dose exposure may cause hematological and clinical chemistry effects, increased weight of several organs and bone marrow effects. Similarly, repeated high dose exposure to N-Methyl 2-pyrrolidinone (NMP) may cause effects to eyes, skin, respiratory system, central nervous system, liver and kidneys.
Carcinogenicity / Chronic Health Effects: High dose exposure to oxyfluorfen may affect blood and liver. In a mouse carcinogenicity study, oxyfluorfen showed combined heptacellular adenomas/ carcinomas. For oryzalin, long-term and life-time high dose exposure can cause similar effects as stated above for subchronic effects and effects to the thyroid. In addition, at these high dose levels decreased survival rats were observed in rats. In mice lifetime feeding study, oryzalin has been shown not to be carcinogenic. In rat life-time feeding study, oryzalin has been shown to cause an increase occurrence of mammary gland tumors in females and skin and thyroid tumors in both sexes. Oryzalin is classified as a Group C Carcinogen (limited evidence of carcinogenicity in animals). Oryzalin is not listed as a carcinogen by IRAC, NTP, OSHA, or ACGIH. This product contains crystalline silica (e.g. quartz), a naturally occurring component. Inhalation of crystalline silica may cause pulmonary fibrosis (silicosis). Crystalline silica has been classified by IARC as carcinogenic to humans (Group 1), by the U.S. National Toxicology Program as a known human carcinogen and by ACGIH as a suspected human carcinogen (A2). Concerning NMP, no increase in tumors was seen in rats via dietary or inhalation exposure for two years; however, an increase in liver tumors was noted in mice receiving high dietary doses over a similar period. Liver tumors are not uncommon when non-genotoxic chemicals such as NMP are tested in the mouse bioassay at very high doses.
Reproductive Toxicity: In laboratory animal studies for oxyfluorfen, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. Similarly, oryzalin was not a primary reproductive toxicant in a multi-generation reproduction study in rats. Reproductive effects were observed only at doses that caused systemic toxicity in adult rats. NMP at high doses may adversely affect reproduction in rats after ingestion, although fertility is unaltered.
Developmental Toxicity: Oxyfluorfen did not cause birth defects in laboratory animals. However, oxyfluorfen produced fetal effects in laboratory animals at high doses that caused maternal toxicity. Oryzalin was not a primary developmental toxicant in rats and rabbits. Development effects were observed but were considered secondary to material toxicity. For NMP, fetal developmental effects were observed following ingestion, inhalation and dermal exposures in pregnant animals, and occurred both in the presence and absence of maternal toxicity.
Genotoxicity: *In vitro* and animal genetic toxicity studies for both oxyfluorfen and oryzalin were negative. Neither *in vitro* nor *in vivo* tests on NMP demonstrated mutagenic effects.

Assessment of 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**
Crystalline Silica, Quartz	A2	1	Known	No

See Section 2: HAZARDS IDENTIFICATION for more information.

12. ECOLOGICAL INFORMATION

Ecotoxicity:
Data on Oxyfluorfen Technical:

96-hour LC_{50} Bluegill:	0.20 mg/L	Bobwhite Quail 8-day Dietary LC_{50}:	390 ppm
96-hour LC_{50} Rainbow Trout:	0.41 mg/L	Bobwhite Quail Oral LD_{50}:	>2,000 mg/kg
96-hour LC_{50} Channel Catfish:	0.40 mg/L	Mallard Duck 8-day Dietary LC_{50}:	>4,000 ppm
Honey Bee Contact LD_{50}:	>100 ug/bee		

Data on Oryzalin Technical:

96-hour LC_{50} Bluegill Sunfish:	2.88 ppm	Bobwhite Quail Oral LD_{50}:	506 mg/kg
96-hour LC_{50} Rainbow Trout:	3.26 ppm	Bobwhite Quail 8-day Dietary LC_{50}:	> 5000 ppm
48-hour LC_{50} Daphnia Magna:	1.4 ppm	Mallard Duck 8-day Dietary LC_{50}:	> 5000 ppm
Honey Bee Contact LD_{50}:	11 ug/bee	Mallard Duck Reproduction Study	100 ppm

Environmental Fate:
Oxyfluorfen is persistent and relatively immobile in soil. The most likely route of dissipation is soil binding. Absorption increases as soil organic content increases. Microbial degradation and hydrolysis are not methods of soil degradation for oxyfluorfen. Because oxyfluorfen is nearly insoluble in water and has a tendency to absorb to soil, it is unlikely to remain in water. It will instead absorb to suspended particles or sediments. However, oxyfluorfen may degrade by photolysis in clear, shallow water.

Oryzalin has low solubility water and it does not have a strong tendency to adsorb to soil particles. Degradation is expected in the soil environment within days to weeks. Its representative soil half-life is 20 days. There was no observed breakdown of oryzalin via hydrolysis from ph 5 to 9. It leaches downward in soils with low organic matter and clay content to a limited extent with rainfall and thus, has a moderate potential to contaminate groundwater. Microbial degradation may be responsible for the breakdown of oryzalin in soils. It is subject to photodecomposition, but not volatilization, at the soil surface.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method:
Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Handling and Disposal:
Nonrefillable container. Do not reuse or refill this container. Offer for recycling, if available. Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay away from smoke.

14. TRANSPORTATION INFORMATION

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

DOT

< 882 pounds per completed package:
Non Regulated

≥ 882 pounds per completed package:
UN 3077, Environmentally hazardous substance, solid, n.o.s., (Oxyfluorfen, Oryzalin), 9, III, Marine Pollutant

IMDG

UN 3077, Environmentally hazardous substance, solid, n.o.s., (Oxyfluorfen, Oryzalin), 9, III, Marine Pollutant

IATA

< 882 pounds per completed package:
Non Regulated

≥ 882 pounds per completed package:
UN 3077, Environmentally hazardous substance, solid, n.o.s., (Oxyfluorfen, Oryzalin), 9, III, Marine Pollutant

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):
Oxyfluorfen (CAS No. 42784-03-3) 2.0% by weight in product
Oryzalin (CAS No. 19044-88-3) 1.0% by weight in product
N-Methyl-2-pyrrolidinone (CAS No. 872-50-4), <5.0% by weight in product

Reportable Quantity (RQ) under U.S. CERCLA:
None

RCRA Waste Code:
None

State Information:
Other state regulations may apply. Check individual state requirements.

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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