MATERIAL SAFETY DATA SHEET

RAGE™ D-TECH HERBICIDE

MSDS Ref. No.: F18-62-6
Date Approved: 12/05/2007
Revision No.: 3

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200. The information contained herein is for the concentrate as packaged, unless otherwise noted.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	RAGE™ D-TECH HERBICIDE
PRODUCT CODE:	6363
ACTIVE INGREDIENT(S):	Carfentrazone-ethyl*; 2,4-D 2-ethylhexyl Ester**
CHEMICAL FAMILY:	Triazolinone*; Phenoxy Herbicide**
MOLECULAR FORMULA:	$C_{15}H_{14}N_3O_3F_3Cl_2$*; $C_16H_{22}Cl_2O_3$**
SYNONYMS:	FMC 116426; F8426; Ethyl 2-chloro-3-[2-chloro-4-fluoro-5-[4-(difluoromethyl)-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl]phenyl]-propanoate; IUPAC: 2-chloro-3-[2-chloro-5-(4-difluoromethyl-3-methyl-5-oxo-4,5-dihydro-[1,2,4] triazol-1-yl)-4-fluoro-phenyl] propionic acid ethyl ester, or Ethyl 2-chloro-3-[2-chloro-5-(4-difluoromethyl-3-methyl-5-oxo-4,5-dihydro-[1,2,4] triazol-1-yl)-4-fluoro-phenyl] propionate*; 2,4-dichlorohenoxy acetic acid, 2-ethylhexyl ester**

ADDITIONAL SYNONYMS: F6119 (formulation)

MANUFACTURER

FMC CORPORATION
Agricultural Products Group
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)
msdsinfo@fmc.com (Email - General Information)

EMERGENCY TELEPHONE NUMBERS

(800) 331-3148 (Medical - U.S.A. & Canada)
(651) 632-6793 (Medical - Collect - All Other Countries)

For leak, fire, spill, or accident emergencies, call:
(800) 424-9300 (CHEMTREC - U.S.A. & Canada)
(703) 527-3887 (CHEMTREC - Collect - All Other Countries)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- Amber liquid with a phenolic odor.
- Moderately combustible. May support combustion if heated above the product's flash point (see Section 9, "Physical and Chemical Properties" below).
- May react violently with strong oxidizing agents.
- Thermal decomposition and burning may form toxic by-products.
- For large exposures or fire, wear personal protective equipment.
- Highly toxic to algae and toxic to fish and aquatic organisms. Keep out of drains and water courses.
- Moderately irritating to the skin and eyes.

POTENTIAL HEALTH EFFECTS: Effects from overexposure may result from ingestion or coming into contact with the skin or eyes. Symptoms of overexposure include lethargy and decreased and labored respiration, burning sensation in the throad and chest, weakness, loss of appetite and weight, and slight albuminuria.

MEDICAL CONDITIONS AGGRAVATED: None presently known.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Carfentrazone-ethyl	128639-02-1	1.44	None	N; R50/53
2,4-D 2-ethylhexyl Ester	1928-43-4	65.52	217-673-3	Xn-N; R22, 43, 50/53
Surfactant Blend		<29	None	Not classified

4. FIRST AID MEASURES

EYES: Flush with water for at least 15 minutes. If irritation occurs and persists, contact a medical doctor.

SKIN: Remove contaminated clothing and thoroughly wash with soap and water. If irritation occurs and persists, contact a medical doctor.

INGESTION: 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 a poison control center or doctor. Do not give anything to an unconscious person.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, obtain medical attention.

NOTES TO MEDICAL DOCTOR: This product has low oral, dermal and inhalation toxicity. It is moderately irritating to the skin and eyes. Treatment is otherwise controlled removal of exposure followed by symptomatic and supportive care.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Foam, CO_2 or dry chemical. Soft stream water fog only if necessary. Contain all runoff.

FIRE / EXPLOSION HAZARDS: Moderately combustible. When heated above the flash point, this material releases vapors which, when mixed with air, can burn or be explosive.

FIRE FIGHTING PROCEDURES: Isolate fire area. Evacuate downwind. Wear full protective clothing and self-contained breathing apparatus. Do not breathe smoke, gases or vapors generated.

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Isolate and post spill area. Wear protective clothing and personal protective equipment as prescribed in Section 8, "Exposure Controls/Personal Protection". Keep unprotected persons and animals out of the area.

Keep material out of lakes, streams, ponds and sewer drains. Large spills should be covered to prevent dispersal. For dry material, use a wet sweeping compound or water to prevent the formation of dust. If water is used, prevent runoff or dispersion of excess liquid by diking and absorbing with a non-combustible absorbent such as clay, sand or soil. Vacuum, shovel or pump all waste material, including absorbent, into a drum and label contents for disposal.

If spilled in soil, remove visibly contaminated soil and replace with clean fill. To clean and neutralize spill area, tools and equipment, wash area with a suitable solution of caustic or soda ash and an appropriate alcohol (i.e., methanol, ethanol or isopropanol). Follow this by washing with a strong soap and water solution. Absorb, as above, any excess liquid and add to the drums of waste already collected. Repeat if necessary. Dispose of drummed waste according to the method outlined in Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

HANDLING AND STORAGE: Store in a cool, dry, well-ventilated place. Do not use or store near heat, open flame or hot surfaces. Do not store near strong oxidizers. Store in original containers only. Keep out of reach of children and animals. Do not contaminate other pesticides, fertilizers, water, food or feed by storage or disposal.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Use local exhaust at all process locations where vapor or mist may be emitted. Ventilate all transport vehicles prior to unloading.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: For splash, mist or spray exposure, wear chemical protective goggles or a face shield with safety glasses.

RESPIRATORY: For splash, spray or mist exposure wear, as a minimum, a properly fitted half-face or full-face air-purifying respirator with organic vapor cartridges (approved by U.S. NIOSH/MSHA, EU CEN or comparable certification organization). Respirator use and selection must be based on airborne concentrations.

PROTECTIVE CLOTHING: Depending upon concentrations encountered, wear coveralls or long-sleeved uniform and head covering. For larger exposures as in the case of spills, wear full body cover barrier suit, such as a PVC suit. Leather items - such as shoes, belts and watchbands - that become contaminated should be removed and destroyed. Launder all work clothing before reuse (separately from household laundry).

GLOVES: Wear chemical protective gloves made of materials such as nitrile or neoprene. Thoroughly wash the outside of gloves with soap and water prior to removal. Inspect regularly for leaks.

WORK HYGIENIC PRACTICES: Clean water should be available for washing in case of eye or skin contamination. Wash skin prior to eating, drinking, chewing gum, or using tobacco. Shower at the end of the workday.

COMMENTS:

NOTE: Personal protective recommendations for mixing or applying this product are prescribed on the product label. Information stated above provides useful, additional guidance for individuals whose use or handling of this product is not guided by the product label.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Phenolic
APPEARANCE:	Amber liquid
DENSITY / WEIGHT PER VOLUME:	1.083 g/mL (9.04 lb/gal) at 20ºC (68ºF)
FLASH POINT:	> 110 °C (> 230 °F)

MOLECULAR WEIGHT:	412.2 (carfentrazone-ethyl) 333 (2,4-D 2-ethylhexyl Ester)
pH:	3.5 at 22.3ºC (72ºF)
VISCOSITY:	32.6 cSt @ 25ºC (77ºF)

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat and fire. Strong oxidizing agents.
STABILITY:	Stable
POLYMERIZATION:	Will not occur
HAZARDOUS DECOMPOSITION PRODUCTS:	Carbon monoxide, carbon dioxide, nitrogen oxides, hydrogen chloride, hydrogen fluoride and phosgene.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: Moderately irritating (rabbit)

SKIN EFFECTS: Moderately irritating (rabbit)

DERMAL LD_{50}: > 5,000 mg/kg (rat)

ORAL LD_{50}: 3,110 mg/kg (rat)

INHALATION LC_{50}: > 2.06 mg/l (4 h) (rat) Zero mortality

SENSITIZATION: (Skin) Sensitizing (guinea pig)

ACUTE EFFECTS FROM OVEREXPOSURE: This product has low oral, dermal and inhalation toxicity. It is moderately irritating to the skin and eyes. Signs of toxicity in laboratory animals may include hunched posture, ataxia, pilo-erection, lethargy, decreased respiratory rate, chromodacryorrhea, ptosis, tremors and tonic convulsions.

Symptoms of exposure to 2,4-D 2-ethylhexyl ester may include a burning sensation in the throat and chest, weakness, loss of appetite and weight, and slight albuminuria. Excessive exposure may cause liver, kidney, gastrointestinal and muscular effects. Signs and symptoms of over exposure may be nausea, vomiting, abdominal cramps and/or diarrhea.

CHRONIC EFFECTS FROM OVEREXPOSURE: No data available for the formulation. In studies with laboratory animals, carfentrazone-ethyl did not cause reproductive toxicity, teratogenicity, or carcinogenicity. An overall absence of genotoxicity has been demonstrated in tests of mutagenicity, DNA damage and chromosome aberrations.

In studies with laboratory animals, chronic exposures to 2,4-D 2-Ethylhexyl Ester caused damage to the liver, kidneys and nervous system with possible damage to striated muscle and the brain. Exposures having no adverse effects on the mother had other harmful effects on the fetus. Animal mutagenicity studies were predominantly negative; in-vitro mutagenicity studies were negative. Excessive dietary levels have caused decreased weight and survival in offspring in a rat reproduction study. IARC lists Chloropheoxy Herbicides (2,4-D 2-ethylhexyl ester) as a Class 2B carcinogen (limited evidence in humans). The Science Advisory Panel of EPA has given it a Class D status (not classifiable as to human carcinogenicity).

CARCINOGENICITY:

Chemical Name	IARC	NTP	OSHA	Other
2,4-D 2-ethylhexyl Ester	2B	Not listed	Not listed	(ACGIH) Not listed

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL DATA: Carfentrazone-ethyl is rapidly degraded in soil (DT50 < 1.5 days) through microbial degradation, initially by hydrolysis to F8426-chloropropionic acid, and then through further side-chain degradation to other acids. Based on field studies, carfentrazone-ethyl and its major metabolite, F8426-chloropropionic acid, are confined to the top soil layer, indicating only slight mobility in soil. Carfentrazone-ethyl is hydrolytically unstable in base (half-life of 5.1 hours), with stability increasing with decreasing pH. It is susceptible to photolytic degradation in water, with a half-life of 8.3 days (pH 5). The Log Pow is 3.36 and the measured bioconcentration factor in whole fish is 159, both indicating a low potential for accumulation. Its vapor pressure is 1.19 x 10-7 torr, indicating that volatility is not a concern with this chemical.
2,4-D is expected to readily biodegrade in soils (reported half-life ranges from <1 day to several weeks). Its adsorption to soil will likely depend on the amount of organic matter present and the pH of the soil (pKa = 2.64). Migration to groundwater may occur in course, sandy soils, and is enhanced at high pH. Degradation in water is expected to occur rapidly, with reported half-life values from 10 to >50 days. In aquatic sediments, the reported half-life is <1 day. 2,4-D is not expected to bioconcentrate in aquatic organisms.

ECOTOXICOLOGICAL INFORMATION: Carfentrazone-ethyl is very toxic to algae (EC50: 5.7 to 17 µg/L), and much less toxic to fish (LC50: 1.6 to 2.0 mg/L), and aquatic crustacea (LC50 > 9.8 mg/L). Care should be taken to avoid contamination of the aquatic environment. In a test with earthworms, carfentrazone-ethyl was shown to cause no effects at concentrations up to 820 mg/kg in soil. Carfentrazone-ethyl shows little toxicity to birds either orally (LD50 > 2,250 mg/kg), or in the diet (LC50 > 5,620 ppm). Similarly, carfentrazone-ethyl has low toxicity to bees (no death at 200 µg/bee).

2,4-D 2-Ethylhexyl Ester is slightly toxic to aquatic organisms on an acute basis with LC_{50} between 10 and 100 mg/L in most sensitive species. It is not expected to bioconcentrate in aquatic organisms.

LC_{50} = 18.7 mg/L water flea (Daphnia magna); Maximum acceptable toxicant concentration (MATC) - 0.020 mg/L
LC_{50} > 5.0 mg/L fathead minnow (Pimephales promelas); Maximum acceptable toxicant concentration (MATC) = 0.16 mg/L
LC_{50} > 5.0 mg/L rainbow trout (Oncorhynchus mykiss)
LC_{50} > 5.0 g/L bluegill (Lepommis macrochirus)
LC_{50} > 0.24 mg/L tidewater silverside (Menidia beryllina)
EC_{50} > 0.21 mg/L shell deposition inhibition in easter oyster (Crassostrea virginica)

2,4-D 2-Ethylhexyl Ester is slightly toxic to birds on an acute basis with LD_{50} between 501 and 2,000 mg/L. It is practically non-toxic to birds on a dietary basis with an LC_{50} > 5,000 ppm.
LD_{50} (oral) = 663 mg/kg mallard (Anas platyrhynchos)

LC_{50} (dietary) >5,620 ppm mallard (Anas platyrhynchos)
LC_{50} (dietary) >5,620 ppm bobwhite (Colinus virginianus)
LC_{50} > 0.14 mg/L grass shrimp (Palaemonetes pugio)
EC_{50} > 30 mg/L green alga (Selenastrum capricornutum)
EC_{50} = 0.5 mg/L duckweed (Lemna sp.)

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Open dumping or burning of this material or its packaging is prohibited. If spilled material cannot be disposed of by use according to label instructions, an acceptable method of disposal is to incinerate in accordance with local, state and national environmental laws, rules, standards and regulations. However, because acceptable methods of disposal may vary by location and regulatory requirements may change, the appropriate agencies should be contacted prior to disposal.

EMPTY CONTAINER: Completely empty package into application equipment. Then dispose of empty package in a sanitary landfill or by incineration, or if allowed by State and local authorities, by burning. If burned, stay out of smoke.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PACKAGING TYPE:	Non-Bulk
PROPER SHIPPING NAME:	RQ Environmentally hazardous substance, liquid, n.o.s.
TECHNICAL NAME(S):	2,4-D 2-ethylhexyl ester
PRIMARY HAZARD CLASS / DIVISION:	9
UN/NA NUMBER:	UN 3082
PACKING GROUP:	III
LABEL(S):	9
PLACARD(S):	9
MARKING(S):	UN 3082
ADDITIONAL INFORMATION:	REMARKS: 2,4-D 2-ethylhexyl ester is in an "RQ" quantity at 154 pounds (17 gallons). In packages less than 154 pounds (17 gallons), this material is not regulated for transportation.
PACKAGING TYPE:	Bulk

PROPER SHIPPING NAME:	Environmentally hazardous substance, liquid, n.o.s.
TECHNICAL NAME(S):	2,4-D 2-ethylhexyl ester
PRIMARY HAZARD CLASS / DIVISION:	9
UN/NA NUMBER:	UN 3082
PACKING GROUP:	III
MARINE POLLUTANT:	Carfentrazone-ethyl, 2,4-D 2-ethylhexyl ester
LABEL(S):	9
PLACARD(S):	9
MARKING(S):	UN 3082 + Marine Pollutant
REPORTABLE QUANTITY (RQ):	2,4-D 2-ethylhexyl ester

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PACKAGING TYPE:	Non-Bulk
PROPER SHIPPING NAME:	Environmentally hazardous substance, liquid, n.o.s.
TECHNICAL NAME(S):	Carfentrazone-ethyl, 2,4-D 2-ethylhexyl ester
PRIMARY HAZARD CLASS / DIVISION:	9
UN/NA NUMBER:	UN 3082
PACKING GROUP:	III
MARINE POLLUTANT:	Carfentrazone-ethyl, 2,4-D 2-ethylhexyl ester
LABEL(S):	9
PLACARD(S):	9
MARKING(S):	Environmentally hazardous substance, liquid, n.o.s. (2,4-D 2-ethylhexyl ester), UN 3082, (2,4-D 2-ethylhexyl ester, carfentazone-ethyl), UN 3082 + Marine Pollutant
ADDITIONAL INFORMATION:	EmS Number: F-A, S-F

ADR - EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD

PACKAGING TYPE:	Non-Bulk
PROPER SHIPPING NAME:	Environmentally hazardous substance,

	liquid, n.o.s.
TECHNICAL NAME(S):	Carfentrazone-ethyl, 2,4-D 2-ethylhexyl ester
PRIMARY HAZARD CLASS / DIVISION:	9
CLASSIFICATION CODE:	M6
UN/NA NUMBER:	UN3082
PACKING GROUP:	III
HAZARD IDENTIFICATION NUMBER:	90
MARINE POLLUTANT:	Carfentrazone-ethyl, 2,4-D 2-ethylhexyl ester
LABEL(S):	9
PLACARD(S):	9
MARKING(S):	UN 3082 + Marine Pollutant

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PACKAGING TYPE:	Non-Bulk
PROPER SHIPPING NAME:	Environmentally hazardous substance, liquid, n.o.s.
TECHNICAL NAME(S):	Carfentrazone-ethyl
PRIMARY HAZARD CLASS / DIVISION:	9
UN/NA NUMBER:	UN3082
PACKING GROUP:	III
LABEL(S):	9
LIMITED QUANTITY:	Y911 / 30 kg G
LIMITED QUANTITY: PASSENGER / CARGO:	914 / 450 L
LIMITED QUANTITY: CARGO:	914 / 450 L
ADDITIONAL INFORMATION:	Carfentrazone-ethyl is toxic to algae and is considered a Marine Pollutant under ADR. Air shipment from, to, or within ADR member countries are shown under IATA above. Shipment to, from, or with the USA presently does not recognize the ADR Marine Pollutant criterion of "toxic to algae". 2,4-D 2-ethylhexyl ester is in an "RQ" quantity at 154 pounds (17 gallons). For shipments within, from, or to the USA "2,4-D 2-ethylhexyl ester" must be identified as

"RQ" when in packages containing 154 pounds (17 gallons) of product.

Marks: Environmentally hazardous substance, liquid, n.o.s. (carfentrazone-ethyl), UN3082 + Marine Pollutant

RQ: 2,4-D 2-ethylhexyl ester

OTHER INFORMATION:

HARMONIZED SYSTEM
Import to the U.S.A.: 3808.93.1500
Export from the U.S.A.: 3808.93.0000

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15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):
Not listed

SECTION 311 HAZARD CATEGORIES (40 CFR 370):
Immediate, Delayed

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):
The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.:
None

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):
This product contains the following ingredients subject to Section 313 reporting requirements:
2,4-D 2-ethylhexyl ester

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):
As noted below:

Chemical Name	RQ
2,4-D 2-ethylhexyl Ester	100 lb

INTERNATIONAL LISTINGS

Australian Hazard Code: 3Z

HAZARD AND RISK PHRASE DESCRIPTIONS:

EC Symbols:	Xn	(Harmful)
	Xi	(Irritant)
	N	(Dangerous for the environment)
EC Risk Phrases:	R22	(Harmful if swallowed.)
	R43	(May cause sensitization by skin contact.)
	R50/53	(Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.)

16. OTHER INFORMATION

NFPA

Health	2
Flammability	1
Reactivity	0
Special	None

No special requirements

NFPA (National Fire Protection Association)

Degree of Hazard Code:
4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Insignificant

REVISION SUMMARY:
This MSDS replaces Revision #2, dated December 5, 2007.
Changes in information are as follows:
Section 3 (Composition / Information on Ingredients)
Section 4 (First Aid Measures)
Section 14 (Transport Information)
Section 15 (Regulatory Information)
Section 16 (Other Information)

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