MATERIAL SAFETY DATA SHEET

Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

TRIFLURALIN TECHNICAL 95% HERBICIDE

Effective Date: 1/28/04
Product Code: 20095
MSDS: 003745

1. PRODUCT AND COMPANY IDENTIFICATION:

PRODUCT: Trifluralin Technical 95% Herbicide

COMPANY IDENTIFICATION:
Dow AgroSciences
9330 Zionsville Road
Indianapolis, IN 46268-1189

2. COMPOSITION/INFORMATION ON INGREDIENTS:

Trifluralin: alpha,alpha,alpha-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine	CAS# 001582-09-8	96.3%
Balance, Total		3.7%

3. HAZARDOUS IDENTIFICATIONS:

EMERGENCY OVERVIEW

Orange crystalline solid with a slight odor. Liquid above 113°F. Causes eye irritation. May cause allergic skin reaction. Boiling Point is 158°F (70°C) Flash Point: 301°F (149.4°C) Toxic fumes are released in fire situations. Toxic to aquatic organisms. LD_{50} for skin absorption is >5000 mg/kg. Oral LD_{50} is 2000->5000 mg/kg. Inhalation LC_{50} is >4.8 mg/L for 4 hours.
EMERGENCY PHONE NUMBER: 800-992-5994

POTENTIAL HEALTH EFFECTS: This section includes possible adverse effects, which could occur if this material is not handled in the recommended manner.

EYE: May cause slight eye irritation.

SKIN: Essentially non-irritating to skin. Skin contact may cause allergic skin reaction. Prolonged skin contact is unlikely to result in absorption of harmful amounts. The LD_{50} for skin absorption in rabbits is >5000 mg/kg.

INGESTION: Low toxicity if swallowed. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. The oral LD_{50} for rats is 2000->5000 mg/kg.

INHALATION: Vapors are unlikely due to physical properties. No adverse effects are anticipated from single exposure to dust. The LC_{50} for rats is >4.8 mg/L for 4 hours.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: In animals, effects have been reported on the following organs: blood, kidney, and liver.

CANCER INFORMATION: A low incidence of urinary tract tumors was seen in only 1 of 5 chronic studies in rats with trifluralin. Trifluralin is not anticipated to be a carcinogenic risk to man.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother.

REPRODUCTIVE EFFECTS: Did not to interfere with reproduction in laboratory animal studies.

4. FIRST AID:

EYES: Flush eyes thoroughly with water for several minutes. Remove contact lenses after initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

SKIN: Wash skin with plenty of water.

INGESTION: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

INHALATION: Move to fresh air; if effects occur, consult a physician.

NOTE TO PHYSICIAN: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIRE-FIGHTING MEASURES:

FLAMMABLE PROPERTIES:
FLASH POINT: 301°F (149.4°C)
METHOD USED: Setaflash Closed Cup (ASTM Method D 3278-82)

FLAMMABLE LIMITS:
LFL: Not determined
UFL: Not determined

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds. Hazardous combustion products may include and are not limited to carbon dioxide, carbon monoxide, nitrogen oxides and hydrogen fluoride.

OTHER FLAMMABILITY INFORMATION: Container may vent and/or rupture due to fire. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Dense smoke is produced when product burns. Do not permit dust to accumulate. Dust layers can be ignited by spontaneous combustion or other ignition sources. When suspended in air, dust can pose an explosion hazard.

EXTINGUISHING MEDIA: Water fog or fine spray, carbon dioxide, dry chemical, foam. Do not use direct warm stream as it will spread fire. General purpose synthetic foams (including AFFF type) or protein foams may be used. Alcohol resistant foams (ATC type) may also function.

FIRE-FIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Fight fire from protected location or safe distance. Consider use of unmanned hose holder or monitor nozzles. Do not use direct water stream. May spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Hand held carbon dioxide or dry chemical extinguishers may be used for small fires. Dust explosion hazard may result from forceful application of fire extinguishing agents. Cool surroundings with water to localize fire zone. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of re-ignition has passed. Immediately withdraw all personnel from area in case of rising sound from venting safety device or discoloration of the container. Move container from fire area if this is possible without hazard. Review the "Accidental Release Measures" and the "Ecological Information" sections of this MSDS. Contain fire water run-off if possible. Fire water run-off if not contained may cause environmental damage.

PROTECTIVE EQUIPMENT FOR FIREFIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant clothing with SCBA. If this will not provide sufficient fire protection, consider fighting fire from a remote location. For protective equipment in post-fire or non-fire clean up situations, refer to the relevant section of this MSDS.

6. ACCIDENTAL RELEASE MEASURES:

PROTECT PEOPLE: Clear non-emergency personnel from area.

ENVIRONMENTAL PRECAUTIONS: Prevent product from entering sewers and natural waters.

METHODS OF CLEANUP: Contain and sweep up material of small spills. Report large spills to Dow AgroSciences on 800-992-5994.

7. HANDLING AND STORAGE:

HANDLING: Good housekeeping and controlling of dusts are necessary for safe handling of product. No smoking, open flames or sources of ignition in handling and storage area. Wash thoroughly with soap and water after handling.

STORAGE: Do not contaminate water, food, or feed by storage or disposal. Store in original container below 113°F (45°C).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

These precautions are suggested for conditions where a potential for exposure exists. Emergency conditions may require additional precautions.

EXPOSURE GUIDELINES: None established.

ENGINEERING CONTROLS: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

EYE/FACE PROTECTION: Use safety glasses.

RESPIRATORY PROTECTION: In dusty atmospheres, use a NIOSH approved particulate respirator.

SKIN PROTECTION: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur.

APPLICATORS AND ALL OTHER HANDLERS: Refer to the product label for personal protective clothing and equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES:

BOILING POINT: 70°C (158°F) @ 0.016 mm Hg (Est.)
VAPOR PRESSURE: 6.1 X 10-3 Pascal's @25°C
VAPOR DENSITY: Not determined
SOLUBILITY IN WATER: 0.3 ppm @25°C
RELATIVE DENSITY: 1.36 @22°C
Product is solid at room temperature
SPECIFIC GRAVITY: 1.258 @60°C
APPEARANCE: Bright orange crystalline solid
ODOR: Aromatic solvent odor
pH: (Aqueous 50/50) 7.0
MELTING POINT: 109.4 to 117.5°F (43.0 to 47.5°C)

10. STABILITY AND REACTIVITY:

CHEMICAL STABILITY: Stable under recommended storage conditions. See storage section. Unstable at elevated temperatures.

CONDITIONS TO AVOID: Avoid temperatures above 158°F (70°C). Product can decompose at elevated temperatures. Generation of gas can cause pressure in closed systems. Pressure build-up can be rapid.

INCOMPATIBILITY WITH OTHER MATERIALS: Avoid contact with oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products depend upon temperature, air supply, and the presence of other materials. Toxic flammable gases and heat are released under decomposition.

HAZARDOUS POLYMERIZATION: Not known to occur.

11. TOXICOLOGICAL INFORMATION:

MUTAGENICITY: In-vitro genetic toxicity studies were negative. Animal genetic toxicity studies were predominantly native.

12. ECOLOGICAL INFORMATION:

ENVIRONMENTAL FATE:

MOVEMENT AND PARTITIONING:
Bioconcentration potential is moderate (BCF is between 100 and 3000 or Log Pow between 3 and 5).
Bioconcentration factor (BCF) in fish is 2280.
Measured log octanol/water partition coefficient (Log Pow) is 5.34.
Potential for mobility in soil is slight (Koc between 2000 and 5000).
Log soil organic carbon partition coefficient (Log Koc) is 3.64-4.49.

DEGRADATION AND PERSISTENCE:
Based on the stringent test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.
Under aerobic soil conditions the half-life is 116-201 days.
Under anaerobic soil conditions the half-life is 25-59 days.
The photolysis half-life in soil is 41 days.
The photolysis half-life in water is 0.8 hours.
Inhibitory concentration (IC50) in OECD Activated Sludge Respiration Inhibition Test (OECD Test No. 209) is >100 mg/L.

ECOTOXICOLOGY:
Material is very highly toxic to aquatic organisms on an acute basis (LC_{50} or EC_{50} <0.1 mg/L in the most sensitive species tested).
Acute LC_{50} for common mullet *(Mugil cephalus)* is 0.032 mg/L.
Acute LC_{50} in bluegill *(Lepomis macrochirus*) is 0.0084-0.40 mg/L.
Acute LC_{50} in rainbow trout *(Oncorhynchus mykiss)* is 0.025-0.10 mg/L.
Acute LC_{50} in fathead minnow *(Pimephales promelas)* is 0.105-0.160 mg/L.
Acute LC_{50} in channel catfish *(Ictalurus punctatus)* is 0.440-2.20 mg/L.
Acute immobilization EC_{50} in water flea *(Daphnia magna)* is 0.245-0.56 mg/L.
Material is practically non-toxic to birds on an acute basis (LD_{50} is >2000 mg/kg).
Acute oral LD_{50} in bobwhite *(Colinus virginianus)* is >2000 mg/kg.
Material is practically non-toxic to birds on a dietary basis (LC_{50} is >5000 ppm).
Dietary LC_{50} in mallard *(Anas platyrhynchos)* is >5000 mg/kg.
Dietary LC_{50} in bobwhite *(Colinus virginianus)* is >5000 mg/kg.
Maximum acceptable toxicant concentration (MATC) in water flea *(Daphnia magna)* is >2.4 and <7.2 µg/L.
Growth inhibition EC_{50} in duckweed *(Lemna sp.)* is 0.048-0.17 mg/L.
Growth inhibition EC_{50} for marine diatom *(Skeletonema costatum)* is 0.028 mg/L.
Growth inhibition EC_{50} for diatom *(Navicula sp.)* is 0.015 mg/L.
Growth inhibition EC_{50} for blue-green alga *(Anabaena flos-aquae)* is >0.339 mg/L.
Growth inhibition EC_{50} for green alga *(Selenastrum capricornutum)* is 0.67 mg/L.
Acute contact LD_{50} in honey bee *(Apis mellifera)* is >100 µg/bee.
Acute oral LD_{50} in honey bee *(Apis mellifera)* is >100 µg/bee.
The LC_{50} in earthworm *(Eisenia foetida)* is >1000 mg/kg.

13. DISPOSAL CONSIDERATIONS:

DISPOSAL METHOD: Do not contaminate water, food or feed by storage or disposal. Dispose of wastes at an approved waste disposal facility in accordance with label requirements and with all federal state, and local regulations. Contact your state environmental office for information on approved waste disposal practices and facilities.

14. TRANSPORT INFORMATION:

U.S. DEPARTMENT OF TRANSPORTATION (DOT) INFORMATION:

For packages <10 pounds shipped by all modes of transportation:
This material is not regulated for transport.

For packages 10 pounds or greater by all modes of transportation:
Environmentally Hazardous Substance, Solid, N.O.S. (Trifluralin)/9/UN3077/III/RQ(Trifluralin)

15. REGULATORY INFORMATION:

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations.

U.S. REGULATIONS

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION
TRIFLURALIN	001582-09-8	96.3%

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SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An immediate health hazard
A delayed health hazard

TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
TRIFLURALIN	001582-09-8	NJ2 NJ3 PA1 PA3

NJ2=New Jersey Environmental Hazardous Substance (present at greater than or equal to 1.0%).
NJ3=New Jersey Workplace Hazardous Substance (present at greater than or equal to 1.0%).
PA1=Pennsylvania Hazardous Substance (present at greater than or equal to 1.0%).
PA3=Pennsylvania Environmental Hazardous Substance (present at greater than or equal to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

Health	2
Flammability	2
Reactivity	2

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND): This product contains the following substance(s) listed as "Hazardous Substances" under CERCLA which may require reporting of releases:

Chemical Name	CAS Number	RQ	% in Product
Trifluralin	001582-09-8	10	96.3

16. OTHER INFORMATION:

MSDS STATUS: Revised Sections: 3, 4, 8, 11, 12, & 14
Reference: DR-0055-6503
Replaces MSDS dated: 9/28/99

The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Dow AgroSciences For Further Information.