1. CHEMICAL PRODUCT IDENTIFICATION:

PRODUCT NAME: DOMAIN DF Herbicide
PRODUCT CODE: 14304
CHEMICAL FAMILY: Heteroaryloxyacetamide; Triazinone
CHEMICAL NAME: N-(4-Fluorophenyl)-N-(1-methylethyl)-2-((5-(trifluoromethyl)-1,3,4-thiadiazol-2-yl)oxy)acetamide; 4-Amino-6-[(1,1-dimethylethyl)-3-(methythio)-1,2,4-triazin-5(4H)-one
SYNONYMS: Flufenacet / Metribuzin
PRODUCT USE: Commercial Herbicide

2. COMPOSITION/INFORMATION ON INGREDIENTS:

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>/CAS NUMBER</th>
<th>EXPOSURE LIMITS</th>
<th>CONCENTRATION (%)</th>
</tr>
</thead>
</table>
| ***** HAZARDOUS INGREDIENTS *****
| Flufenacet      | 142459-58-3 | OSHA : Not Established | 24%               |
|                 |             | ACGIH: Not Established  |
| Metribuzin      | 21087-64-9  | OSHA : 5.00 mg/m3 TWA | 36%               |
|                 |             | ACGIH: 5.00 mg/m3 TWA  |
| Ingredient 2090 |             | OSHA : Not Established | 5-10%             |
| Specific chemical identity is withheld as a trade secret. | ACGIH: Not Established |
| Ingredient 1611 |             | OSHA : Not Established | 3-5%              |
| Specific chemical identity is withheld as a trade secret. | ACGIH: Not Established |
| Ingredient 2091 |             | OSHA : Not Established | 3-5%              |
| Specific chemical identity is withheld as a trade secret. | ACGIH: Not Established |
| Ingredient 1606 |             | OSHA : .10 mg/m3 TWA (respirable) | < 1%              |
| Specific chemical identity is withheld as a trade secret. | ACGIH: .10 mg/m3 TWA (respirable) |
| Ingredient 1901 |             | OSHA : 5.00 mg/m3 TWA (respirable) | 15-20%            |
| Specific chemical identity is withheld as a trade secret. | ACGIH: 2.00 mg/m3 TWA (respirable) |

3. HAZARDS IDENTIFICATION:

EMERGENCY OVERVIEW
CAUTION!

Color: Tan; Form: Solid; Granules; Odor: Disinfectant-like

POTENTIAL HEALTH EFFECTS:

ROUTE(S) OF ENTRY: Inhalation; Skin Contact; Skin Absorption; Eye Contact

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE:

ACUTE EFFECTS OF EXPOSURE: Based on EPA Toxicity Category criteria, this product is mildly toxic by the oral and dermal routes of exposure. In addition, animal studies have shown that it can cause moderate irritation to the eyes.

CHRONIC EFFECTS OF EXPOSURE: No chronic human health effects to the active ingredients in this product are known. However, this product may contain up to approximately 1% total crystalline silica. Excessive long-term exposure to respirable crystalline silica may cause silicosis, a form of progressive pulmonary fibrosis. Severe and permanent lung damage may result.

CARCINOGENICITY: This product is not listed as a carcinogen by NTP or IARC, or regulated as a carcinogen by OSHA. However, it may contain crystalline silica (quartz), a substance which is classified by NTP as a Group 2 carcinogen and by IARC as a Group 1 carcinogen. Crystalline silica is a naturally-occurring mineral component of many sands and clays. Although controversial, the carcinogenic potential of crystalline silica must be considered if it is inhaled under excessive exposure conditions. However, the respirable portion of the silica which may be contained in this product is small, such that excessive inhalation exposure during normal conditions of use is unlikely.

NTP: Crystalline Silica is classified as an NTP Anticipated Human Carcinogen - “Substances or groups of substances that may reasonably be anticipated to be carcinogens.”
HAZARDS IDENTIFICATION Continued:
IARC: IARC has classified crystalline silica as a Group 1 carcinogen. "There is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica (quartz) from occupational sources."

OSHA: Not regulated

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: No specific medical conditions are known which may be aggravated by exposure to the active ingredients in this product; however, pulmonary and respiratory diseases may be aggravated by exposure to respirable crystalline silica.

ACCIDENTAL RELEASE MEASURES Continued:

SPILL OR LEAK PROCEDURES continued:
absorbent material such as clay granules to absorb and collect wash solution for proper disposal. Contaminated soil may have to be removed and disposed. Do not allow material to enter streams, sewers, or other waterways.

7. HANDLING AND STORAGE:

STORAGE TEMPERATURE(MIN/MAX): 0 / 30-day average not to exceed 100°F

SHELF LIFE: Time/temperature-dependent. Contact Bayer for details.

SPECIAL SENSITIVITY: Avoid prolonged storage at temperatures exceeding 100°F

HANDLING/STORAGE PRECAUTIONS: Store in a cool dry area designated specifically for pesticides. Do not store near any material intended for use or consumption by humans or animals.

8. PERSONAL PROTECTION:

EYE PROTECTION REQUIREMENTS: Goggles should be used when needed to prevent dust or spray mixture from getting into the eyes.

SKIN PROTECTION REQUIREMENTS: Avoid skin contact. Use chemical-resistant gloves such as nitrile and wear long sleeves and trousers to prevent dermal exposure.

VENTILATION REQUIREMENTS: Maintain exposure levels below the applicable exposure limits through the use of general and local exhaust ventilation.

RESPIRATOR REQUIREMENTS: When needed, based on the conditions of use, wear a NIOSH-approved particulate respirator.

ADDITIONAL PROTECTIVE MEASURES: Clean water should be available for washing in case of eye or skin contamination. Educate and train employees in safe use of the product. Follow all label instructions. Launder clothing after handling product. Wash thoroughly after handling.

9. PHYSICAL AND CHEMICAL PROPERTIES:

PHYSICAL FORM: Solid

APPEARANCE: Granules

COLOR: Tan

ODOR: Disinfectant-like

MOLECULAR WEIGHT: 363.3 (flufenacet); 214.3 (metribuzin)

BOILING POINT: Not applicable

MELTING/FREEZING POINT: 76-81 (flufenacet); 126.5 (metribuzin)

SOLUBILITY IN WATER: Dispersible

SPECIFIC GRAVITY: Not applicable

BULK DENSITY: 30-35 lb/cu-ft

VAPOR PRESSURE: Not established

10. STABILITY AND REACTIVITY:

STABILITY: This is a stable material.

HAZARDOUS POLYMERIZATION: Will not occur.

INCOMPATIBILITIES: Bases
STABILITY AND REACTIVITY Continued:

INSTABILITY CONDITIONS: Temperatures above 70°C; unstable under basic conditions

DECOMPOSITION PRODUCTS: None known

TOXICOLOGICAL INFORMATION Continued:

CHRONIC TOXICITY:
ppt. In a 2 year feeding study, rats were administered flufenacet at dietary concentrations of 25, 400 or 800 ppm. The toxicological response of the rat could be broadly characterized as involving structural and/or functional alterations in liver-, kidney-, hematologic/spleen-, and thyroid-related endpoints. Eye effects were also observed and included cataracts and ocular soleral mineralization. The NOEL was 25 ppm. Dogs were administered metribuzin for 2 years at dietary concentrations of 25, 100 and 1500 ppm. Effects observed at the high concentration included decreases in body weight and food consumption, anemia, liver effects, kidney effects, testicular effects and mortality. The NOEL was 100 ppm. In chronic studies using rats, metribuzin was administered for 2 years at dietary concentrations ranging from 25 to 900 ppm. At concentrations of 300 ppm and greater, effects observed included decreased body weight gains, increased thyroid weights and changes in thyroid hormones. At 900 ppm, there was an increased incidence of follicular hyperplasia seen in the thyroid. The systemic NOEL was 30 ppm.

CARCINOGENICITY:
Flufenacet was investigated for carcinogenicity in chronic feeding studies using mice and rats at maximum levels of 400 and 800 ppm, respectively. There was no evidence of a carcinogenic potential observed in either species. Metribuzin was investigated for carcinogenicity in chronic feeding studies using rats and mice at maximum levels of 900 and 3200 ppm, respectively. There was no evidence of a carcinogenic potential observed in either species.

MUTAGENICITY:
In vivo and in vitro mutagenicity studies conducted on flufenacet have all been negative. Thus, flufenacet is not mutagenic. Numerous in vitro and in vivo mutagenicity studies have been conducted with metribuzin. The data, taken collectively, demonstrate that metribuzin is not genotoxic.

DEVELOPMENTAL TOXICITY:
In a developmental toxicity study using rats, flufenacet was administered by oral gavage during gestation at doses of 5, 25 or 125 mg/kg. The NOEL for both maternal and developmental toxicity was 25 mg/kg. In a developmental toxicity study using rabbits, flufenacet was administered by oral gavage during gestation at doses of 5, 25, 125, or 200 mg/kg. The NOELs for maternal and developmental toxicity were 5 and 25 mg/kg, respectively. In a developmental toxicity study using rats, metribuzin was administered orally during gestation at doses of 25, 70 or 200 mg/kg. Maternal toxic effects were observed at all doses. Developmental effects were observed at 200 mg/kg. The NOELs for maternal and developmental toxicity were less than 25 mg/kg and 70 mg/kg, respectively. When rabbits were administered metribuzin by oral gavage during gestation at doses of 10, 30 or 85 mg/kg, there was no evidence of any developmental effects. The NOELs for maternal and developmental toxicity were 30 and 85 mg/kg, respectively.

REPRODUCTION:
In a reproduction study using rats, flufenacet was administered at dietary concentrations of 20, 100, or 500 ppm for 2 generations. There were no compound-related effects on the adult reproductive or pup parameters. The NOELs for parental and reproductive toxicity were 20 and 500 ppm, respectively. In a reproduction study using rats, metribuzin was administered for 2 generations at dietary concentrations of 30, 150 or 750 ppm. Offspring at the high dose exhibited reduced body weight gains starting at Day-14.
TOXICOLOGICAL INFORMATION Continued:

REPRODUCTION continued:
lactation, an age correlating with the consumption of treated diets. The NOELs for maternal and reproductive toxicity were 30 and 750 ppm, respectively.

NEUROTOXICITY:

In an acute neurotoxicity study using rats, flufenacet was administered as a single oral dose at doses of 75, 200, or 450 mg/kg for males and 75, 150, or 300 mg/kg for females. Compound-related deaths occurred at the high dose-dose for both sexes with all high-dose females dying within three days following treatment. All clinical signs & neurobehavioral effects observed were ascribed to acute systemic toxicity. Based on these results, the NOEL for neurotoxicity was 450 mg/kg for males & 150 mg/kg for females (the highest doses with survivors). In a subsequent study, an overall NOEL of 50 mg/kg was established for females. In a 13-week neurotoxicity study, flufenacet was administered to rats at dietary concentrations of 120, 600, or 3000 ppm. Effects observed at the high-dose included reduced body weights, reduced forelimb grip strength, slightly uncoordinated righting response, decreased body temperature, increased hindlimb footplay, increased activity, & increased relative brain weight. Microscopic examinations revealed an increased incidence of axonal swelling in the brain & spinal cord tissues at the mid- & high-dose levels. The NOEL for subchronic neurotoxicity was 120 ppm based on microscopic lesions. In an acute neurotoxicity screening study using rats, metribuzin technical was administered as a single oral dose at doses of 2, 5, 20 or 100 mg/kg. Transient neurobehavioral effects were evident in both sexes at dose levels of 5 mg/kg & greater. There were no treatment-related lesions within the skeletal muscle or neural tissues. Based on these results, the NOEL for microscopic lesions for both sexes is 100 mg/kg, the highest dose tested. The overall NOEL for both sexes from this study was 2 mg/kg based on transient neurobehavioral effects. In a 13 week neurotoxicity screening study, metribuzin technical was administered to rats at dietary concentrations of 30, 300 or 900 ppm. Body weight & food consumption was reduced for females at concentrations of 300 or 900 ppm. Functional observational battery (FOB) & automated measures of motor and locomotor activity were not affected by treatment. There were no treatment-related microscopic lesions in neural tissues or skeletal muscle in any of the treated animals. There was no evidence of neurotoxicity at any dietary concentration. The NOEL for microscopic lesions was 900 ppm, the highest concentration tested. The NOEL for overall toxicity was 900 ppm for males and 30 ppm for females.

12. ECOLOGICAL INFORMATION:

This compound has been thoroughly evaluated for ecological effects. Bayer will provide a summary of specific data upon written request. As with any pesticide, this product should be used according to label directions and should be kept out of streams, lakes and other aquatic habitats of concern. In case of accidents involving environmental release of this material, please call Bayer’s emergency number at 1-800-414-0244.

13. DISPOSAL CONSIDERATIONS:

WASTE DISPOSAL METHOD: Follow container label instructions for disposal of wastes generated during use in compliance with the product label. In other situations, dispose in a RCRA hazardous waste incinerator.

DISPOSAL CONSIDERATIONS Continued:

EMPTY CONTAINER PRECAUTIONS: Do not reuse the container unless authorized in writing by Bayer Corporation. Clean and empty containers should be disposed in accordance with state and local laws.

14. TRANSPORTATION INFORMATION:

TECHNICAL SHIPPING NAME: Flufenacet / Metribuzin

FREIGHT CLASS PACKAGE: Herbicides, NOI - NMFC 50320, Sub. 2

PRODUCT LABEL: Not Noted

DOT (DOMESTIC SURFACE)

HAZARD CLASS OR DIVISION: Non-Regulated

IMO / IMDG CODE (OCEAN)

HAZARD CLASS DIVISION NUMBER: Non-Regulated

ICAO / IATA (AIR)

HAZARD CLASS DIVISION NUMBER: Non-Regulated

15. REGULATORY INFORMATION:

OSHA STATUS: This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA STATUS: This product is exempt from TSCA Regulation under FIFRA Section 3 (2)(B)(ii) when used as a pesticide.

CERCLA REPORTABLE QUANTITY: None

SARA TITLE III:

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES: None

SECTION 311/312 HAZARD CATEGORIES: Immediate Health Hazard; Delayed Health Hazard

SECTION 313 TOXIC CHEMICALS: Metribuzin 36% (CAS # 21087-64-9)

RCRA STATUS: If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

16. OTHER INFORMATION:

NFPA 704M RATINGS:

Health 2 Flammability Reactivity Other
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

Bayer's method of hazard communication is comprised of Product Labels and Material Safety Data Sheets. NFPA ratings are provided by Bayer as a customer service.

REASON FOR ISSUE: Create New MSDS

PREPARED BY: V. C. Standard

APPROVED BY: D. C. Eberhart

TITLE: Product Safety Manager

APPROVAL DATE: 08/13/1999

SUPERSEDES DATE: None

MSDS NUMBER: 35540
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