



BAYER CROPSCIENCE LP
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For Medical and Transportation Emergencies Only:
Call 24 hours a day 1-800-334-7577
For Product Use Information: Call 1-866-99BAYER (1-866-992-2937)

1. CHEMICAL PRODUCT IDENTIFICATION:

PRODUCT NAME.....: AXIOM DF Herbicide
PRODUCT CODE.....: 14301
CHEMICAL FAMILY.....: Heteroaryloxyacetamide; Triazinone
CHEMICAL NAME.....: N-(4-Fluorophenyl)-N-(1-methylethyl)-2-((5-(trifluoro-
methyl)-1,3,4-thiadiazol-2-yl)oxy)acetamide; 4-Amino-6
-(1,1-dimethylethyl)-3-(methylthio)-1,2,4-triazin-5(4H)-
one
SYNONYMS.....: Flufenacet; Metribuzin
EPA Registration No.: 264-766

2. COMPOSITION/INFORMATION ON INGREDIENTS:

INGREDIENT NAME
/CAS NUMBER EXPOSURE LIMITS CONCENTRATION (%)

\*\*\*\*\* HAZARDOUS INGREDIENTS \*\*\*\*\*

Flufenacet Technical
142459-58-3 OSHA : Not Established 54.4 %
ACGIH: Not Established

SENCOR Technical (metribuzin)
21087-64-9 OSHA : 5.00 mg/m3 TWA 13.6 %
ACGIH: 5.00 mg/m3 TWA

Ingredient 2090
Specific chemical identity is withheld as a trade secret.
OSHA : Not Established 3-5 %
ACGIH: Not Established

2. COMPOSITION/INFORMATION ON INGREDIENTS (Continued)

INGREDIENT NAME /CAS NUMBER	EXPOSURE LIMITS	CONCENTRATION (%)
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Ingredient 1611	Specific chemical identity is withheld as a trade secret.	
	OSHA : Not Established	1-3 %
	ACGIH: Not Established	
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Total crystalline silica (quartz)		
14808-60-7	OSHA : .10 mg/m3 TWA (respirable)	< 0.5 %
	ACGIH: .10 mg/m3 TWA (respirable)	
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Ingredient 1606	Specific chemical identity is withheld as a trade secret.	
	OSHA : 5.00 mg/m3 TWA (respirable)	5-10 %
	ACGIH: 2.00 mg/m3 TWA (respirable)	
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Ingredient 2091	Specific chemical identity is withheld as a trade secret.	
	OSHA : Not Established	3-5 %
	ACGIH: Not Established	
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Ingredient 1901	Specific chemical identity is withheld as a trade secret.	
	OSHA : Not Established	1-3 %
	ACGIH: Not Established	
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Ingredient 1979	Specific chemical identity is withheld as a trade secret.	
	OSHA : Not Established	10-20 %
	ACGIH: Not Established	

3. HAZARDS IDENTIFICATION:

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*                               EMERGENCY OVERVIEW                               *
*                               *                                               *
* CAUTION! Color: Tan to brown; Form: Solid; Granules;                       *
* Odor: Disinfectant-like; Harmful if inhaled; Harmful if                    *
* absorbed through skin; Harmful if swallowed.                                *
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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 is moderately irritating to the

3. HAZARDS IDENTIFICATION (Continued)

eyes. See Section 11 for additional toxicological information.

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."

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.

4. FIRST AID MEASURES:

FIRST AID FOR EYES.....: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes; then continue rinsing eye. Call a poison control center or doctor for treatment advise.

FIRST AID FOR SKIN.....: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advise.

FIRST AID FOR INHALATION: 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 information.

FIRST AID FOR INGESTION.: Call poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do

4. FIRST AID MEASURES (Continued)

not induce vomiting unless told to do so by physician or poison control center. Do not give anything by mouth to an unconscious person.

NOTE TO PHYSICIAN.....: Treat symptomatically. For an emergency, call the emergency number on page 1.

5. FIRE FIGHTING MEASURES:

FLASH POINT.....: Not applicable

EXTINGUISHING MEDIA.....: Water; Carbon Dioxide; Dry Chemical; Foam

SPECIAL FIRE FIGHTING PROCEDURES: Keep out of smoke. Cool exposed containers with water spray. Fight fire from upwind position. Use self-contained breathing equipment. Contain runoff to prevent entry into sewers or waterways. Equipment or materials involved in pesticide fires may become contaminated.

6. ACCIDENTAL RELEASE MEASURES:

SPILL OR LEAK PROCEDURES.....: Isolate area and keep unauthorized people away. Do not walk through spilled material. Avoid breathing dusts and skin contact. Avoid generating dust (a fine water spray mist, plastic film cover, or floor sweeping compound may be used if necessary). Use recommended protective equipment while carefully sweeping up spilled material. Place in covered container for reuse or disposal. Scrub contaminated area with soap and water. Rinse with water. Use dry 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 be exceed 100 F

SHELF LIFE.....: Time/temperature-dependent. Contact Bayer Crop Science for additional information.

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.

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8. PERSONAL PROTECTION:  
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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.....: Under normal handling conditions no respiratory protection is needed. However, if needed to prevent respiratory irritation, 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 use. Wash thoroughly after handling.

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9. PHYSICAL AND CHEMICAL PROPERTIES:  
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PHYSICAL FORM.....: Solid  
APPEARANCE.....: Granules  
COLOR.....: Tan to brown  
ODOR.....: Disinfectant-like  
MOLECULAR WEIGHT.....: 363.3 (BAY FOE 5043 Technical); 214.3 (SENCOR Technical)  
pH .....: 4-5 (10% slurry in distilled H2O at 20 C)  
BOILING POINT.....: Not applicable  
MELTING/FREEZING POINT....: 76-79C (FOE 5043 Tech);116-126C (SENCOR Tech)  
SOLUBILITY IN WATER .....: Dispersible  
SPECIFIC GRAVITY .....: Not applicable  
BULK DENSITY.....: 31-33 lb/cu-ft  
VAPOR PRESSURE .....: Not established

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10. STABILITY AND REACTIVITY:  
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STABILITY.....: This is a stable material.  
HAZARDOUS POLYMERIZATION...: Will not occur.  
INCOMPATIBILITIES.....: Bases  
INSTABILITY CONDITIONS.....: Temperatures above 70 C; unstable under basic conditions  
DECOMPOSITION PRODUCTS.....: None known

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11. TOXICOLOGICAL INFORMATION:  
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Only an eye irritation study has been conducted on this product as formulated. The other acute toxicity data provided have been extrapolated from a similar AXIOM DF formulation. The non-acute information pertains to the active ingredients, flufenacet technical and metribuzin technical.

ACUTE TOXICITY

ORAL LD50.....: Male Rat: 2347 mg/kg - Female Rat: 2072 mg/kg

DERMAL LD50.....: Male and Female Rat: >2000 mg/kg

INHALATION LC50....: 4 HR Exposure to Liquid Aerosol: Male & Female Rat: >0.977 mg/l (analytical) -- 1 HR Exposure to Liquid Aerosol (extrapolated from 4 HR LC50): Male & Female Rat: >3.90 mg/l (analytical)

EYE EFFECTS.....: Rabbit: Moderate irritation to the cornea, iris, and/or conjunctiva was observed with all irritation cleared by 72 hours post-treatment.

SKIN EFFECTS.....: Rabbit: Not a dermal irritant.

SENSITIZATION.....: Guinea pig: Dermal sensitization studies have not been performed on this product as formulated, however, dermal sensitization studies performed on the active ingredient, flufenacet technical and a similar Axiom DF formulation, have produced sensitization.

SUBCHRONIC TOXICITY...: In 3 mo. feeding studies with flufenacet in mice, rats, and dogs, the main target organs affected were brain, thyroid, liver, kidney, & spleen as indicated by changes in clinical chemistries, organ weights and/or histopathological findings. Alterations in circulating serum thyroid hormones (thyroxine and triiodothyronine) were observed in each species and considered indicative of hepatic interference. Primary hematological parameters affected by treatment in each species included changes in erythrocytes, platelets, hemoglobin, and hematocrit concentrations. Histopathological findings generally correlated with alterations in organ weights. A decrease in body weight gain was seen in mice and rats. In a subacute dermal toxicity study, rats were treated with flufenacet at doses of 20, 150 or 1000 mg/kg. Animals were treated for 6 hr/day such that males received 17 applications and females received 18 applications in a period of 21- and 22-days, respectively. An additional control & high-dose group were treated and maintained for two weeks to ascertain extent of recovery. Effects observed included decreased levels for thyroxine (T4) & free thyroxine (FT4), increased liver weights, and centrilobular hepatocytomegaly. The additional animals treated with 1000 mg/kg demonstrated a complete recovery. The no-observed-effect-level (NOEL) was 20 mg/kg. In a 3 wk. dermal toxicity study, rabbits were treated with the active ingredient, metribuzin, at 40, 200 or 1000 mg/kg for 6 hr/day, 5 days/wk. At the high dose, there was evidence of increased cholesterol levels and liver enzyme induction. Thyroxine levels were increased at doses of 200 mg/kg and above. All of these effects were slight and reversible. The NOEL was 40 mg/kg. In subacute inhalation studies, rats were exposed to aerosol concentration of metribuzin ranging from 31 to 745 mg/m<sup>3</sup> for 6 hr/day, 5 days/wk for 3 wk. Effects observed included behavioral changes, decreased body weight gains, liver enzyme induction & organ weight effects. The NOEC was 31 mg/m<sup>3</sup>.

CHRONIC TOXICITY.....: Dogs were administered flufenacet at dietary

11. TOXICOLOGICAL INFORMATION (Continued)

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concentrations of 40, 800 or 1600 ppm for 1 year. Effects observed included decreased terminal body weights, head tilt, computerized electrocardiography findings, quantitative electroencephalography findings, clinical neurological findings, organ weight differences, and changes in clinical chemistry and hematology parameters. Micropathological observations were noted in the liver, kidney, eye, brain, spinal cord and sciatic nerve. The NOEL was 40 ppm. 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 scleral 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 25, 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 25

11. TOXICOLOGICAL INFORMATION (Continued)

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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 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 for both sexes with all high-dose females dying within three days following treatment. All clinical signs and neurobehavioral effects observed were ascribed to acute systemic toxicity. Based on these results, the NOEL for neurotoxicity was 450 mg/kg for males and 150 mg/kg for females (the highest doses with survivors). The overall NOEL was 75 mg/kg for males and less than 75 mg/kg for females. 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 footsplay, increased activity, and increased relative brain weight. Microscopic examinations revealed an increased incidence of axonal swelling in the brain and spinal cord tissues at the mid- and high-dose levels. The NOEL for subchronic neurotoxicity was 120 ppm based on microscopic lesions. In an acute neurotoxicity screening study using rats, metribuzin tech 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 tech 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 treatment 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.

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12. ECOLOGICAL INFORMATION:

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12. ECOLOGICAL INFORMATION (Continued)

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This compound has been thoroughly evaluated for ecological effects. Bayer Crop Science 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 CropScience's emergency number on page 1.  
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13. DISPOSAL CONSIDERATIONS

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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.  
EMPTY CONTAINER PRECAUTIONS.: Do not reuse the container. Clean and empty containers should be disposed in accordance with state and local laws.  
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14. TRANSPORTATION INFORMATION:

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TECHNICAL SHIPPING NAME.....: Flufenacet; metribuzin  
FREIGHT CLASS PACKAGE.....: Herbicides, NOI - NMFC 50320  
PRODUCT LABEL.....: AXIOM DF Herbicide

DOT (DOMESTIC SURFACE)

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HAZARD CLASS OR DIVISION .....: Non-Regulated

IMO / IMDG CODE (OCEAN)

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HAZARD CLASS DIVISION NUMBER...: Non-Regulated

ICAO / IATA (AIR)

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HAZARD CLASS DIVISION NUMBER...: Non-Regulated  
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15. REGULATORY INFORMATION:

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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.  
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