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# Bromacil

## HERBICIDE FACT SHEET

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U.S. DEPARTMENT OF ENERGY  
BONNEVILLE POWER ADMINISTRATION

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This fact sheet is one of a series issued by the Bonneville Power Administration for their workers and the general public. It provides information on forest and land management uses, environmental and human health effects, and safety precautions. A list of definitions is included in Section VIII of this fact sheet.

### I. BASIC INFORMATION

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**COMMON NAME:** bromacil\*

**CHEMICAL NAME:** 5-bromo-3-sec-butyl-6-methyluracil, CAS No. 314-40-9  
5-bromo-3-sec-butyl-6-methyluracil, lithium salt, CAS No. 53404-19-6

\* According to EPA, bromacil and bromacil lithium salt are toxicologically similar. This Fact Sheet applies to both active ingredients.

**CHEMICAL TYPE:** uracil class of herbicide

**PESTICIDE CLASSIFICATION:** systemic, broad-spectrum herbicide to controls weeds and brush

**REGISTERED USE STATUS:** General Use Pesticide. Restricted Use Pesticide in Washington.

**FORMULATIONS:** Commercial herbicide products generally contain one or more ingredients. An inert ingredient is anything added to the product other than an active ingredient. Because of concern for human health and the environment, EPA announced its policy on toxic inert ingredients in the Federal Register on April 22, 1987 (52FR13305). This policy focuses on the regulation of inert ingredients. EPA's strategy for implementing this policy included the development of four lists of inerts, based on toxicological concerns. Inerts of toxicological concern were placed on List 1. Potentially toxic inerts/high priority for testing were placed on List 2. Inerts of unknown toxicity were placed on List 3, and inerts of minimal concern were placed on List 4.

The inert ingredients of the dicamba formulations are not classified by the USEPA as inert ingredients of toxicological concerns to humans or the environment.

The contents of the bromacil formulation is listed below:

Hyvar™ X (Wettable Powder)

Bromacil	80 %
Inert	20 %

Hyvar™ X-L (Water Soluble Liquid)

Bromacil Lithium Salt	21.9 %
Inert	78.1 %

**RESIDUE ANALYTICAL METHODS:** EPA METHOD 632

## II. HERBICIDE USES

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**REGISTERED FORESTRY, RANGELAND AND RIGHT-OF-WAY USES:** Bromacil as Hyvar™ is registered for use in non-agricultural and agricultural areas for the control of weeds, grasses, and as a total vegetation management tool for bare-ground treatment. For terrestrial use only.

### OPERATIONAL DETAILS:

**TARGET PLANTS:** Bromacil is a non-selective herbicide for annual and perennial weeds and brush, woody plants and, vines.

**MODE OF ACTION:** Bromacil enters the plant through the root zone and moves throughout the plant inhibiting photosynthesis.

**METHOD OF APPLICATION AND RATES:** Broadcast, band and basal application at 2 to 12 pounds of formulated product per acre. Aerial application is prohibited.

### SPECIAL PRECAUTIONS:

**TIMING OF APPLICATION:** For woody plants and brush, Bromacil is applied in the spring and summer. Weeds are controlled by applying Bromacil prior to or after emergence. As bromacil must move to the root zone to be effective, adequate soil moisture is necessary.

**DRIFT CONTROL:** Care should be exercised not to overspray or apply the herbicide to adjacent non-target areas. Drift control is achieved by observing weather conditions and following label and sprayer instructions. Spray droplet size should be 150 microns or larger.

**Restrictions/Warnings/Limitations:** Do not enter or allow others to enter the treated area until sprays have dried. Not for use in recreation or residential areas. Do not apply through any type of irrigation system. Do not apply more than 12 pounds/acre/year for any treated site. Do not apply when ground is frozen. Do not apply directly to water or areas where surface water is present, or to intertidal areas below the mean high water mark. Do not apply to irrigation banks or other ditch banks. Do not graze animals in treated areas. Will harm non-target plants.

### III. ENVIRONMENTAL EFFECTS/FATE

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#### SOIL:

**RESIDUAL SOIL ACTIVITY:** The half-life of bromacil is 275 days.

**ADSORPTION:** The  $K(oc)$  of bromacil is 32.

**PERSISTENCE AND AGENTS OF DEGRADATION:** Bromacil is persistent with no major (>10%) degradates.

**METABOLITES/DEGRADATION PRODUCTS AND POTENTIAL ENVIRONMENTAL EFFECTS:** The primary metabolites of bromacil are carbon dioxide, 5-bromo-6-methyluracil, 5-bromo-3-(alpha-hydroxymethylpropyl)-6-methyluracil, 5-bromo-3-sec-butyl-6-hydroxymethyluracil, 5-bromo-3-(2-hydroxy-1-methylpropyl)-6-methyluracil, and 3-sec-butyl-6-methyluracil. These metabolites are not of toxicological concern to EPA.

#### WATER:

**SOLUBILITY:** 700 mg/kg in water.

**POTENTIAL FOR LEACHING INTO SURFACE AND GROUND WATER:** Bromacil is persistent and highly mobile. Bromacil is known to leach into ground water and has high potential to enter surface waters.

#### AIR:

**VOLATILIZATION:** Very low.

**POTENTIAL FOR BYPRODUCTS FROM BURNING OF TREATED VEGETATION:** Not known.

### IV. ECOLOGICAL TOXICITY EFFECTS ON NON-TARGET SPECIES

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#### MICROORGANISMS:

**ACUTE ORAL TOXICITY:**  $LD_{50}$  (honey bee 48-hour) >193.3  $\mu\text{g}/\text{bee}$

**ACUTE CONTACT TOXICITY:**  $LD_{50}$  (honey bee 48-hour) >100  $\mu\text{g}/\text{bee}$

**OVERALL TOXICITY: Practically Non-Toxic**

**PLANTS:** Contact will injure or kill target and non-target brush/woody plants.

#### AQUATIC VERTEBRATES:

**ACUTE TOXICITY:**  $LC_{50}$  (rainbow trout 96-hour) 36 mg/l

**ACUTE TOXICITY:**  $LC_{50}$  (bluegill sunfish 96-hour) 127 mg/l

**OVERALL TOXICITY: Slightly Toxic**

#### AQUATIC FRESHWATER INVERTEBRATES:

**ACUTE TOXICITY:**  $EC_{50}$  (*Daphnia magna* 48-hour) 121 mg/l

**OVERALL TOXICITY: Practically Non-Toxic**

#### **AQUATIC ESTUARINE/MARINE INVERTEBRATES:**

**ACUTE TOXICITY:** LC<sub>50</sub> (Eastern oyster larvae 48-hour) 130 mg/l

**ACUTE TOXICITY:** LC<sub>50</sub> (mysid 48-hour) 12.9 mg/l

**ACUTE TOXICITY:** LC<sub>50</sub> (sheepshead minnow 48-hour) 1620 mg/l

**OVERALL TOXICITY: Practically Non-Toxic**

#### **TERRESTRIAL ANIMALS:**

**AVIAN ACUTE ORAL TOXICITY:** LD<sub>50</sub> (bobwhite quail) >2250 mg/kg

**MAMMAL ACUTE ORAL TOXICITY:** LD<sub>50</sub> (rat) 3998 mg/kg

**AVIAN SUBACUTE DIETARY TOXICITY:** LC<sub>50</sub> (bobwhite quail) >10,000 mg/kg

**AVIAN SUBACUTE DIETARY TOXICITY:** LC<sub>50</sub> (mallard duck) >10,000 mg/kg

**OVERALL TOXICITY: Practically Non-Toxic**

#### **BIOACCUMULATION POTENTIAL: Low potential**

**THREATENED AND ENDANGERED SPECIES:** Federally listed plants may be adversely affected if the product is applied directly to the plants.

## **V. TOXICOLOGICAL DATA**

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#### **ACUTE TOXICITY:**

**ACUTE ORAL TOXICITY:** LD<sub>50</sub> (rat) 5126 mg/kg

**ACUTE DERMAL TOXICITY:** LD<sub>50</sub> (rabbit) >5000 mg/kg

**PRIMARY SKIN IRRITATION:** Rabbit - Not an Irritant

**PRIMARY EYE IRRITATION:** Rabbit – Slight Irritant

**ACUTE INHALATION:** LC<sub>50</sub> (rat) >14.4 mg/l

**OVERALL TOXICITY:** Category III – Caution

#### **CHRONIC TOXICITY:**

**CARCINOGENICITY:** Classified by EPA as Group C - possible human carcinogen.

**DEVELOPMENTAL/REPRODUCTIVE:** No effects reported.

**MUTAGENICITY:** Not a mutagenic.

**HAZARD:** The end-use product label for Hyvar™ carries the *Caution* signal word due to eye irritation, potential exposure to mixers/applicators, and PPE requirements.

## VI. HUMAN HEALTH EFFECTS

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### ACUTE TOXICITY (POISONING):

REPORTED EFFECTS: Low Risk.

### CHRONIC TOXICITY:

REPORTED EFFECTS: None reported.

### POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM CONTACTING OR CONSUMING TREATED VEGETATION, WATER OR ANIMALS: None reported.

### POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM INERT INGREDIENTS CONTAINED IN THE FORMULATED PRODUCTS: Information not available.

**HEALTH EFFECTS OF EXPOSURE TO FORMULATED PRODUCTS:** Mild, temporary skin and eye irritation.

**HEALTH EFFECTS ASSOCIATED WITH CONTAMINANTS:** None reported.

**HEALTH EFFECTS ASSOCIATED WITH OTHER FORMULATIONS:** None reported.

## VII. SAFETY PRECAUTIONS

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### SIGNAL WORD AND DEFINITION:

BROMACIL - **CAUTION** – HARMFUL IF SWALLOWED. CAUSES MODERATE EYE IRRITATION. AVOID CONTACT WITH EYES OR CLOTHING

**PROTECTIVE PRECAUTIONS FOR WORKERS:** Applicators and other handlers must wear long-sleeved shirt and long pants, shoes plus socks, and waterproof gloves.

### MEDICAL TREATMENT PROCEDURES (ANTIDOTES):

**EYES:** Flush eyes with water; call physician if irritation persists.

**SKIN:** Wash all exposed areas with soap and water; call physician if irritation persists.

**INGESTION:** Induce vomiting and call physician or Poison Control Center.

**INHALATION:** None.

**HANDLING, STORAGE AND DISPOSAL:** Store at room temperature or cooler. Do not reuse container. Rinse container and dispose accordingly. Liquid formulation is combustible. Do not use or store near heat or open flame. Keep container closed when not in use.

**EMERGENCY SPILL PROCEDURES AND HAZARDS:** Contain and sweep up material of small spills and dispose as waste. Do not contaminate water, food or feed by storage or disposal.

## VIII. DEFINITIONS

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**adsorption** – the process of attaching to a surface

**avian** – of, or related to, birds

**CAEPA** – California Environmental Protection Agency

**carcinogenicity** – ability to cause cancer

**CHEMTREC** – Chemical Transportation Emergency Center

**dermal** – of, or related to, the skin

**EC<sub>50</sub>** - median effective concentration during a bioassay

**ecotoxicological** – related to the effects of environmental toxicants on populations of organisms originating, being produced, growing or living naturally in a particular region or environment

**FIFRA** – Federal Insecticide, Fungicide and Rodenticide Act

**formulation** – the form in which the pesticide is supplied by the manufacturer for use

**half-life** – the time required for half the amount of a substance to be reduced by natural processes

**herbicide** – a substance used to destroy plants or to slow down their growth

**Hg** – chemical symbol for mercury

**IARC** – International Agency for Research on Cancer

**K(oc)** – the tendency of a chemical to be adsorbed by soil, expressed as:  $K(oc) = \text{conc. adsorbed}/\text{conc. dissolved}/\% \text{ organic carbon in soil}$

**LC<sub>50</sub>** – the concentration in air, water, or food that will kill approximately 50% of the subjects

**LD<sub>50</sub>** – the dose that will kill approximately 50% of the subjects

**leach** – to dissolve out by the action of water

**mg/kg** – weight ratio expressed as milligrams per kilogram

**mg/l** – weight-to-liquid ratio expressed as milligrams per liter

**microorganisms** – living things too small to be seen without a microscope

**mPa** – milli-Pascal (unit of pressure)

**mutagenicity** – ability to cause genetic changes

**NFPA** – National Fire Protection Association

**NIOSH** - National Institute for Occupational Safety and Health

**NOEL** - no observable effect level

**non-target** – animals or plants other than the ones that the pesticide is intended to kill or control

**OSHA** - Occupational Safety and Health Administration

**Pa – Pascal (unit of pressure)**

**persistence** – tendency of a pesticide to remain to remain in the environment after it is applied

**pesticides** – substances including herbicides, insecticides, rodenticides, fumigants, repellents, growth regulators, etc., regulated under FIFRA

**PPE** – personal protective equipment

**ppm** – weight ratio expressed as parts per million

**residual activity** – the remaining amount of activity as a pesticide

**T&E** – Threatened and Endangered Species (from the Endangered Species Act)

**µg** – micrograms

**volatility** – the tendency to become a vapor at standard temperatures and pressures

## IX. INFORMATION SOURCES

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Du Pont Agricultural Products, Hyvar<sup>®</sup> X Herbicide, Material Safety Data Sheet M0000018, December 12, 1996

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Extension Toxicology Network, Pesticide Information Profile, Bromacil,  
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<http://ace.orst.edu/info/extoxnet/tibs/bioaccum.htm>

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Spray Drift Task Force, A Summary of Ground Application Studies, 1997  
<http://www.agdrift.com/publications/Body.htm>

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<http://www.infoventures.com/e-hlth/pesticide/pest-fac.html>

USEPA, Office of Pesticide Programs, Reregistration Eligibility Decision, Bromacil, EPA-738-R-96-013, August 1996  
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<http://www.epa.gov/oppsrrd1/REDs/>

## X. TOXICITY CATEGORY TABLES

TABLE I: HUMAN HAZARDS

Category	Signal Word	Route of Administration			Hazard	
		Acute Oral LD <sub>50</sub> (mg/kg)	Acute Dermal LD <sub>50</sub> (mg/kg)	Acute Inhalation LC <sub>50</sub> (mg/l)	Eye irritation	Skin irritation
<b>I (Highly Toxic)</b>	<b>DANGER (poison)</b>	0-50	0-200	0-0.2	corrosive: corneal opacity not reversible within 7 days	corrosive
<b>II (Moderately Toxic)</b>	<b>WARNING</b>	>50-500	>200-2000	>0.2-2	corneal opacity reversible within 7 days; irritation persisting for 7 days	severe irritation at 72 hours
<b>III (Slightly Toxic)</b>	<b>CAUTION</b>	>500-5000	>2000-20.000	>2-20	no corneal opacity; irritation reversible within 7 days	moderate irritation at 72 hours
<b>IV (Practically Non-toxic)</b>	<b>NONE</b>	>5000	>20,000	>20	no irritation	moderate irritation at 72 hours

After *Pesticide User's Guide*, Ohio State University, Extension Bull. No. 745, 1998.

TABLE II: ECOTOXICOLOGICAL RISKS TO WILDLIFE (TERRESTRIAL AND AQUATIC)

Risk Category	Mammals	Avian	Avian	Fish or Aquatic Invertebrates
	Acute Oral LD <sub>50</sub> (mg/kg)	Acute Oral LD <sub>50</sub> (mg/kg)	Acute Dietary LC <sub>50</sub> (mg/kg)	Acute Concentration LC <sub>50</sub> (mg/l)
<b>Very Highly Toxic</b>	<10	<10	<50	<0.1
<b>Highly Toxic</b>	10-50	10-50	50-500	0.1 – 1
<b>Moderately Toxic</b>	51-500	51-500	501-1,000	>1 – 10
<b>Slightly Toxic</b>	501-2,000	501-2,000	1,001-5,000	>10 – 100
<b>Practically Non-toxic</b>	>2,000	>2,000	>5,000	>100

Table II created from information contained in *Pesticides and Wildlife*, Whitford, Fred, et al., Purdue University Cooperative Extension Service PPP-30, 1998.

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