

# Dichlobenil

## 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:** dichlobenil

**CHEMICAL NAME:** 2,6-dichlorobenzonitrile

Cas No. 1194-65-6

**CHEMICAL TYPE:** benzonitrile

**PESTICIDE CLASSIFICATION:** herbicide

**REGISTERED USE STATUS:** "General Use."

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

The contents of the dichlobenil formulation are listed below:

Casoron<sup>®</sup> Herbicide

Dichlobenil	4.0 %
Inert	96.0 %

**RESIDUE ANALYTICAL METHODS:** Gas chromatography with electron capture.

## II. HERBICIDE USES

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**REGISTERED FORESTRY, RANGELAND AND RIGHT-OF-WAY USES:** Dichlobenil is registered for use in crop and non-crop sites for selective and total weed control. For terrestrial use only.

### OPERATIONAL DETAILS:

**TARGET PLANTS:** Dichlobenil is used for control of annual and perennial grasses, broadleaf weeds, and woody plants.

**MODE OF ACTION:** Acts on growing points and root tips, dichlobenil inhibits germination of actively dividing meristems.

**METHOD OF APPLICATION AND RATES:** Ground broadcast, spot and localized applications. One hundred to five hundred pounds per acre depending on target species.

### SPECIAL PRECAUTIONS:

**TIMING OF APPLICATION:** Timing is dependent on the target plant.

**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 plant or transplant into treated soil. Do not graze livestock in treated areas.

## III. ENVIRONMENTAL EFFECTS/FATE

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### SOIL:

**RESIDUAL SOIL ACTIVITY:** The half-life of dichlobenil is 60 days.

**ADSORPTION:** The  $K(oc)$  of dichlobenil is 400.

**PERSISTENCE AND AGENTS OF DEGRADATION:** Dichlobenil is moderately persistent in the plant and soils. The primary route of degradation is microbial activity.

**METABOLITES/DEGRADATION PRODUCTS AND POTENTIAL ENVIRONMENTAL EFFECTS:** Dichlobenil degrades to 2,6-dichlorobenzamide (BAM) and 2,6-dichlorobenzoic acid. BAM is the primary metabolite produced by soil microbes.

### WATER:

**SOLUBILITY:** 21.2 mg/l in water (pH 7 at 25° C).

**POTENTIAL FOR LEACHING INTO SURFACE AND GROUND WATER:** Dichlobenil is moderately persistent with a very high soil adsorption coefficient. There is a moderate potential for dichlobenil to leach into groundwater and a high potential for surface water runoff.

### AIR:

**VOLATILIZATION:** 0.088 Pa at 20° C.

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

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

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### MICROORGANISMS:

ACUTE CONTACT TOXICITY: LD<sub>50</sub> (honey bee contact) >120 µg/bee

**OVERALL TOXICITY: Practically Non-Toxic**

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

### AQUATIC VERTEBRATES:

ACUTE TOXICITY: LC<sub>50</sub> (rainbow trout 96-hour) 6.26 mg/l

ACUTE TOXICITY: LC<sub>50</sub> (bluegill sunfish 96-hour) 6.72 mg/l

**OVERALL TOXICITY: Moderately Toxic**

### AQUATIC FRESHWATER INVERTEBRATES:

ACUTE TOXICITY: LC<sub>50</sub> (*Daphnia magna* 48-hour) 5.8 mg/l

**OVERALL TOXICITY: Moderately Toxic**

### AQUATIC ESTUARINE/MARINE INVERTEBRATES:

ACUTE TOXICITY: LC<sub>50</sub> (sheepshead minnow 96-hour) >12.7 mg/l

ACUTE TOXICITY: LC<sub>50</sub> (grass shrimp 96-hour) >1.0 mg/l

ACUTE TOXICITY: LC<sub>50</sub> (eastern oyster 96-hour) >1.63 mg/l

**OVERALL TOXICITY: Moderately Toxic**

### TERRESTRIAL ANIMALS:

AVIAN ACUTE ORAL TOXICITY: LD<sub>50</sub> (bobwhite quail) 683 mg/kg

AVIAN ACUTE ORAL TOXICITY: LD<sub>50</sub> (mallard duck) >2000 mg/kg

AVIAN SUBACUTE DIETARY TOXICITY: LC<sub>50</sub> (bobwhite quail) 5200 mg/kg

AVIAN SUBACUTE DIETARY TOXICITY: LC<sub>50</sub> (mallard duck) >5200 mg/kg

MAMMAL ACUTE ORAL TOXICITY: LD<sub>50</sub> (rat) 4250 mg/kg

**OVERALL TOXICITY: Slightly Toxic**

### BIOACCUMULATION POTENTIAL: Slight Potential

**THREATENED AND ENDANGERED SPECIES:** Federally listed terrestrial and aquatic plants may be adversely affected if the product is applied directly to the plants, or indirectly as the result of drift or leaching.

## V. TOXICOLOGICAL DATA

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### ACUTE TOXICITY:

**ACUTE ORAL TOXICITY:** LD<sub>50</sub> (rat) 4250 mg/kg

**ACUTE DERMAL TOXICITY:** LD<sub>50</sub> (rabbit) >2000 mg/kg

**PRIMARY SKIN IRRITATION:** Rabbit - Non-Irritant

**PRIMARY EYE IRRITATION:** Rabbit – Non-Irritant

**ACUTE INHALATION:** LC<sub>50</sub> (rat) >3.3 mg/l

**OVERALL TOXICITY:** Category III – Slightly Toxic

### CHRONIC TOXICITY:

**CARCINOGENICITY:** EPA Group C - possible human carcinogen.

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

**MUTAGENICITY:** No adverse effects.

**HAZARD:** The end-use product labels for the dichlobenil formulation Casoron® carries the *Caution* signal word due to potential eye and skin irritation.

## VI. HUMAN HEALTH EFFECTS

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### ACUTE TOXICITY (POISONING):

**REPORTED EFFECTS:** None reported.

### 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:** None reported.

**HEALTH EFFECTS OF EXPOSURE TO FORMULATED PRODUCTS:** None reported.

**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:**

DICHLORBENIL - **CAUTION** – HARMFUL IF SWALLOWED. AVOID BREATHING DUST. AVOID CONTACT WITH SKIN AND EYES.

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

### **MEDICAL TREATMENT PROCEDURES (ANTIDOTES):**

**EYES:** Flush eyes with water.

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

**INGESTION:** Rinse mouth thoroughly with water. Do not induce vomiting. Call physician.

**INHALATION:** Remove to fresh air. Call a physician if breathing difficulty persists.

**HANDLING, STORAGE AND DISPOSAL:** Store at room temperature or cooler. Do not reuse container. Rinse container and dispose accordingly.

**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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Cornell University, Pesticide Active Ingredient Fact Sheet, Dichlobenil, February 20, 1985  
<http://pmep.cce.cornell.edu/profiles/index.html>

EPRI, Determination of the Effectiveness of Herbicide Buffer Zones in Protecting Water Quality, EPRI Final Report TR-113160, 1999

Extension Toxicology Network, Toxicology Information Briefs: Bioaccumulation, Revised 1993,  
<http://ace.orst.edu/info/extoxnet/tibs/bioaccum.htm>

PBI/Gordon Corporation, Barrier<sup>®</sup> Ornamental Landscaping Herbicide, Product Information Sheet  
TOPRODINFO/5M/1197, 1997

PBI/Gordon Corporation, Barrier<sup>®</sup> Ornamental Landscaping Herbicide, Material Safety Data Sheet No.  
512-6, Version 9, November 29, 1993

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

Uniroyal Chemical Company, Inc., Casoron<sup>®</sup> 4G, Specimen Product Label, 1995

Uniroyal Chemical Company, Inc., Casoron<sup>®</sup> 4G, Material Safety Data Sheet, MSDS No. A308002,  
October 1, 1998

USDA Forest Service, Pesticide Fact Sheet, Dichlobenil, November 1995  
<http://www.fs.fed.us/foresthealth/pesticide/index.html>

USEPA, Office of Pesticide Programs, Reregistration Eligibility Decision, Dichlobenil, EPA-738-R-98-003,  
October 1998 <http://www.epa.gov/oppsrrd1/REDs/>

USEPA, Office of Pesticide Programs, R.E.D. Facts, Dichlobenil, EPA-738-F-98-005, October 1998  
<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
I (Highly Toxic)	<b>DANGER (poison)</b>	0-50	0-200	0-0.2	corrosive: corneal opacity not reversible within 7 days	corrosive
II (Moderately Toxic)	<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
III (Slightly Toxic)	<b>CAUTION</b>	>500-5000	>2000-20,000	>2-20	no corneal opacity; irritation reversible within 7 days	moderate irritation at 72 hours
IV (Practically Non-toxic)	<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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