

# Prodiamine

## HERBICIDE FACT SHEET

U.S. DEPARTMENT OF ENERGY  
BONNEVILLE POWER ADMINISTRATION

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

**COMMON NAME:** prodiamine

**CHEMICAL NAME:** N3,N3-Di-n-propyl-2,4-dinitro-6-(trifluoromethyl)-m-phenylenediamine

Cas No. 29091-21-2

**CHEMICAL TYPE:** dinitroaniline

**PESTICIDE CLASSIFICATION:** herbicide

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

**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 and no concern were placed on List 4A and 4B, respectively.

The contents of the prodiamine formulation for Barricade® 65WG herbicide are listed below:

Barricade® 65WG Herbicide			
Active Ingredient	prodiamine	65.0 %	Inert ingredients include kaolin clay and a dispersing agent listed as either non-hazardous or proprietary.
Inert Ingredients		35.0 %	

**RESIDUE ANALYTICAL METHODS:** Standard herbicide screening analysis.

## II. HERBICIDE USES

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**REGISTERED FORESTRY, RANGELAND AND RIGHT-OF-WAY USES:** Prodiamine is registered for weed control for commercial nurseries, landscaping, Christmas tree farms, turf farms, golf courses, etc. For terrestrial use only.

### OPERATIONAL DETAILS:

**TARGET PLANTS:** Pre-emergent control of grasses and broadleaf weeds.

**MODE OF ACTION:** Inhibits mitotic processes.

**METHOD OF APPLICATION AND RATES:** Ground broadcast spray, spot and localized spray applications. The application rate is 0.4 oz per 100 sq ft.

### SPECIAL PRECAUTIONS:

**TIMING OF APPLICATION:** Timing is dependent on the target plant and desired results. Barricade may be applied as necessary to control target weeds.

**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. Tank or hose pressure should not exceed 25 psi.

### Restrictions/Warnings/Limitations:

T&E toxicity warning for ALL plants.

T&E toxicity warning for aquatic species.

Groundwater and surface water warning.

Do not use on food or feed crops.

Do not use on areas to be grazed or cut for hay.

Do not use the product to treat irrigation ditches or other channels used for either agricultural or domestic purposes

Do not apply this herbicide via any type of irrigation system.

Do not apply aurally.

### III. ENVIRONMENTAL EFFECTS/FATE

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**SOLUBILITY:** 0.013 ppm in water at 25° C.

**VAPOR PRESSURE:**  $5.6 \times 10^{-6}$  mm Hg.

**HYDROLYSIS:** Stable.

**PHOTOLYSIS IN WATER:** 30 days.

**PHOTOLYSIS ON SOIL:** 106 days.

**AEROBIC SOIL METABOLISM: AVERAGE:** 106 days.

**ANAEROBIC SOIL METABOLISM:** 19 days.

**K<sub>OC</sub>:** 273.9

**PERSISTENCE AND AGENTS OF DEGRADATION/DISSIPATION:** The primary route of dissipation is photolysis.

**METABOLITES/DEGRADATION PRODUCTS AND POTENTIAL ENVIRONMENTAL EFFECTS:** None

**POTENTIAL FOR LEACHING INTO SURFACE AND GROUND WATER:** High dependent on soil type and organic content.

**POTENTIAL FOR BYPRODUCTS FROM BURNING OF TREATED VEGETATION:** Information not available.

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

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#### TERRESTRIAL:

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

**AVAIN 8-DAY DIETARY** LC<sub>50</sub> (mallard duck) >10,000 mg/kg

**HONEY BEE** LC<sub>50</sub>/EC<sub>50</sub> >100 ug/bee

**EARTHWORM** Less than 25% mortality (No significant toxicity).

**SMALL MAMMAL ACUTE ORAL TOXICITY:** LD<sub>50</sub> (rat) >5000 mg/kg

**OVERALL TOXICITY: Practically Non-Toxic**

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

## FRESHWATER AQUATIC SPECIES:

ACUTE TOXICITY: LC<sub>50</sub> (rainbow trout 96-hour) 0.83 mg/l

ACUTE TOXICITY: LC<sub>50</sub> (bluegill sunfish 96-hour) 0.55mg/l

ACUTE TOXICITY: EC<sub>50</sub> (Daphnia 48-hour) 0.66 mg/l

**OVERALL FRESHWATER AQUATIC TOXICITY: Highly Toxic**

**BIOACCUMULATION POTENTIAL:** Low to no potential.

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

## V. TOXICOLOGICAL DATA

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### ACUTE TOXICITY:

ACUTE ORAL TOXICITY: LD<sub>50</sub> (rat) >5000 mg/kg

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

ACUTE INHALATION: LC<sub>50</sub> (rat 4-hour) >1.81 mg/l

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

### CHRONIC TOXICITY:

**CARCINOGENICITY:** Not listed, however, benign thyroid tumors have been reported in rats but not mice.

**DEVELOPMENTAL/REPRODUCTIVE:** Fetal toxicity at high does and developmental and maternal toxicity observed at 1 g/kg/day.

**MUTAGENICITY:** Information not available.

**HAZARD:** The end-use product labels for the prodiamine formulation Barricade® 65WG herbicide carries the *Caution* signal word due to inhalation and skin absorption potential.

## 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.

**POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM INERT INGREDIENTS CONTAINED IN THE FORMULATED PRODUCTS:** None.

**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:**

PRODIAMINE (*Barricade*<sup>®</sup> 65WG Herbicide) - **CAUTION** – HARMFUL IF INHALED OR ABSORBED THROUGH THE SKIN.

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

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

**EYES:** Flush eyes with water for 15 to 20 minutes. Call physician.

**SKIN:** Wash all exposed areas with soap and water, call physician if irritation is present.

**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.

**UNUSUAL HAZARD:** *This product is considered electrically conductive. Static electricity, mechanical sparks, open flames, and certain hot surfaces (greater than 680 degree F can serve as ignition sources for this material.*

**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

**LOEC** – lowest observed effect concentration

**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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Syngenta Crop Protection, Inc., Barricade® 65WG Herbicide, Specimen Product Label, SCP 834A-M4C 0504, 2004

Syngenta Crop Protection, Inc., Barricade® 65WG Herbicide, Material Safety Data Sheet, SCP-955-834A-00145P, December 2004

## 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</b> (poison)	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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