

3-19-85

DYNAMAC
CORPORATION

BROMACIL ADDENDUM

Final Report

**Task 2: Environmental Fate and
Exposure Assessment**

Contract No. 68-01-6679

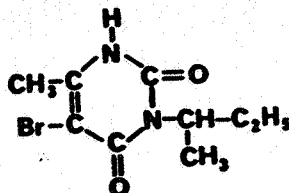
MARCH 19, 1985

Submitted to:
Environmental Protection Agency
Arlington, VA 22202

Submitted by:
Dynamac Corporation
Enviro Control Division
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852

Environmental Fate and Exposure AssessmentBromacil Addendum

BOREA, BROMAX 4G, BROMAX 4L, CYNOGAN,
HYVAR X, HYVAR X-L, ROUT, URAGON,
UROX "B", UROX "HX"



5-Bromo-3-sec-butyl-6-methyluracil

[¹⁴C]Bromacil (purity unspecified), at 250 ppm, degraded with a half-life of <12 weeks in sediment (uncharacterized) covered with river water (pH 6.5) (Chrzanowski, 1984a, No MRID). After 12 weeks of incubation at 18-20 C in natural sunlight outdoors, 41% of the applied radiolabel was associated with the sediment. Of the radiolabel in the water, bromacil (1.1% of applied), 3-sec-butyl-5-acetyl-5-hydroxyhyantoin (2.8%), 3-sec-butyl-6-methyluracil (12%), 3-sec-butyl-ketohydantoin (1.5%), and sec-butyl-urea (40%) predominated. Possible minor degradates included 3-sec-butyl-3H-imidazole-2,4-dione, 3-sec-butyl-5-hydroxyhydantoin, and 5-bromo-3-sec-butyl-5,6-epoxy-6-methyl-uracil.

[¹⁴C]Bromacil (purity unspecified), at 5 lb ai/A, was very mobile in columns of sandy loam soil, with 104% of the applied detected in the leachate after ~20 inches of water percolated through the soil over a 2-day period (Chrzanowski, 1984b, No MRID). Aged (30-day) bromacil residues (uncharacterized) were similarly mobile, with ~80% of the radioactivity (before aging) detected in the leachate. [¹⁴C]Bromacil and aged bromacil residues were mobile in columns of silt loam and muck soils, but <2% of the applied was removed from these soils in the leachate. The maximum concentration of radioactive residues was detected at the 8-16 inch depth of the silt loam soil column and the 0-10 inch depth of the muck soil column.

[¹⁴C]Bromacil (>99% pure), applied alone at 4 lb ai/A or in combination with [¹⁴C]diuron, each at 4 lb ai/A, dissipated with a half-life of ~2 months from the top 2 inches of a Keyport silt loam soil confined in stainless steel cylinders in a Delaware field plot (Rapisarda, No MRID). At the 0- to 2-inch depth of Myakka fine sand soil cylinders (Florida), [¹⁴C]bromacil dissipated with a half-life of 0.5-1 month following application with [¹⁴C]diuron (each applied at 3 lb ai/A). 5-Bromo-3-sec-butyl-6-hydroxymethyluracil; 5-bromo-3-(3-hydroxy-1-methylpropyl)-6-methyluracil; 5-bromo-3-(α-hydroxymethylpropyl)-6-methyluracil; 5-bromo-3-(3-hydroxy-1-methylpropyl)-6-hydroxy-methyluracil; 5-bromo-6-methyluracil, and 4A,10A-dibromo-3,9-di-sec-butyl-4B,10B-dimethyl-cyclobutadi[1,2-D:3,4-DPR]pyrimidine-2,4,8,10-tetrone were found in soil samples from both field plots at maximum concentrations which were <2% of the applied at any sampling interval. Less than 30% of the radioactivity moved into lower soil depths (4-14 inches) at any sampling interval. Total radioactivity dissipated from the 14-inch soil cylinders with a half-life of <4 months in both soils treated with [¹⁴C]bromacil plus [¹⁴C]diuron, and a half-life of ~8 months in the Keyport silt loam soil treated with [¹⁴C]bromacil alone.

The following represents the data currently required (EPA Data Requirements for Registering Pesticides, 1983) to fully assess the environmental fate and transport of, and the potential exposure to bromacil based on the data submitted for the Bromacil Registration Standard dated September 30, 1982 and this addendum: hydrolysis studies; photodegradation studies in water and on soil; aerobic and anaerobic soil metabolism studies; anaerobic and aerobic aquatic metabolism studies; leaching and adsorption/desorption studies; terrestrial, aquatic, and long-term field dissipation studies; accumulation studies on crops, fish, and aquatic nontarget organisms; and possibly re-entry studies.

Hydrolysis studies: No data were submitted for this addendum; however, all data are required.

Photodegradation studies in water: One study was reviewed (Chrzanowski, 1984a, No MRID) that is scientifically invalid because no dark controls were analyzed to confirm photolysis. In addition, this study would not fulfill data requirements because the purity of the test substance was not specified, the solutions were not buffered or stated to be free of live bacteria, and the sunlight was

not completely characterized. Based on data submitted for the Bromacil Registration Standard dated September 30, 1982, a study is needed providing information on the rate of photodegradation of parent bromacil in water.

Photodegradation studies on soil: No data were submitted for this addendum; however, all data are required.

Photodegradation studies in air: No data were submitted for this addendum; however, this data requirements is waived due to the nonvolatile nature of bromacil.

Aerobic soil metabolism studies: No data were submitted for this addendum; however, based on data submitted for the Bromacil Registration Standard dated September 30, 1982, a study is needed providing information on the formation and decline of degradation products and the identification of degradation products other than CO₂.

Anaerobic soil metabolism studies: No data were submitted for this addendum; however, based on data submitted for the Bromacil Registration Standard dated September 30, 1982, a study is needed providing information on the formation and decline of degradation products and the identification of degradation products other than CO₂.

Anaerobic aquatic metabolism studies: One study was reviewed (Chrzanowski, 1984a, No MRID) that is scientifically valid, but does not fulfill data requirements because the purity of the test substance was not specified, characteristics of the sediment and water were not provided, and radioactive residues in the sediment were not characterized. All data are required.

Aerobic aquatic metabolism studies: No data were submitted for this addendum; however, all data are required.

Microbiological studies: No data were submitted for this addendum; however, the requirement for the submission of microbiological data is currently being reserved.

Leaching and adsorption/desorption studies: One study was reviewed (Chrzanowski, 1984b, No MRID) that is scientifically valid, but does not fulfill data requirements because the aged residues were not characterized in the soil or leachate, radioactive residues (aged and unaged) in the sandy loam soil were not quantified, the test substance was not characterized, incubation conditions during the aging of the bromacil were incomplete, and K_d values were not calculated. Based on data submitted for the Bromacil Registration Standard dated September 30, 1982, the following studies are required: (1) A mobility study to assess the leaching potential of bromacil and its degradates after the pesticide has been aged in a sandy soil or a soil representative of the use area. This will satisfy the data requirements for A (Noncrop) and B (Tree Fruit and Nut Crop) use patterns. (2) A batch equilibrium (adsorption/desorption) study on one aquatic sediment obtained from or representative of the use area. This will satisfy the data requirements for D (Aquatic noncrop) use pattern. (3) A "rapid" and aged leaching study using the soil typical of pineapple growing areas (in Hawaii only). This will satisfy the C (Field and Vegetable Crop) use pattern data requirement.

Laboratory volatility studies: No data were submitted for this addendum; however, this data requirement is waived due to the nonvolatile nature of bromacil.

Field volatility studies: No data were submitted for this addendum; however, this data requirement is waived due to the nonvolatile nature of bromacil.

Terrestrial field dissipation studies: One study was reviewed (E.I. du Pont de Nemours and Company, No MRID) that is scientifically invalid because the sampling protocol was inadequate to accurately assess the dissipation of bromacil from soil, and because no methodology was available for critical review to determine if the analytical procedures were adequate. In addition, this study would not fulfill data requirements because the soil was not completely characterized, the test substance was not characterized, field test data were not provided, no pre-treatment samples were analyzed, and a nonspecific analytical method was used. All data are required.

Aquatic field dissipation studies: No data were submitted for this addendum; however, all data are required.

Forestry dissipation studies: No data were submitted for this addendum; however, no data are required because bromacil does not have a forestry use.

Dissipation studies for combination products and tank mix uses: One study was reviewed (Rapisarda, No MRID) that is scientifically valid; however, no data are required because data requirements for combination products and tank mix uses are currently not being imposed for this Standard.

Long-term field dissipation studies: No data were submitted for this addendum; however, all data are required.

Confined accumulation studies on rotational crops: No data were submitted for this addendum; however, no data are required because the use pattern indicates that bromacil and salts are used on crops which are not grown in rotation with other crops.

Field accumulation studies on rotational crops: No data were submitted for this addendum; however, no data are required because the use pattern indicates that bromacil and salts are used on crops which are not grown in rotation with other crops.

Accumulation studies on irrigated crops: No data were submitted for this addendum; however, all data are required.

Laboratory studies of pesticide accumulation in fish: No data were submitted for this addendum; however, all data are required.

Field accumulation studies on aquatic nontarget organisms: No data were submitted for this addendum; however, all data are required.

Reentry studies: No data were submitted for this addendum; however, all data may be required.

Label Restrictions

Pending the submission of crop rotation data, it is suggested that crops other than those with registered bromacil uses be restricted from being planted in bromacil-treated soil.

References (All Studies Reviewed in this Addendum)

Chrzanowski, R.L. 1984a. Photodegradation of bromacil in water. Unpublished study received March 10, 1984. In E.I. du Pont de Nemours and Company Response to Bromacil Registration Standard Environmental Fate. Submitted by E.I. du Pont de Nemours and Company, Wilmington, DE. Accession No. 249679. (No MRID)

Chrzanowski, R.L. 1984b. Soil column adsorption studies with 2-¹⁴C-bromacil. Unpublished study received March 10, 1984. In E.I. du Pont de Nemours and Company Response to Bromacil Registration Standard Environmental Fate. Submitted by E.I. du Pont de Nemours and Company, Wilmington, DE. Accession No. 249679. (No MRID)

E.I. du Pont de Nemours and Company. 1984. Bromacil residue analyses soil samples (1966 to 1982). Unpublished study received March 10, 1984. In E.I. du Pont de Nemours and Company Response to Bromacil Registration Standard Environmental Fate. Submitted by E.I. du Pont de Nemours and Company, Wilmington, DE. Accession No. 249679. (No MRID)

Rapisarda, C. 1984. Degradation of ¹⁴C-labeled Krovar Weed Killer in soil. Unpublished study received March 10, 1984. In E.I. du Pont de Nemours and Company Response to Bromacil Registration Standard Environmental Fate. Submitted by E.I. du Pont de Nemours and Company, Wilmington, DE. Accession No. 249679. (No MRID)