9/21/77

EEB BRANCH REVIEW

DATE: IN _____ OUT _____ IN 3/21/77 OUT 9/21/77 IN _____ OUT _____

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. 3125-121, 122, 146, 214 and GNA

PETITION OR EXP. PERMIT NO. 2F1244

DATE DIV. RECEIVED 9/20/76

DATE OF SUBMISSION _____

DATE SUBMISSION ACCEPTED 9/21/76 3CID-2B-Yes

TYPE PRODUCT(S): (I) D, H, F, N, R, S

PRODUCT MGR. NO. 12 - F. Sanders

PRODUCT NAME(S) Baygon 70% Wettable Powder, Baygon MOS

COMPANY NAME Mobay Chemical Corporation, Chemagro Agricultural Division

SUBMISSION PURPOSE For use on alfalfa and pasture grass to control mosquitoes.

CHEMICAL & FORMULATION 2-(1-methylethoxy)phenol methylcarbamate.

1.0 Introduction

1.1 Baygon, O-isopropoxyphenyl methylcarbamate, aprocarb, propoxur.

1.2 Percent active:

Baygon MOS: 12.8% (1 lb/gal.)
Baygon 70% Wettable Powder: 71.6%

1.3 For use on alfalfa and pasture grass.

1.4 Other environmental reviews:

3125-GNA	8/13/75
3125-ETE,3125-ETG	6/6/74
5719-AA	8/3/76
6720-EAU	8/4/76
3125-GNA	1/15/76
475-173	2/17/77

2.0 Directions for Use

2.1 Baygon MOS:

2.1.1 Do not contaminate water, food, or feed by storage, disposal, or cleaning of equipment.

2.1.2 Keep out of lakes, streams, ponds, tidal marshes, and estuaries.

2.1.3 Do not apply when weather conditions favor drift from target area.

2.1.4 Do not use or store near heat or open flame.

2.1.5 Shrubbery and vegetation around stagnant pools, marshy areas, ponds and shorelines may be treated.

2.1.6 Mosquito control on alfalfa and pasture grass: Apply Baygon MOS insecticide at rates below. Apply as necessary at 7 to 14 day intervals with no more than 10 applications per crop year. Applications may be made without removal of grazing cattle.

Non-thermal ULV (ultra-low volume) aerosol ground application:

Apply Baygon MOS insecticide undiluted using 1 1/4 to 4 fluid ounces per acre or 3 to 9 pints per mile of front covering a swath 300 feet wide (36.4 acres).

NOTE: Rates less than 2 fluid ounces per acre or 4 1/2 pints per mile front may be used in Florida only. Use equipment specifically designed for ULV application of non-thermal aerosols (cold fogging). Repeat as necessary to maintain adequate control.

NOTE: Spray droplets should have a median droplet size range from 5 to 20 microns with a Mass Median Diameter (MMD) not to exceed 15 microns. Droplets 45 microns or larger may cause permanent damage to automobile paint finishes.

Use the following flow rates at the indicated vehicle speed to obtain the correct dosage per acre:

BAYGON MOS Flow Rate in Fluid Ounces per Minute Urban and Open Field Areas (Florida Only)	(Other States)	Vehicle Speed Miles per Hour
4 to 12	6 to 12	5
8 to 24	12 to 24	10
12 to 32	16 to 32	15

NOTE: Rates above 12 fluid ounces per minute require specially modified equipment.

2.1.7 Do not use ULV (ultra-low volume) non-thermal aerosol or space spray inside buildings or other enclosed or semi-enclosed areas such as animal barns.

2.1.8 Do not apply to humans or animals.

2.1.9 Do not use on food, feed, or forage crops.

2.1.10 Open dumping is prohibited. Pesticide, spray mixture, or rinsate that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies.

2.1.11 Container disposal: Triple rinse (or equivalent) and offer for recycling, reconditioning, or disposal in approved landfill or bury in a safe place.

2.2 Baygon 70% Wettable Powder:

Mist Spray for Adult Mosquitoes:

Apply 1 to 1 1/2 ounces (0.05 to 0.07 lbs. active) per acre. For mist-blower machines calibrated to deliver 100 gallons per hour traveling at a speed of 4 m.p.h. and covering a swath width of up to 350 feet, use 11 3/4 to 17 1/4 pounds wettable powder per 100 gallons of water to treat 170 acres.

Low Volume Spray for Control of Adult Mosquitoes:

Apply 1 to 4 ounces Baygon 70% Wettable Powder (0.05 to 0.175 lb. active) per acre in 1/2 to 1 gallon total volume of water suspension by air.

Mosquito control on alfalfa and pasture grass: Apply 1 to 1 1/2 ounces (0.05 to 0.07 lbs. active) per acre of Baygon 70% Wettable Powder in a water emulsion as directed for mist spray or low volume aerial spray applications. Apply as necessary at 7 to 14 day intervals. Apply no more than 10 times per crop year. Applications may be made without removal of grazing cattle.

3.0 Discussion of Data

All data was previously reviewed and is not validated at this time per Rogoff's memo of August 12, 1977, to Doug Compt.

4.0 Conclusions

4.1 Hydrolysis

1. Baygon is relatively stable at acid and neutral pH and hydrolyzes in alkaline solution. 2,0-isopropoxyphenol is identified as a major hydrolysis product and would be present in the environment.

4.2 Effect of Microbes on Pesticides

1. Soil microorganisms appear to participate in the breakdown of Baygon in water suspensions but stability to metabolism in bulk soil tests indicates that concentration or other factors may influence microbial breakdown. In the study using acetylcholinesterase as an assay method, several microorganisms were found to reduce Baygon toxicity.

2. In the bulk soil tests after 116 days, 80 to 99% of the applied was parent Baygon.

4.3 Effect of Pesticides on Microbes

1. Baygon had minimal effect on soil microorganisms.

4.4 Leaching

1. Baygon leaches in soil.

4.5 Field Soil Dissipation

1. T 1/2 is less than 3 months.

2. The study is not acceptable. See recommendations.

4.6 Fish Accumulation

1. Accumulation in whole fish was 1.2 X at 28 days.

5.0 Recommendations

5.1 No opinion is given.

5.2 Studies required but never submitted:

1. Aerobic Soil Metabolism

2. Anaerobic Soil Metabolism

3. Rotational Crop

An example of an acceptable protocol for an aerobic soil metabolism study is below:

Aerobic soil metabolism. Rate, type, and degree of metabolism of the pesticide residues are to be determined in a sandy loam, loam, silt loam, or other textured soil appropriate to the intended application sites. Radiolabeling in one or more positions in the pesticide molecule is required to assure adequate coverage of chemical transformations. Where radiolabeling will be of little benefit, comparable detection techniques are required. Residues comprising more than ten percent of initial application or 0.01 ppm should be identified. A material balance, including nonextractable residues, must be provided. The experimental dose rate must approximate field application rate. Treated soil must be maintained at temperatures of 18 to 30°C at or below 75% of 0.33 bar moisture content. Collect data until a ninety percent loss of the pesticide occurs and until patterns of formation and decline of metabolic products are established. Preferred sampling times are at pretreatment, 0, 1, 2, and 7 days, 2 and 3 weeks, and 1, 2, 3, 4, 6, 9, and 12 months. The study need not be conducted for more than one year for terrestrial crop and non-crop uses, and terrestrial/aquatic uses.

Characterization of soils must be reported including texture (percent sand, silt, and clay), percent organic matter, pH, cation exchange capacity, and bulk density.

An example of an acceptable protocol for an anaerobic soil metabolism study is below:

Anaerobic soil metabolism. Terrestrial anaerobic soil studies should use the same soil as used in aerobic studies. Obtain an aliquot at the thirty day interval from the aerobic soil study, and establish anaerobicity by either waterlogging or purging with inert gases. Preferred sampling intervals are thirty and sixty days after anaerobicity has been established.

An example of an acceptable protocol for a rotational crop study is below:

Rotational crops. Studies are required to establish if pesticide residue uptake occurs in rotational crops, emergency replanting, or in situations where crops receive water from treated areas. The applicant must identify crops that can be rotated in the proposed use areas. Treat a sandy loam soil with radiolabeled pesticide at a rate equivalent to that expected under actual use conditions. Following treatment, age the pesticide aerobically for a time approximating the anticipated cultural practice; for example, one year for crops rotated the following year, 120 days for crops rotated immediately after harvest, and 30 days for assessing circumstances of crop failure. Plant a root crop, small grain, and leafy vegetable crop at the above times and periodically analyze to maturity. When residues are found, a field study using formulated products shall be undertaken to determine when residues would not occur in subsequent crops under actual use conditions. A crop residue study under actual use conditions is required for those practices where a subsequent crop is treated with the same active ingredient as the initial crop. This study is not required for a cover crop if typically plowed under and not grazed. A crop residue study under actual field use conditions is required where water from treated areas, including holding ponds or effluent and other discharges, is typically used to irrigate crops.

Note: Data which are to be reported from field tests include precipatation (accumulated from first application to each sampling), water table, grade (slope), and soil type. In addition, dates of planting and harvesting, application and sampling times; dates and stages of crop and pest development; application-to-harvest and application-to-sampling intervals for each treatment; and the depth, weight, or volume of each sample and the weights and volumes of aliquots taken for analysis must be reported. When water flow is measured in situ, flow meters or comparable techniques are required. (Data in gallons per minute or liters per minute will be acceptable).

Characterization of soils must be reported including texture (percent sand, silt, and clay), percent organic matter, pH, cation exchange capacity, and bulk density.

5.3 Reentry data may be required if toxicology branch so indicates. An example of an acceptable protocol for a reentry study is below:

The reentry study consists of five parts:

a. Aerobic and anaerobic soil metabolism.

b. Field dissipation.

c. Vapor phase photolysis study.

d. Volatility of the pesticide under actual use conditions by monitoring of air samples at the same time intervals as specified in dislodgable residue study [below].

e. Dislodgable residue part of reentry data requirement includes chemical analysis of dislodgable residues of the active ingredient applied to the crop. A dislodgable residues is easily removed from the plant surface by a simple wash, as distinguished from residues released from within the leaf or its surface waxes by more drastic means such as organic solvent extraction or homogenization (the latter normally are not critical under situations of worker exposure).

Data from two collecting sites differing in climatic, crop-cultural and edaphic conditions must be selected. These sites may be same sites chosen for other environmental chemistry studies or for residue chemistry studies. Before application of the pesticide, the investigator should obtain the spray history of the plot to ensure that pre-existing residues will not affect the experimental results. Actual application operation must be carefully supervised to ensure that quantities delivered are consistent with proposed or actual label recommendation. Furthermore, the application should be made in the growing season and at the frequency dictated by pest management practices. Residue samples are to be taken at zero time, 12 hours, 1 day, 2, 5, 7, 14, 21, and 30 days. A decline curve of the residues, including any plateau which may occur with time, must be determined. The final result of the analysis should be a measure of pesticide residue expressed in milligrams or micrograms per square centimeter of ~~soil~~ surface. Meteorological data in the area containing the plot should be recorded daily during the study. If growth characteristics of the treated crop produce unique microenvironmental conditions such as shaded foliage or arboring then samples must be representative of the conditions.

In like manner, samples for residue analysis must also be collected from soil in the test plot and reported as milligrams or micrograms per square centimeter of soil surface.

5.4 The following studies were previously reviewed and are not being validated at this time as mentioned in Rogoff's memo of August 12, 1977 to Doug Compt. Data previously reviewed:

1. Hydrolysis.
2. Effect of microbes on pesticide.
3. Effect of pesticide on microbes.
4. Leaching.
5. Fish accumulation.

5.5 The following studies are not acceptable and were not accepted previously:

1. Photodegradation:

Studies on silica gel or in hexane or ethanol are ancillary. Studies in water and soil are required for this use. Studies in air may be required if toxicology indicates that re-entry data is needed.

An example of an acceptable protocol for a photodegradation study is below:

Photolysis. Conduct photodegradation studies using radioisotopic or comparable detection techniques at one concentration (approximately use rate) under natural or simulated [greater than 280nm (280×10^{-9} meters) wavelength] sunlight. Such studies must provide a material balance, half-life estimate, and the identification of photoproducts. Rate studies are conducted in distilled or deionized water at pH of maximum stability, and sampling should continue up to twenty percent degradation with sampling for identification of photoproducts to half-life, or thirty days, whichever comes first. Yield of photoproducts may be increased by changing such conditions as wavelengths, concentration, photosensitizers, and solvents other than water. The intensity of incident sunlight and time of exposure must be reported if sunlight is used as a source. Information on artificial light sources should contain type of source, intensity, wavelength, and time of exposure.

Photodegradation data must be supported by incident light intensity and percent transmission. Values for intensity in lumens or lux are required for artificial light sources. Latitude, time of year, atmospheric cover, and other major variables which affect incident light are to be reported when natural sunlight is used. Characteristics of water must be reported including pH, temperature, and oxygen content.

2. Field soil study:

a) Depth of soil was either not reported or only six inches. Dissipation may be due to leaching beyond the sampling zone. Soil should be sampled in increments to a depth of 12 inches.

b) No analyses were made for degradation products.

c) Soil characteristic of bulk density is not given for any report. Report # 30533 and 30534 also do not report percent sand, silt, and clay; percent organic matter, pH, and cation exchange capacity. Degradation varies in different soils so soil characteristics are needed to define results.

d) Four agricultural use areas are to be studied. When taken together, the field soil studies do not include four agricultural areas. Climate may affect degradation.

e) In reports # 30533, 30958, and 30961, granular formulations were used. These differ from spray formulations under review. Actual use conditions should be met.

f) In reports # 30533 and 30534, other deficiencies are noted:

1) Analyses were made apprximately 2 years after sampling.

2) Samples should be taken on day 0 so that the actual initial concentration is known.

The following is an example of an acceptable protocol for a field soil dissipation study:

A field dissipation study under actual use conditions is required. Analyses are continued until a ninety percent loss of the pesticide occurs or until patterns of formation and decline of degradation products are established or to a maximum test duration of eighteen months. Soil samples are taken in increments to a depth of 12 inches from sites in four agricultural use areas. Sampling times include preapplication, day of application, and shortly post-application. Succeeding samples are dependent upon degradation and metabolism characteristics.

Identification of residues comprising more than ten percent of initial application or 0.01 ppm is needed to construct decline curves of residues in soil.

Characterization of soils must be reported including texture (percent sand, silt, and clay), percent organic matter, pH, cation exchange capacity, and bulk density.

Precipitation to each sampling, water table, grade (slope), and depth and volume of each sample should also be reported.

5.6 See attached sheet for data requirements for different use patterns.

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Table I. Summary of environmental chemistry data requirements by intended use pattern.

Data Requirements * / Use Patterns	Terrestrial Uses					Aquatic Uses		Terrestrial/ Aquatic Uses	Aquatic Impact Uses			To Support Registration of:	
	Domestic Outdoor	Greenhouse	Non-crop	Tree Fruit-Nut Crop	Field-Veg. Crop	Aquatic Food Crop	Aquatic Non-Crop	Forest	Direct Discharge	Indirect Discharge	Wastewater Treatment	Manufacturing Use Product	Formulated Product
PHYSICO-CHEMICAL DEGRADATION													
Hydrolysis	X	X	X	X	X	X	X	X	X	X	X	X	X
Photodegradation			X	X	X	X	X	X	X				X
METABOLISM													
Aerobic soil	X	X	X	X	X			X					X
Anaerobic soil					X								
Anaerobic aquatic						X	X	X	X				X
Aerobic aquatic						X	X		X				X
Effects of microbes on pesticides			X	X	X	X	X	X	X				X
Effects of pesticides on microbes			X	X	X	X	X	X[a]	X				X
Activated sludge										X	X	X	X
MOBILITY													
Leaching			X	X	X			X[b]					X
Volatility		X											X
Adsorption						X	X	X	X				X
Water dispersal						X	X		X				X
FIELD DISSIPATION													
Soil	X		X	X	X	X		X					X
Water						X	X	X[c]					X
Ecosystem. (X[d] combined study with X[a], X[b], X[c])								X[d]					X
ACCUMULATION													
Rotational crop					X	X							X
Irrigated crop						X	X						X
Fish			X	X	X	X	X	X	X				X
Special Fish Study							X						

* Data requirements cited in §162.60-29(c)(3), (f) and (g); §162.60-30(e); §162.60-31; and §162.60-32 are not included in this Table.