94301

A N B

Date Out: EFB: FEB 3 1981

To: D. Stubbs
Product Manager 41
TS-767

From Dr. Willa Garner
Chief, Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 81-TX-08

Chemical: Aldicarb

Type Product: Nematicide

Product Name: Temik

Company Name: Union Carbide

Submission Purpose: Section 18 Texas

ZBB Code: Section 18

ACTION CODE: 510

Date in: 1/29/81

EFB # 754

Date Completed: 2/3/81

TAIS (level II) 57

Days 3

Deferrals To:

X Ecological Effects Branch

____ Residue Chemistry Branch

____ Toxicology Branch

rec'd 2-5-81

Subject: Reassessment of Section 18 for use of aldicarb on grapefruit in Texas.

Introduction

Aldicarb*(2-methyl-2-(methylthio) propionaldehyde O-(methylcarbomoyl) oxime) is a registered insecticide/nematicide that is currently used on oranges. Directions for use on oranges call for one appliation per season of 10 lbs. ai/A just prior to or during spring flush of foilage growth. The chemical can be applied either: 1) in band application along the dripline of the tree (on both sides), incorporated 2-3 inches below the surface, or 2) applied in irrigation furrows using 2 shanks per furrow, with prompt and thorough irrigation after treatment.

The proposed Section 18 is for use in Texas on grapefruit in Cameron, Hildago, and Willacy Counties. The total acerage involved is 25,000 and the proposed application rate is 5.00 lbs. ai/A (maximum rate is 10 lbs. ai/A).

This Section 18 is reproposed from the orginal request of March 4, 1980, and includes actual monitoring data and water quality and soils data which were not available previously. We had originally reviewed the data in context of 5 available references (included again) that included data predominantly from California.

Background

The following soil series and characteristics are typical for the area of proposed use in Texas and includes information of the average annual precipitation and evapotranspiration rates. Data on supplemental irrigation water and on the water resources of the lower Rio Grande is included.

SCS Land Capability	Soil Series	Characteristics
A.	Delfina fine sandy loam	pH 6.6-7.8 seasonal high water table percolation rate of 2 - 6.3 in./hr. Texture 60% sand (of which 30% fine, 30% coarse) 30% silt, 10% clay.

*formulated product Temik

B.	Willacy fine sandy loam	same as Delfina
C.	Camergo silty loam	pH 7.9 - 8.4 perched water table common after rain or irrigation. percolation 0.6 - 2.0 in./hr. Texture 60% silt, 30% sand, 10% clay.

It is noted that many of these fields are tile-drained which can serve to discharge irrigation water applied to the orchards. The tile drain can be either deep tilled or shallow tilled and drain into discharge ditches. The composition of these ditches is generally soil and they flow into a common discharge basin.

Precipitation in the area ranges from 16 - 32 inches per year, with the pan evapotransporation ranging from 80 - 112 inches per year, which results in a negative natural water balance. Supplemental irrigation rates are 2.5 acre feet per acre per annum.

Water Resources (Surface)

The Rio Grande is both the major watercourse within and the major water supply source for the Lower Rio Grande Valley. The flow of the Rio Grande is utilized by two major water impoundments along the Rio Grande. Falcon Reservoir, the first, located between Laredo and Brownsville, Texas, provides water for many uses. The second, Amistad Reservoir, located a short distance upstream from Del Rio, Texas, serves as the second source of water for area included in the proposed Section 18. Total capacity of Falcon Reservoir is nearly 3,200,000 acre-feet while the total storage capacity of the Amistad Reservoir is 5,250,000 acre-feet. The water data was presented from historical data and the results are shown in Tables 1 and 2.

Almost all the water used for consumptive purposes in the Lower Rio Grande Valley is supplied from the Rio Grande. Small reservoirs, such as Delta Lake, in east Hidalgo County, and Valley Acres Reservoir, north of Mercedes, are used for temporary storage.

Table 1. Total Inflows of Falcon Reservoir (Acre-Feet)

	1971	1972	1973	1974	1968 to 1974	
					Average	Minimum
January	50,635	114,198	57,671	62,390	83,571	50,635
February	453,053	109,199	142,059	54,934	153,721	54,934
March	64,313	84,517	60,125	222,436	104,594	53,064
April	65,098	90,592	86,955	73,961	90,598	49,911
May	101,854	211,920	254,054	235,556	178,096	101,854
June	770,709	119,744	354,036	134,145	254,522	46,609
July	834,367	59,847	130,529	64,091	202,705	33,481
August	581,600	148,904	208,931	131,696	197,107	64,413
September	1,442,682	232,866	469,234	1,165,974	554,398	137,408
October	1,365,884	224,837	434,596	920,186	491,005	122,189
November	316,191	60,637	86,268	538,929	177,004	45,260
December	188,564	57,192	42,870	281,211	120,578	42,870
Yearly Total	6,234,950	1,514,453	2,327,328	3,885,509	2,607,899	802,628

Table 2. Average Storage (Thousands of Acre-Feet)

	1971	1972	1973	1974	1954 - 1974 Ave.	1954 - 1974 Max.	1954 - 1974 Min.
January	1320	3070	2651	2720	2078	3071	219
February	1277	2891	2685	2463	1961	2963	156
March	1387	2884	2753	2393	1928	2960	227
April	1231	2695	2631	2353	1820	2955	326
May	855	2604	2413	2201	1764	2870	490
June	865	2673	2145	1939	1601	2674	274
July	2095	2685	2365	1832	1712	2686	210
August	2464	2707	2388	1607	1764	2707	208
September	2871	2636	2456	1678	1832	2871	256
October	3128	2653	2584	2370	2128	3250	308
November	3125	2642	2743	2641	2190	3125	391
Deember	3130	2644	2767	2870	2217	3130	343
Average	1979	1732	2548	2256	1916	2938	284

(Other Surface Waters)

Other surface waters of the Lower Rio Grande Valley include Laguna Madre, South Bay, Laguna Atascosa, Bathia Grande, Brownsville Ship Channel, Arroyo Colorado, North Floodway, and San Martin Lake. These hydrologic features are not used for water supply although they are utilized for non-consumptive purposes.

(Ground Water)

The ground water resources of the Lower Rio Grande Valley area consists of three ground water reservoirs:

1. Linn-Faysville ground water reservoir
2. Lower Rio Grande
3. Mercedes-Sebastian

The Linn-Faysville ground water reservoir is located in and supplies irrigation water to central Hildago County. The water drawn from this source is high in salts and sodium. The Boron content is also high.

The Lower-Rio Grande ground water reservoir is located in southern Hildago and Western Cameron County and supplies irrigation water to parts of Cameron, Hildago, Willacy and Starr Counties. The estimated yield of this reservoir is 20,000 to 30,000 acre-feet of water per year. The salinity and sodium content is higher as the distance from the Rio Grande increases. The Boron content is also high in this water supply.

The Mercedes-Sebastian ground water reservoir, located in southern Willacy and north-western Cameron Counties, supplies irrigation water to parts of Cameron, Hildago, Willacy, and Starr Counties. The quality of the water in this reservoir is varied in content of salts, sodium, and Boron.

The ground water systems are slow moving and eventually discharge into the Gulf of Mexico and the pH is basic (8.0 - 8.5), with a mean temp. of 75°F.

The best quality water is located in a belt extending northeast into Willacy County from Mercedes (26°10' by 97°55') and can be located from Map 1.

Water that is used for irrigation purposes is collected by tile-drain systems, which carries the excess eastward to Rio Hondo and to a communal drainage basin near Harlington (26°15' by 97°40' on Map 1.), with eventual discharge into the Gulf of Mexico. The drainage water is not used again for irrigation.

Environmental Chemistry

Aldicarb is stable to hydrolysis at acidic (pH 5.0) and neutral (pH 7.0) aqueous solution. The reaction in basic solution (pH 9.0) is much faster with half-lives dependent upon both temperature and pH.

Aldicarb degradation in soils is dependent upon soil properties (pH, moisture, texture, tmeperature, clay, and organic matter). Aldicarb is most stable in soils exhibiting coarse texture, low pH, and low moisture.

Aldicarb does not compete with water for adsorption sites on soils. The compound is weakly bonded to water molecules adhering to external adsorbate surfaces. The compound is readily displaced by water and is carried deep into the soil matrix during periods of rain or irrigation.

Review of Data

Previously we had estimated that aldicarb would leach in the areas proposed for the Section 18 and had based our estimates from published sources for both nitrate and aldicarb treated systems. All studies were conducted in California and EFB was asked to make a worst case estimate (which was provided).

The monitoring data received in support of the re-submitted Section 18 was conducted in groves located in the proposed use site. All treatments were made in April or May each year and all sampling was done in September of 1980. During this time 18 inches of rain were received from a tropical storm that moved through the area.

Soil sampling in the Texas area indicated that there were two bands in the soil, one at the surface and one located at the 4-8 foot level, the top band contained 5 - 12 ppb and the lower band contained 2 - 5 ppb. This reflects 1-2 % of applied material left in the soil matrix.

Water samples from wells (100 foot depth) were found to contain from 2 - 3.5 ppb of aldicarb.

Surface water samples taken from drainage areas near the treaed site were found to contain 3-6 ppb. Surface water samples from the Laguna Madre Bay were found to contain no detectable levels of aldicarb except one sample, which contained 1 ppb.

Extrapolations from proposed use rates on the label would indicate that from 0.18 to .30% of the applied material would leave the treated site (surface runoff and ground water) based on the largest rainfall received for the year.

The data reflects correlation to the temperature and pH dependency of aldicarb to chemical degradation.

No data was submitted as to residues found in the months preceding sampling (September) after application (April - May).

Conclusions

It is noted that the soils in the proposed use site in Texas for the Section 18 are generally sandy to sandy loam in nature. The soils are generally neutral to basic in pH response, and percolation is moderate. The temperature of the ground water averages about 75° F and reflects the average temperature for the year. Rainfall does not exceed the evapotranspiration potential, and irrigation is limited to 2.5 acre-feet per acre per annum.

Under the above conditions aldicarb can be expected to degrade at a faster rate than in areas where the temperature and pH are colder and more acidic.

The submitted monitoring data reflects the above relationship.

The submitted data does not include any residue concentrations immediately after application.

Recommendations

The submitted data supports the proposed Section 18 for the limited acres proposed.

The data does not support the full registration of the chemical for use on grapefruit. The data would have to contain information on both tile-drain effluents and drainage routes from immediately post application (April - May) to the beginning of the monitoring data submitted (September). This data when complete would fulfill the required information to support registration in semi-arid citrus growing regions.

The use of this information in support of other registration actions where the rainfall and/or rainfall-irrigation exceeds the evapotranspiration potential (i.e. (Florida) it is recommended that the of use of aldicarb in these areas should be re-evaluated.

Robert F. Carsel 2/3/81

Robert F. Carsel
Section 11
Environmental Fate Branch

Attachments

References

1. Anonymous- 1976. Effects of irrigation methods on ground water pollution by nitrates and other solutes. EPA 600/2-76-291. 1330 p.

2. Calvert, D.U. and H.T. Phung. 1971. Nitrate-nitrogen movement into drainage lines under different soil management systems. Soil and Crop Science Society of Florida. Vol. 31. p. 229-232.

3. Elgindi, D.M., Van Gundy, S.D., and Small, R.H. 1978. Dispersion and persistence of aldicarb in soil water of nematode - infested soils. Rev. Nematol. (2):207-215.

4. Jury, W.A. 1975. Solute travel-time estimates for tile-drained fields: 1. Theory. Soil Sci. Soc. Amer. Proc. Vol. 39. p. 1020-1028.

5. Talsma, T. 1966. Leaching of tile drained saline soils. Aust. J. Soil Res. 5. p. 37-46.