098301

Shaugh. No. 098301

EAB Log Out Date: FEB 03 1986

Init.:

To: J. Ellenberger
Product Manager 12
Registration Division (TS-767)

From: Stuart Z. Cohen
Team Leader, Ground Water Team
Exposure Assessment Branch, HED (TS-769)

Attached, please find the environmental fate review of:

Reg./File No.: 264-330

Chemical: Aldicarb

Type Product: I/N

Product Name: Temik

Company Name: Union Carbide

Submission Purposes: Response to Union Carbide's reproposed label dealing with ground water

Action Code: 656

Date In: 10/3/85

EFB#: 5969

Date Completed: 2/3/86

TAIS (Level II)	Days
31	1

Deferrals To:

_____ Ecological Effects Branch

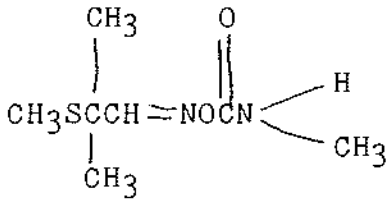
_____ Residue Chemistry Branch

_____ Toxicology Branch

REVIEW OF ALDICARB LABEL PERTAINING TO GROUND WATER

1. CHEMICAL:

Chemical name: 2-Methyl-2(methylthio) propionaldehyde O-(methylcarbamoyl) oxime.
Common name: Aldicarb
Trade name: Temik
Structure:



2. TEST MATERIAL:

Not applicable

3. STUDY/ACTION TYPE:

Review of Union Carbide's rebuttal to Stuart Cohen's review (dated 1/31/85) of Union Carbide's proposed ground water label restriction; review of Union Carbide's reproposed label.

4. STUDY IDENTIFICATION:

Title: Letter from J.S. Lovell of Union Carbide with attachments to J.S. Ellenberger, Re: TEMIK® 15G Aldicarb Pesticide, EPA Reg. No. 264-330 Groundwater Labeling
Author: J.S. Lovell, Registration Manager, Union Carbide
Identifying No: 264-330
Submitted by: J.S. Lovell, Registration Manager, Union Carbide
Issue Date: 9/26/85
Record No: 154544

5. REVIEWED BY:

Matthew N. Lorber, Agricultural Engineer Date 2/3/86
Environmental Processes and Guidelines Section/EAB/HED

6. APPROVED BY:

Stuart Z. Cohen, Team Leader Date 2/3/86
Ground Water Team/EAB/HED

7. CONCLUSIONS:

Union Carbide agreed to remove well setback provisions from the label as recommended by S. Cohen in his review dated 1/31/85. However, Union Carbide disagreed with S. Cohen in his suggestion to remove soil temperature and rainfall provisions from the label. The rainfall provisions proposed

by Union Carbide are unenforceable mainly because of the vague wording, "Heavy anticipated seasonal rainfall within one month after use (based on historical records)". More importantly, however, is the fact that pesticides should not be regulated based on the probability of future events. Rainfall provisions of any kind (see Discussion section) are felt to be inappropriate. In terms of the temperature provision, Union Carbide has provided sufficient evidence that temperature is a key factor which, when followed, will minimize the leaching of aldicarb.

8. RECOMMENDATIONS:

Accept Union Carbide's revised label with the exception of the rainfall provision: "Heavy anticipated seasonal rainfall within one month after use (based on historical records)". This provision should be deleted from the label with no replacement statement concerning rainfall.

9. BACKGROUND

Stuart Cohen reviewed Union Carbide's label amendment to aldicarb, which was transmitted to EPA on 10/15/84. His review, dated 1/31/85 and filed under Reg./File No. 264-330, included a draft label in response to Union Carbide's proposed label. His label differed from Union Carbide's in the following ways:

1) deletion of a soil temperature provision which initially read: "Soil temperature below 50°F at time of application",

2) deletion of a rainfall provision which initially read: "Heavy Rainfall within one month after use",

3) slight modification of provisions relating to soil moisture, soil organic matter, and acidic subsoil, by adding the qualifier "average",

4) definition of "shallow" ground water as <50 ft,

5) total deletion of section dealing with well set-back provisions (i.e., sections dealing with distance from a drinking water well where aldicarb may be applied).

Union Carbide reproposed a label which read almost exactly as did S. Cohen's proposed label, including the last three changes outlined above, except it included the two initial provisions concerning rainfall and soil temperature, rewritten as follows:

"Fields with average soil temperature in the root zone below 50°F at time of application"

"Heavy anticipated seasonal rainfall within one month after use (based on historical records)"

In the letter from Lovell to Ellenberger submitting this re-proposed label, Lovell includes a discussion by R.L. Jones of Union Carbide outlining the rationale behind retaining these label statements.

10. DISCUSSION

There is no argument between EPA and Union Carbide on the fact that heavy rainfall following application will lead to leaching - heavy rainfall will obviously lead to leaching. However, a rainfall provision such as that proposed by Union Carbide should never appear on a pesticide label for the simple reason that regulations should not be based on the probability of future events occurring; they should only be based on current and past conditions. Regulations should be based on facts which can be ascertained at the time of application, such as soil conditions, depth to ground water, plant emergence, calender date, geographic location, etc. In his argument for this provision, R. Jones cites the fact that applying early in the year in Florida will significantly reduce leaching of aldicarb as compared to applications in June, when the heaviest rainfall occurs in Florida. As a result, aldicarb cannot be applied to citrus after April 1. This is the appropriate way to handle concerns with future heavy rainfalls, since the occurrance of April 1 is easily ascertainable. Another way to appropriately time applications to avoid heavy spring rains in Northern climates is to delay applications until plant emergence, as is done for potatos in Wisconsin and elsewhere. Again, plant emergence is an easily ascertainable fact. Besides this important reason for exclusion of a rainfall statement on the label, there is a secondary problem with the word, "Heavy" when describing rainfall. It has no quantitative meaning, in contrast to other label provisions concerning organic matter, pH, and temperature. For these two reasons, more importantly the first one, this rainfall provision should remain excluded from the aldicarb label.

The argument for the inclusion of soil temperature is not as strong as the argument to exclude the heavy rainfall provision. The recommendation of this data review to include it is more in the spirit of, as J. Lovell puts it in his letter to J. Ellenberger, "the importance of implementing those label changes which we can agree upon as quickly as possible...". The arguments in favor of keeping this statement on the label as Union Carbide desires is as follows:

1) There is a proven correlation between enhanced microbial activity and warm soil temperatures. There is no argument on this point.

2) Field studies on aldicarb by Union Carbide do indicate a more rapid rate of decay for the warmer climates of Arizona (0.3-0.8 months half-life) and Florida (0.6 months), in con-

trast to their results for cooler climates such as Wisconsin (0.9-2.0 months), Washington (1.7 months), Virginia (1.1 to 1.3 months), North Carolina (0.9-1.3 months), and New York (0.9-1.0 months). Their field studies also indicate a more rapid rate of decay when aldicarb is applied at potato emergence rather than potato planting, which is probably due in part to a warmer soil environment. However, this latter evidence is tenuous at best for three reasons: 1) there is also the possibility that the rate of decay at emergence is more rapid due to uptake by young potato roots, 2) two of their field studies indicated the reverse trend - planting applications indicated more rapid decay in contrast to emergence applications, and 3) there is only a two to four week difference in planting and emergence dates, and soil temperatures do not change that rapidly.

3) Model calibrations can be considered a more accurate means to estimate in-situ rates of decay than field observations because they estimate the additional avenues of loss of soluble pesticides including runoff and leaching below the depth of sampling. In a recent publication by this reviewer (Lorber and Offutt, 1986, "A Method for the Assessment of Ground Water Contamination Potential Utilizing PRZM - A Pesticide Root Zone Model for the Unsaturated Zone", to be published in 1986 in an ACS Symposium Series), the PRZM model was calibrated to Union Carbide's field studies of aldicarb applied to potatos in Wisconsin. Best fit between model calibrations and field data occurred when the rate of decay was set at 1.5 months for emergence applications and 2.3 months for planting applications, again supporting the hypothesis that applications at potato emergence lead to more rapid decay. Two additional observations can be made based on this result: 1) these rates of decay were slower (longer half-life) than rates of decay which were estimated from in-situ data alone due to estimation of leaching below the depth of sampling in the model, and 2) in one case, the field data indicated the reverse trend - that the planting application decayed more rapidly than the emergence trend. This field data observation was due to leaching of aldicarb below the depth of sampling, resulting in a shorter and incorrect estimate of aldicarb half-life.

The arguments against the inclusion of a soil temperature label provision are as follows:

1) There is no hard evidence for the choice of 50°F in contrast to 40 or 60°F. Rather, 50°F was arrived through experience and intuitive understanding. This contrasts other unsaturated zone parameters included on the label which have a stronger technical base for inclusion: soil pH - hydrolysis, organic matter - the relation of this parameter to in-situ aldicarb adsorption partition coefficient, K_d,

5

and soil moisture holding capacity - understanding of the properties of loamy sand to sandy soils and the knowledge of water transport in these soils.

2) Soil moisture at and after the time of application is at least as important as temperature for microbial activity in the soil. Should an additional provision be added to the label addressing the issue of actual soil moisture? No - because soil moisture is a transitory feature, and aldicarb requires moisture to activate the granules. It would not make sense by any criteria to have a statement such as, "Avoid application to dry soils".

3) Whereas it is true that soil temperature measurements are taken on a regional basis by regularly reporting agencies such as NOAA, it is not common for a farmer to measure the temperature of the soil on his farm, particularly at various points to the entire depth of the root zone, in order to obtain an average. As well, microclimates can vary greatly and be significantly different than a regionalized average due to factors such as: 1) dark (in color) soils warm up more quickly than light soils due to their capacity to absorb heat, 2) moist soils warm up more slowly than dry soils due to the cooling effects of evaporating water.

The intention behind any label statement is to minimize the leaching of aldicarb if the label is followed. It is felt that if the farmer abides by the label and is cognizant of soil temperature (in addition to the other parameters on the label), than the leaching of aldicarb will be minimized. Furthermore, it is felt that a regionalized soil temperature measurement is a reasonable surrogate for in-situ temperature measurements. For these reasons, it is recommended that Union Carbide's suggested temperature provision be maintained.

However, the issue of an appropriate label for aldicarb is an on-going issue. Therefore, this label should be viewed as an interim label appropriate for this point in time, but further study may result in a recommendation for a different label.