Chemical No: 109701, 109702, 109301, 121501, 128825
DP Barcode: D199570
Date Out of EFGWB: 4/19/94

TO: George LaRocca
PM #13
Registration Division

FROM: Henry Nelson, Ph.D., Head H/Nelson
Surface Water Section
Environmental Fate and Groundwater Branch/EFED (7507C)

Thru: Henry Jacoby, Chief Henry Jacoby
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Environmental Fate and Effects Division (7507C)

Attached, please find the EFGWB review of:.

Chemical #: 109701, 109702, 109301, 121501, 128825

Common Name: Permethrin, cypermethrin, fenvalerate, tralomethrin, bifenthrin

Type of Product: Insecticide

Product Name: Various

Company Name: Pyrethroid Working Group (PWG)

Purpose: Protcol for conducting VFS pyrethroid runoff studies

Total Review Time: 2 days

This is a review of a protocol for a runoff study that is designed to determine the effectiveness of a vegetative filter strip (VFS) in reducing sediment and associated pyrethroid runoff from cotton and bare ground plots. It was submitted by the Prethroid Working Group (PWG).

1. CHEMICAL:
Common Name: Permethrin, cypermethrin, fenvalerate, tralomethrin, bifenthrin
Chemical Name: Varies with chemical
Type of Product: Insecticide
Chemical Structure: Varies with chemical
Physical/Chemical Properties: Varies with chemical

2. TEST MATERIAL:
A as yet unspecified product containing one of the pyrethroids

3. STUDY/ACTION TYPE:
A protocol for a runoff study that is designed to determine the effectiveness of a vegetative filter strip (VFS) in reducing sediment and associated pyrethroid runoff from cotton and bare ground plots.

4. STUDY IDENTIFICATION:
Hendley, P. 1994. PWG proposal for investigating the potential impact of vegeteative filter strip (VFS) in reducing sediment transport. Submitted to OPP/USEPA on February 10, 1994 by the Pyrethroid Working Group.

5. REVIEWED BY:
Henry Nelson, Ph.D., Head H Nelson 4/18/94
Surface Water Section
Environmental Fate and Groundwater Branch/EFED

6. APPROVED BY:
Henry Jacoby, Chief
Environmental Fate and Groundwater Branch
Environmental Fate and Effects Division

7. BACKGROUND:
In a memo dated 11/3/93 from A. Maciorowski and H. Jacoby to G. LaRocca, EFED recommended to RD that a minimum 10 foot vegetative buffer be required for all pyrethroid applications to reduce the amount of pyrethroid runoff from treated fields (primarily via adsorption to eroding soil particulates). EFED also recommended that a runoff study be performed to determine the effectiveness of a 10 foot and optionally a 25 foot vegetated filter strip (VFS) in reducing sediment yield and associated pyrethroid loadings at the edge of the field. In response, the Pyrethroid Working Group (PWG) has submitted this protocol (D199570) for conducting the study.

8. CONCLUSIONS:

If the study is performed as indicated in the protocol (attached), it may result in difficulties in interpreting data and in determining the successive storm and severe storm capacity of the VFS in reducing sediment and pyrethroid loading from high runoff sites. The reasons include changing too many variables at one

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time, allowing artificial rainfall to fall only long enough to collect one adequately sized sample, the possibility of not using high runoff plots and no replication.

The following recommendations are based on discussions between myself, Dave Jones, and Ron Parker of the Surface Water Section of EFGWB and should be taken into consideration by the registrants in this and/or future studies. However, there are no approved guidelines or formal requirements for conducting such studies, such studies can be performed in many ways that will yield useful data including the way described in the protocol, and our recommendations will require more resources than called for in the protocol. Therefore our comments should be considered as only recommendations, not mandatory revisions.

(1) The proposed slopes of $\geq$ 1% represent $\geq$ upper 25th percentile of cotton field slopes. It might be more appropriate to use slopes corresponding to $\geq$ the upper 10th percentile of cotton field slopes.

(2) Although the soil type selected should be one actually used to grow cotton, the selected soil should be one of the more erodible ones from the distribution of cotton growing soils.

(3) The rationale for having the rows perpendicular to the slope is unclear. Although contour plowing may now be much more prevalent than conventional plowing down the slope, it is important to demonstrate that a VFS is effective in reducing sediment and associated pyrethroid losses under conditions of high runoff potential. Also, it may not be necessary to use a diffuser if the total flow is more or less uniformly distributed down several rows running parallel to the slope.

(4) In attempting to determine both the effect of sequential runoff events and increasing runoff intensities on the sediment and associated pyrethroid removal efficiency of the VFS with the same set of experiments, it may be very difficult to interpret results (as indicated in the protocol). If storms of increasing intensity are applied sequentially as planned, it will be difficult to determine whether any decreases in VFS efficiency or any VFS breakthroughs are due to the increased intensity , to cumulative effects decreasing the capacity of the VFS or a combination of both. Therefore, sequential and intensity-duration effects should probably be studied separately.

(5) To determine the effect of sequential runoff events, it is recommended that the same storm intensities and durations be used for each of the 3 or more sequential events and that the intensity/duration used be typical of the post-application period for the site simulated such as 1 in/hr for 1 hour.

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(6) The protocol is designed to determine the effect of storm intensity, but not storm duration on the sediment and associated pyrethroid removal efficiency of the VFS. The protocol calls for rainfall simulation to last only long enough to collect one adequate sample. Any given return frequency on rainfall intensity duration curves corresponds to numerous combinations of intensity and duration. A very intense storm over a short duration and a less intense storm over a longer duration may have the same return frequency, but different effects on the VFS.

To determine the effect of increasing intensity at a set duration, it is recommend that for a set duration of 2 or 3 hours, intensities corresponding to a 1 or 2 year and a 5 or 10 year return frequency be run. To determine the effect of duration at a set intensity, it is recommended that the studies be run for longer than the set duration of 2 or 3 hours (if necessary to obtain breakthrough) until breakthrough is obtained or until it is no longer practical to continue due to limitations on the irrigation water available and/or resource limitations. Instead of collecting only one composite sample for each runoff event, several composite samples should be collected each representing a different stage of the runoff event. That would allow some determination of the effectiveness of the VFS as a function of time.

(7) The 10 foot VFS recommended in the 3/11/93 EFED memo was somewhat arbitrary. It is not really known if a 10 foot VFS will generally be effective. Consequently, as recommended in the 3/11/93 memo, the PWG should consider also running studies with a 25 foot VFS.

(8) There is some concern over the lack of replication in the protocol. It is recommended that some replication be considered, particularly for the no VFS plots that serve as the controls. A suggested replication schedule for each study (e.g., the successive runoff study, the 1 or 2 year return frequency study, and the 5 or 10 year return frequency study) would be 4 replicates for the no VFS plot, and 2 replications each for the 10 foot and 25 foot VFS. However, it is recognized that some replication may have to be sacrificed to perform separate studies on successive runoff and intensity-duration as well as studies on both 10 foot and 25 foot VFSs.

(9) It will probably be sufficient to conduct studies only on plowed bare ground plots. Although also conducting studies on cotton plots would give additional useful information, it is more important to use additional plots for replications, for separating studies on sequential runoff events from studies on increasing intensity and duration, and for studying 25 foot as well as 10 foot buffers.

(10) Other issues such as the possibility of pumping slurries directly upon the VFSs as well as the issues discussed above can be

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further discussed at a proposed PWG/Surface Water Section meeting (see recommendations below).

9. RECOMMENDATIONS:

In a April 18 phone conversation with Paul Hendley of the PWG, he suggested that a meeting be set up soon between the PWG and the Surface Water Section to further discuss this protocol. The Surface Water Section concurs. He also pointed out that with individual companies and workgroups performing limited mitigation validation studies on specific chemicals and chemical families, substantial overlaps and gaps will occur in our knowledge about the effectiveness of various mitigation measures unless OPP plays a role in coordinating such studies over multiple companies and workgroups. The Surface Water Section also concurs with that viewpoint. The Surface Water Section believes that some mitigation methods such as the vegetative filter strip are best studied by at the very least, chemical family workgroups (such as the PWG) rather than by individual companies, and that some may be best studied by even larger groups comparable to the Spray Drift Task Force if possible.

10. DISCUSSION:
See conclusions