2-11-92

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Pendimethalin Rice Monitoring Protocol

TO: Terri Stowe, PM 74
Reregistration Branch
Special Review and Reregistration Division

FROM: Doug Urban, Chief Norman J. Cook for 2.11.92
Ecological Effects Branch
Environmental Fate and Effects Division

EFED has evaluated American Cynamid's Pendimethalin rice monitoring protocol. The attached review summary was the result of a coordinated review effort by the Ecological Effects Branch (EEB), Environmental Fate and Groundwater Branch (EFGWB) and Science Analysis and Coordination Staff (SACS). The registrant is advised to resubmit a revised protocol that will enable the requirements of 72-7 (Aquatic Residue Monitoring) and 164-2 (Field Dissipation) to be simultaneously addressed. The PM is advised to set a near-future deadline for the submission of a revised protocol so that 1993 deadlines for study initiation and completion can be scheduled once the resubmitted protocol is reviewed and accepted.

From: David Farrar
Date: 1/23/92
Protocol Review: Pendimethalin on rice.
Joint Statement of AFST, EFGWB, EEB, and SACS

The Aquatic Field Studies Team (AFST), consisting of representatives of relevant branches of EFED, has considered the study protocol submitted by American Cyanimid on 8/15/98 for use of Pendimethalin on Rice. The goal of the proposed study is to satisfy simultaneously requirements 164-2 (Field Dissipation) and 72-7 (Aquatic Residue Monitoring). The ASFT agrees that it is plausible to collect data that will satisfy these requirements simultaneously; however the protocol submitted has various deficiencies which will need to be addressed in a revised protocol.

With regard to 72-7 (residue monitoring) EEB considers that residues of Pendimethalin in excess of 10 ppb may adversely effect finfish reproduction in various aquatic ecosystems. With regard to 164-2 (field dissipation), EFGWB is primarily concerned with the development of a decay curve for the agent and primary degradates within a particular rice paddy, and is concerned that dissipation be evaluated for an appropriate range of soil types. Whereas the dissipation study will be concerned primarily with dissipation in a rice paddy, EEB is concerned to evaluate potential affects outside the study area, e.g. in adjacent lakes, rivers, and bayous.

SITE SELECTION

Sites will be located in Arkansas and Louisiana. The registrant will need to demonstrate that sites have been selected so as to represent realistic worst-case scenarios for ecological effects in a given region, i.e. scenarios that favor adverse ecological effects, within a range of scenarios that are realistic for a region. Factors to be considered include soil type and drainage targets.

Regarding prevalent soil types in the regions of interest, EFGW has consulted a number of academic and other non-agency experts in agronomic disciplines or wetlands ecology. Apparently the predominant soil associations in rice-growing regions of Louisiana are the Crowley silt loam in Arkansas and South Louisiana, and the Sharkey association in North Louisiana. In considering appropriate soil types for a study site, the following factors may need to be considered. Silt soils are expected to be more erodible than clay, yield particles that remain longer in suspension, and absorb pendimethalin less tightly. Apparently, silt loam soils present a greater potential than clay soils for transport of the agent off-site. However, soil types at a study site should represent realistic scenarios for a given region.

With regard 72-7 requirements, the AFST had concluded that

2

adequate replication would require five (5) sites in Arkansas and five (5) in Louisiana. The table below displays a tentative reconciliation of this requirement with EFGWB's conclusions regarding prevalent regional soil types. Here of course the term "estuarine" indicates the need to evaluate the potential of transport of the agent to an estuary, and not necessarily the location of a site within an actual estuary: proximity to estuaries will be determined by what is realistic for rice fields in South Louisiana.

Suggested Scheme for Site Selection
Combined 164-2 and 72-7 Requirements.

# Sites	Region	Soil Texture & Series	Target of Drainage
5	Arkansas	Crowley Silt Loam	Non-Estuarine
2 or 3[2]	South Louisiana	Crowley Silt Loam	Estuarine
2 or 3[2]	North Louisiana	Clay?[1]	Non-Estuarine
5[2]	South Louisiana plus North Louisiana		

[1] Or otherwise the predominant type, within the Sharkey Association, used to grow rice in North Louisiana.

[2] i.e. either 2 sites in South La. and 3 in North La., or vice versa.

Site selection will need to be justified in terms of aquatic ecosystem types receiving drainage, with the objective of assessing region-specific ecological effects. For example, with regard to sites in South Louisiana we are concerned particularly with potential adverse effects on estuarine ecosystems. Consequently the selection of sites in that region should be realistic in terms of transport from rice fields to estuarine ecosystems. Of course, maximum environmental concentrations will likely occur where relatively small drainage basins with high water retention receive drainage from relatively large treated paddies.

Site-specific data will be needed on factors such as drainage pattern, placement of well head (source water) with respect to rice field, water quality, soil variability within sites, and locations of potentially affected bodies of waters. Particularly if water at the well head has high salt or calcium carbonate content, chemical or physical properties of the water affecting the degradation of pendimethalin may vary with distance from the well head.

SAMPLE COLLECTION FOR DISSIPATION REQUIREMENT

- The AFST suggests that pre-treatment samples be collected in order to evaluate background levels of the agent. Use of matched control sites appears to be somewhat less relevant, although possibly useful.
- At least 6 soil cores should be taken from each quadrant per sampling interval. The AFST suggests that two composite samples (e.g. composite 3 of 6 per quadrant), rather than 1 as suggested by the registrant, be established per quadrant.
- A protocol should be specified and justified for location of samples within quadrants (e.g. random sampling, transect sampling).
- Soil/sediment samples were not planned in the submitted protocol for 2 and 4 days after application. Sampling needs to be conducted at those intervals.
- Statistical treatment should include an evaluation of the variation due to differences among composite samples within quadrants, and variation among quadrants within sites. (Variance components analysis may be a useful tool for this purpose). Some statistical analyses may be more effective when carried out in the log scale than in the original scale of measurement.
- The standard rate of application of pendimethalin for rice, in combination with propanil is 1.5-2.0 pints/A of Prowl 4EC, or 0.75-1 pound ai/A. For this study, the maximum labeled rate of 1 pound ai/A is appropriate.
- Soil samples from the field should if possible be divided into segments of 0-3 inches and 3-6 inches depth, to be evaluated separately.

OTHER ISSUES

- Storage stability data for the agent in soil, water, and sediment, referenced in the submitted protocol, must be submitted to EFGWB if these data are to be considered by the agency.

- Validation of the analytical method(s) is necessary for environmental media that contain both propanil and pendimethalin. Also, the registrant should submit information about the potential interactions of pendimethalin and propanil when mixed in the tank, and information on toxicity of the pendimethalin-propanil mixture.

- The AFST reiterates that spiked field samples will need to be included in the protocol.

- The registrant failed to address spray drift in the submitted protocol. If spray drift is not addressed in the residue monitoring study, a rate of 5% will be assumed for EEC calculations.

- Detection limits for analytical methods should be stated in the protocol.

DP BARCODE: D162891 REREG CASE #

CASE: 819421
SUBMISSION: S393409

DATA PACKAGE RECORD
BEAN SHEET

DATE: 03/26/91
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 665 DATA PROT-REG STND GN DAT
CHEMICAL: 108501 Pendimethalin (N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrob
ID#: 108501
COMPANY:
PRODUCT MANAGER: ~~50 JAY ELLENBERGER~~ 74 LOIS ROSSI 703-308-~~8085~~ 8080 ROOM: CST 4J1
PM TEAM REVIEWER: TERRI STOWE 703-308-8043 ROOM: CST 3D5
RECEIVED DATE: 07/18/90 DUE OUT DATE: 10/16/90 ~~[illegible]~~

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 162891 EXPEDITE: Y DATE SENT: 03/26/91 DATE RET.: / /
DP TYPE: 001 Submission Related Data Package
ADMIN DUE DATE: 06/04/91 CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	03/27/91	/ /
BRAN: EEB	/ /	/ /
SECT:	/ /	/ /
REVR :	/ /	/ /
CONTR:	/ /	/ /

* * * DATA PACKAGE REVIEW INSTRUCTIONS * * *

ATTN.: FOR IMMEDIATE REVIEW - REVISED PENDIMETHALIN PROTOCOL FOR GLN 72-7

Please review revised protocol for GLN 72-7 sent in response to review dated 02/16/90 of previous protocol (08/15/89).

Please send a copy of the protocol review to: Terri Stowe
SRRD/RB
(H7508W)
Crys. Sta. I

THANK YOU!!

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL

Herb Manning - EFGWB reviewer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Pendimethalin Residue Monitoring/Dissipation Study Protocol

FROM: James Breithaupt
Agronomist, Review Section 3 James Breithaupt
OPP/EFED/EFGWB (H7507-C)

TO: Tom A. Bailey, Ph.D.
Chairman, Aquatic Field Study Team
OPP/EFED/EEB

and

John Noles, Lead Reviewer
OPP/EFED/EEB

Attached is a memorandum of understanding of a phone conversation with Dr. Robert Wells of the Agronomy Department of the University of Arkansas. He is an expert in rice research and culture. We discussed typical rice production practices and he indicated that he would send me some information that might be useful.

DATE: November 20, 1991

REVIEWER: James Breithaupt **CHEMICAL:** Pendimethalin

Irrigation and Soil Property Effects

In North Louisiana/South Arkansas, well water is primarily used for irrigation of rice. Some potential properties of the water that might be of interest to us are the salinity and $CaCO_3$ content. The use of saline/calcareous water tends to lead to soil property gradients. The soil near the water source (top levee) tends to be saline/calcareous while the soil away from the water source (bottom levee) tends to be less affected by the water. Significant differences in soil properties (e.g. pH from calcium carbonate, salinity from salty water) from use of certain sources of water can occur at approximately 1/4-1/2 mile of linear distance. This could lead to differences in soil properties within the study area, possibly affecting half-life estimates.

In South Louisiana, surface water from an irrigation district tends to be used since ground water tends to be very saline. pH gradients are not generally created in the field as a result of the surface water from the irrigation districts.

Off-Site Water and Soil Movement

Off-site water movement is a function of water management and local rainfall. A 3" rain event will generally lead to overflow of levees. Interval stations are useful for monitoring downstream movement of pesticide.

Generally speaking, the sediment load leaving a rice field is very low except for precipitation events immediately following tillage. If we want check plots and treated areas to flow to different "bodies of water," obviously the drainage pattern will have to be very different.

In California, farmers tend to recycle the rice water after the growing season or let the water evaporate off the fields instead of draining it. This avoids the potential release of pesticide into the environment through agricultural drainage. Rice farmers in the south tend to drain the water and many do not recycle it.

Typical Rice Soils and Properties

A "typical" rice soil for both Louisiana and Arkansas would be a Crowley silty loam. Generally speaking, a soil that has supported rice production for some time has a natural impeding layer at 6-18 (8-10 inches) inches of depth in addition to a traffic pan at 4-6 inches of depth. The depth to the first impeding layer will be the depth of leaching of the compound, if it leaches.

Planting, Flooding, and Harvesting

When rice is planted (dry seeded), it germinates and emerges between 8 and 18 days (temperature dependent). It reaches the 4-5 leaf stage about 2.5-3.5 weeks after it emerges. This leads to a "typical" pre-flood time of approximately 28-35 days. Rice is flooded from 70-110 days, depending on their maturity date and variety. Rice matures within 120-160 days. A depth of water of 2-4 inches of water is kept on the field during the time of flooding, and no water is intentionally released during the growing season. About 2 weeks need to elapse after drainage of fields before harvest can be started. This time is necessary since the machinery needs a stable (non-saturated) soil for support.

Seedbed Preparation ⟶ planting —— 8-18 days (temperature dependent) ⟶ Emergence **

—— 2 1/2 - 3 1/2 weeks ⟶ 4-5 leaf stage (flooding w/ 2-4" of H_2O) —— 70-110 days (depending on maturity date and variety) ⟶ drainage —— 2 weeks ⟶ harvest

** - application of pendimethalin/propanil after emergence but before flooding.

tillering and vegetative growth, but does not delay flowering [93], unless the application is excessive. Increases in plant height, grain and straw yield, and number of heads usually are proportional to the amount of nitrogen added [68]. Where little chemical fertilizer is applied, the rice plant depends for its nitrogen largely upon the decomposition of organic matter under anaerobic conditions, and upon nitrogen fixed by blue-green algae (which usually are present in paddy fields) [108]. Controlled experiments in India indicate that the yields of rice are consistently higher where algae are present. A considerable increase in nitrogen occurred in fields in which algae grew abundantly, whereas there was a loss of nitrogen on similar soils where algal growth was absent [29].

The rice plant absorbs considerable quantities of phosphorus from the soil, and phosphate applications give increased yields on some soils but not on others. Phosphorus tends to increase the yield of grain but not of straw, while a severe phosphorus deficiency reduces both plant growth and tillering [38].

Potash often is not required on heavy rice soils, which usually contain considerable potassium. However, potash applications on light-textured (sandy) soils frequently increase rice yields.

Calcium applications improve the growth of rice on some soils. In Arkansas, the addition of calcareous carbonate and calcium chloride to very acid soils reduced the sterility in rice plants [70].

Heavy applications of organic amendments to flooded soils may increase the iron uptake by the plant, but decrease the manganese absorption and thus reduce yields. The iron levels in submerged or unsubmerged plants without organic amendments may be comparable, but submergence increases both rice yields and manganese uptake. The better growth of submerged rice on some soils may be partly owing to the greater availability of manganese in submerged soil [22]. A marked response to manganese sometimes has been obtained in upland rice. The rice plant has a high requirement for manganese, as well as an exceptionally high tolerance to it.

WATER REQUIREMENTS

Rice thrives only on wet soils and requires from 2.5–15 feet of water during the growing season to produce a good crop.

Upland or Nonsubmerged Rice

If water for flooding is not available, upland rice is grown only in humid regions with more than 40 inches of annual rainfall. It yields only

one-third to two-thirds as much as lowland rice, even in countries with high rainfall. Many weeds thrive on wet soils that are not submerged, and thus are difficult to control on upland rice fields. Upland rice also is likely to suffer from moisture shortage at some time during the growing season, even where the average annual rainfall is 60 inches or more. Furthermore, submerged rice plants yield more than do those grown in soil that is kept wet constantly but not submerged.

Many nonirrigated rice fields in the high rainfall areas of monsoon Asia are submerged from much or part of the growing season by the construction of dikes to retain all of the rainfall. A limited acreage formerly grown by this method in the United States was called "providence" rice.

Lowland or Submerged Rice

Lowland or paddy rice fields are submerged during most or all of the growing period. The depth of water on a field generally is increased as the plants grow until it reaches 4–8 inches or more. The chief purpose of such depths is to suppress weed growth. The water around rice plants should never be stagnant, but should flow gently through the field. Rice in fields submerged in still water for three weeks or more is benefited by draining or by fresh water supplies [118]. Most of the fields in the southern United States are submerged from 4–8 inches from the time the seedlings are about 6–10 inches high until the crop is ready to drain for harvest about two weeks prior to full maturity, a period of 3–5 months. Some of the rice is sown in flooded fields. In California, nearly all of the rice is sown in 4–6 inches of water, and the water level is maintained at a depth of 6–8 inches during the latter part of the season until the rice is nearly ripe.

Deep water generally increases plant height but reduces tillering. The number of tillers, total leaf area, total dry matter, and grain yield might be greatest where the water barely covers the soil surface, but such a depth cannot be maintained in the field, and weed growth would be so excessive that yields would be low [36].

Quantity of Water

From 3 to 5 acre-feet of water usually is needed to produce a crop of rice on suitable land. Since light porous soils may require 12–15 acre-feet of water per season, such soils are uneconomical for rice production in the United States. In Arkansas, an average of 32.9 acre-inches of water was applied to rice fields. This seasonal total consisted of 10.9 inches supplied by rainfall and 22 inches by pump irrigation. In Louisiana and Texas, the total requirement may be 4–5 acre-feet of water. The usual seasonal irrigation in these three states is 1.5–3 acre-feet. In California, where little rain falls in summer, the amount necessary may be 3–8 feet, usually 5–6 acre-feet. The total water applied has been reduced to some extent by growing earlier varieties. In Japan, the seasonal water requirement ranges from 2.3–4.3 acre-feet [83, 6].

The water required is increased by permeability of the soil, seasonal evaporation, transpiration, and by a long growing season. Transpiration of water by the plant is relatively constant regardless of the degree of soil saturation so long as available moisture is present. Transpiration may be increased by phosphate applications, or decreased by barnyard manure applications [38]. About 450 gallons per minute (one second-foot) of water will maintain about 50 acres of rice during the growing season in California.

Quality of Water

Water that contains more than 35 grains of salt per gallon (600 parts per million) should not be used to irrigate rice when the soil is dry or when the water is to remain on the field. Rice irrigated continuously with water that contained 35 and 75 grains of salt per gallon (600 and 1300 parts per million) was reduced in yield about 25 and 70 per cent, respectively. The rice also was of lower quality than when water containing 25 grains per gallon was used. Older plants can tolerate higher concentrations of salt than can seedlings, although very high concentrations may kill the plants or make them sterile. Salinity at the tillering stage inhibited the growth of the Caloro variety twice as much as during heading [111]. The Blue Rose variety is more tolerant to salt than are some other varieties. It has made satisfactory yields when the water contained salt concentrations of 75, 150, 200, and 250 grains per gallon in the tillering, jointing, booting, and heading stages, respectively. Some of the newer varieties probably would be damaged seriously by comparable amounts of salt [6].

When a field has been watered with fresh water and the supply is then replenished with salt water, the damage will be less than when the salt water is put on dry soil. In the latter case, the salt is more concentrated in the dry soil and more of it moves into the root zone, whence it is taken up by the plants. Rice grown on clay soils may not be injured by salt water to the same extent as on lighter soils, because less water is used and less is lost by seepage [6].

About three tons per acre of salt are added when water that contains 50 grains of salt per gallon is used for the whole growing season. The accumulations of salt over the years may deflocculate the soil, so that stickiness, compactness, and impermeability increase. The deflocculated soil is hard to cultivate and produces low yields [6].

When the rainfall is below normal in the gulf coast of Louisiana and Texas, the water level in the streams that supply irrigation water in these areas often is so low that brackish water seeps in from the Gulf. The concentration of chloride salts may become so high that the yield and quality of the rice are reduced or the crop ruined [6].

Well water, used to irrigate a large part of the rice acreage in Arkansas, usually is low in chlorides. However, in the lower basin of the Vermillion River in Louisiana, salt encroaches on the Chicot Reservoir when the river is intruded by salty water [6].

Water from shallow wells in Arkansas that contains 75 parts per million of calcium and 22 parts per million of magnesium was applied to rice fields for many years. The soil increased in pH from about 5 up to as high as 8. That change from a highly acid to a highly alkaline reaction is due to the annual addition of about 1500 pounds per acre of limestone equivalent. The increase in available calcium and magnesium lowered the availability of phosphorus in the soil [6].

Rice has been grown in order to reclaim saline or alkali lands in California. It is successful when the water is appreciably lower in dissolved minerals than is the soil, the soil is relatively permeable, and drainage is adequate. Crops that are not salt-tolerant can be grown on the alkali soils after two or three years of rice [6].

Effect of Temperature

The temperature may be too low early in the season, or too high late in the season, for maximum emergence of rice sown in the water. Germination is retarded when the temperature of the water is below 70°F. Roots often develop poorly when the temperature is above 85°F, perhaps because warm water has a low oxygen content. The temperature of the water from shallow wells in Arkansas and from streams in California is usually 65°F or lower. When such cool water goes directly into the field, the rice growing near the water inlet usually is retarded. Such "cold water" rice may ripen 7–10 days later than that in the rest of the field. Cold water can be held in shallow basins until it is warm enough to turn into the rice field [6].

In tropical regions, the temperature of irrigation water may be raised as high as 104°F without injury to rice. The optimum temperature for grain yield in southern Japan is about 90°F. Adverse effects, such as lowered spikelet fertility, occur below 77°F. The critical temperature of irrigation water in northern Japan is about 70°F. The adverse effects of low water temperatures can be offset to some extent in the cooler areas by an increase in water depth to about four inches [103].

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Pendimethallin Residue Monitoring/Dissipation Study Protocol

FROM: Tom A. Bailey, Ph.D.
Chairman, Aquatic Field Study Team
Ecological Effects Branch
Environmental Fate and Effects Division

TO: John Noles, Lead Reviewer
Ecological Effects Branch
Environmental Fate and Effects Division

Attached is a report from the AFST concerning a residue monitoring protocol for the selective herbicide, Pendimethallin. Please review and address any questions or comments to John Noles (305-6752) or Tom A. Bailey (305-6666).

cc: Doug Urban
Harry Craven
Ann Stavola
Amy Rispin/SACS

DATE: 19 November 1991

REVIEWER: John Noles **CHEMICAL:** Pendimethallin

TEAM MEMBERS: Jim Breithaupt, David Farrar, Mary Frankenberry, Curtis Laird, Richard Lee, Kathy Monk, Brian Montague, John Noles, Harry Winnik.

STUDY TYPE: Monitoring and Dissipation Study

BACKGROUND: An Aquatic Residue Monitoring Study was required for Pendimethallin in the 1985 Registration Standard. EEB was concerned that residues into receiving waters at concentrations exceeding 10 ppb may adversely effect finfish reproduction.

Protocols submitted by the registrants on 9/15/86 and 8/15/89 were rejected. The protocols had several weaknesses, however, the major deficiencies were a lack of study site description, refusal to spike field samples, and the use of propanil in conjunction with pendimethallin.

Recent modifications include attempting to satisfy both the 164-2 (EFGWB) and 72-7 (EEB) requirements simultaneously.

PROBLEMS: The residue monitoring and dissipation study protocol submitted by American Cyanamid continues to have serious deficiencies. Major concerns include but are not limited to the following.

1. The registrant has failed to provide specific site location and characteristics.

2. The use of a single site per region divided into quadrants is unacceptable.

3. The release of water from Control and treatment sites into a common basin is unacceptable.

4. A more detailed experimental design, including the specific statistical methodology to be used, must be provided to ensure validity of the study.

5. Analytical procedures must be submitted for validation.

6. The AFST concurs that field samples collected for analysis should be spiked.

7. The AFST questioned the use of a pendimethallin/propanil mixture for the residue monitoring study. The registrant should provide information on the toxicity of a pendimethallin/propanil mixture. In addition, if the

registration label does not specify that propanil must be used in conjunction with pendimethallin, the committee concurred that the residue monitoring study should be done with only pendimethallin.

8. The Registrant failed to address Spray Drift in the study protocol.

DISCUSSION: Many of the same deficiencies identified in earlier protocols remain. The Registrant is urged to submit a specific study design to include a map identifying geographic location and sampling sites as well as number of samples to be collected at each site.

The Study sites must represent worst case. The committee has suggested that the site(s) contain large paddies with small drainage basins preferably with high water retention. Slope is not an issue of concern. The AFST recommends using heavy hydrosoil of type of C or D in areas with adequate rainfall. Arkansas was considered adequate as a freshwater site and Louisiana was considered adequate for representing estuarine habitat.

The Dissipation study (164-2) will concentrate exclusively on establishing a decay curve for the product within the rice paddy. EEB's primary concern is establishing an EECs for water bodies mostly outside the rice paddies (adjacent lakes, streams, ponds, rivers, and bayous). The AFST concurred that it was feasible to satisfy conditions for both the 164-2 and 72-7 data requirements with a single study, but the sampling regime must be adequate to satisfy the needs of either study.

The overall sampling regime for this study was challenged by the AFST. The proposed sampling intervals was considered to be adequate, however other aspects needed modification. The AFST proposed that pre-treatment samples be collected in order to determine background levels of the pesticide in question. The Committee also debated the issue of using multiple controls per study site. It was suggested that pre-treatment data from respective sample sites could be used for comparison to post-treatment results in lieu of data from control sites. Albeit properly selected control sites may provide more useful information. The compositing scheme proposed by the Registrant was considered to be problematic by the Committee. The AFST suggested using five sites (Registrant proposed the use of a single site), each site being divided into four quadrants, with four samples being collected from each quadrants. Two composite samples, rather than one, would be established per quadrant.

The Registrant proposed to determine aggregate residue levels in 15 inches of sediment. The AFST suggested that sediment samples be collected from two distinct regions, 0 to 3.0 inches and 3.0 to 6.0 inches, and analyzed separately.

PROPOSALS: The AFST agreed that the residue monitoring and dissipation study protocol contained numerous deficiencies and was therefore unacceptable. In addition to the above problems of concern, the following recommendations were offered by the AFST.

1. The selected study sites must represent worst case.
   Δ Large paddies feeding into small drainage basins
   Δ The hydrosoil should be group C or D (heavy sediment)
   Δ Area rainfall should be adequate for typical worst case

2. The AFST suggested sites in Arkansas to represent a freshwater scenario and sites in Louisiana to represent an estuarine scenario. The estuarine sites should be areas with the least tidal effects, low flushing rates, and of limited size.

3. The AFST recommends that the registrant provide a specific study design complete with a map of the study site as well as a diagram indicating specific sampling sites.

4. The Committee did not concur with the method proposed for compositing samples. The AFST suggested that four samples be collected from each of four quadrants per site and divided into two composite samples per quadrant.

5. The AFST agreed that five sites per State would be required to fulfill study requirements.

6. The AFST recommended that the Registrant provide estimates of precision and the relative sources of variability for the various measurements taken during the study.

7. Detection limits for analytical methods must be provided to the Agency prior to initiation of the study.

8. If drift is not addressed in the residue monitoring study, a drift rate of 5% will be used for EEC calculations.

SUMMARY: Generally, the AFST concluded that the study protocol was unacceptable. The major concerns were lack of study site information, inadequate experimental design, refusal to spike field samples, and the use of a pendimethallin/propanil mixture for the study.

The Committee concurred that study sites in Arkansas and Louisiana would represent worst case. Major recommendations presented by the AFST included the selection of sites containing heavy hydrosoils (Type C or D), the use of five sites per State, the establishment of detailed experimental design, submission of analytical methodology, and the use of pendimethallin alone in the residue monitoring study. In the absence of spray drift data, EEC calculations will be based on a 5% drift rate. The AFST recommends that a new protocol reflecting suggested modifications be submitted to the Agency.

cc: AFST Committee; D. Urban; H. Craven; A. Stavola
A. Rispin/SACS