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

MEMORANDUM **Date:11/19/08**

SUBJECT: **Response to registrant Comments on Combined Fipronil (129121) Ecological Risk Assessment (Aquatic Issues) DP353647**

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The Environmental Fate and Effects Division has reviewed and prepared the following responses to issues and comments presented to the Agency in MRID 47438301. This response document deals with the aquatic effects and exposure issues. Another response document addressing terrestrial effects and exposure comments will be forthcoming under separate cover.

Aquatic Effects Assessment

Use of All Available Effects Data
Registrant Comment: The registrant requested that the EPA-reviewed GLP aquatic data and higher field tier work be used to evaluate risk to the aquatic environment.

EFED Comment: In accordance to the Overview Document, the Agency is compelled to use these data and in addition data from the public literature providing it is scientifically appropriate for risk assessment purposes.

Use of Overmeyer et al. 2005
Registrant Comment: The registrant believes that this study should not be considered in the risk assessment because it does not meet guideline standards and the study reported in the journal is insufficient to allow usage of the endpoints in risk assessment. Furthermore mean measured concentrations are highly variable outside guideline requirements.

EFED Comment: EFED does not believe the excursions in the analytical methods are sufficiently great to state that the study is scientifically unsound. Therefore the endpoint will continue to be considered in the risk assessment. It should be noted that alternative endpoints from the registrant's own data set were also evaluated in the risk assessment.

Use of Higher Tier Mysid Study
Registrant Comment: The registrant is concerned that the risk assessment does not make use of MRID 46619103, a study of mysid reproduction response to fipronil in a sediment water environment.

EFED Comment: EFED has conducted an initial evaluation of the study. Certainly the study should be included in the risk assessment. However, the registrant seems to suggest that the most appropriate expression of effects endpoints should be based on the nominal addition concentration to the test system. EFED believes that nominal concentration endpoints are inappropriate because of (1) the chronic nature of the exposure for a reproduction study, (2) the need to have comparative averaging times between exposure assessment and effects assessment, and (3) the expected partitioning of fipronil to sediment and it's effect on dissolved water concentrations (in exposure modeling and in effects assessment dissolved concentrations should be mindful of partitioning to sediment). Therefore the study will be considered in the context of time-weighted average concentrations of fipronil in the water column. Moreover, the study will be evaluated for the ability of the methods to detect meaningful levels of impairment and so the no effect threshold may be based on biologically not necessarily statistically relevant effects.

As a consequence, the 60 ng/l endpoint suggested by the registrant (highest concentration tested) from this study is likely to represent an overestimation of the effects threshold derived from this study. For example the overlying water concentration (time weighted average) for that dose level over the course of the study was actually10.89643 ng/L. This value is only a factor of 2 different from the toxicity value used in the risk assessment. Further, initial review suggests that there is a downward trend in the number of mysids at all treatment doses not just the highest concentration tested, suggesting that even 10 ng/L might be an overestimation of an effects threshold.

In summation, inclusion of this study is warranted but is not likely to radically alter the conclusions of the risk assessment.

Use of MRID 463329905
Registrant Comment: The registrant requests that this study be included in the risk assessment.

EFED Comment: EFED reviewed this study several years ago and found the study to be invalid. Invalid studies are not included in risk assessment documents as general EFED policy.

Use of Mesocosm Study
Registrant Comment: the mesocosm study suggests an ecologically acceptable effects threshold of 0.4 ug/L

EFED Comment: EFED summarized the Agency evaluation of this study in the risk assessment. Contrary to an ecologically acceptable threshold of 0.4 ug/L the risk assessment reports the following:

Mean arthropod abundance was lower in the treatment than control at day 7 (52% of control), and Day 14 (61% of control) This trend reversed for days 21, 28, 42, and 56, where treatments showed increases in abundance relative to controls ranging from 0.5% to 183 %. None of the overall arthropod effects, though marked were statistically significant (P>0.05). Within the arthropods, certain copepod species (Mesocyclops edax and Tropocyclops prasinus) showed statistically significant (p≤0.05) reductions in abundance in treatment relative to control. Treatment abundances ranged from 65 to 365% of control values. By day 21 (the last day of analysis at species resolution) these reductions were not statistically significant, but were still markedly reduced 14% to 60% of controls. Hester-Dendy sampling results for clitellora (worms and leeches) showed statistically significant increase in treatments relative to control for sampling days 8, 14, and 56 (increases greater than 200%). Gastropods (snails) showed similar increases in abundance, though not statistically significant, in treatments relative to control. Evaluation of total macroinvertebrate insect abundance showed mixed results as the study progressed. Reductions in total abundance were statistically significant (P<0.5) for fipronil treatment at day 8, with reductions still evident at day 28 and 56, though not statistically significant. Benthic sampling for mayfly juveniles showed significant reductions in the presence of fipronil (p<0.05) at days 8, 14, 28, and 56 of the study. Juvenile chironomids were also reduced significantly (p<0.05) by fipronil at day 8, though these effects were largely reversed by day 56 of the study. Numbers of emergent insects were too small in the study to make definitive statistically supported statements about individual taxonomic groups. However, total emergent insects were lower in the fipronil treatment than in control for all sampling days of the study.

The treatment level may have been 0.4 ug/L nominal. However, actual measured concentrations over time were much lower as discussed in the risk assessment: *The time-weighted average concentration of fipronil in treated mesocosms from initiation of*

biological exposure out to 84 days (holding non-detects at half detection limit) was 0.042 ug/L.

EFED does not believe a change to the risk assessment's use of the data is necessary.

Use of Sediment Recolonization Study
Registrant Comment: The conclusion from this study is that while fipronil effects are possible for sediments spiked with relatively high levels of fipronil, potential impacts are isolated and transient. The potential for impacts on benthic invertebrate communities from currently labeled uses of fipronil is minimal.

EFED Comment: The Agency's risk assessment reached similar conclusions for sediment infaunal organisms with little to no direct contact with overlying water. However, given the very high toxicity of fipronil to aquatic invertebrates, the risk assessment still expressed concerns for epibenthic organisms with contact to overlying water concentrations of dissolved fipronil. The available pond mesocosm study, discussed earlier suggests that this is the case.

The existing sediment recolonization study is limited in its utility to address these concerns because there is only a spiked sediment exposure. The overlying water in all systems investigated did not also have an exposure to fipronil that would be expected under any realistic field conditions where the aquatic system would receive runoff and drift from nearby treatment areas. Moreover, in discussions with the registrant, a number of procedural issues with the study were enumerated and they include:

1. No information on the effects of sediment manipulation before replacement to the aquatic system on the control or treatment sediments to support benthic life as compared to sediments in non-manipulated areas of the aquatic system
2. No information on the impact of the very high level of un-impacted sediment areas surrounding the treated areas on the degree to which recolonization occurs. This is important because the study design does not readily duplicate expected conditions in aquatic systems receiving runoff and drift, where most if not all sediment areas may be contaminated with fipronil.
3. No information tracking the fate of individual organisms found to occur in treated areas. It is unknown if the measurements of recolonization represent organisms successfully maturing to emergence or if it reflects organisms simply moving into the treatment areas over time, only to succumb to fipronil exposure over the course of their occupation of the treated sediments.

For these reasons, EFED believes that the study may suggest recovery potential in areas where fipronil water exposure does not occur and where very small amounts of fipronil contaminated sediments occur. EFED is not convinced at this time that this is a situation expected to commonly occur in natural systems receiving fipronil drift and runoff.

Aquatic Exposure Assessment

Use Rate

Registrant Comment: The registrant indicates the label use rate for H&G 61743A (EPA Reg. No. 7969-211) should be 0.001 kg/ha instead of 0.002 kg/ha. This application rate assumes a 1 foot treatment perimeter @ 0.1089 lbs ai/A around a house or structure.

EFED Comment: This correction in application rate result in estimated environmental concentrations (EECs) being 0.5 of the reported EECs in the risk assessment.

Degradation Rates of Metabolites in Aquatic Environments

Registrant Comment: "The degradation rate of MB46136 and MB 45950 were assumed by EFED to be equivalent to MB 46513 because of their similarity in chemical structure and physical/chemical properties." The registrant contends the small pond study (Hoberg, J. 2005. Chipco® TopChoice™ Effects on Aquatic Fauna in Outdoor Simulated Ponds) shows a clear degradation pattern of MB46136, MB45950, and MB46513. The registrant provided an analysis of simultaneous degradation and formation kinetics to estimate first order rate constants and half-lives for fipronil and its degradation products (MB46136, MB45950, and MB46513) (Table 1).

Table 1: Registrant Estimated Half-lives Derived From the Small Pond Study

Residue	Half-Life (days)
Fipronil	5.2,9.9,3.4
MB46513	27
MB45950	43
MB46136	28

The estimated first-order half-lives from the Small Pond Study were used in PRZM/EXAMS modeling. The modeling result in no accumulation metabolite concentrations in the water column of the standard pond water. Additionally, the 1 in 10 year EECs for the metabolites were substantially reduced compared the EFED/OPP exposure assessment.

EFED Comment: EFED notes that original registrant of fipronil (Aventis) stated the estimated aerobic soil metabolism half-lives of MB45950 and MB46136 is 700 days. According to EFED Model Input Parameter Guidance Document, the aerobic soil metabolism half-life can be multiplied by 2 to estimate the aerobic aquatic metabolism half-life of 1400 days. This half-life has been used in every fipronil exposure assessment with no disagreement from the registrant. Additionally, the aquatic metabolism laboratory data for fipronil indicate that MB45950 is stable (MRID 43291204, 442610909, 44661301). Figure 1 illustrates the fipronil degradation with MB45950 formation in an aerobic soil metabolism study. Unfortunately, there are insufficient laboratory aquatic metabolism data to document the half-life of MB46136 in aquatic metabolism studies.

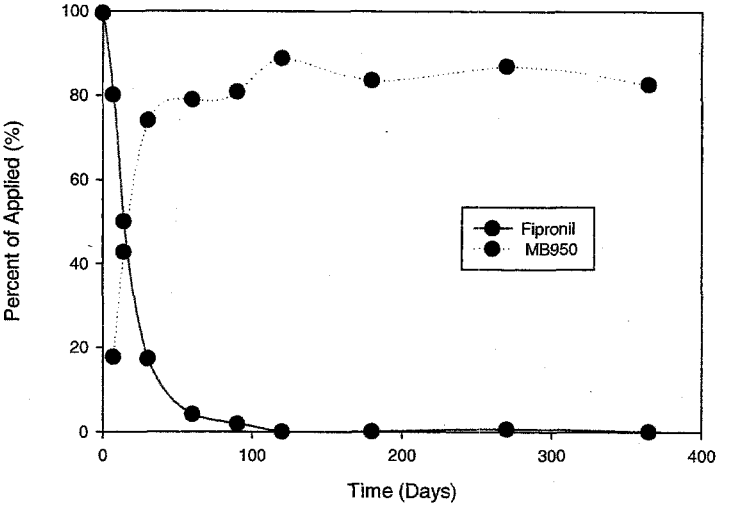

Figure 1: Residues of Fipronil and MB45950 in Aerobic Aquatic Metabolism Study (MRID 44261909)

The registrant provided a data submission on the estimation of simultaneous formation and degradation first-order rates from the small pond study (MRID 46936101). These data were reviewed by EFED. Because the modeling assumed the presence of the sulfide degradation product (MB 45950) as the primary biological degradation product, it implies the model water sediment system is anaerobic. Such conditions are not expected to be present in water/sediment systems capable of supporting a viable population of invertebrates. Additionally, there were no redox data from the small pond study. More importantly, there was no attempt to balance the mass of applied fipronil in the small pond study. Figure 2 illustrates EFED attempt to assess the mass balance of residues in the small pond study. This approximation assumed a sediment bulk density of 1.8 grams/cm^3. Because of the poor mass balance approximation, it is clear that the modeling does not account for all processes contributing to the dissipation of fipronil and its degradation products.

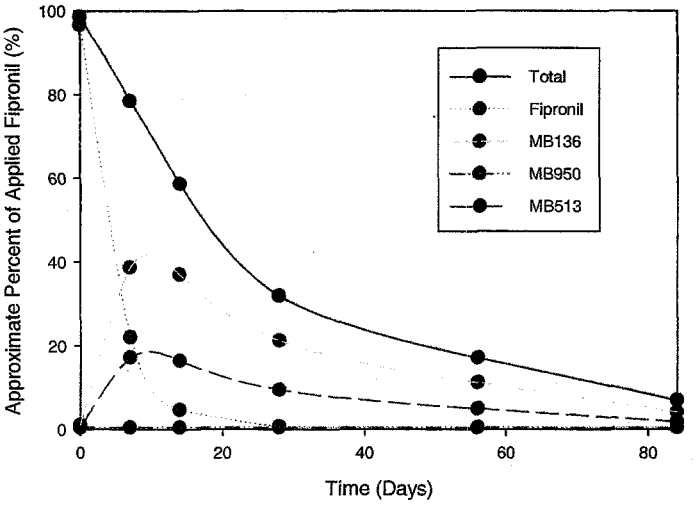

Figure 2: Estimated Residue Concentrations (expressed as % of applied fipronil) for the Small Pond Study (Hoberg, J. 2005. Chipco® TopChoice™ Effects on Aquatic Fauna in Outdoor Simulated Ponds)

Other factors potentially explaining the loss of metabolites in the pond water column would include accumulation of metabolites in the sediment. As discussed in a recent SAP on PBT-like pesticides, the PRZM/EXAMS modeling scenario does not account for sediment burial (FIFRA SAP, October 28th -31st, 2008).

Although there are insufficient laboratory data to assess the half-life of MB46136 in aquatic environments, the aerobic soil metabolism laboratory study (MRID 42918663) showed accumulation of MB46136 during a 365 day study. These data suggest the half-life of MB46136 is greater than 365 days.

The estimated half-life for MB46136 and MB 45950 ($t_{1/2}$=1400 days) in aquatic environments is a reasonable value according to the available data.

Runoff Buffer Efficiency

Registrant Comment: The registrant believes OPP should not consider buffer efficiencies from the Simulated Small-scale Runoff (SSRO) study (MRID 46490303) because the study is non-GLP exploratory study. The registrant stated the turf in the buffer strip was in poor condition, which reduced efficiency (33%).

EFED Comment: EFED considered all the SSRO data submitted to the Agency. The buffer efficiencies were evaluated to establish maximum and minimum efficiency for retaining fipronil in the 15 feet buffer strip. EFED believes the poor turf condition of buffer strip is a possible scenario and, therefore, should not be dismissed as an inappropriate situation. More importantly, the registrant's contention of deficient

exploratory study implies all the SSRO data are not of sufficient quality for assessing buffer efficiency.

Runoff Buffer Efficiency

Registrant Comment: The registrant disagree with EPA's interpretation of the NAWQA monitoring data showing frequent detections (14 to 34%) of fipronil residues in surface water with urban and integrated watersheds, and these detections may be associated with the use of fipronil in turf for control of fire ants. The registrant believes the detection are not associated with fire ant uses for the following reasons:

1. It very difficult to discriminate the cause of detections in a watershed with mixed uses;
2. Some of the detections in mixed watershed occurred prior to the registration of fipronil for control of fire ants;
3. Some of the detections are from regions where fipronil is not registered for fire ant control.

The registrant provided analysis of the NAWQA monitoring data to demonstrate that fipronil detection in fire ant quarantine may be associated with other uses. The registrant provided a box plot showing the highest fipronil detections were found in CA, GA, LA, NC, TN, and TX. The registrant contends the fipronil concentrations in LA were reduced from 2002 to 2003 due to the elimination of the rice use. Fipronil is used for fire ant use in CA in Coachella Valley, LA County, Orange County, and Riverside County. Two USGS monitoring stations are located in the fire ant use area. These total fiprole concentrations at the two stations were < 0.07 µg/L.

EFED Comment: Detections of fipronil residues in urban and integrated watersheds cannot be explicity linked to the fipronil use on fire ants. The registrant is correct that evaluation of monitoring data requires consideration of use area, timing of use, and region of use. However, fipronil detections have been reported in areas of the country where there has been market penetration by the fipronil product for fire ant use. So while a definitive linkage cannot be made, there is also no evidence to eliminate the possibility of such a linkage. Although the registrant attempted to address the low fipronil concentrations in known fire ant quarantine regions in LA and CA, they did not provide sufficient rationale to discount fiprole detections in other fire ant quarantine states including GA, NC, TN, and TX. It is for these reasons that the Agency's assessment couched the linkage between use and detection with the reasonable statement "these detections **may be associated** with the use of fipronil in turf for control of fire ants". The important point is that fipronil residues are detected in surface water.