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

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

MEMORANDUM

DATE: August 3, 2011

SUBJECT: Estimated Drinking Water Concentrations of Metaflumizone from Use in Fly Bait on Numerous Use Sites, for the Use in Human Health Risk Assessment (**PC Code No: 281251 & 281250, DP Barcode: D367556**)
Decision: 404129

TO: Rosanna Louie-Juzwiak, Acting Product Manager 7
Meredith Laws, Chief
Insecticide-Rodenticide Branch,
Registration Division (7505P)

AND: Kelly Lowe, Risk Assessor
Dana Vogel, Chief
Risk Assessment Branch I
Health Effects Division (7509P)

FROM: José L. Meléndez, Chemist
Environmental Risk Branch V
Environmental Fate and Effects Division (7507P)

THRU: Mah T. Shamim, Ph.D., Chief
Environmental Risk Branch V
Environmental Fate and Effects Division (7507P)

This memorandum presents the Estimated Drinking Water Concentrations (EDWCs) for metaflumizone, for use in an FQPA human health risk assessment. The registrant, BASF Corporation, is seeking registration of metaflumizone for a new product "Metaflumizone Fly Bait" (EPA Reg. No. 7969-xx), for use against flies on numerous use sites, as described below and further in **Appendix A**. Metaflumizone Fly Bait is co-formulated with the biochemical pesticide (Z)-9-tricosene (a pheromone which is the sex attractant of the female house fly), and is proposed for scatter applications at a maximum rate of 1.0 lb product/2000 ft^2 (equivalent to 0.0137 lb a.i./A), as well as applications in bait stations/ trays at a maximum rate of 1.25 lb product/2000 ft^2. Applications are allowed both indoors and outdoors in sites described below. The label provides no maximum number of applications or minimum retreatment interval. Thus, the Environmental Fate and Effects Division (EFED) relied on certain assumptions in modeling the new uses. **Table 1** provides a summary of the modeling results.

Metaflumizone consists of two isomers and is characterized by a very low solubility (1.79 ppb), very high affinity to soil/sediment (K_{OC} = 30,753 L/Kg), high persistence in the soil and water/sediment systems (temperature corrected 90th percentile $t_{½}$ = 122, and $t_{½}$ > 378 days, respectively), and degrades to a large number of degradates at low concentrations in most environments in the laboratory. For further information on the environmental fate characteristics of metaflumizone, see the previous assessment in **Appendix C**). In a metabolites meeting (10/27/05), the committee requested EFED to model parent only (covering both isomers) for drinking waters assessment.

EDWC estimates are based on the use of metaflumizone as a scatter fly bait only, the use that appears to bring the highest exposure. Parent only was considered as per the Health Effects Division (HED) request and because of the moderately low application rate implying the contribution of the degradates may be minimal, compared to that of the parent. In this assessment, the scenario yielding the highest concentration resulted in lower than the solubility limit of 1.79 ppb (*i.e.*, modeled concentrations were not capped by the solubility limit).

The screening level EDWCs from surface water sources were calculated using the tier 2 aquatic models PRZM (Pesticide Root Zone Model) and EXAMS (Exposure Analysis Modeling System). The tier 1 aquatic model SCI-GROW (Screening Concentration In GROund Water) was used to calculate the EDWCs from ground water sources. The estimates are presented in **Table 1** for surface water (acute "peak" and non-cancer/cancer chronic values) and for groundwater. Parent was modeled using various scenarios/ weather stations at the maximum proposed application rate (the scatter fly bait), assumed maximum number of applications (26) and an assumed minimum interval (14 days). Results in **Table 1** are for the highest modeled concentrations. For additional information about the models, refer to **Appendix C**.

Table 1 Surface and groundwater EDWC values for metaflumizone (ppb)

Source:	*Surface Water EDWCs (ppb); 1 in 10 Years*			*Groundwater*
Chemical	*Acute Peak*	*Non-cancer/Chronic (Annual Mean)*	*Cancer/Chronic (Overall Annual Mean)*	*Acute/ Chronic*
Metaflumizone	1.14	0.597	0.398	0.00214

Based on the results above, the surface water acute 1-in-10 years peak EDWC is 1.14 ppb for parent metaflumizone while the surface water non-cancer/chronic 1-in-10 years annual mean EDWC is 0.597 ppb, and the overall mean cancer/chronic value is 0.398 ppb, based on scatter applications on use sites such like recreational facilities and outdoor recreational areas including parks, picnic grounds, camp grounds, and outdoor latrines, and represented by the PA turf modeling scenario. For ground water acute/chronic, EDWCs is 2.14×10^{-3} ppb, based on similar use sites. The above stated values represent upper-bound estimates of total concentrations that might be found in surface and ground water due to the use of metaflumizone as scatter fly bait in uses sites mentioned above. EFED emphasizes that even though this DWA used the tier 2 tools/ models PRZM/ EXAMS for surface waters modeling, this is a screening level analysis, and should there be a need by HED, additional refinements may be made.

Modeling Uncertainties

This drinking waters assessment relied extensively on the earlier assessment (shown in **Appendix C**). Essentially, the environmental fate data is the same and the input parameters are very similar (except that the aquatic metabolism input values were corrected for temperature as per the most recent EFED guidance). Based on the modeling approach described in **Appendix A**, the following major sources of uncertainty were identified in the surface waters modeling:

1. The scenarios that yielded the highest EDWCs were FL turf and PA turf, based on the maximum application rate for scatter applications at 1 lb product/2,000 ft^2 or 0.0137 lb a.i./A. It appears unlikely that the entire watershed would be treated at this rate. The turf scenarios were used to represent use sites such like recreational facilities and outdoor recreational areas including parks, picnic grounds, camp grounds, and outdoor latrines.
2. The maximum rate of application was assumed to be 26 applications at 14-day intervals in the absence of detailed use information in the product label. It is uncertain whether this product would be applied with this frequency. For characterization purposes, a run was performed for the PA turf scenario with only 4 applications at 28-day intervals (a frequency of applications that is similar to the previous assessment for fire ant control).
3. For the use sites represented by the combination of the CA residential and CA impervious scenarios, run in tandem:
    a. The percent pervious and impervious were assumed to be 50% each. This assumption brings uncertainty to the analysis, since not all watersheds will have the same proportions of pervious/ impervious areas.
    b. It is uncertain whether the CA residential/impervious combination is representative of the use sites modeled on food and beverage processing plants, meat and poultry processing plants, food handling establishments, restaurants, cafes, fast-food establishments, supermarkets, farm markets, bakeries, commissaries, warehouses, livestock handling and feeding facilities including broiler and layer houses, swine production facilities, livestock barns, horse stables, milking parlors, dairy barns, feed lots, feed storage buildings, feed silos, and other animal handling and feeding facilities. The modeling approach for these sites is described under the heading "Scatter Bait Applications Conceptual Model" in **Appendix A**.
    c. Assumptions regarding the representative building size and density (one medium sized building per hectare or around 172 buildings in the entire watershed) bring uncertainty to the analysis.
    d. The CA residential/ impervious scenarios were used to represent the use sites on a national scale using various weather stations.

Based on the modeling approach described in **Appendix B**, the following major source of uncertainty was identified in the groundwater modeling:

The parent chemical's K_{OC} is 28,261 L Kg^{-1}, which is >9,995 L/Kg, therefore, estimated concentrations are beyond the scope of the regression data used in SCI-GROW development. If there are concerns with the results obtained for this chemical, a higher tier groundwater exposure assessment should be considered, regardless of the concentration returned by SCI-GROW.

Appendix A: MODELING SURFACE WATERS EDWCs FOR METAFLUMIZONE

Metaflumizone is an insecticide with no readily available surface water monitoring data. Estimated Drinking Waters Concentrations (EDWCs) are based on simulated screening values using the tier 2 aquatic models PRZM/ EXAMS. The screening-level EDWCs for metaflumizone were completed using tier 2 linked PRZM/ EXAMS runs. Model runs were executed based on a "broadcast" application rate of 0.0137 lb a.i/A for all the new use sites, as per label indications. The urban exposure weather stations were chosen based on previously modeled EDWCs that used a broader suite of weather stations but at a different application rate. The turf scenarios were used to represent scatter applications to use sites such like recreational facilities and outdoor recreational areas including parks, picnic grounds, camp grounds and outdoor latrines. The remaining scenarios are based on a combination of the CA residential and the CA impervious scenarios, run in tandem and with various weather stations, to represent use sites with significant impervious areas, such like processing plants, food establishments, restaurants, cafes, fast-food establishments, supermarkets, farm markets, bakeries, commissaries, warehouses, livestock facilities, swine production facilities, barns, stables, feed storage buildings, and other animal facilities. Results obtained are summarized in **Table 1**.

Table 1 Estimated Drinking Waters Concentrations (EDWCs) for Metaflumizone (ppb)[a]

Scenario/Weather Station	*Peak* [a]	*Annual* [a]	*Annual Ave.* [a]
PA Turf	**1.14**	**0.597**	**0.398**
PA Turf (characterization)	0.203	0.104	0.0685
FL Turf	0.324	0.149	0.114
Baton Rouge, LA	0.411	0.167	0.147
Daytona, FL	0.482	0.171	0.148
San Diego, CA	0.740	0.317	0.239
Savannah, GA	0.378	0.168	0.152

[a] Results were rounded to three significant figures. For all scenarios, 26 applications were modeled at 14-day interval and the maximum application rate of 0.0137 lb a.i./A; the exception is the PA turf scenario that for characterization purposes, 4 applications in the summer, at the same rate were modeled at 28-day interval.

A summary of input parameters used for the PRZM/EXAMS modeling is given in **Table 2**.

Table 2. Summary of PRZM/EXAMS input parameters for modeling metaflumizone[1]

Input Parameter	*Value*	*References and Notes*
Molecular Weight (g $mole^{-1}$)	506.4	Product chemistry submission
Application Efficiency (fraction)	1.0	Assume 100% application efficiency for bait applications
Spray Drift (fraction)	0.0	No drift for bait applications
Vapor Pressure (torr or mmHg)	9.30×10^{-11}	Assumed same for M320 I23 (MRID 462642-06 for parent)
Henry's Law Constant (atm-m^3/mole)	3.46×10^{-8}	Calculated VP/S

1 Input parameters were selected as per current guidance dated 10/22/09, available at http://www.epa.gov/oppefed1/models/water/input_parameter_guidance.htm (accessed 07/27/11).

Input Parameter	*Value*	*References and Notes*
Aerobic Soil Metabolism Half-life (days)	122	(MRID 462644-05/07)[2]
Water column Half-life (days) (Aerobic Aquatic Metabolism half-life)	244	The available aerobic aquatic metabolism studies lasted only 100 days, at which time significant proportion of the parent remained undegraded. Aerobic soil $t_{½}$x2: no significant hydrolysis at pH 7 (MRID 46623343).
Benthic sediment Half-life (days) (Anaerobic Aquatic Metabolism half-life)	0	Half-life for the total system >378 days or 'Relatively Stable' (MRID 462644-22)
Application Rate (Kg a.i./ha) and	0.0154 [3] 0.0010 [3] 0.0004 [3]	Turf scenarios (FL and PA turf) Pervious scenario (CA residential) Impervious scenario (CA impervious)
Number of Applications	26	Considered to be conservative, based on previous assessments.[4]
Interval between applications (days)	14	
Depth of Incorporation (cm)	0.0 0.1	Granules are scattered evenly onto surfaces (for turf and residential scenarios) Recommended for the impervious scenario
CAM (Chemical Application Method)	1 4	1 = Surface applied (broadcast, not incorporated); for applications as scattered bait (for turf and residential scenarios) 4 = Incorporated, uniform with depth (default incorporation CAM) Recommended for the impervious scenario
IPSCND (post-harvest "foliar" pesticide disposition)	1	1 = Surface applied
Solubility (ppm)	0.00179	(MRID 462642-12)
K_{OC} (L Kg^{-1})	30,753	Average for 7 soils (MRIDs 462644-11/12)
Hydrolysis Half-life @ pH 7 (days)	Stable	MRID 462644-19
Direct Aqueous Photolysis $t_{½}$ (days)	4.6	MRID 462644-20
FEXTRC, Foliar extraction	0.5	---
PLDKRT, Decay rate on foliage (day^{-1})	0	---
PLVKRT, Volatilization rate from foliage	0	---
UPTKF, Uptake factor	0	---

Table 3 summarizes scenarios and weather stations selected to be used in PRZM/EXAMS modeling.

2 The 90th percentile $t_{½}$ from five values for parent; at 20°C 194 days (NJ SL) and at 27°C 75.1days (ID LS), 85.8 days (MN ClL), 73.4 days (NJ SiL), and 110 days (PA loam). The temperature corrected values at 25°C are 137 days (NJ SL), 86.3 days (ID LS), 98.6 days (MN ClL), 84.3 days (NJ SiL), and 126 days (PA loam); mean 106.44, std. dev. 23.842 days, n-1=4, t_{90} = 1.533, $t_{½(input)}$ = 122 days.

3 Single application is calculated as follows: 1 lb of product per 2000 ft^2 = 1 lb product x 0.063% a.i. in product/0.045913682 A = 0.0137214 lb a.i/A = 0.0154 kg a.i./ha.
For pervious surfaces-application rate x percent area treated = (0.0153789 Kg a.i./ha)(0.0682) = 0.0010 Kg a.i./ha; and for impervious surfaces, similarly (0.0153789 Kg a.i./ha)(0.0228) = 0.0004 Kg a.i./ha.

4 For one scenario, 4 applications at 28-day interval was also modeled, resembling the frequency of applications of the fire ant broadcast and mound treatment done earlier.

Table 3. Metaflumizone proposed use patterns and representative scenarios

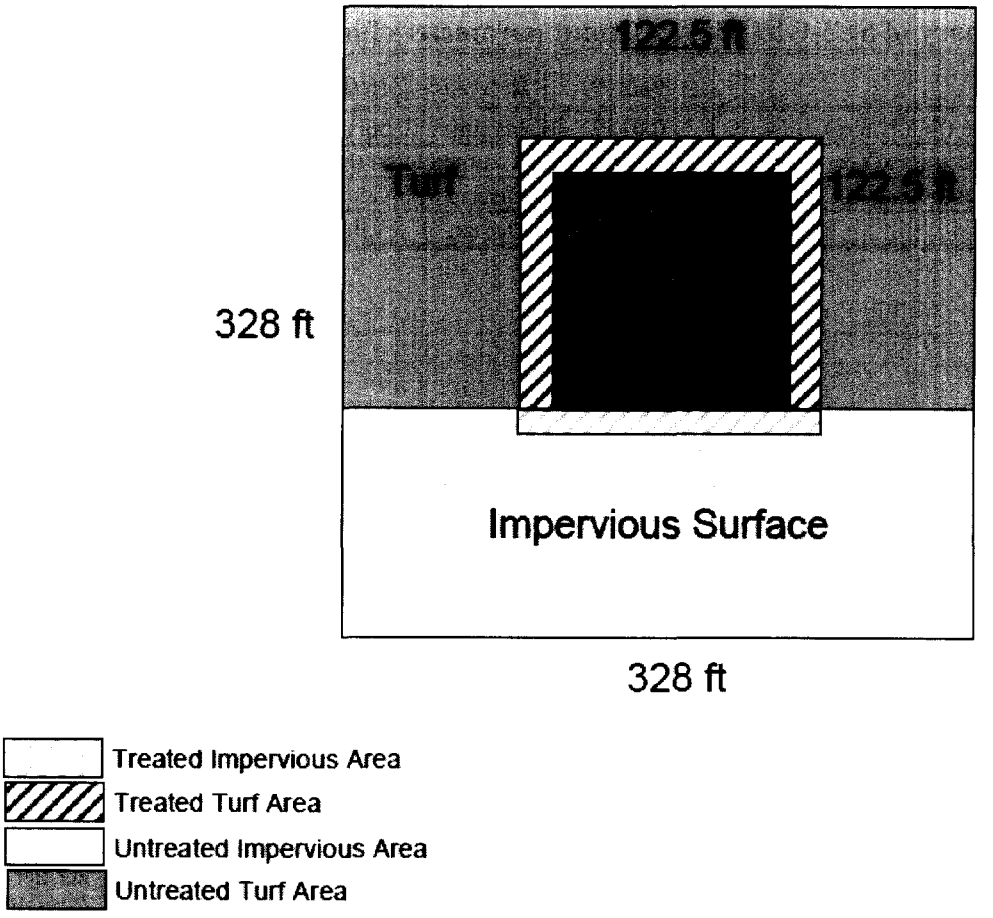
Use Pattern	***Representative Scenarios***	***Reaplication Interval (days)/ Day of First Application (dd-mm)***
Scatter Applications: Food and beverage processing plants, meat and poultry processing plants, food handling establishments, restaurants, cafes, fast-food establishments, supermarkets, farm markets, bakeries, commissaries, warehouses, livestock handling and feeding facilities including broiler and layer houses, swine production facilities, livestock barns, horse stables, milking parlors, dairy barns, feed lots, feed storage buildings, feed silos, and other animal handling and feeding facilities.	CA residential + CA impervious[5], using the following weather stations which cover extensive areas of the USA and have been determined previously to bring high exposure for similar uses: Baton Rouge, LA (W13970) Daytona Beach, FL (W12834) San Diego, CA (W23188) Savannah, GA (W03822)	Reapply as bait is consumed to maintain control, apply at the beginning of the season. Assume 26 applications at 14 day intervals, starting 02-01.
Scatter Applications: Recreational facilities and outdoor recreational areas including parks, picnic grounds, camp grounds, and outdoor latrines.	These uses represented by the following scenarios:[6] FL turf (Daytona Beach, W12834) PA turf (Harrisburg, W14751)	Reapply as bait is consumed to maintain control, apply at the beginning of the season. Assume 26 applications at 14 day intervals, starting 02-01.
Scatter Applications: Used indoors as scatter bait in livestock handling and feeding facilities, but only in areas where livestock cannot come in contact with or ingest bait granules; such as walkways or manure pits in caged layer houses, dairy barns, and swine facilities.	These uses were not assessed since exposure to wildlife is expected to be relatively small, compared to scatter applications outdoors.	Not modeled.
Bait Stations/ Trays: In and around areas infested with houseflies including food and beverage processing plants, meat and poultry processing plants, food handling establishments, restaurants, cafes, fast-food establishments, supermarkets, farm markets, bakeries, commissaries, and warehouses. Also, in and around livestock handling and feeding facilities including broiler and layer houses, swine production facilities, livestock barns, horse stables, milking parlors, dairy barns, feed lots, feed storage buildings, feed silos, and other animal handling and feeding facilities.	These uses are not assessed since applications are made using bait stations or trays and exposure to wildlife is expected to be relatively small, compared to scatter applications. However, it is noted that the per area application rate for these uses is higher than for scatter applications at a maximum of 1.25 lb product/ 2000 ft^2 or 0.0172 lb a.i./A.	Not modeled.

5 US Department of Energy's Building Energy Data Book's Query Tool, available at: http://buildingsdatabook.eren.doe.gov/CBECS.aspx (accessed 07/27/11): categories selected under "Building Types" were convenience store, grocery store, other food sales, non-refrigerated warehouse (includes distribution center, non-refrigerated warehouse, self-storage), food service (includes fast food, restaurant), and others (include various types of buildings like those with substantial agricultural activity). As per the survey, around 1,103,095 buildings lie within those categories and the total area is 13,262,857,638 ft^2 or a mean of ~12,000 ft^2 (see the next section).

6 For characterization: scenario with highest exposure was modeled with 4 applications at 28-day interval, starting 01-05 (summer application).

Scatter Bait Applications Conceptual Model

Treated area estimate of the outside building usage assumptions: A typical building resides in each hectare in the 10 hectare square. Each building is assumed to be 15,000 square feet in size (US Department of Energy[5]), with sides roughly 122.5 feet in length each side. Fifty percent of each hectare is impervious and fifty percent is turf (see the figure). To estimate the area treated on the turf sides of the building, it is assumed that a 10 ft wide swath of turf on three sides of the building are treated. The area of treatment is 3,675 square feet (3 sides x 10 ft x 122.5 ft), or approximately 3.41% of the total area, or 6.82% of the total pervious area. To estimate the area treated on the impervious side of the building, it is assumed that a 10 ft wide swath on the ground from the building side is treated. The area of treatment is 1,225 square feet (10 ft x 122.5 ft), or approximately 1.14% of the total area, or 2.28% of the total impervious area. This is likely an overestimation for a typical scatter bait application because it was assumed that: 1) the treatment area included an area surrounding the entire structure and, 2) the treatment area was 10 ft wide.



Appendix B: MODELING GROUNDWATER EDWCs FOR METAFLUMIZONE

Metaflumizone is a new insecticide and no ground water monitoring data is readily available. For this reason, the Agency used tier 1 aquatic model SCI-GROW, a high exposure first tier model, to arrive at the EDWC for this chemical in ground water sources. Background information on SCI-GROW model is included in **Attachment 2** of the previous drinking waters assessment (**Appendix C**) and input/output values are summarized in **Tables 2** and **1**, respectively. The output file from SCI-GROW is shown after **Table 2**.

Table 1 Summary of output from SCI-GROW for metaflumizone

Parameter	*Value (ppb)**	*Reference*
EDWC	2.14×10^{-3}	Output from Model Run[7]

Table 2 Summary of SCI-GROW v.2.3 input parameters for metaflumizone[8]

Parameter	*Value**	*Reference (MRID Number)*
Application Rate (lb a.i./acre)	0.0137	Maximum label rate[9]
Number of Applications/Year	26	Assumed to be the maximum per year
Aerobic Soil Metabolism $t_{½}$ (days)	85.8	Median of 5 values (MRID 462644-05/07)
K_{OC} (L Kg^{-1})	28,261	Median of 7 values (MRIDs 462644-11/12)

7 Parent chemical K_{OC} is 28,261 L Kg^{-1}, which is >9,995, therefore, estimated concentrations are beyond the scope of the regression data used in SCI-GROW development. If there are concerns for such chemicals, a higher tier groundwater exposure assessment should be considered, regardless of the concentration returned by SCI-GROW.

8 Input parameters were selected as per current guidance dated 10/22/09, available at http://www.epa.gov/oppefed1/models/water/input_parameter_guidance.htm (accessed 07/27/11).

9 Label rate for uses such like recreational facilities and outdoor recreational areas including parks, picnic grounds, camp grounds and latrines (1 lb product/2000 ft^2).

Output File from SCI-GROW

SCIGROW
VERSION 2.3
ENVIRONMENTAL FATE AND EFFECTS DIVISION
OFFICE OF PESTICIDE PROGRAMS
U.S. ENVIRONMENTAL PROTECTION AGENCY
SCREENING MODEL
FOR AQUATIC PESTICIDE EXPOSURE

SciGrow version 2.3
chemical:Metaflumizone
time is 7/28/2011 15:41:19

Application rate (lb/acre)	Number of applications	Total Use (lb/acre/yr)	Koc (ml/g)	Soil Aerobic metabolism (days)
0.014	26.0	0.356	2.83E+04	85.8

groundwater screening cond (ppb) = **2.14E-03***
*Estimated concentrations of chemicals with Koc values greater than 9995 ml/g are beyond the scope of the regression data used in SCI-GROW development. If there are concerns for such chemicals, a higher tier groundwater exposure assessment should be considered, regardless of the concentration returned by SCI-GROW.
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