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WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: "DPX-V9360" (Sulfonylurea Herbicide) - NEW CHEMICAL
ACCENT (Trade name); terrestrial food crop uses (corn)

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Attached are the Environmental Fate and Ground Water Branch (EFGWB) Science Chapter and the EFGWB Data Requirements for the new sulfonylurea herbicide "DPX-V9360"

"DPX-V9360" is the code number E.I. du Pont de Nemours and Company, Inc., has assigned to the active ingredient in the new herbicide ACCENT. The chemical name for DPX-V9360 is 3-pyridinecarboxamide ((((4,6- dimethoxy-pyridin-2-yl)aminocarbonyl)aminosulfonyl))-N,N-dimethyl. The Chemical Abstracts Registry Number for this chemical is 111991-09-4.

ACCENT Herbicide is a water dispersible granule containing 75% of the active ingredient DPX-V9360 by weight. It is a selective herbicide developed to control annual and perennial grass weeds and selected broadleaf weeds when applied postemergence in field corn. It is not to be used on popcorn, sweet corn, or corn grown for seed production.

Foliar absorption is the primary means of ACCENT uptake by plants. ACCENT should be applied prior the 10-leaf stage of corn. The application method recommended is by ground spraying. The pesticide should not be applied through any type of irrigation system. Maximum single application rate is 1 oz ai/acre. If split applications are to be made they should not exceed a total of 1 1/3 oz ai/acre in any crop per year (split applications of 2/3 oz each are recommended).

ENVIRONMENTAL FATE ASSESSMENT

There are still several data gaps that do not allow a complete assessment of the environmental fate of "DPX-V9360" at the present time.

"DPX-V9360" is stable in aqueous solutions at neutral and alkaline pHs. The solubility of DPX-V9360 increases with increasing pH and it is as high as 18,000 ppm and 250,00 ppm at pH 7 and 9, respectively. At pH 5, DPX-V9360 degrades with a half-life of 15 days. Hydrolytic degradation involves primarily cleavage of the sulfonylurea bridge; this pathway is consistent with that of other sulfonylureas. However, in DPX-V9360 a minor degradation pathway is also found and involves elimination of the $-SO_2-$ group in the sulfonylurea bridge followed by rebridging (that is, the resulting degradate is structurally similar to parent DPX-V9360 but without the $-SO_2-$ group). This pathway is favored in acidic media and occurs because of the presence of the pyridine ring. The main hydrolytic degradates of DPX-V9360 are Pyrimidine Amine and Pyridine Sulfonamide.

Photodegradation is not an important degradation route for DPX-V9360. However, microbial degradation under aerobic conditions is an important process in the breakdown of DPX-V9360. The half-life of parent DPX-V9360 in a silt clay soil (pH 6.1, 5.1% OM, CEC 30.4 meq/100g) was 26 days. The major metabolites/degradates found were the hydrolytic degradates Pyridine Sulfonamide and Pyrimidine Amine. From the study it was not possible to establish the pattern of decline of these two products and, therefore, it is not known at this point how persistent they are or to which products they further degrade. When anaerobic conditions were established, a slow down in degradation was observed (half-life 63 days). Thus, the breakdown of DPX-V9360 is expected to diminish when the conditions change from aerobic to anaerobic.

Parent DPX-V9360 was shown to be mobile in sandy loam and silt loam soils. It is slightly more mobile than terbacil, which is known to be a mobile pesticide. Of the two main degradates, Pyridine Sulfonamide is more mobile than the parent, but Pyrimidine Amine appears to be the least mobile.

The numerous deficiencies in the terrestrial field dissipation studies precludes the use of this study to define a depth of leaching or to use the reported half-lives to estimate the persistence of the DPX-V9360 under field conditions.

From the accumulation in confined rotational crops study, there is evidence that those degradates containing the pyridine ring alone are more readily uptaken by the plants. There are several deficiencies in the study that do not allow establishing rotational crop intervals at the present time.

Based on the low vapor pressure of parent DPX-V9360, volatilization from soils will not be an important dissipation mechanism for DPX-V9360. The low octanol/water partition coefficient suggests that parent DPX-V9360 will have a low tendency to accumulate in fish.

The main concerns with DPX-V9360 at the present time are its high solubility in water, its high stability in aqueous solutions at neutral and alkaline pHs, its borderline persistence in soils under aerobic conditions (and its longer persistence under anaerobic conditions), and its high mobility in soils. These properties place DPX-V9360 as a potential candidate for leaching to ground water or to move to surface waters. Because of the high phytotoxicity of DPX-V9360 (even at low concentrations), waters contaminated with this herbicide are potentially dangerous to nontarget vegetation.

The Branch recommends that precautionary warnings/restrictions be included in the label to avoid/minimize water transport of DPX-V9360 to nontarget land.

TABLE A
GENERIC DATA REQUIREMENTS FOR "DPX-V9360"
Sulfonylurea herbicide; ACCENT (Uses on corn)

Data Requirement	Composition[1]	Use Pattern[2]	Does EPA have data to satisfy this requirement?	Bibliographic citation[3]	Must additional data be submitted under FIFRA Sect.3(c)(2)(B)?
Section 158.290 Environmental Fate					
DEGRADATION STUDIES- LABORATORY:					
161-1 Hydrolysis	PAIRA or TGAI	A	Yes	40924220	No[4]
Photodegradation					
161-2 In water	PAIRA or TGAI	A	Partially	41082620	Yes[5]
161-3 On soil	PAIRA or TGAI	A	Yes	41082621	No
161-4 In air	PAIRA or TGAI				No[6]
METABOLISM STUDIES- LABORATORY:					
162-1 Aerobic soil	PAIRA or TGAI	A	Partially	41082622	Yes[7]
162-2 Anaerobic soil	PAIRA or TGAI	A	Yes	41082623	No
162-3 Anaerobic aquatic					
162-4 Aerobic aquatic					

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Data Requirement	Composition[1]	Use Pattern[2]	Does EPA have data to satisfy this requirement?	Bibliographic citation[3]	Must additional data be submitted under FIFRA Sect.3(c)(2)(B)?
Section 158.290 Environmental Fate (Continued)					
MOBILITY STUDIES:					
163-1 Mobility in soil;		A	Partially	40922422	Yes[8]
a. Batch-equilibrium adsorption/ desorption	PAIRA or TGAI				
b. Soil TLC					
c. Soil column leaching	PAIRA or TGAI				
163-2 Volatility (Lab)					No[6]
163-3 Volatility (Field)					No[6]
DISSIPATION STUDIES- FIELD					
164-1 Soil	TEP	A	Partially	41082624	Yes[9]
164-2 Aquatic (sediment)					
164-3 Forestry					
164-4 Combination and tank mixes					
165-5 Soil, long term					

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Data Requirement	Composition[1]	Use Pattern[2]	Does EPA have data to satisfy this requirement?	Bibliographic citation[3]	Must additional data be submitted under FIFRA Sect.3(c)(2)(B)?
Section 158.290 Environmental Fate (Continued)					
ACCUMULATION STUDIES:					
165-1 Rotational crops (Confined)	PAIRA	A	Partially	41082625	Yes[10]
165-2 Rotational crops (Field)					Reserved[11]
165-3 Irrigated crops					
165-4 Fish	PAIRA	A			Reserved[12]
165-5 In aquatic, nontarget organisms					
Section 158.440, Spray Drift					
201-1 Droplet size spectrum					Yes[13]
202-1 Drift field evaluation					Yes[13]
Section 158.75, Other Data					
Ground water and/or surface water monitoring studies					Reserved[14]

TABLE A
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Sulfonylurea herbicide; ACCENT (Uses on corn)

FOOTNOTES

[1] Composition: TGAI= Technical grade of the active ingredient;
PAIRA= Pure active ingredient, radiolabeled;
TEP= Typical end-use product.

[2] The use patterns are coded as follows: A= Terrestrial, Food Crop; B= Terrestrial, Nonfood;
C= Aquatic, Food Crop; D= Aquatic, Nonfood;
E= Greenhouse, Food Crop; F= Greenhouse, Nonfood;
G= Forestry; H= Domestic Outdoor; I= Indoor

[3] EPA MRID Numbers.

[4] This data requirement was satisfied with additional information submitted by the registrant on 11/14/89. No MRID # was assigned to this additional information.

[5] The cited study is basically acceptable to satisfy data requirements since the study was satisfactorily conducted at the pH of maximum hydrolytic stability (pH 9). The study was also conducted at pH 5 and 7. The following additional information is being requested for the study conducted at pH 5 since the information was not included in the report:

a) Data on the chemical species (and their percentage) present at each sampling interval for both the irradiated and nonirradiated samples.
b) Indicate if the "Ipso Precursor" was also present in the irradiated and nonirradiated solutions and at what percentage, if any.
c) Indicate if there is any evidence that the "Photoproduct 1" is/is not the "Ipso Precursor".

TABLE A
GENERIC DATA REQUIREMENTS FOR "DPX-V9360"
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FOOTNOTES (Continued)

[6] This study is not required because the vapor pressure of parent DPX-V9360 is very low (1.2×10^{-16} Torr at 25°C).

[7] Although the study is scientifically sound and adequately addresses the microbial degradation of parent DPX-V9360 under aerobic conditions, the patterns of decline of the major metabolites Pyridine Sulfonamide and Pyrimidine Amine cannot be established from the study. The duration of the study was 8 months and at 6- and 8- months the maximum concentrations (>80%) of these degradates were found. Thus, from the study it is not possible to determine how persistent are these degradates and how are they further degraded.

Therefore, the registrant must submit acceptable experimental evidence showing the pattern of decline of Pyridine Sulfonamide and Pyrimidine Amine and identification/characterization of their degradation products.

[8] The Branch is requesting that a batch-equilibrium adsorption/desorption study be conducted with the degradates Pyridine Sulfonamide and Pyrimidine Amine with the same soils and under the same experimental conditions as in the study conducted with parent DPX-V9360.

[9] The following additional information must be submitted:
a. Experimental evidence showing that the "lost" radioactivity is associated with formation of $^{14}CO_2$ or volatiles and not as the result of radioactivity moving below the 14-inch depth of the cylinders.
b. An explanation as to why a site with an alkaline pH was chosen (that is, a soil with a pH higher than the recommended upper limit of pH 7.5).

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TABLE A
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FOOTNOTES (Continued)

c. Clarify how the pHs of the soils were obtained.
d. Expand the description of the test plots (size, depth of water table, pattern of placing the cylinders throughout the plots).
e. Provide actual data in support of the reported storage stability of samples.
f. For the Newark, DE and Rochelle, IL sites provide a comparison (on a monthly basis) between normal, average rainfall/termperatures for the area with the rainfall/temperatures measured during the the course of the studies.

The registrant has the option to conduct new studies. However, the cylinders should be 90-cm in depth. It is important that irrigation be used if the rainfall during the course of the studies fall below the average rainfall for the area. Provisions should be made to place a $^{14}CO_2$ "trap" on top of at least two cylinders (one for each of the radiolabels). The registrant should refer to the newly released Standard Evaluation Procedure (SEP) for Terrestrial Field Dissipation studies (EPA -540-09/90-073; December 1989).

10 The study reviewed was considered to provide supplemental information at this time. The following additional information is being requested:

a. Explanation as to why total radioactive residues in unplanted aged soils (30 and 120 days and 10 months) slightly increased when the pyridine labeled DPX-V9360 was used.
b. Since Pyrimidine Amine has clearly been detected in the field studies, explain if there is a possibility that the extraction method used in the accumulation study failed to extract Pyrimidine Amine.
c. The possibility that "Compounds A, B, and C" are formed from degradate(s) in which the $-SO_2-$ was previously eliminated instead of being formed from Pyridine Sulfonamide.
d. Comment if the presence of pesticides used to control disease/insect infestations had any interference with the extraction methods or with the uptake of DPX-V9360 by the plants.

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GENERIC DATA REQUIREMENTS FOR "DPX-V9360"
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FOOTNOTES (Continued)

e. Provide information about the health and development of the crops throughout the study.

If after the submitted information the study is still unacceptable, a new study will be required. A field study may be submitted in place of the confined study.

11 This study may be required if, after reevaluation of the requested additional data for the confined study, the confined rotational crop study is not acceptable.

12 This study was waived by EFGWB (10/20/89 review) at the requested of the registrant (letter of 7/5/89). The waiver is based on the low octanol/water partition coefficient of parent DPX-V9360. However, if concerns arise about the potential bioaccumulation of the degradates, then this study will be required.

13 These studies are being required by request of the Ecological Effects Branch. The spray drift droplet spectrum and field evaluation may be done altogether in order to evaluate the droplet spectrum associated with actual use pattern.

14 There are insufficient data to fully assess the potential of DPX-V9360 to leach to ground water or to move to surface waters during run-off events. However, it is known that DPX-V9360 is very mobile in soils and very soluble in water. The Pyridine Sulfonamide degradate is even more mobile.

Thus, the registrant should be made aware that ground-water and/or surface water monitoring study may be required if, there is further evidence that DPX-V9360 and/or its degradates/metabolites have the potential to leach to ground water or to reach surface waters.