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

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

Chemical ID # : 128922 and 128821
DP Barcode # : D233915

MEMORANDUM

TO: Philip Errico, PM # 25
Registration Division (7505C)

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EFGWB/EFED (7507C)

THROUGH: Betsy Behl, Chief
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MAR 18 1997

SUBJECT: New chemical registration: Lightning

American Cyanamid is requesting a new use registration for a combination of two previously registered herbicides: imazethapyr currently registered for use on peanuts, soybeans, and other legume vegetables, and imazapyr currently registered for use on non-crop terrestrial areas and forests. The new product, trade name Lightning, is a mixture of 52.5% imazethapyr and 17.5% imazapyr for use on imi-corn which are selected field corn hybrids bred for resistance to these herbicides.

The environmental fate data base is fairly complete for these compounds. There are no unfulfilled data requirements for imazethapyr. The only data gap for imazapyr is a partially fulfilled field dissipation guideline. To strengthen the assessment of the fate of imazapyr, additional terrestrial field dissipation data are needed which identify the routes of dissipation under typical use conditions. Additionally, imazapyr and Lightning have aerial applications; the registrant may choose to use the spray drift task force data to fulfill the Droplet Size Spectrum (201-1) and the Field Drift Evaluation (202-1) data requirements.

The environmental fate assessment is similar for both imazethapyr and imazapyr; these compounds are both **persistent** and have the potential to be **very mobile** in the soil environment. **Because of these characteristics, EFGWB strongly recommends that the registrant conduct at least three small scale prospective ground water studies to monitor the impact of imazethapyr and imazapyr on ground water.**

To date there have been four imidazolinone class pesticides which have been registered for use as herbicides. The active ingredients are Imazapyr (Arsenal), Imazamethabenz (Assert), Imazaquin (Scepter) and Imazethapyr (Pursuit). Furthermore, two new chemicals from this

same class of chemicals have been submitted for registration (Cadre and AC299263). A table comparing some fate characteristics of these compounds (excluding imazamethabenz) is included in this memo.

The imidazolinones, as a class, have characteristics of persistence and mobility similar to compounds known to leach to the ground water and to runoff from the soil surface during periods of precipitation and/or irrigation. Mobility may be an important route of dissipation for these pesticides. They are persistent in the environment and all are capable of leaching to groundwater.

Lightning is to be applied at a rate of 1.28 oz of formulated product per acre which amounts to 0.042 lbs of imazethapyr and 0.014 lbs of imazapyr. **The persistence and efficacy of weed control at these low rates is supported by the extensive plant-back intervals of up to 40 months which are recommended on the proposed label.**

Since imazethapyr and imazapyr degrade very slowly with the major route of dissipation being the mobility with water across or through the soil, the contamination of water to be used as irrigation sources seems probable and this contamination may have serious implications in major corn growing areas where many crops are irrigated.

ENVIRONMENTAL FATE DATA COMPARISON OF SELECTED IMIDAZOLINONES

PARAMETER	SCEPTER	ARSENAL	CADRE	PURSUIT	AC299263
	Imazaquin	**Imazapyr**		**Imazethapyr**	
SOLUBILITY ppm at 20°C in water	60	11,272	2150	1400	4413
HYDROLYSIS	Stable	Stable	Stable	Stable	Stable
AEROBIC t1/2 (months)	7	71	67	29	1
MOBILITY (K_d)					
Loamy sand	0.03	0.04	0.10	--	0.08
Silty Clay loam	--	--	0.27	--	0.12
Loam	--	0.23	0.43	--	0.21
Sandy loam	0.13	0.07	0.70	0.46-0.78	0.28
Silt loam	0.39	0.86	1.92	0.54-0.82	1.22
Clay loam	0.41	--	2.99	--	2.45
Pond sediment	--	3.37	--	--	--
VAPOR PRESSURE (at 60°C)	$<2x10^{-8}$	$<1x10^{-7}$	$<1x10^{-7}$	$<1x10^{-7}$	$1.1x10^{-7}$

Environmental Fate Assessments for imazapyr and imazethapyr

The environmental fate data bases for imazapyr and imazethapyr are fairly complete with the exception of additional terrestrial field and aquatic field dissipation information for imazapyr. The major route of dissipation for both compounds appears to be transport with water. Contamination of surface water and ground water by imazapyr and imazethapyr residues is probable.

Aqueous photolysis seems to be the only important degradation mechanism for either compound. Imazapyr photodegraded in water with half-lives of 3-5 days while imazethapyr photodegraded in water with half-lives of 46-96 hours. Imazapyr and imazethapyr did not degrade by any other process both compounds were stable to hydrolysis, aerobic/anaerobic soil and aerobic/anaerobic aquatic metabolism, and soil photolysis. Neither compound accumulated in fish.

Imazapyr: In an acceptable batch equilibrium mobility study, imazapyr was potentially mobile in soil systems with Freundlich K_{ads} of 0.04 to 0.86 mL/g in agricultural soils and 3.37 mL/g in a pond sediment. Volatilization is not a likely route of dissipation (estimated Henry's constant = 6.8×10^{-15} atm*m^3/mol). Bare ground field studies produced conflicting dissipation information. Supplemental field dissipation information indicated that imazapyr dissipated with half-lives of 64 to 143 days. No degradates were monitored in the field studies. Although no clear pattern of leaching was noted, imazapyr residues were detected as deep as 18 to 24 inches in soils. The route(s) of dissipation were not clear from these studies. In supplemental aquatic field dissipation studies, imazapyr dissipated with half-lives of 1.9 to 3.7 days. Although degradates were not monitored, the studies were apparently designed to emphasize aqueous photolysis, the only apparent route of imazapyr degradation. In acceptable forestry dissipation studies, imazapyr had a half-life of 12 to 44 days. The major route of dissipation appeared to be transport with surface water runoff. Imazapyr was detected at soil depths of 16 to 20 inches in both studies, but there was no clear pattern of leaching.

Imazethapyr: In batch equilibrium studies, imazethapyr was very mobile in two sandy loam and two silt loam soils with Freundlich K_d values of 0.46-0.82. There was no apparent relationship between adsorption and soil organic matter content. In supplemental terrestrial field dissipation studies conducted in KY, GA, NE, IA, and IL, imazethapyr dissipated from the upper 3 inches of soil with half-lives of 4 to 340 days. In an acceptable study conducted in GA, the calculated field dissipation half-life was 36 days with dissipation attributed to leaching and run-off.

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Status of Environmental Fate Data Requirements for

	imazapyr		imazethapyr	
Data Requirement	Status	MRID	Status	MRID
161-1 Hydrolysis	S	00132359	S	00262932
161-2 Aqueous Photolysis	S	00131617	S[1]	40429407
161-3 Soil Photolysis	S	40003713	S	40429408
162-1 Aerobic Soil Metab.	S	41023201	S	40074201
162-2 Anaerobic Soil Metab.	S	00131619	S	40429409
162-3 Anaer. Aquatic Metab.	S	40003712	NR[2]	
162-4 Aerobic Aquatic Metab.	S	41002301	NR[2]	
163-1 Leaching Ads./Des.	S	43423703	S	00262932
164-1 Terr. Field Dissip.	PS	42192101 42192102	S[1]	40429410 41467701
164-2 Aqua. Field Dissip.	NS[6]		NR[2]	
164-3 Forestry Field Dis.	S	40003714 40003704	NR[3]	
165-4 Fish Bioaccum.	S	Acc 258899	S[5]	40429413
201-1 Droplet Size Spectrum	NS		NR[4]	
202-1 Field Drift Eval.	NS		NR[4]	

Status codes for data requirements: S = satisfied, PS = partially satisfied, NS = not satisfied, NR = not required.

1. Supplemental in the Registration Standard (9/15/88), but upgraded in response to Reg Std 1/31/89.
2. No aquatic uses.
3. No forestry uses.
4. No aerial applications.
5. This study was considered supplemental in the Registration Standard. There is no record in the file that data were submitted to upgrade the study; however, lack of acceptable information is not noted in subsequent memos regarding Section 18's and ground water memos. Although the study did not fulfill guidelines, it is clear that imazethapyr did not bioaccumulate in fish so we can consider this data requirement fulfilled.
6. The company requested a registration for aquatic uses. Aquatic field dissipation data are required for compounds with aquatic uses; however, the current request for use of imazapyr on corn would not require aquatic field dissipation data.

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