

9-15-88

Shaughnessy No.: 128821

Date Out of EAB: SEP 15 1988

1988

To: Robert Taylor  
Product Manager #25  
Registration Division (TS 767)

From: Paul Mastradone, Acting Chief  
Environmental Chemistry Review Section #1  
Environmental Fate and Ground Water Branch

Thru: Paul F. Schuda, Chief  
Environmental Fate and Ground Water Branch

*Paul F. Schuda*

Attached, please find the EAB review of:

Reg./File Symbol: 241-296

Chemical Name: Imazapyr

Type Product: Herbicide

Product Name: CHOPPER, ARSENAL

Company Name: American Cyanamid

Purpose: Review request for addition of forestry use to CHOPPER label

Date Received: 08/02/88

Action Code: 305

Date Completed: 08/12/88

EAB #(s): 80304

Monitoring Study Requested: \_\_\_\_\_

Total Reviewing Time: 5.0 days

Monitoring Study Voluntarily: \_\_\_\_\_

Deferrals To:

\_\_\_\_\_ Ecological Effects Branch

\_\_\_\_\_ Residue Chemistry Branch

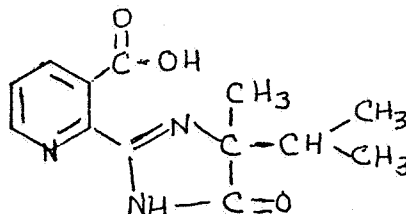
\_\_\_\_\_ Toxicology Branch

1. Chemical: Imazapyr

Trade Names: ARSENAL®, CHOPPER® [both products are the isopropylamine salt]

Chemical Name: 2-(4-Isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)-nicotinic acid

Chemical Structure:



2. Test Material: N/A

3. Study/Action Type: Addition of new use (forestry) to CHOPPER® label

4. Study Identification: (letter)

Letter from Mark Galley (American Cyanamid Company) to Robert Taylor (RD) dated December 11, 1987 plus copy of old and new CHOPPER label

5. Reviewed By:

Patricia Ott  
Chemist  
Environmental Chemistry Review Section #1

Signature: *Patricia Ott*  
Date: 9/15/88

6. Approved By:

Paul Mastradone  
Acting Chief  
Environmental Chemistry Review Section #1

Signature: *Paul J. Mastradone*  
Date: SEP 15 1988

7. Conclusions:

Relevant Issues:

The reviewer has examined branch files and several important issues regarding imazapyr registration, related to data requirements, are presented:

\*\*\*ISSUE #1: Aerobic Soil Metabolism and Terrestrial Field Dissipation Studies:

Initially, the registrant submitted an aerobic soil metabolism study for the noncropland uses, which was not acceptable because all degradates were not identified. The radiolabel was on the carboxyl portion of the molecule, so that only  $^{14}\text{CO}_2$  could be detected as a degradate. Subsequently, the registrant conducted a small plot field study using radiolabelled material. The company's opinion was that the aerobic soil study was no longer needed, since soil degradates had been identified and quantified in the small plot radiolabelled field study. However, the registrant did not adequately define the depth of leaching. After meeting with the registrant (10/22/87), it was agreed that for the forestry use for ARSENAL, a conditional registration would be granted with the stipulation that the registrant conduct a new aerobic soil metabolism and

terrestrial field dissipation study within 27 months. For the field study, the 27 month period would begin after agency approval of a submitted protocol.

\*\*\*ISSUE #2: Other Data Gaps:

The registrant still has not submitted all required data for the terrestrial noncrop, aquatic noncrop, and forestry use patterns. The data requirements in the Subpart N Pesticide Assessment Guidelines are:

<u>Uses:</u>	<u>Terrestrial Noncrop</u>	<u>Aquatic Noncrop</u>	<u>Forestry</u>
	Hydrolysis	Hydrolysis	Hydrolysis
	Photodegradation in Water	Photodeg. in Water	Photodeg. in Water
	Aerobic Soil	Aerobic Aquatic	Photodeg. in Soil
	Leaching	Anaerobic Aquatic	Aerobic Soil
	Soil Field Dissipation	Leaching	Anaerobic Aquatic
	Fish Bioaccumulation	Aquatic Field Dissip. (164-2)	Leaching
		Irrigated Crop	Forestry Dissipation
		Fish Bioaccumulation	Fish Bioaccumulation
<u>Sites:</u>	Rights-of-Way, etc.	Ditchbanks	Forests

Satisfied Data Requirements:

1. Hydrolysis--satisfied per EAB Review #4088 dated 3/15/84
2. Photodegradation in Water--satisfied per EAB Review #4088 dated 3/15/84
3. Leaching--satisfied per EAB Review #4088 dated 3/15/84. Data was only submitted for aged leaching, but the unaged leaching data requirement was waived, because data submitted indicated that the parent was stable in soil over the 30 day aging period.
4. Anaerobic Soil Metabolism--satisfied per EAB Review #4088 dated 3/15/84. This study is normally required only when there is a field/vegetable crop use.
5. Fish Bioaccumulation--satisfied per EAB Review #5853 dated 10/7/86
6. Anaerobic Aquatic--satisfied per EAB Review #70765 dated 9/25/87
7. Photodegradation on Soil--satisfied per EAB Review #70765 dated 9/25/87
8. Forestry Dissipation--satisfied per EAB Review #70765 dated 9/25/87

Unsatisfied Data Requirements:

1. Aerobic Soil Metabolism--an unsatisfactory study was submitted
2. Aerobic Aquatic--apparently, no study has been submitted
3. Aquatic Field Dissipation (164-2)--apparently, no study has been submitted

4. Irrigated Crop—the registrant has the option of requesting a data waiver if a statement is put on the label prohibiting the use near water that will be used for irrigation purposes. This data requirement is triggered by the ditchbank (aquatic noncrop) use.

Data Requirements Partially Satisfied:

1. Terrestrial Field Dissipation—studies submitted were found to be deficient because degradates were not identified and the depth of leaching was not defined. The registrant did a small plot field study using radiolabelled material and identified degradates. The remaining deficiency is to define the depth of leaching. The Ground Water Team of the Environmental Fate and Ground Water Branch (formerly the Exposure Assessment Branch) recommends monitoring 2 feet below the depth at which residues are found.

\*\*\*ISSUE #3: Registrant Request for CHOPPER Label Amendment (this submission)

The registrant is requesting that the label of CHOPPER (the isopropylamine salt of imazapyr) be amended to include a forestry use. Another product, ARSENAL (the isopropylamine salt of imazapyr) has already been granted a conditional registration for the forestry use, based on the registrant's submitting an acceptable aerobic soil metabolism and terrestrial field dissipation study. Their rationale and the Environmental Fate and Ground Water Branch's response are:

Rationale #1: The Use Rate for CHOPPER is Less Than for ARSENAL

The registrant presented a comparison table of the two formulations, which indicates that the percent active ingredient of CHOPPER is 29.44%, while ARSENAL is 54.94%. ARSENAL's directions for use includes aerial or ground spraying as a postemergence application to control annual and perennial grasses and broadleaf weeds, and hardwood trees in release of loblolly pine stands or in site preparation prior to planting loblolly pines. In comparison to this, CHOPPER is applied by ground spraying of cut stumps, tree injection, frill or girdle treatment, or basal bark treatment for brush control.

The reviewer concludes that the use pattern for CHOPPER will probably result in a more controlled use of imazapyr, resulting in a lesser overall environmental exposure than with ARSENAL.

Rationale #2: "The concerns of soil metabolism and nontarget plant effects that are currently resulting in the conditional registration of ARSENAL Applicator Concentrate are not concerns with CHOPPER. Careful reading of the CHOPPER label will attest to the fact that CHOPPER is never applied to the soil or to nontarget vegetation."

CHOPPER is not directly applied to the soil, but exposure to soil is likely, since CHOPPER is applied to the base of vegetation, or it could easily contaminate soil if it rained after application.

Rationale #3: "The addition of wildlife areas under the directions for use is simply to make the label more "user friendly" for organizations and states that require such a phrase before they will allow such use on wildlife management

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areas. This is not a new usage since wildlife habitats are covered under the terrestrial noncrop general use pattern."

Wildlife habitats can include terrestrial, aquatic, and forestry sites, falling into the terrestrial noncrop, aquatic noncrop, and forestry use patterns.

Other Label Changes:

1. The registrant wants to delete the sentence "DO NOT apply on ditches used to transport irrigation water." Their rationale is that CHOPPER is not applied to soil or surface areas.

According to the label, CHOPPER is applied to ditchbanks and if the registrant wishes to delete the above sentence, then an irrigated crop study must be submitted before the agency will consider approving the deletion of this sentence.

2. The registrant wants to delete the word "nonirrigation" from in front of ditchbanks because the statement is not applicable to CHOPPER applications.

CHOPPER is applied to ditchbanks and if the registrant wishes to delete the word "nonirrigation", an irrigated crop study must be submitted before EFGWB can concur with approving the deletion of this word.

Note: Imazapyr may have a potential to leach to ground water, since it is both persistent in soil and mobile.

8. Recommendations:

As of the date of this review, RD had already approved the forestry use for the CHOPPER label. Because of the type of application and use pattern (see Section 7, Issue #3, Rationale #1), EFGWB can concur with this action. EFGWB also notes that conditional registration for the forestry use on the ARSENAL label was granted based on submission of a new soil metabolism study and terrestrial field dissipation study. Imazapyr is mobile and persistent in soil and has a potential to leach to ground water. EFGWB recommends that no further uses be granted for imazapyr under any label or trade name until the EFGWB data requirements are fulfilled. Also, it is recommended that the comments on the amended label with regard to the forestry use cited in Section 7 (Conclusions) of this review be incorporated into the amended label.

It is further recommended that since imazapyr may have a potential to leach to ground water, the terrestrial field dissipation study must be done and the depth of leaching defined.

9. Background:

Because of data deficiencies, EFGWB (formerly EAB) recommended against registering imazapyr for the original noncropland use (terrestrial noncrop and aquatic noncrop). In 1985, RD granted the registration. EAB also recommended not granting an EUP for the forestry use in 1985.

With regard to the environmental fate of imazapyr, the compound is stable to

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hydrolysis, but had a half-life of 3-5 days (12 hr irradiation/day) when irradiated with artificial light in water. An aged leaching study gave  $K_d$ 's of 1.7-4.9.

The anaerobic soil metabolism study indicated the compound was persistent and the parent had a half-life of 1-7 months in field soil.

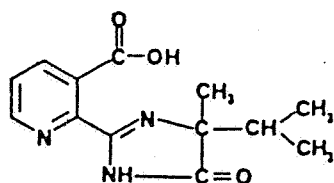
Since imazapyr is both persistent in soil and mobile, it has a potential to leach to ground water.

Imazapyr has a low potential to bioaccumulate in fish and an octanol-water partition coefficient ( $K_{ow}$ ) of 1.3.

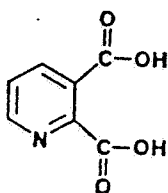
10. Review of Individual Studies: N/A

11. Completion of One-Liner: attached

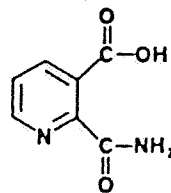
12. CBI Appendix: N/A



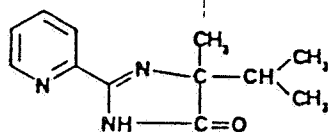
2-(4'-Isopropyl-4'-methyl-5'-oxo-2'-imidazolyl) nicotinic acid  
(AC 243,997)



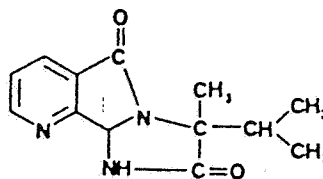
2,3-Pyridinedicarboxylic acid-  
(CL 9,140)



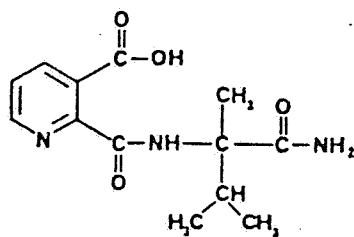
2-Carbamoylnicotinic acid  
(CL 60,032)



2,(2'-Pyridyl)-4-methyl-4-isopropyl-5-oxo-imidazole  
(CL 247,271)



[2,3b]-(2-Methyl-2-isopropyl-3-oxo)-imidazolidino-  
[2,3b]-pyrido-1-oxo-pyrrole  
(CL 247,087)



2-[2'-Carbamyl-N-2',3'-dimethylbutamido]-nicotinic acid  
(CL 252,974)

Figure 1. Structures of Arsenal and degradates.

EXPOSURE ASSESSMENT BRANCH  
PESTICIDE ENVIRONMENTAL FATE ONE-LINER

IMAZAPYR

File No: 128821 CAS No:  
Type Pesticide: Herbicide  
Chemical Name: 2-(4-Isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)-  
nicotinic acid

Empirical Form:

Uses: terrestrial noncrop, aquatic noncrop(ditchbanks), forestry  
Form. Type: EC

Mole Wt.	Sol. @25C (ppm)	Vap. Pres. (torr)	Kow	Henry
00	620-650		1.3	

Hydrolysis (161-1)

\*\*pH 5: stable  
\*\*pH 7: stable  
\*\*pH 9: stable

Photolysis (161-2, - 3, -4)

Air:

Soil: Half-Life = 5 months

\*\*Water: Half-life of 3 to 5  
days (12 hours of  
irradiation per day)

Mobility Studies (163-1)

Soil Partition	(KD)	%OM	CEC	Rf Factors
** 1 Clay Loam	1.7	4.6	26.5	
** 2 Loamy Sand	2.1	0.5	4.2	
** 3 Sandy Loam	3.8	1.8	7.4	
** 4 Silt Loam	4.9	4.6	17.3	
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Soil Metabolism Studies -- Terrestrial

Aerobic (162-1)

Anaerobic (162-2)

# 1 Half-life = 17 months

\*\*No degradation after 30 days  
aerobic incubation plus 60 days  
anaerobic incubation

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Soil Metabolism Studies - Aquatic

Aerobic (162-4)

Anaerobic (162-3)

(Study done but can't find it)

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3  
4

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Field Dissipation Studies

Terrestrial (164-1)

Aquatic (164-2)

#1 Half-Life of 1-7 months

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\*\* EPA Acceptable Study

# Supplement (Scientifically Sound) Information

Field Dissipation Studies

Forest (164-3)

Other (164-5)

\*\*1 Half-Life = 37-14 days (litter),  
19-34 days (soil), 12-40 days (plants)

2

Ground Water Findings

1

2

3

Rotational Crop Restrictions (165-1, -2)

1

2

Fish Accumulation Studies (165-4)

\*\*1 No bioaccumulation after 28 days exposure of bluegills to  
1 mg/l imazapyr in a flow-through system

2

Degradation Products

1 In soil: [2-[2'carbamyl-N-2', 3'-dimethylbutamido-nicotinic  
acid or CL-252,974

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Notes

Key Reviews:

EAB #4088 dated 3-15-84

EAB #5853 dated 10-7-86

EAB #70765 dated 9-25-88

References

Writer Patricia Ott