Date Out:

Chemical Code: 080808
DP Barcode: D224353

ENVIRONMENTAL FATE AND GROUND WATER BRANCH

Review Action

To: Robert Taylor, PM #25
Registration Division (7505C)

From: Elizabeth Behl, Section Head
Ground Water Technology Section
Environmental Fate & Ground Water Branch/EFED (7507C)

Thru: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch/EFED (7507C)

10/7/96

Attached, please find the EFGWB review of...

Common Name:	Propazine	Trade name:	Milo-Pro
Company Name:	Griffin Corporation		
ID #:	080808		
Purpose:	Should the propazine be included in the triazine special review?		

Type Product:	Action Code:	EFGWB #(s):	Review Time:
Herbicide	116		7 days

STATUS OF STUDIES IN THIS PACKAGE:

Guideline #	MRID	Status[1]

STATUS OF DATA REQUIREMENTS ADDRESSED IN THIS PACKAGE:

Guideline #	Status[2]

2041148

[1]Study Status Codes: A = Acceptable U = Upgradeable C = Ancillary I = Invalid.
[2]Data Requirement Status Codes: S = Satisfied P = Partially satisfied N = Not satisfied R = Reserved W = Waived.

DP BARCODE: D224353

CASE: 044963 DATA PACKAGE RECORD DATE: 01/21/99
SUBMISSION: S502126 BEAN SHEET Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REGISTRATION ACTION: 116 RESB NC-NON-FOOD/FEED U
RANKING : 5 POINTS ()
CHEMICALS: 080808 Propazine (ANSI) 98.0000%

ID#: 001812-00363 PROPAZINE TECHNICAL
COMPANY: 001812 GRIFFIN L.L.C.
PRODUCT MANAGER: 25 JIM TOMPKINS 703-305-5697 ROOM: CM2 239
PM TEAM REVIEWER: EDITH MINOR 703-305-7390 ROOM: CM2 229
RECEIVED DATE: 09/27/95 DUE OUT DATE: 04/04/96

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 224353 EXPEDITE: N DATE SENT: 03/19/96 DATE RET.: 10/07/96
CHEMICAL: 080808 Propazine (ANSI)
DP TYPE: 001 Submission Related Data Package

	CSF:	LABEL:	
ASSIGNED TO	DATE IN	DATE OUT	ADMIN DUE DATE: 07/17/96
DIV : EFED	04/02/96	10/07/96	NEGOT DATE: 09/30/96
BRAN: ERB4	04/02/96	10/07/96	PROJ DATE: / /
SECT: IO	04/02/96	10/03/96	
REVR : JWOLF	07/23/96	10/03/96	
CONTR:	/ /	/ /	

* * * DATA REVIEW INSTRUCTIONS * * *

This is Griffin's response to triazine special review as it relates to propazine's use on sorghum and on its present greenhouse use. I have only copy that portion that specifically addresses ground water and the letter of transmittal. Surface Water Section has the complete package if you need to see it (DP BARCODE D224188). Thanks.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
224185	RAB1/IO	03/14/96	07/12/96	Y	N	N
224748	CEB1/IO	04/01/96	06/01/96	Y	N	N
224749	CEB1/IO	04/01/96	06/01/96	Y	N	N
224187	ERB4/IO	03/14/96	07/12/96	Y	N	N
224188	ERB4/IO	03/14/96	07/12/96	Y	N	N

Date Out: 10/07/96

Propazine: PC Code: 080808
DP Barcode: D224353

FROM: James K. Wolf, Ph.D., Soil Physicist JKW
Ground Water Section
Environmental Fate and Ground Water Branch (7507C)

TO: Robert Taylor, PM 25
Registration Division (7505C)

THRU: Elizabeth Behl, Section Chief EBehl
Ground Water Section

Henry Jacoby, Chief Henry Jacoby 10/7/96
Environmental Fate and Ground Water Branch (7507C)

SUBJECT: Griffin's Response to the triazine special review on **Propazine** (PC 080808; DP Barcode D224353). Submission dated: Sept. 27, 1995

INTRODUCTION AND BACKGROUND

The registrant, Griffin Corporation, contends that propazine, a chloro-s-triazine, should not be placed into special review or be included in the ongoing triazine special review process.

The registrant provides several statutory citations in addition to numerous data bases and computer simulations to support their contention that propazine should not be placed into special review. A number of the basic data requirements for propazine fate under 40 CFR §158.202 were identified in previous EFGWB reviews (DP Barcodes D222268, D224521, D220769) as not complete. As a matter-of-fact the registrant has only submitted studies in support of non-food greenhouse uses and not on terrestrial uses. However, based upon the available information (supplemental studies, literature citations, etc.), EFGWB determined that the persistence, degradation mechanisms, and mobility of propazine is similar to that of atrazine and simazine which also have degradates common to propazine. Atrazine, simazine and some of their degradates are known leachers which have contaminated ground water. EFGWB therefore recommended that propazine be addressed in the same manner as atrazine and simazine (D224521).

Available health advisory (HAs) levels of four triazines, including propazine, are summarized in Table 1. Although maximum contaminate levels (MCLs) have <u>not</u> been established for propazine, information suggests that toxicity may be greater for the other three triazines.

Proposed use area: The registrant asserts that only the grain sorghum use is being pursued for a five-state area (Colorado, Kansas, New Mexico, Oklahoma, and Texas).

Detections in ground water: Triazine (parent and degradates) herbicides, which are used on variety of crops, have been frequently detected in ground water. The Pesticides in Ground Water Database (PGWDB) (USEPA, 1992) show that the triazine pesticides, atrazine and cyanazine and to a lesser extent cyanazine and propazine, have been included in a number of ground-water monitoring studies. Nationally (entire PGWDB) atrazine and simazine have been considered the most often; 1512 wells (5.6%) with detections out of 26,909 wells sampled and 486 wells (2.2%) with detections out of 22,374 wells sampled, respectively. Fewer wells have been sampled for cyanazine and propazine. The PGWDB reported that nationally the total number of wells sampled for propazine and cyanazine were 1428 and 7468 wells and number of detections were 15 (1.1 %) and 155 wells (2.1%); respectively. Parent concentrations of triazines detected in ground water ranged from; trace to 1500 µg/L, 0 to 67 µg/L, trace to 29 µg/L, and trace to 0.2 µg/L, for atrazine, simazine, cyanazine, and propazine, respectively. Detections in 27 (3.9%) wells out of 689 wells were attributed to atrazine degradates. Specific limits of detections are not known, but are generally below 1.0 µg/L. Atrazine and simazine which share common degradates were attributed to either atrazine or simazine in 18 wells (35.3%) with detections of 51 wells sampled. Frequently these detections exceeded establish HAs or MCLs.

The PGWDB (USEPA, 1992) indicates that a limited number of wells (220 wells) have been sampled for propazine in the five state proposed propazine market area (Colorado, Kansas, New Mexico, Oklahoma, and Texas). Fewer than 1.0 percent (0.91) of wells in these states sampled for propazine have detected propazine residues; reported concentrations were $\leq$ 0.20 µg/L. Detections occurred in only two wells (KS and TX). Monitoring data for propazine and three other triazines for the five state area are summarized in Table 2. Nationally, the total number of wells (1428) sampled and number of detections (15) for propazine reported in the PGWDB differ slightly from the numbers reported by the registrant (page 11); 17 detections out of 1548 wells sampled. Two additional detections not cited in the PGWDB were noted in Kansas by the registrant and appear to be valid.

In general, the numbers of detections for any triazines (parent) in the proposed five state market area were quite low, although the percentages within the five state area are about the same nationally. Propazine degradates were not considered in any of the ground-water monitoring studies. Degradates of the other triazines were not considered in monitoring studies conducted within the proposed five state area. Pesticide usage data were not available to determine whether the specific triazine

pesticide of interest was used within a wells recharge area. Thus, the lack of detections may be because the pesticide of interest was not used within the area of the monitoring study.

DISCUSSION

The registrant utilized a number of generalized data bases to evaluate the leaching potential within the proposed five-state propazine market area. Data included general information on aquifers (depth, areal extent, type), rainfall (annual and seasonal), soils (soil properties such as permeability class, SCS Hydrologic Soil Group), sorghum production area, and proposed propazine market area. These data represent several different scales of analysis, point, county, and Major Land Resource Areas (MLRA), and levels of confidence. Much of this data was processed and presented utilizing Geographical Information Systems (GIS) methods to obtain a number of spatial distributions; including grain sorghum production areas, proposed propazine market areas, rainfall, soil hydrologic groups, depth to ground water, and leaching susceptibility. The uncertainty and precision associated with overlapping the different GIS databases (e.g., soils map, rainfall map, sorghum map) was not addressed.

Modeling: The registrant uses the PRZM2 computer model to provide an indication of the potential for parent propazine to leach. The information shows that the five-state proposed propazine market area is included within 10 MLRAs. Three MLRAs (# 75, 77, and 150A), representing three different geographical areas, were selected for the modeling scenarios. Based upon the generalized soils, hydrology, precipitation, and areas of grain sorghum production information submitted by the registrant (e.g., Figures 3 and 4, Table 3), these areas represent the distribution of rainfall (qualitatively: high to low) within the proposed use area. Figures 7, 8, 9 were overlayed to provide an estimate of the sorghum producing areas in proposed use area with shallow ground water and highly permeable soil. The registrant states on page 26 that MLRA 150A represents high runoff (high rainfall - 48.6 inches per year) conditions, MLRA 75 represents moderate runoff (moderate rainfall - 26.82 inches per year) conditions, and MRLA 77 represents low runoff (low rainfall -17.8 inches per year) conditions.

Three soils were selected for modeling; one soil series from each MLRA: MLRA #75 - Crete series (Fine, montmorillonitic, mesic Pachic Argiustolls), MLRA #77 - Dalhart series (Fine-loamy, mixed, mesic Aridic Haplustalfs), and MLRA #150A - Lake Charles series (Fine, montmorillonitic, hyperthermic, Typic Hapluderts). The Dalhart series is well-drained and moderately permeable. Data were not provided to evaluate the aerial extent (acreage) of these soil mapping units with respect to sorghum production.

The modeling appears to have been conducted using acceptable modeling procedures, although the conditions simulated do not represent conditions with "high" leaching potentials and primarily address runoff potential. Several major concerns or comments which pertain to the results of the modeling should be noted.

- The environmental fate properties of propazine and atrazine are similar in nature. EFGWB (D224521) summarized the "sorption" parameters K_d and K_{oc} for propazine and atrazine for a number of soils. Average K_d values for propazine were 2.45 and atrazine were 2.82 and average K^{oc} values were 156 for propazine and 195 for atrazine. Reported aerobic soil metabolism $T_{½}$ vary but are about 128 and 146 days for propazine and atrazine, respectively (EFGWB One Liner Database). The similarities of these fate properties indicates that PRZM2 predictions of propazine and atrazine leaching would be similar under the same conditions.

- The *In-Situ* soil conditions of two of the soils (Crete and Lake Charles) used in modeling the "high and moderate" rainfall conditions would generally be considered non-leaching soils (excluding preferential flow associated with Lake Charles series). The Crete series, although moderately well-drained, has slow permeability and a "slowly pervious layer" within 1-meter of the surface which keeps the soil wet close to the surface (NRCS, 1994). The Lake Charles series is also moderately well drained and very slowly permeable when wet. This soil is also subject to cracking due to wetting and drying cycles, thus preferential flow may occur.

- The water balance portion of PRZM is also not well suited to consider preferential flow conditions (Lake Charles series) and restricting layer (Crete series). The restricted drainage option in PRZM (Record 19 column 29- 32) may be appropriate for the Crete scenarios. Therefore, the leaching estimates may not reflect reality due to an erroneous water balance (e.g., drainage) component. The registrant should include the amounts of drainage leaching below the bottom of the soil core from the different modeling scenarios.

- The selection of soil properties can greatly influence the estimates of pesticide leaching due to major differences in the water balance. Selecting properties from a leaching soil or non-leaching soil will influence the water available for pesticide transport. For example, using input parameters associated with MLRA 150A (Lake Charles series-non-leaching soil) and the meteorological file for MLRA 150A, the annual cumulative recharge out of the bottom of

the soil core ranged from 0 to 12.3 cm (mean = 1.5 cm, median = 0.38 cm). Using the same meteorological file, but the soil properties associated with the Dalhart series (a leaching soil), the annual recharge out of the bottom of the soil core ranged from 2.2 cm to 44.6 cm (mean = 24.8 cm; median = 23.9 cm). The reviewer notes that some parameters of the MRLA 77 are not appropriate for use in MLRA 150A, but this clearly shows that in hydrogeologically vulnerable soils, leaching could be significant in portions of the proposed use area.

- The precipitation may be so low, especially at two of the modeling locations (MLRA #s 75 and 77) leaching may be limited. Therefore, the predictions of low pesticide masses leaching is not unexpected due to low precipitation amounts and high evapotranspiration or high runoff associated with much of the proposed use area. The modeling and other information submitted by the registrant does generally provide and indication that much of the propazine use within the proposed use area has low likelihood to leach.

Registrant's Conclusions and Recommendations (page 36): The second and third sentences of this paragraph do not appear to be in agreement. It would appear that "relatively high permeability soils" was the intended point, rather than "relatively low permeability".

CONCLUSIONS

1. The persistence, degradation mechanisms, and mobility of propazine are similar to that of atrazine and simazine. Atrazine, simazine and their degradates are known leachers which have contaminated ground water. From a fate stand point, the leaching potential for propazine would be expected to be similar to the atrazine and simazine. EFGWB previously recommended that propazine be addressed in the same manner as atrazine and simazine.

2. Less than 1.0 (0.91%) percent of the wells sampled within the proposed propazine market area contained propazine residues at levels $\leq$ 0.20 μg/L. Propazine usage in relationship to the wells sampled or with detections is not known. About 4.8 percent of the wells sampled for atrazine in this area had positive detections. Nationally about 1.1 and 5.6 percent of the wells sampled contained detectable levels of propazine and atrazine, respectively. Therefore, the percentage of wells with detectable levels of triazines appear to about the same at both the national level and within the proposed five state use area.

3. Much of the proposed market area has relatively low precipitation amounts in comparison to evapotranspiration,

and therefore, generally low leaching potential. But a portion of the area (primarily southeastern Texas) does have areas with relatively high rainfall amounts, making this area more vulnerable to contamination.

4. Shallow ground water that is vulnerable to contamination occurs within the proposed market area. Soil properties which influence water movement are often spatially and temporally variable, thus while much of the proposed propazine use area may have relatively low leaching potential, localized areas may be quite vulnerable to ground-water contamination.

5. When used under the same conditions, propazine would be expected to contaminate ground-water in a manner similar to the other triazines (e.g., atrazine). However, differences in use and management may lower the probability of propazine contaminating ground water. For example, atrazine used on irrigated corn would have a greater likelihood of contaminating ground water compared with propazine used on dryland grain sorghum. Whereas use of atrazine and propazine on dryland grain sorghum would result in a similar impact on ground water quality.

6. Due to the mobility and persistence similarities between propazine and other triazines which are known to leach, the contamination of ground water from propazine use on sorghum remains an area of concern. Existing ground-water monitoring data is inadequate to estimate exposure (extent or concentration levels).

RECOMMENDATIONS

1. The registrant should address the following additional issues:

   a. Is sorghum irrigated in any of proposed market area? (Irrigation will enhance ground-water recharge).

   b. Source of 35-inch per year, pages 9 and 19

   The registrant should provide more detail concerning the "source or responsible person" of the rainfall amount of 35 inches as a "cut-off" for label restrictions, etc. (specific chemicals, which Division, Branch, source, date, etc.). Other factors in addition to rainfall amounts also influence leaching.

   c. The amount of water leaching below the soil core depths obtained from the computer simulations should be specified.

d. Address the apparent inconsistency noted in the characterization of soil permeability (page 36).

2. Propazine use should be restricted to the low rainfall grain sorghum areas as presented by the registrant. Use should be restricted to <u>only</u> grain sorghum within these five states. Sorghum should not be irrigated. Propazine should also not be used on permeable soils (e.g., sands, loamy sands, sandy loams) and soils susceptible to preferential flow (e.g., soils prone to shrink-swell, soils with well developed structure) and when water table is close (i.e., <50 feet) to the surface.

3. A ground-water monitoring program should be established by the registrant in the propazine use areas. The monitoring program must be adequate to estimate possible human exposure to propazine residues in ground water (parent and degradates).

4. Propazine should be included in the triazine special review process. Any restrictions applied to the other triazine chemicals either through the special review process or State Management Plans should be applied to propazine.

5. A ground-water label advisory, per Option II (see below), should be added to the propazine label, if registered. At the present there are two ground water label advisory options. Although the fate data base is incomplete, Option II is appropriate for propazine.

   Conditions for **Option II** are as follows:

   When EFGWB has adequate data to determine that the chemical (or major degradates) has laboratory derived mobility and persistence characteristics similar to other chemicals found in ground water as a result of normal label uses; **<u>and:</u>**

   1. Detections are reported in ground water (for example, in a monitoring study conducted for registration, or contained in the Pesticides and Ground Water Database).

   2. Field dissipation results are available that confirm that the chemical leaches.

   The following label language is appropriate:

   <u>This chemical is known to leach through soil into ground water under certain conditions as a result of label use. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.</u>

REFERENCES

U.S. Environmental Protection Agency. 1992. Pesticides in Ground Water Database. A compilation of monitoring studies: 1971 - 1991 National Summary. EPA 734-12-92-001. U. S. Environmental Protection Agency: Arlington, VA.

U.S. Environmental Protection Agency. 1996. Drinking Water Regulations and Heath Advisories. Office of Water. EPA 822-R-96-001. Washington, DC.

Table 1. Comparison of Four Triazine Health Advisory Levels (in mg/L) (USEPA, 1996)

Chemical	Standard		Health Advisories							
			10-kg Child			70-kg Adult				
	MCLG	MCL	1-day	10-day	Longer term	Longer term	RfD	DWEL	Lifetime	Cancer Risk
Atrazine	0.003	0.003	0.1	0.1	0.05	0.2	0.035	0.2	0.003	-
Cyanazine	0.001	-	0.1	0.1	0.02	0.07	0.002	0.07	0.001	-
Propazine	-	-	1	1	0.5	2	0.02	0.7	0.01	-
Simazine	0.004	0.004	0.07	0.07	0.07	0.07	0.005	0.2	0.004	-

- Not determined or known.

Table 2. Summary of ground water monitoring data for the triazines in a five state area (USEPA, 1992).

State	Chemical	Number of Wells			Concentration Range (µg/L)
		Sampled	≥ MCL	< MCL	
Colorado	Atrazine	4	0	4	0.8 to 2.3
	Cyanazine	0	0	0	-
Kansas	Atrazine	130	3	3	0.1 to 7.4
	Cyanazine	27	0	0	-
	Propazine	21	0	1	0.01
	Simazine	27	0	0	-
New Mexico	Atrazine	-	-	-	-
Oklahoma	Atrazine	7	0	0	-
	Simazine	1	0	0	-
Texas	Atrazine	279	3	7	0.21 to 200
	Cyanazine	188	0	0	-
	Propazine	199	0	1	unknown
	Simazine	91	0	0	-