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TYPE PRODUCT(S): (1) I, E, T, P, I, S

DATE ACCESSION NO(S)

PRODUCT REG. NO.

PRODUCT NAME(S) Hill's Holiday Flea Stop Pump Spray for Dogs and Cats

COMPANY NAME Pet Chemicals, Inc.

SUBMISSION PURPOSE Registration

CHEMICAL & FORMULATION	
Linalool	0.925%
Piperonyl Butoxide	0.500%
Propylene Glycol	10.000%
Inert Ingredients	88.575%

CONCLUSIONS & RECOMMENDATIONS

Introduction - Refer to the review of 6-18-85 for background information. The submissions of 7-17 and 8-7 (which includes the letter of 7-2-85 from Ohio State University to the applicant) contain information to clarify the questions in the review of 6-18-85, as well as supplementary data.

Data Summary - Supplementary data consists of a report of testing various Linalool concentrations on ~~moist~~ filter paper for activity against eggs, larvae, and pupae. For each concentration, 10 eggs, 10 larvae and 44-60 pupae were tested by exposure to the ~~test~~ moist filter paper. Eggs were checked every 24 hours for 4 days, larvae were checked after 24 hours and pupae were checked daily for emergence for 30 days. Test results are summarized as follows.

Activity of Linalool on Filter paper  
Against Immature flea stages

Stage	Concentration (Percent)	Percent Mortality
Eggs	5.0	100
	1.0	100
	0.5	100
	0.2	100
	0.1	80 - 20% egg hatch
	Control (water treated paper)	10 - 90% egg hatch
Larvae	10.0	100 - at 30 minutes
	5.0	100 "
	2.5	100 "
	1.0	100 "
	Control (water treated paper)	0 "
	Pupae	5.0
3.0		100
2.0		100
1.0		55
0.5		37
Control ( [redacted] + water treated paper)		36

Linalool concentrations of 5%, 1.0%, 0.5% and 0.2% produced no hatching eggs, while 0.1% showed 80% mortality (20% hatching).

All concentrations tested (10.0%, 5.0%, 2.5% and 1.0%) showed 100% mortality for larvae at 30 minutes.

For pupae the concentrations of 5.0% (97% mortality), 3% and 2% (100% mortality for both) showed high activity while the 1.0% concentration (55% mortality) and the 0.5% concentration (37% mortality) showed low activity. It is noted that the alcohol water control showed 36% mortality.

The letter of 7-2-85 from Ohio State University states that microscopic examination of the eggs was conducted and that "Linalool is toxic to the developing embryo and completely prevents hatch."

Conclusions— Although testing is limited (submissions of 3-20 and 7-17), the data support claims for control of flea eggs, flea larvae and adult fleas by contact activity. The data also show good activity of the subject formulation relative to contact activity against pupae. However, because of the limited amount of testing and the characteristic resistance of the

pupal stage <sup>of insects</sup> to pesticide action, the claim for pupae should be substantiated by additional testing in order to demonstrate consistent contact activity against flea pupae.

The front panel label claim "Kills all 4 stages of Fleas" is not acceptable without additional data for pupae.

The front panel label statement "For use on pet and pet's bedding" should clearly state that this is use as a contact spray.

The back panel label ~~statement~~ <sup>claim</sup> that the product is the only pet spray that kills fleas at all 4 stages of the life cycle is not acceptable.

The back panel label claim that use of the product will result in a more complete treatment is not acceptable. There are other insecticides which will kill preadult fleas.

A. J. VanDunburgh 8-23-85