State of California

M e m o r a n d u m

HSM-93006
[HSM # assigned after issuance of original memo]

To : Gary Sprock, Registration Specialist
Pesticide Registration Branch

Dale : June 25, 1993

Place : Sacramento

Phone : 4-1119

From : **Department of Pesticide Regulation**

Tareq A. Formoli, Associate Environmental Research -Scientist
Worker Health and Safety Branch

Subject ; **PRODUCT NAME:** Baytan
ACTIVE INGREDIENT: Triadimenol
COMPANY NAME: Miles Inc.
I.D. NUMBER: 140758-E
DOCUMENT NUMBER: 50512-036
EPA REGISTRATION NUMBER: 3125-
TITLE: Risk Assessment of Baytan® 2.6 FS (Baytan® 312 FS) as a Seed Treatment: Exposure of Workers to Triadimenol During Treatment of Grain Seeds with Baytan® 312 FS Seed Treatment.

Triadimenol exposure to workers was-observed during seed treatment operations at three locations in Canada, representing large, medium, and small capacity seed treatment facilities. The treating capacities of the large, medium, and small facilities were 2400, 1600, and 320 bushels/day, respectively, lasting an estimated 55 to 65 working days in a year. Baytan® 312 FS (28% triadimenol), a liquid formulation of triadimenol was used at a rate of 0.3 g/kg seed. This rate is equivalent to the maximum application rate of Baytan® 30 Flowable Fungicide, a 30% liquid formulation of triadimenol.

The large facility treated seeds using a Gustafson seed treater. Measured amounts of seed and triadimenol mixture were emptied into an auger treatment chamber. The seed was coated with triadimenol mixture as they were conveyed through the chamber. Three work tasks were involved in the operation. One worker (treater/bagger) fitted an empty paper bag onto a filler spout where the treated seed was blown into the bag to a proper weight. The bag head was closed automatically by the force of seed inside. The bagging machine was equipped with an exhaust ventilation at the filling spout. The bag then fell off mechanically on a conveyer belt and moved to an area where
two workers (slackers) took the bag and stacked it on a pallet. Pallets of 40 bags were moved by forklift drivers to the tagging area where a worker (tagger) labeled each bag. The two stackers and one tagger alternated jobs periodically. Pallets of tagged bags were moved to the storage area by a forklift driver.

In the medium facility, the seed treatment mechanism was basically identical to that of the large facility, but the operation was somewhat different. The bags were filled by gravity force and the bagging machine had an auto-weighing device in this facility. One worker (bagger) placed the empty paper bag under the bagging spout. The filled bag was transferred by a conveyer belt to a sewing station where a worker (tagger/sewer) fed the top of the bag and a tag through the sewing machine. The conveyer belt then moved the bag to the stacking area. Two workers (stackers) stack the bags onto the pallets. The pallets were taken to the storage area by a forklift.

A Panogen treater equipped with limited ventilation was used in the small facility. Measured amounts of seed and triadimenol mixture were emptied into a rotating drum. One worker performed all the activities. The worker

SURNAME	*Original signed by T. Formoli*		

attached the empty bags to the end stream of the drum as treated seed fell into the bag. The worker then removed the bag, set it on a scale, corrected the weight by a hand scoop, sewed the top of the bag along with a tag and placed it on a pallet.

The triadimenol mixing/loading process was performed by hand in all three facilities, by weighing Baytan, seed colorant, and water in a drum. The drum was manually rolled back and forth to mix the components. The exposure during mixing and calibration of equipment was monitored as one work activity. The disassembly of the equipment by the same worker was monitored as a separate work activity. These activities were not considered representative of procedures and equipment involved in Baytan use in commercial seed treatment facilities.

In the large facility, one treater/bagger, three stackers/taggers, and one forklift driver were monitored for four one-half day periods. One treater/bagger, one tagger, and two slackers were monitored for six half-day periods in the medium size facility. The seed treatment operator of the small facility was also monitored for six half-day periods. The mixer/calibrator of each facility was monitored once during work prior to treatment. The same workers in medium and small facilities were monitored once during disassembly of equipment. A half day work period averaged 3.45±0.27 hours.

Workers were monitored for dermal and inhalation exposure to triadimenol. All workers wore long-sleeved shirt, long pants, nitrile gloves, baseball cap, and cotton/polyester coveralls. The report indicates that some workers took their gloves off occasionally during monitoring. Dermal exposure was monitored by attaching dermal dosimeters (gauze pads) to the outside of coveralls at various parts of the body and to the cap. Additional dermal dosimeters were attached to the clothing under the coveralls in a manner that would not be directly under the dosimeters on the coveralls. Hand exposure was monitored by collecting ethanol hand washes at the end of monitoring period. Glove exposure was monitored for some workers by collecting ethanol glove washes. Inhalation exposure was monitored by collecting air samples from the breathing zone of workers, using personal air samplers connected to filter cassettes containing quartz microfiber filters (QMA). Field spike and blank samples were collected for quality assurance. Recoveries were generally over 95 percent. All results were corrected for recoveries.

All samples were stored on dry ice after collection, until overnight delivery to the laboratory where they were kept in a freezer until analysis. All sample analysis were performed according with the EPA's GLP guidelines. Samples below the detection limit were assumed to be half of MDL (0.012 ug/cm^2). The dosimeters outside the coveralls and the hat were use to calculate the exposure to uncovered body areas and the dosimeters under the coveralls were used to calculate exposure to covered body areas. An average of 27 percent of residues on the pads outside of the coveralls was found on pads under the coveralls. Body surface area and inhalation rate as recommended in the EPA pesticide exposure assessment guidelines, Subdivision U were used for extrapolation. Mean (geometric) exposure values were reported as µg/kg active ingredient (a.i.) handled, µg/hour work, and µg/replicate. Total (dermal and inhalation) exposures for various job categories in the large facility were 0.06, 0.01, and 0.003 mg/kg/day for treater/bagger, stacker/tagger, and forklift driver, respectively. Treater/baggers, tagger/sewers, and stackers in the medium facility received total exposures of 0.02. 0.04, and 0.01 mg/kg/day, respectively. The treater/bagger of the small facility had total exposure of 0.03 mg/kg/day.

We used the exposure values reported as µg/replicate to estimate the absorbed daily dosages (ADD) for various job categories in seed treatment facilities. The ADD for workers of large, medium. and small seed treatment facilities

are shown in Table 1. A dermal absorption of 25 percent was assumed for triadimenol based on a conservative estimate of dermal absorption for triadimefon, a chemically similar and related pesticide to triadimenol. The 25 percent dermal absorption was estimated in the exposure assessment for triadimefon based on two triadimefon dermal absorption studies in animals and one exposure study in humans (Knaak, 1982, Hixson, 1985, and Popendorf, 1981).

Additional protective clothing and/or equipment will reduce seed treatment workers exposure to triadimenol, as shown in Table 2.

Triadimenol is the alcohol of triadimefon, a currently registered fungicide. Following absorption, triadimenol is metabolized to triadimefon. Exposure levels experienced by workers currently handling triadimefon range from 2 to 336 µg/kg/day. These levels of exposure are typically much higher than those that would be experienced by protected triadimenol handlers. Using the suggested personal protective equipment and engineering controls (Table 2), the exposure of triadimenol handlers relative to triadimefon handlers will be insignificant.

Table 1

Triadimenol Exposure to Workers of Seed Treatment Facilities

Handling a Liquid Formulation of Baytan®

Large Facility:	Treater/bagger		Stacker/bagger		Forklift driver	
	(µg/person)	(% exposure)	(µg/person)	(% exposure)	(µg/person)	(% exposure)
Head, Face, Neck	107.57	6.03	19.14	3.72	6.81	3.51
Rest of Body	1340.68	75.10	432.88	84.10	135.22	69.65
Hand	245.71	13.76	42.26	8.21	41.95	21.61
Inhalation	91.20	5.11	20.43	3.97	10.15	5.23
Total Dermal	2299.72		509.38		183.99	
ADD (µg/kg/workday)	18.86		4.42		1.57	

Medium Facility:	Treater/bagger		Tagger/Sewer		Stacker	
Head, Face, Neck	143.69	13.88	121.74	7.35	25.83	5.43
Rest of Body	391.58	37.84	470.80	28.41	312.64	65.69
Hand	79.61	7.69	137.97	8.33	62.57	13.15
Inhalation	420.00	40.58	926.47	55.91	74.89	15.74
Total Dermal	668.91		838.37		429.13	
ADD (µg/kg/workday)	9.75		18.43		3.88	

Small Facility:	Treater/bagger		Mixer/calibrator*		Disassembler**	
Head, Face, Neck	57.81	10.21	67.76	0.56	6.98	1.85
Rest of Body	386.96	68.37	11797.77	97.24	251.04	66.69
Hand	40.55	7.16	265.62	2.19	111.11	29.52
Inhalation	80.65	14.25	1.63	0.01	7.31	1.94
Total Dermal	495.37		13064.72		403.60	
ADD (µg/kg/workday)	4.92		98.11		1.49	

* - All three facilities

** - Medium and small facilities only, workday of 0.77 hour.

All values are geometric means.

Based on clothing of long-sleeved shirt, long pants, and nitrile gloves; 25% dermal Absorption, 50% respiratory uptake, 70 kg body weight, and 7-hour workday (based on an average 3.45 hours half day work in this study).

Mixing, calibrating, and disassembling activities were not typical of activities or equipment involved in triadimenol use in commercial seed treatment facilities.

Table 2

Triadimenol Add (µg/kg/day) for Seed Treatment Workers with Additional Protective Clothing and/or Equipment

Additional Protective Measures*			
Large Facility:	Treater/bagger	Stacker/tagger	Forklift driver
None			1.57
Coveralls		1.43	
Coveralls + Respirator	4.86		
Medium Facility:	Treater/bagger.	Tagger/Sewer	Stacker
Coveralls			1.78
Coveralls + Respirator	1.71	2.82	
Small Facility	Treater/bagger	Mixer/calibrator**	Disassembler***
None			1.49
Coverall + Respirator	1.71		
Closed system + Apron		4.91	

* - Protective measures in addition to a long-sleeved shirt, long pants and chemical resistant gloves. ** - All three facilities
*** - Medium and small facilities only, workday of 0.77-hour.
Coveralls providing dermal protection of 73% (this study).
Half-face respirator providing respiratory protection of 90% (Thongsinthusak, et al. 1991 a and b)
Closed system mixing/loading and: chemical resistant apron providing dermal and respiratory protection of 95% (Thongsinthusak, et al. 1991a and b)

References

Hixson, E.J., and T.R Hathaway. 1985. Dermal absorption of ^{14}C-Bayleton applied as 50 percent wettable powder in rabbits. Mobay Chemical Corporation, Stilwell, Kansas. DPR Registration Doc. No. 410-028.

Knaak, J.B. et al. 1982. Development and validation of an animal model to study the dermal absorption of pesticides, Phase I: Dermal absorption of triadimefon using the back skin of the female rate. CDFA, UC, Davis, and UC, Berkeley. DPR Registration Doc. No. 410-023.

Popendorf, W.D. et al. 1981. Pesticide exposure during the loading/mixing and application of Bayleton. UC, Berkeley. DPR Registration Doc. No. 410-028.

Thongsinthusak[a], T. et al. 1991. Reduction of pesticide exposure by using protective clothing and closed cabs. Worker Health and Safety Branch, CDFA, Sacramento, CA. HS-1616.

Thongsinthusak[b], T. et al. 1991. Developing pesticide exposure mitigation strategies for handlers and harvesters. Worker Health and Safety Branch, CDFA, Sacramento, CA. HS-1631.

cc: Joshua Johnson (1 original, 5 copies)
John Donahue
Tian Thongsinthusak
Michael Dong