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

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

September 28, 2006

MEMORANDUM

Subject: Study Review: *Determination of Dermal and Inhalation Exposure to Reentry Workers During Maintenance Activities in Golf Courses*" (MRID# 467340-01), DP Barcode 327361.

From: Seyed Tadayon, Chemist
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Attached is a review of the study entitled *Determination of Dermal and Inhalation Exposure to Reentry Workers During Maintenance Activities in Golf Courses*" (MRID# 467340-01 A primary review of the study was performed by Versar, Inc. under the supervision of HED. It has undergone secondary review in HED and has been revised to reflect Agency policies.

The attached report reviews the Turf Transferable Residue (TTR) data provided in the study "*Determination of Dermal and Inhalation Exposure to Reentry Workers During Maintenance Activities in Golf Courses*" which was submitted by the Agricultural Reentry Task Force to the U.S. EPA in support of constructing a comprehensive database that will be used to calculate dermal exposure transfer coefficients applicable to all pesticides, crops, and activities. The requirements for the TTR phase of the study were specified by the U.S. EPA OPPT Series 875, Occupational and Residential Exposure Test Guidelines Group B: Postapplication Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turf.

Please note, the TTR phase of the study was designed to collect data to calculate worker-specific TTR values for chlorothalonil which were then used to calculate worker transfer coefficients for various golf course maintenance tasks performed on both greenways and fairways in the concurrent worker reentry exposure study. Therefore, transferable residue dissipation curves for chlorothalonil on greenway and fairway turf were not determined.

EXECUTIVE SUMMARY:

This study was designed to collect data to calculate worker-specific turf transferable residue (TTR) values for chlorothanil that correspond to worker exposures measured in a concurrent worker re-entry study. The TTR and exposure values were used to calculate worker transfer coefficients for six golf course maintenance tasks performed on greenways and fairways. The study was conducted on a public golf course near Hood River, Oregon using Daconil Weather Stik® Flowable Fungicide Turf Care® Turf and Ornamental Fungicide, a liquid flowable formulation containing 54.0 percent active ingredient (chlorothalonil). The TTR and worker exposure samples were collected from separate plots on 1 and 2 days after a single treatment using a tractor-mounted groundboom broadcast sprayer. Two trials were conducted 2 days apart, using distinct treatment areas at the golf course, for a total of four monitoring days. The turf used for the TTR sampling was treated at approximately the same time and using the same equipment as the turf used for the worker exposure sampling. During each day of re-entry exposure monitoring, TTR samples were taken randomly from a practice green and a section of driving range turf (fairway) at 30 minute intervals for the entire periods during which exposure monitoring was performed (which was approximately 10 hours on each reentry day). Transferable residues were sampled using the Modified California Roller Technique. Four TTR subplots (two from the practice greens and two from the driving range) were monitored with one TTR replicate per sampling interval per subplot. In total, 18 to 21 TTR samples were taken from treated greens and fairway TTR areas on each of the four monitoring days.

Worker-specific TTR measurements corresponded to the turf type involved (greenway or fairway) in each worker's task and to the portion of the day during which the worker was monitored. All of the TTR samples collected during the time the specific worker was performing his task were averaged together to calculate the worker-specific average TTR value. Worker-specific average TTR values calculated by Versar for tasks performed on the greens ranged from 0.014 $\mu g/cm^2$ (worker who watered the greens in the afternoon on the second re-entry day after the second application event) to 2.80 $\mu g/cm^2$ (worker changing cups first thing in the morning on the first reentry day after the first application event). Worker-specific average TTR values for tasks performed on the fairways ranged from 0.021 $\mu g/cm^2$ (worker repairing irrigation lines in the late afternoon on the second re-entry day after the second application event) to 1.46 $\mu g/cm^2$ (worker mowing the fairways first thing in the morning on the first reentry day after the first application event). Worker-specific TTR values calculated by Versar were slightly different than the Study Author's due to the method used to correct the raw residue values. The study author corrected all residues greater than the limit of quantitation (1.00 µg/sample or 0.00179 $\mu g/cm^2$) to 100% for the average field fortification recovery of the closest field fortification level over all sampling days. Versar corrected all of the raw residue values >LOQ for field fortification recoveries <90% using the average recovery of the closest field fortification level from each of the corresponding reentry days.

Transferable residue dissipation curves for chlorothanil on greenway and fairway turf were not determined, though TTR values were plotted. The graphs show a general decline in TTR values over the sampling duration; however, the residues spiked in the morning on the second day after

the first application for both the green and fairway plots. In the morning the turf was wet from dew. Additionally, the graphs showed that the TTR values from the second application event were generally lower than the TTR values from the first application event, especially on the second day after application.

Although the purpose of this study was to calculate worker-specific TTR values which were used to calculate worker transfer coefficients, the data were generated from studies designed to fulfill the requirements of OPPTS Series 875, Occupational and Residential Exposure Test Guidelines, Group B: Post-application Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turfs. The data presented in this study met the majority of the pertinent guidelines. The issues of concern are:

(1) Approximately 50% of the residues in the TTR samples were greater than the highest field fortification level of 1,000 µg/sample. The residues greater than 1,000 µg/sample ranged from 1,005 to 20,675 µg/sample (up to ~20 times higher). However, the high level laboratory fortification was closer to the level of residues detected on the cloth samples.

(2) Only one location was used in this study (Oregon).

(3) A rainfall event occurred on the morning of Study Day 3 (1 day after the second application event) prior to the monitoring period. Additionally, a light drizzle was apparent for 20 minutes in the afternoon on this monitoring day.

(4) The guidelines recommend a minimum of three replicates per sampling interval. In this study only one sample was collected at each sampling interval. However, each worker-specific TTR value is an average of values from 4 to 11 sampling intervals.

(5) The protocol target application rate was set at 5.5 lb ai/acre; however, the maximum label recommended application rate for a single application was 11.3 lbs ai/A.

(6) Data from a 9-month storage stability test that was conducted previously were not provided in the Study Report; however, field fortification and travel recoveries indicated acceptable storage stability.

(7) The test substance was initially applied to the turf on September 12, 2004. Due to a significant rain event on the day after application, the study was postponed until October 3, 2004. The control samples used in the study were collected prior to September 12, 2004. There were no TTR control samples collected between September 12, 2004 and October 3, 2004.

COMPLIANCE: Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided. The study sponsor waived claims of confidentiality within the scope of FIFRA Section 10(d) (1) (A), (B), or (C). The study sponsor and author stated that the study was conducted under EPA Good Laboratory Practice Standards (40 CFR part 160) with the following

exceptions: (1) the uniformity and concentration of the test substance when mixed with the carrier (tank mix) was not determined; and (2) the golf course survey conducted using a handheld GPS device was not conducted under GLPs. None of these deviations were thought to have compromised the scientific integrity of this study.

CONCURRENT EXPOSURE STUDY: Yes

A separate Reentry Exposure study review was prepared per EPA instructions.

GUIDELINE OR PROTOCOL FOLLOWED: The study protocol submitted to EPA was dated August 25, 2004. Series 875, Occupational and Residential Exposure Test Guidelines Group B: Postapplication Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turf was followed for the compliance review of this study.

I. MATERIALS AND METHODS

A. MATERIALS:

1. Test Material:

Formulation:	Daconil Weather Stik® Flowable Fungicide Turf Care® Turf and Ornamental Fungicide - a liquid flowable formulation containing 54.0 percent active ingredient (chlorothalonil).
Batch #:	FL041051 (formulated product)
Lot #:	S02-2673 (reference standard)
Purity:	The purity of the reference standard was verified at 99.5% with an expiration date of September, 2008.
CAS #(s):	1897-45-6
Other Relevant Information:	EPA Reg. No. 50534-209-100. The test product was packaged in 2.5-gallon plastic jugs.

2. Relevance of Test Material to Proposed Formulation(s):

The liquid flowable formulation sent to the field site was labeled as Daconil Weather Stik® Flowable Fungicide Turf Care® Turf and Ornamental Fungicide, which is the same product discussed in the assessment. A label for this product was not provided with the Study Report, however, a label was obtained through EPA's PPLS. The test product used for this study is the same product name and formulation that appears on the test product label. According to the Study Report, the formulation and packaging of the test product used in this study was representative of that currently available to the golf course industry.

B. STUDY DESIGN:

There was one amendment to and two deviations from the study protocol as they pertain to the turf transferable residue phase of the study. The amendment to the protocol defined the analytical phase for the analysis of the field samples. The deviations from the protocol were as follows: (1) TTR sampling frames could only be secured with spikes at the two front corners; and (2) on three of the four monitoring days, some of the field fortification solutions used were intended for different study days. The amendment and deviations were reported to not have any adverse effects on the study's overall integrity.

1. Site Description:

Test locations:	This study was performed in the early fall on a public, 18 hole golf course near Hood River, Oregon which is located about 60 miles east of Portland, Oregon.
Areas sprayed and sampled:	Two practice greens and two fairway turf practice areas (driving ranges) were treated and used exclusively for TTR sampling. The two treated sections of fairways used for the TTR study were 60 ft^2 (0.0014 acre) each. The size of the two treated practice greens was not reported. Researchers laid out a sampling grid on each section of turf (greenway and fairway) containing 57 to 75 subplots. Each subplot measured approximately 2.5 ft x 3.5 ft. The subplots were laid out side by side in rows with a 3 foot wide row between the double rows of subplots which created a walking row for TTR samplers.
Meteorological Data:	A weather station was placed near the dressing/undressing tent, which continuously monitored wind speed and direction, temperature, and relative humidity on the application and reentry days. Data were recorded every 60-minutes. Rainfall was monitored at the site for the duration of the study using a plastic rain gauge. A total rainfall of 0.15 inch occurred the morning after the second application (0400 to 0700). The rain stopped prior to

the first monitoring event. Additionally, a very light drizzle was observed in the afternoon on this monitoring day. Table 1 provides a summary of the weather conditions during the application or monitoring event based on hourly summary data. In general, dew was present in the mornings and as the day progressed the TTR plots dried out.

Historical meteorological data were not provided in the Study Report.

Table 1. Summary of Meteorological Measurements Collected During Study[1]

Parameter	First Application Event (Plot 1)			Second Application Event (Plot 2)		
	Application	Re-entry Day 1	Re-entry Day 2	Application	Re-entry Day 1	Re-entry Day 2
Date	10/3/04	10/4/04	10/5/04	10/5/04	10/6/04	10/7/04
Min. Temp (°C)	15.7	6.5	8.3	18.8	13.6	7.4
Max. Temp (°C)	26.7	26.0	23.9	23.9	20.9	21.6
Min RH (%)	20.1	21.4	36.6	33.3	54.9	38.5
Max RH (%)	52.3	84.0	78.0	46.8	91.9	88.5
Min Wind Speed (avg. mph)	0.0	0.0	0.31	4.21	0.0	0.68
Max Wind Speed (avg. mph)	1.66	0.82	6.76	6.76	5.92	2.59
Wind Direction (avg, compass degrees)	30 – 71	56 – 82	97 – 288	266 – 270	200 – 272	16 – 320
Min Soil Temp. (°C)	18.8	12.6	13.0	17.3	15.5	13.3
Max Soil Temp (°C)	28.6	21.1	19.7	19.4	19.6	20.5
Rainfall	None	None	None	None	Trace	None
Moisture Conditions	NA	Dew, until 1000 to 1200	Dew, until 0900 to 1030	NA	Ground wet from rain; very light drizzle for about 20 minutes in afternoon	Dew, until 1000 to 1200
Other rainfall	0.15 inch on 10/6/04 between 0400 and 0700					

1. All data were collected on site. Weather conditions are during the application or monitoring event and are based on hourly summary data.

2. Surface Monitored:

Turf Species: The fairways were made up of *Poa annua* turf and the greens were a mix of bent grass and (mostly) *Poa annua* turf.

Residential or Public Area: The test site was a public golf course.

Other relevant Characteristics: Prior to the initiation of the study, the fairways were mowed to a height of ¾-inch and the greens were mowed to a height of 7/32-inch. The TTR plots were undisturbed (not irrigated or mowed) during the monitoring period.

Other products used on turf: Maintenance pesticides were not used on the golf course since March, 2004, except for one application of the test product on the front nine holes. This application was made on September 12, 2004 at a target application rate of 6 lb ai/A. The study was expected to begin on that day, but the study was postponed due to significant rain events on September 13, and September 14, 2004.

Granular fertilizer (N-P-K = 10-6-4; 10% Nitrogen, 6% Phosphorus, and 4% Potassium) was applied to the 2 practice greens over a two-day period of September 16 to 17, 2004. Prior to that there were no fertilizer treatments on the golf course since approximately March 2004.

3. Physical State of Formulation as Applied:

Granular / Liquid: Daconil Weather Stik® Flowable Fungicide Turf Care® Turf and Ornamental Fungicide is a liquid flowable formulation.

4. Application Rates and Regimes:

Residential or Commercial Applicator: Commercial Applicator

Application rate(s): The protocol and field phase of the Study Report stated that the target application rate was 5.5 lbs ai/A. This less-than-maximum application rate was selected to better represent the application rate of typical golf course turf products. The maximum label recommended application rate for a single application is 15.1 pints/A (11.3 lbs ai/A). The actual application rates for the first day of applications (10/3/04) were 5.45 lbs ai/A for the fairways and 5.50 lbs ai/A for the greens. The actual application rates for the second day of applications (10/5/04) were 5.30 lbs ai/A for the fairways and 5.55 lbs ai/A for the greens. The actual application

rates were determined by timed passes of each sprayer over the treated TTR areas and the measured total spray nozzle outputs.

Application Regime: One application of Daconil Weather Stik® Flowable Fungicide Turf Care® Turf and Ornamental Fungicide was made on each section of the TTR plots. Half of the practice greens and half of the fairways (driving range) were treated on October 3, 2004 and the second half of the practice greens and the second half of the fairways (driving range) were treated on October 5, 2004. For the worker exposure portion of the study, the front nine holes were treated on October 3, 2004 and the back nine holes were treated on October 5, 2004, at approximately the same times as the TTR plots.

Application Equipment: The golf course fairways and greens were sprayed with two tractor-mounted groundboom broadcast spray rigs. On each application day, the greens were sprayed using a sprayer fitted with a 110-gallon tank and a 3-section drop nozzle boom attachment that sprayed a 15-foot swath of turf. The sprayer was a Cushman Truckster Model 8020 sprayer fitted with nine flat fan spray nozzles with 50-mesh screens at 20-inch spacing. The fairways were sprayed in part with the Cushman sprayer and in part with a John Deere 1500 Turf Sprayer fitted with a 150-gallon tank and a shielded drop nozzle boom attachment that also sprayed a 15-foot swath of turf. The sprayer was fitted with nine flat fan spray nozzles with 50-mesh screens at 20-inch spacing.

Spray Volume: The greens were sprayed with a volume of approximately 82 to 84 gallons per acre (GPA) and the fairways with a volume of approximately 28 to 29 GPA. The label recommended application volume ranges from 90 to 450 GPA for greens and 30 to 40 GPA for fairways.

Equipment Calibration Procedures: According to the study protocol, the spray equipment was to be calibrated prior to each application using field facility SOPs. Details of the calibration procedure were not provided.

Was application Awatered in@: No

Was total deposition measured: No

5. <u>Transferable Residue Sampling Procedures</u>:

Method and Equipment: Transferable turf residues (TTR) were collected from the two practice greens and the two fairways using the Modified California Roller Technique, which was approved by the Outdoor Residential Exposure Task Force (ORETF). This technique involves the use of a 32 lb roller and a cloth dosimeter backed by a heavy gauge plastic sheet inside a rigid 2 ft x 3 ft plastic frame. Nails were used to secure the frame to the turf at two corners. Only two spikes were used to secure the frame to the turf because of the close layout of the subplots (back-to-back with limited access). The cloth media used in the study was 100% cotton sheeting (200 thread count).

Sampling Procedure(s): Each cloth sample consisted of a 6 ft^2 (2 ft x 3 ft, 5,570 cm^2) piece of cotton sheeting. The cloth samples were covered with a similar sized piece of plastic and clamped into a modified California roller frame. The frame was placed on a subplot section to be sampled and held in place with nails in the two front corners of the frame. A 32 lb roller was then pushed back and forth five times (10 lengths). The TTR samples were randomly collected from the pool of acceptable subplots (no thin areas, brown grass, or major defects in turf).

Surface area(s) sampled: The area of the cloth dosimeters which came in contact with the treated turf when placed in the sampling frame was 2 ft x 3 ft or 5,570 cm^2.

Replicates per surface:

– Replicates per sampling time: Single cloth dosimeter samples were collected from each subplot at each sampling interval. Sampling was conducted on Study Day 1 (1 day after application on the first half of the plots), Study Day 2 (2 days after application on the first half of the plots), Study Day 3 (1 day after application on the second half of the plots), and Study Day 4 (2 days after application on the second half of the plots).

– Number of sampling times: For the practice greens, there were 19 sampling intervals on Study Days 1, 2, and 3 and there were 21 sampling intervals on Study Day 4. The total number of sampling intervals for the first application was 38 and the total number of sampling intervals for the second application was 40.

For the driving ranges, there were 18 sampling intervals on Study Day 1, 19 sampling intervals on

Study Days 2 and 3, and 20 sampling intervals on Study Day 4. The total number of sampling intervals for the first application was 37 and the total number of sampling intervals for the second application was 39.

Times of sampling: TTR samples were collected from both turf types every 30 minutes during the day while workers in the concurrent worker exposure study were being monitored on separate turf plots. Sampling was conducted on one and two days after the turf applications and lasted approximately 10 hours each day. This resulted in 18 to 21 sampling intervals per turf type per day.

Other Relevant Information: The TTR sampling areas were undisturbed for the duration of the study (were not irrigated or mowed). In general, dew was present in the mornings and as the day progressed the TTR plots dried out. The first 3 to 9 samples per day were "wet", the next 1 to 8 samples were "damp", and the rest were "nearly dry" or "dry".

Control TTR samples were collected September 10, 2004 and September 11, 2004 because the exposure monitoring study was planned to start on September 12, 2004. However, the study was postponed to October 3, 2004 due to a significant rain event the day after the application.

6. <u>Sample Handling</u>:

During dry times (later in the day), a small metal scoop or tweezers were used to remove blades of grass on the cloth samples. During moist times (morning dew), many very small pieces of turf adhered to the sheets and compressed carbon dioxide was used to blow away the pieces of turf. After sampling, the sheet was folded with the exposed side inward, wrapped in aluminum foil, placed in a re-sealable plastic bag, and placed into a cooler with dry ice for storage. The samples were transferred to freezers on the same day of collection, generally within four hours of collection. According to the Study Report, the longest interval between when any samples were collected/frozen (exposure samples included) and later thawed for analysis was approximately 9 months.

7. <u>Analytical Methodology</u>:

Extraction method(s): All of the field samples were kept frozen during transport to the analytical laboratory and remained frozen until analysis. Transferable turf residue cloth samples were placed in a 4 L jar with a Teflon-lined lid. A 2 L portion of ethyl acetate was used to rinse the foil that the cloth was wrapped in and to extract the

sample in the jar. Extraction was accomplished by shaking the jar for 30 minutes. A portion of the extract was removed for GC/ECD analysis.

Detection methods: See Table 2

Table 2. Summary of Chromatographic Conditions	
GC Column:	HP 5890, RTX-5, 30 M X 0.53 mm, 0.5 µm film thickness
Temperatures:	Injector: 270 °C Detector: 350 °C Column: 160 °C for 1 min. Program Rate 1: 240 °C@ 20 °C/min, hold 2 min. Program Rate 2: 270 °C @ 20 °C/min, hold 6 min.
Carrier Gas:	Hydrogen
Makeup Gas:	Nitrogen
Gas Flow:	Hydrogen: 8 mL/minute Nitrogen: 30 mL/minute
Injection Volume:	1 µL

Method validation: Transferable turf residue cloths were analyzed using method ARTF-AM-021. This analytical method utilized for the determination of chlorothalonil from cloth samples was validated by Ricerca Biosciences, LLC prior to initiation of the study. Results for the method validation were said to have met EPA guidelines for recoveries, however the results were not provided in the Study Report. The LOQ for the cloth TTR samples was 1.0 ∝g (0.00179 ∝g/cm^2).

Instrument performance and calibration: Calibration standards were diluted from a 50.0 mg/mL primary stock solution in ethyl acetate received on August 19, 2004. GC standards were prepared from this stock solution by dilution with ethyl acetate. Chlorothalonil concentrations ranged from nominal 0.001 µg/mL to 10.0 µg/mL. The R^2 value (square of the correlation coefficient) for each set of standards was at least 0.99 and the results of back calculating the standards to those curves were generally within + 20% for the lowest standard in the set and + 10% for all other standards. At least four calibration standards were run with each set.

Quantification: Chromatographic quantification was achieved using a standard curve obtained from peak heights or areas of injections of several concentrations of standards. The peak areas were converted to a µg amount using the best-fit line created with the calibration standards in each run sequence.

8. Quality Control:

Lab Recovery: Concurrent laboratory fortifications were analyzed with each set of samples to evaluate the validity of the analytical data. Each set of samples was run with one blank and two fortified controls at spike levels ranging from 10 µg to 10,000 µg. The average percent recoveries for each spike level was 96.7±17.8%, 96.2±17.9%, 87.9±10.7% and 100% for the 10 µg, 1,000 µg, 2,000 µg and 10,000 µg levels, respectively. All of the percent recoveries ranged from 70.9% to 127%.

Field blanks: One field blank was prepared with each set of field fortification samples for each turf type. There were no chlorothalonil residues detected above the LOQ in the field blanks. The control TTR samples were collected from untreated areas throughout the golf course prior to the start of the study on September 10 and 11, 2004. This was before the first initial application of the test substance to the TTR area on September 12, 2004. The study was to begin on this date, but was postponed to October 3, 2004 due to a significant rainfall event on the day after application. No field blanks were collected between the application on September 12, 2004 and the application on October 2, 2004.

Field recovery: The control TTR samples collected on September 10 and 11, 2004 throughout the untreated golf course were used for the field fortification samples. Triplicate samples of TTR cloth were fortified with 10, 50 and 1,000 µg of chlorothanil on each of the sampling days and immediately placed into frozen storage without exposure to ambient conditions. These samples were stored

and analyzed with the test samples. Table 3 summarizes the range of field fortification concentrations used and the overall average recoveries for each of the sampling days. The overall average recoveries ranged from 96.3% to 105% with standard deviations ranging from 19.7 to 25.0%. All mean recoveries were within the acceptable range of 70% to 120%. One low level field fortification sample on Study Day 2 was dropped because it appeared to have been spiked at the mid-level.

Table 3. Summary of Field Fortification Recoveries

Study Day[1]	Fortification Level	Amount Fortified (µg)	Average Recovery (%)	Overall Average Recovery (%)	Standard Deviation
1	Low	10	73.7	96.3	23.4
	Medium	50	94.9		
	High	1000	120		
2	Low	10	118	98.0	23.0
	Medium	50	95.1		
	High	1000	87.7		
3	Low	10	95.4	99.5	19.7
	Medium	50	89.5		
	High	1000	114		
4	Low	10	117	105	25.0
	Medium	50	112		
	High	1000	85.9		

1. Study Day 1 = 1 Day After Single Application on October 3, 2004 (Trial #1)
   Study Day 2 = 2 Days After Single Application on October 3, 2004 (Trial #1)
   Study Day 3 = 1 Day After Single Application on October 5, 2004 (Trial #2)
   Study Day 4 = 2 Days After Single Application on October 5, 2004 (Trial #2)

Formulation: The test product used in this study was a flowable liquid containing a nominal 54% active ingredient (ai) chlorothalonil. According to the GLP analysis, the test product contained 53.4% (w/w) active ingredient (Certificate of Analysis A12531B, 8/13/04). The Analytical Report stated that the analytical standard of chlorothalonil had a purity of 99.5% (expires September 2008).

Tank mix: Not reported.

Travel Recovery: No travel spikes were prepared for cloth TTR samples.

Storage Stability: According to the study author, frozen storage stability of chlorothalonil was demonstrated in previous studies for all matrices. These results were not provided in this Study Report. The longest interval between sample collection/frozen storage and thawing for analysis was approximately 9 months. The study author states that the results from this study indicate that chlorothalonil was generally stable under field conditions, during transit, and during storage, and no significant sample degradation occurred.

II. RESULTS AND CALCULATION

The study author corrected all raw residue values using the mean recovery of the closest field fortification level over all four sampling days. All raw residue values ≥ LOQ were corrected to 100% recovery. The registrant did not conduct any statistical tests for outliers in this data set.

Versar re-corrected all of the raw residue values using the mean recovery of the closest field fortification level from each of the corresponding reentry days. All raw residue values > LOQ were corrected for average field fortification recoveries < 90%. Tables 4 through 11 summarize the raw residue values and corrected residue values for each sampling interval on each monitoring day and each turf type. Average values and standard deviations could not be calculated because only one sample was collected at each 30 minute sampling interval.

Figures 1 through 4 present decline graphs for the TTR values by Study Day (Days 1 through 4 separately) and Figures 5 and 6 present decline graphs for the TTR values by the day after treatment (Study Days 1 and 3 combined and Study Days 2 and 4 combined). The plots show a general decline in TTR values over the sampling duration. However, the plots show a spike in the morning on the second day after the first application for both the greens and fairways. In the morning the turf was wet from dew. Additionally, the TTR values from the second application event were generally lower than the corresponding TTR values from the first application event, especially on the second day after application.

Worker-specific TTR measurements corresponded to the turf type involved (greenway or fairway) in each worker's task and to the portion of the day during which the worker was monitored. All of the TTR samples collected during the time the specific worker was performing his task were averaged together to calculate the worker-specific average TTR value. When available, TTR samples taken just before and just after each worker's monitoring period were included in the average. Tables 12 and 13 provide a summary of the worker-specific average TTR measurements for the tasks performed on the greens and fairways. Worker-specific average TTR values for tasks performed on the greens ranged from 0.014 $\mu g/cm^2$ (worker who watered the greens in the afternoon on Study Day 4) to 2.80 $\mu g/cm^2$ (worker changing cups first thing in the morning on Study Day 1). Worker-specific average TTR values for tasks performed on the fairways ranged from 0.021 $\mu g/cm^2$ (worker repairing irrigation lines in the late afternoon on Study Day 4) to 1.46 $\mu g/cm^2$ (worker mowing the fairways first thing in the morning on Study Day 1). There were no raw residue values below the LOQ (0.0018 $\mu g/cm^2$).

III DISCUSSION

A. LIMITATIONS OF THE STUDY:

Although the purpose of this study was to calculate worker-specific TTR values which were used to calculate worker transfer coefficients, the data were generated from studies designed to fulfill the requirements of OPPTS Series 875, Occupational and Residential Exposure Test Guidelines, Group B: Post-application Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turfs. The data presented in this study met the majority of the pertinent guidelines. The issues of concern are:

(1) Approximately 50% of the residues in the TTR samples were greater than the highest field fortification level of 1,000 µg/sample. The residues greater than 1,000 µg/sample ranged from 1,005 to 20,675 µg/sample (up to ~20 times higher). However, the high level laboratory fortification was closer to the level of residues detected on the cloth samples.

(2) Only one location was used in this study (Oregon).

(3) A rainfall event occurred on the morning of Study Day 3 (1 day after the second application event) prior to the monitoring period. Additionally, a light drizzle was apparent for 20 minutes in the afternoon on this monitoring day.

(4) The guidelines recommend a minimum of three replicates per sampling interval. In this study only one sample was collected at each sampling interval. However, each worker-specific TTR value is an average of values from 4 to 11 sampling intervals.

(5) The protocol target application rate was set at 5.5 lb ai/acre; however, the maximum label recommended application rate for a single application was 11.3 lbs ai/A.

(6) Data from a 9-month storage stability test that was conducted previously were not provided in the Study Report; however, field fortification and travel recoveries indicated acceptable storage stability.

(7) The test substance was initially applied to the turf on September 12, 2004. Due to a significant rain event on the day after application, the study was postponed until October 3, 2004. The control samples used in the study were collected prior to September 12, 2004. There were no TTR samples control sample collected between September 12, 2004 and October 3, 2004.

B. CONCLUSIONS:

The worker-specific TTR values were similar to those calculated by the study author. The difference in the values is due to the different correction methods used by the study author and Versar. The study author corrected all raw residues for all recoveries (to 100% recovery) and used the average recovery value for all monitoring days. Versar only corrected raw residues for

field fortification recoveries <90% and used the average recovery for the corresponding monitoring day.

Table 4. Transferable Residue Data for Greens Turf on Study Day 1 (Application 1 / Day 1)				
Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	16,866	NA	16,866	3.03
30	20,675	NA	20,675	3.71
60	7,907	NA	7,907	1.42
90	17,005	NA	17,005	3.05
120	2,301	NA	2,301	0.413
150	6,243	NA	6,243	1.12
180	5,571	NA	5,571	1.00
210	3,929	NA	3,929	0.705
240	4,084	NA	4,084	0.733
270	3,711	NA	3,711	0.666
300	3,220	NA	3,220	0.578
330	4,377	NA	4,377	0.786
360	638	NA	638	0.115
390	466	NA	466	0.084
420	1,534	NA	1,534	0.276
450	1,119	NA	1,119	0.201
480	538	NA	538	0.097
510	1,155	NA	1,155	0.207
540	505	NA	506	0.091

1. Samples did not require correction because the medium and high level fortification recoveries for Study Day 1 were >90% and there were no residues < 30 µg/cm^2 which would have required a correction of 73.7% for the low level fortification recovery. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 5. Transferable Residue Data for Greens Turf on Study Day 2 (Application 1 / Day 2)				
Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	12,905	87.7	14,715	2.64
30	8,334	87.7	9,503	1.70
60	4,658	87.7	5,311	0.953
90	15,153	87.7	17,278	3.10
120	2,326	87.7	2,652	0.476
150	1,241	87.7	1,415	0.254
180	1,874	87.7	2,137	0.383
210	1,954	87.7	2,228	0.400
240	3,960	87.7	4,515	0.810
270	1,093	87.7	1,246	0.224
300	4,575	87.7	5,217	0.936
330	6,488	87.7	7,398	1.33
360	3,691	87.7	4,209	0.755
390	446	NA	446	0.080
420	1,836	87.7	2,094	0.376
450	1,147	87.7	1,308	0.235
480	1,048	87.7	1,195	0.214
510	1,222	87.7	1,393	0.250
540	1,334	87.7	1,521	0.273

1. Study Day 2 samples with residues >525 µg/sample required correction for the high level field fortification recovery of 87.7%. The field fortification recoveries for the low and mid levels were >90%. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 6. Transferable Residue Data on Greens Turf for Study Day 3 (Application 2 / Day 1)				
Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	2,364	NA	2,364	0.424
30	2,587	NA	2,587	0.464
60	3,002	NA	3,002	0.539
90	3,374	NA	3,374	0.605
120	3,139	NA	3,139	0.563
150	2,350	NA	2,350	0.422
180	2,040	NA	2,040	0.366
210	1,005	NA	1,005	0.180
240	504	89.5	563	0.101
270	671	NA	671	0.120
300	718	NA	718	0.129
330	502	89.5	561	0.101
360	449	89.5	501	0.090
390	471	89.5	527	0.095
420	989	NA	989	0.178
450	1,195	NA	1,195	0.214
480	1,271	NA	1,271	0.228
510	1,470	NA	1,470	0.264
540	820	NA	820	0.147

1. Study Day 3 samples with residues between 30 and 525 µg/sample required correction for the mid level field fortification recovery of 89.5%. The field fortification recoveries for the low and high levels were >90%. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 7. Transferable Residue Data for Greens Turf on Study Day 4 (Application 2 / Day 2)

Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	118	NA	118	0.021
30	356	NA	356	0.064
60	428	NA	428	0.077
90	408	NA	408	0.073
120	503	NA	503	0.090
150	502	NA	502	0.090
180	337	NA	337	0.060
210	372	NA	372	0.067
240	274	NA	274	0.049
270	343	NA	343	0.062
300	56.0	NA	56.0	0.010
330	72.4	NA	72.4	0.013
360	72.7	NA	72.7	0.013
390	89.4	NA	89.4	0.016
420	75.9	NA	75.9	0.014
450	102	NA	102	0.018
480	96.3	NA	96.3	0.017
510	87.8	NA	87.8	0.016
540	94.4	NA	94.4	0.017
570	111	NA	111	0.020
600	107	NA	107	0.019

1. Samples did not require correction because the low and medium level fortification recoveries for Study Day 4 were >90% and there were no residues > 525 µg /sample which would have required a 85.9% correction for the high level fortification recovery. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 8. Transferable Residue Data for Fairway Turf on Study Day 1 (Application 1 / Day 1)				
Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	7,280	NA	7,280	1.31
30	6,720	NA	6,720	1.21
60	19,113	NA	19,113	3.43
90	7,678	NA	7,678	1.38
120	4,031	NA	4,031	0.724
150	3,948	NA	3,948	0.709
180	6,089	NA	6,089	1.093
210	1,869	NA	1,869	0.336
240	780	NA	780	0.140
270	640	NA	640	0.115
300	501	NA	501	0.090
330	621	NA	621	0.111
360	3,140	NA	3,140	0.564
390	876	NA	876	0.157
420	677	NA	677	0.122
450	1,298	NA	1,298	0.233
480	607	NA	607	0.109
510	754	NA	754	0.135

1. Samples did not require correction because the medium and high level fortification recoveries for Study Day 1 were >90% and there were no residues < 30 µg/cm^2 which would have required a correction of 73.7% for the low level fortification recovery. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 9. Transferable Residue Data for Fairway Turf on Study Day 2 (Application 1 / Day 2)				
Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	5,596	87.7	6,381	1.14
30	5,884	87.7	6,709	1.20
60	3,519	87.7	4,013	0.720
90	17,945	87.7	20,462	3.67
120	2,387	87.7	2,721	0.488
150	1,617	87.7	1,844	0.331
180	1,571	87.7	1,792	0.321
210	180	NA	180	0.032
240	1,060	87.7	1,208	0.217
270	40.0	NA	40.0	0.007
300	1,102	87.7	1,256	0.225
330	1,241	87.7	1,415	0.254
360	1,163	87.7	1,326	0.238
390	1,784	87.7	2,034	0.365
420	1,495	87.7	1,704	0.306
450	980	87.7	1,117	0.200
480	541	87.7	617	0.111
510	1,535	87.7	1,751	0.314
540	1,549	87.7	1,766	0.317

1. Study Day 2 samples with residues >525 µg/sample required correction for the high level field fortification recovery of 87.7%. The field fortification recoveries for the low and mid levels were >90%. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 10. Transferable Residue Data for Fairway Turf on Study Day 3 (Application 2 / Day 1)				
Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	9,778	NA	9,778	1.75
30	9,161	NA	9,161	1.64
60	11,966	NA	11,966	2.15
90	9,689	NA	9,689	1.74
120	5,394	NA	5,394	0.968
150	3,404	NA	3,404	0.611
180	2,305	NA	2,305	0.414
210	668	NA	668	0.120
240	1,253	NA	1,253	0.225
270	579	NA	579	0.104
300	704	NA	704	0.126
330	600	NA	600	0.108
360	383	89.5	428	0.077
390	318	89.5	355	0.064
420	975	NA	975	0.175
450	1,159	NA	1,159	0.208
480	895	NA	895	0.161
510	783	NA	783	0.140
540	3,907	NA	3,907	0.701

1. Study Day 3 samples with residues between 30 and 525 µg/sample required correction for the mid level field fortification recovery of 89.5%. The field fortification recoveries for the low and high levels were >90%. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 11. Transferable Residue Data for Fairways Turf on Study Day 4 (Application 2 / Day 2)

Sampling Interval (minutes)	Measured Residue (µg/sample)	Spike-Level Specific Field Recovery (%)	Corrected Residue[1] (µg/sample)	Corrected Residue[2] (µg/cm^2)
0	211	NA	211	0.038
30	940	86	1,094	0.196
60	410	NA	410	0.073
90	438	NA	438	0.079
120	938	86	1,092	0.196
150	424	NA	424	0.076
180	429	NA	429	0.077
210	217	NA	217	0.039
240	103	NA	103	0.019
270	253	NA	253	0.045
300	135	NA	135	0.024
330	993	86	1,156	0.207
360	149	NA	149	0.027
390	156	NA	156	0.028
420	65.0	NA	65.0	0.012
450	100	NA	100	0.018
480	97.8	NA	97.8	0.018
510	116	NA	116	0.021
540	109	NA	109	0.019
570	125	NA	125	0.022

1. Study Day 4 samples with residues > 525 µg /sample required a 85.9% correction for the high level fortification recovery. Samples with residues < 525 µg /sample did not require correction because the low and medium level fortification recoveries were >90%. LOQ = 1.0 µg = 0.00179 µg/cm^2
2. Corrected Residue (µg/cm^2) = Corrected Residue (µg/sample) / Surface area of sample (5,570 cm^2)

Table 12. Worker-Specific TTR Values for Greens Maintenance Tasks			
Replicate	**App # / Reentry Day**	**Time Worked**	**Average TTR ($\mu g/cm^2$)**
Cup Changing			
CC1	1 / 1	0713 - 0849	2.803 (n = 4)
CC2	1 / 1	0722 - 0934	2.124 (n = 6)
CC3	1 / 2	0710 - 0951	1.359 (n = 7)
CC4	2 / 1	0754 - 0943	0.503 (n =6)
CC5	2 / 2	0727 - 0907	0.065 (n = 5)
CC6	2 / 2	0723 - 0839	0.059 (n =4)
Greens Mowing			
GM1	1 / 1	0803 - 1043	1.632 (n = 7)
GM2	1 / 1	0814 - 1108	1.520 (n = 8)
GM3	1 / 2	0810 - 1108	1.010 (n = 8)
GM4	1 / 2	0828 - 1045	0.911 (n = 7)
GM5	2 / 1	0800 - 1042	0.483 (n = 7)
GM6	2 / 1	0818 - 1052	0.445 (n = 8)
GM7	2 / 2	0807 - 1059	0.071 (n = 8)
GM8	2 / 2	0753 - 1005	0.076 (n = 6)
Greens Watering			
GW1	1 / 1	1306 - 1607	0.232 (n = 8)
GW2	1 / 1	1312 - 1602	0.232 (n = 8)
GW3	1 / 2	1301 - 1608	0.439 (n = 8)
GW4	1 / 2	1256 - 1556	0.439 (n = 8)
GW5	2 / 1	1246 - 1505	0.132 (n = 7)
GW6	2 / 1	1508 - 1725	0.206 (n = 5)
GW7	2 / 2	1238 - 1452	0.014 (n = 7)
GW8	2 / 2	1455 - 1701	0.018 (n = 6)

1. The Average TTR value is an average of individual TTR values that correspond to the turf type involved (greens) in each worker's task and to the portion of the day during which the worker was monitored. When available, TTR samples taken just before and just after each worker's monitoring period were included in the average.

Table 13. Worker-Specific TTR Values for Fairway Maintenance Tasks			
Replicate	**App # / Reentry Day**	**Time Worked**	**Average TTR[1] ($\mu g/cm^2$)**
Fairway Mowing			
FM1	1 / 1	0731 - 0944	1.459 (n = 6)
FM2	1 / 1	0747 - 1147	1.044 (n = 10)
FM3	1 / 2	0738 - 1114	0.903 (n = 9)
FM4	1 / 2	0732 - 9333	1.260 (n = 6)
FM5	2 / 1	0838 - 1306	0.895 (n = 11)
FM6	2 / 1	0850 - 1126	1.091 (n = 7)
FM7	2 / 2	0736 - 1134	0.084 (n = 10)
FM8	2 / 2	0746 - 1002	0.110 (n = 6)
Irrigation Repair			
IR1	1 / 1	0913 - 1154	0.642 (n = 7)
IR2	1 / 1	1221 - 1545	0.182 (n = 9)
IR3	1 / 2	0744 - 1043	0.989 (n = 8)
IR4	1 / 2	1246 - 1548	0.252 (n = 8)
IR5	2 / 1	0851 - 1204	0.983 (n = 8)
IR6	2 / 1	1410 - 1656	0.218 (n = 7)
IR7	2 / 2	1159 - 1538	0.042 (n = 10)
IR8	2 / 2	1350 - 1703	0.021 (n = 8)
Miscellaneous Grooming			
MG1	1 / 1	1233 - 1602	0.182 (n = 9)
MG2	1 / 2	0834 - 1117	0.826 (n = 7)
MG3	1 / 2	1239 - 1558	0.259 (n = 9)
MG4	2 / 1	0814 - 1151	1.069 (n = 9)
MG5	2 / 1	1228 - 1533	0.136 (n = 8)
MG6	2 / 2	0907 - 1214	0.069 (n = 8)

1. The Average TTR value is an average of individual TTR values that correspond to the turf type involved (fairway) in each worker's task and to the portion of the day during which the worker was monitored. When available, TTR samples taken just before and just after each worker's monitoring period were included in the average.

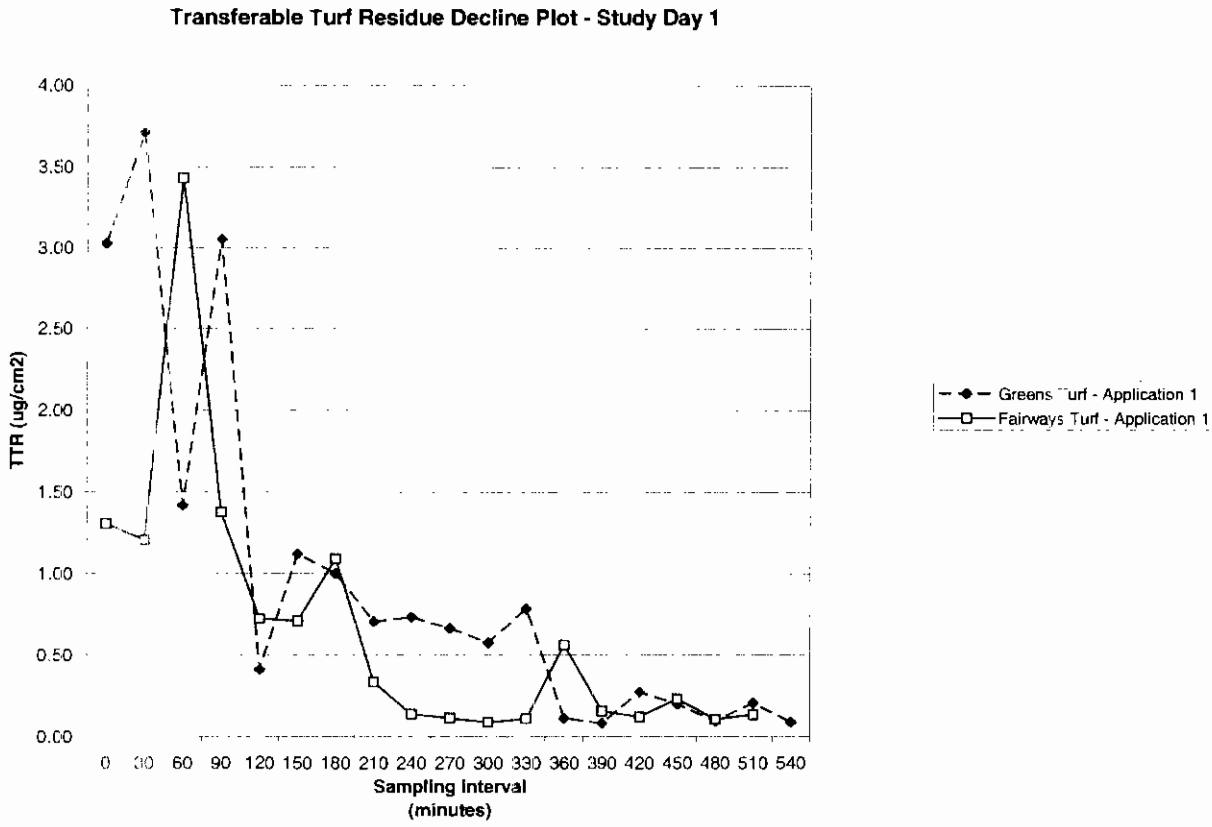

Figure 1. Decline Plot – Study Day 1 (Application 1 / Day 1)

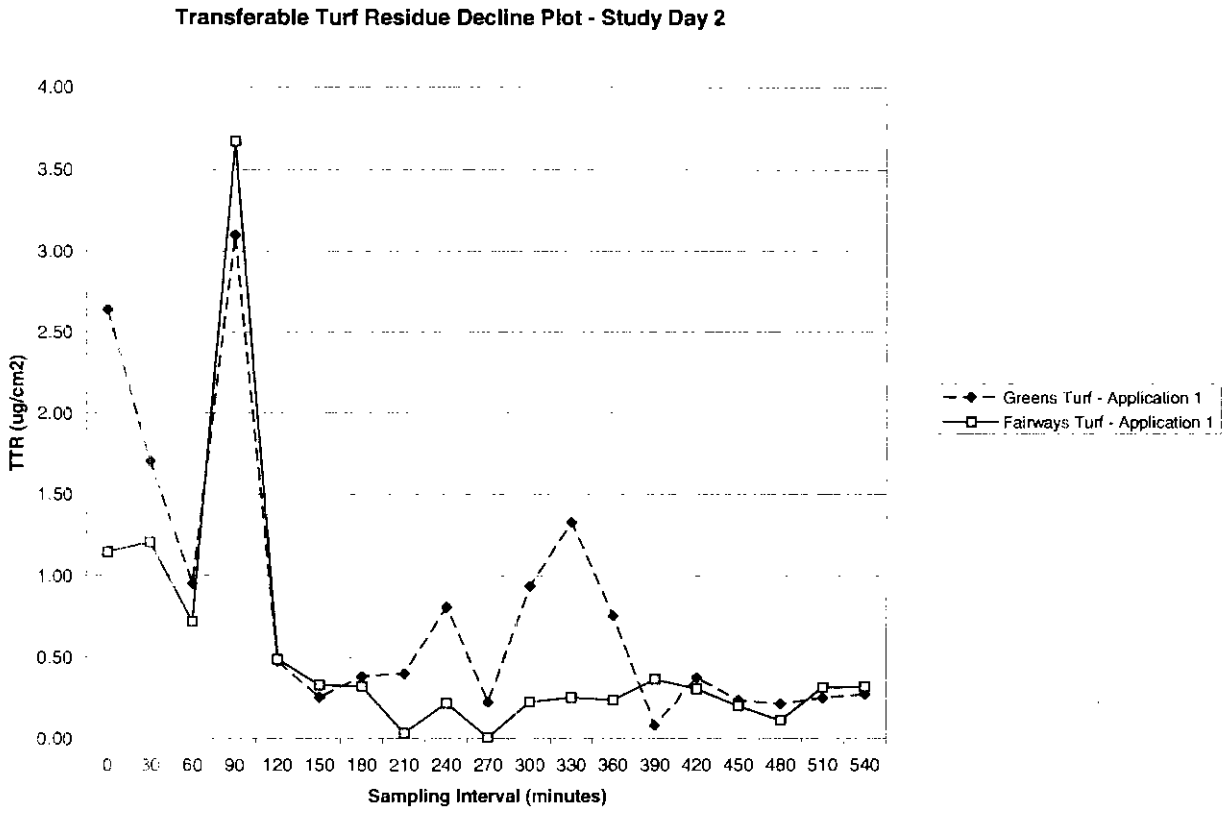

Figure 2. Decline Plot – Day 2 (Application 1 / Day 2)

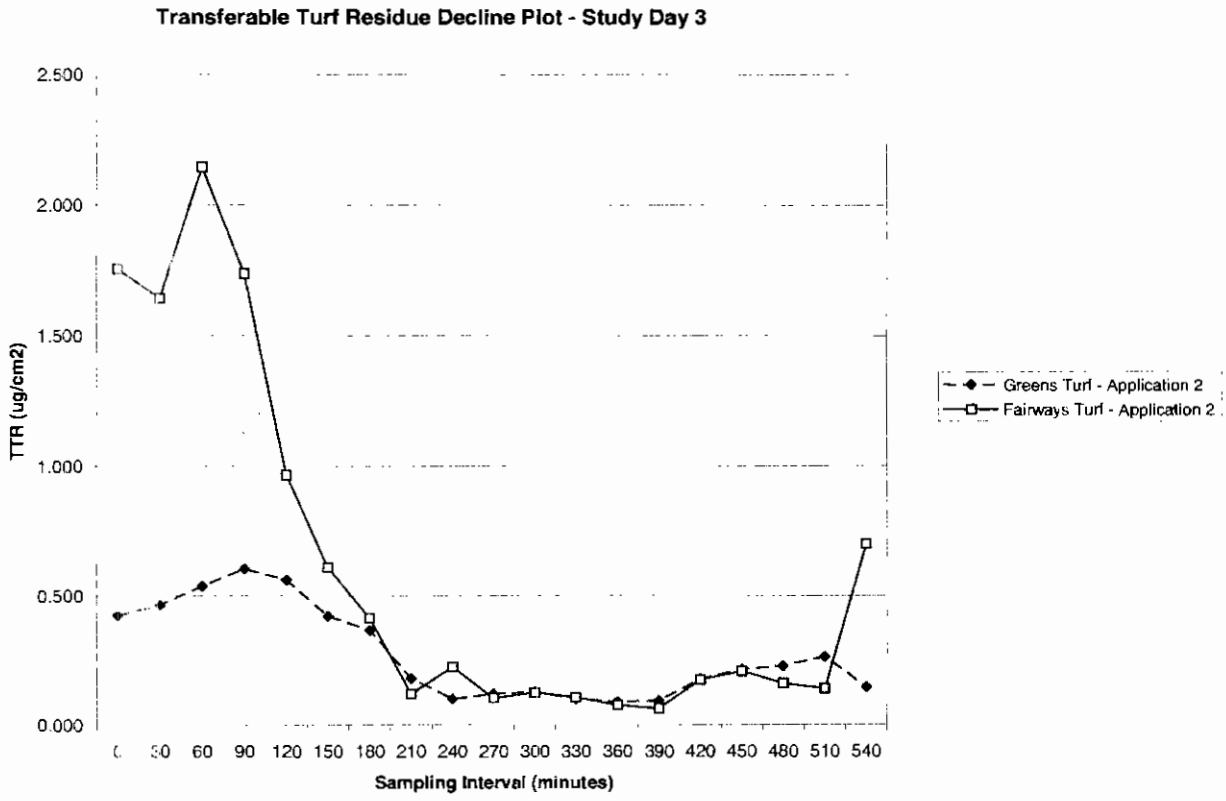

Figure 3. Decline Plot – Day 3 (Application 2 / Day 1)

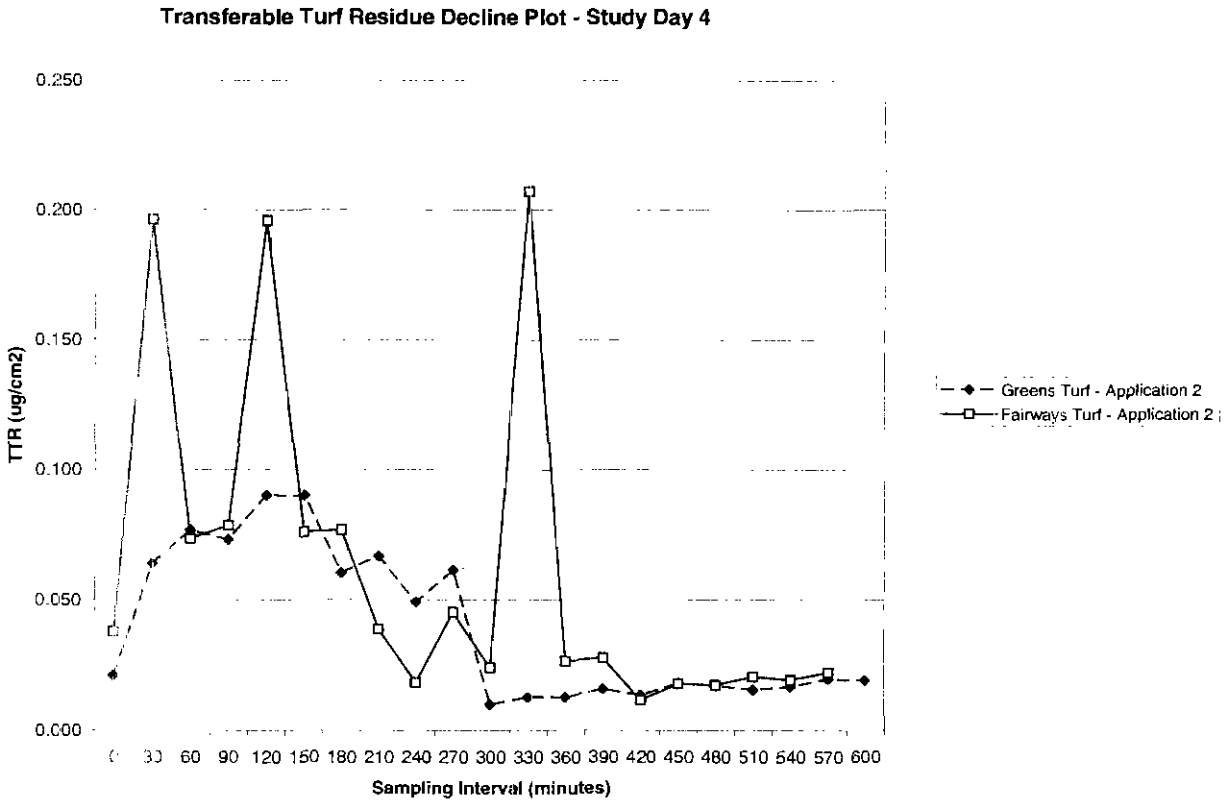

Figure 4. Decline Plot – Day 4 (Application 2 / Day 2)

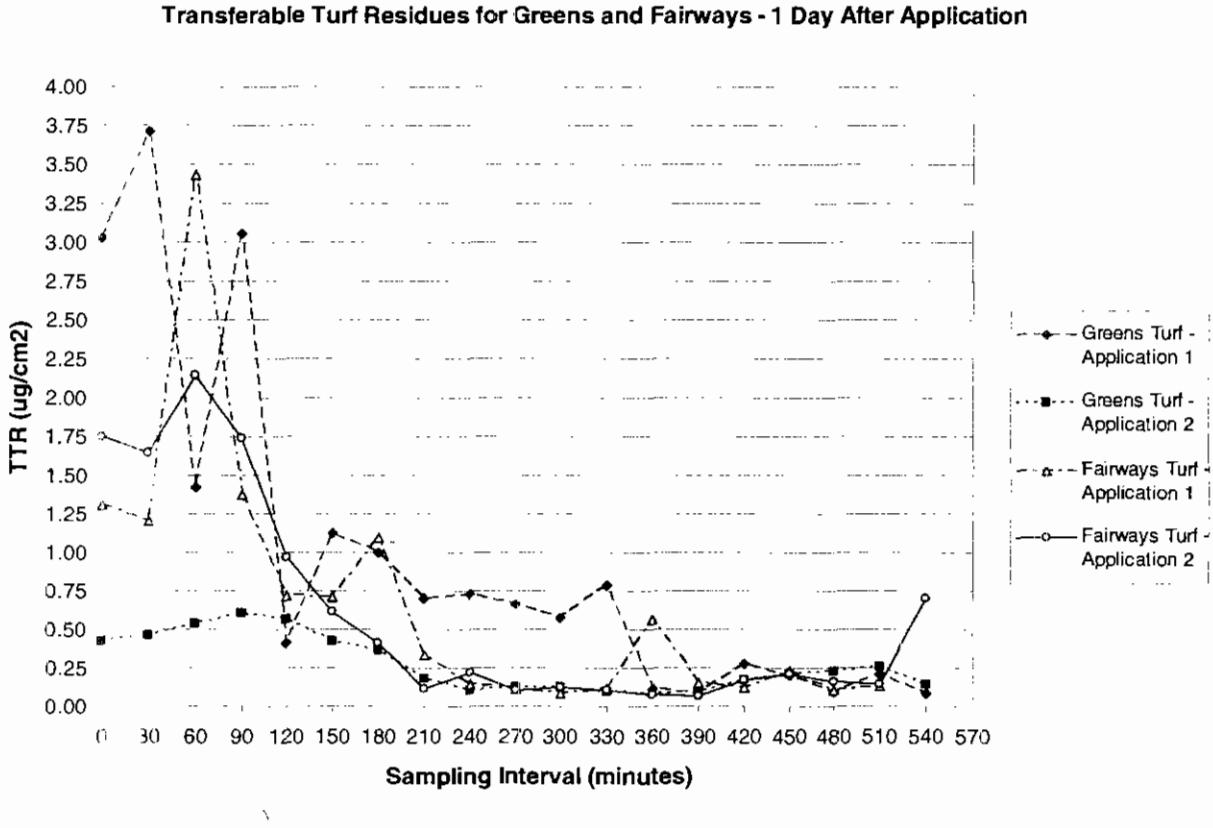

Figure 5. Decline Plot – 1 Day After Application (Study Days 1 and 3)

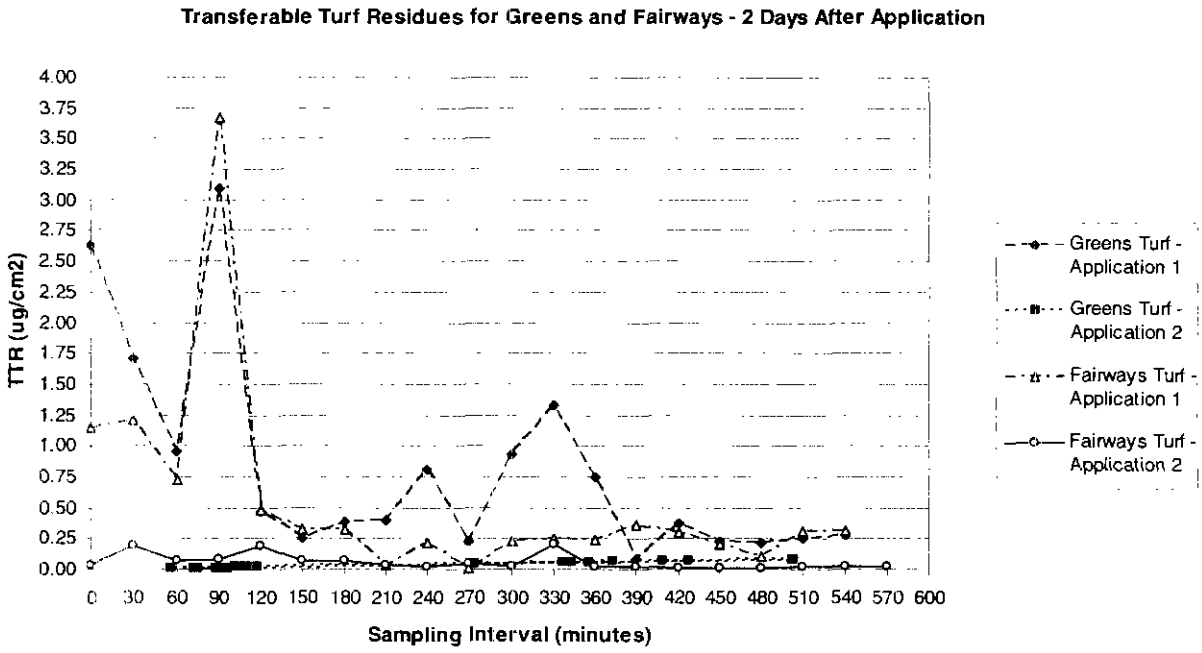

Figure 6. Decline Plot – 2 Days After Application (Study Days 2 and 4)

APPENDIX A

Compliance Checklist for "Transferable Foliar Residues of Chlorothalonil on Turf"

Compliance Checklist

Compliance with OPPTS Series 875, Occupational and Residential Exposure Test Guidelines, Group B: Post-application Exposure Monitoring Test Guidelines, 875.2100, Transferable Residue Dissipation, Lawn and Turf, is critical. The purpose of this study was to calculate worker-specific TTR values for chlorothalonil which were then used to calculate worker transfer coefficients; therefore, not all of the guideline requirements in the itemized checklist below apply to this study.

- *The test substance must be the typical end use product of the active ingredient.* This criterion was met.

- *The production of metabolites, breakdown products, or the presence of contaminants of potential toxicologic concern, should be considered on a case-by-case basis.* It is not certain if this criterion was met. The study did not discuss metabolites or breakdown products of chlorothalonil.

- *Applications should occur at the time of season that the end-use product is normally applied to achieve intended pest control.* This criterion was met.

- *Initiating testing immediately before a precipitation event should be avoided. Applications should be made after mowing and watering.* This criterion was partially met. A rainfall event occurred on the morning of Study Day 3 (Trial #2, 2 Days after Application) prior to the monitoring period. Additionally, a light drizzle was apparent for 20 minutes in the afternoon of the monitoring activities on this monitoring day.

- *The end use product should be applied by the application method recommended. Formulations which can be applied in a minimal amount of water and do not require "watering in" should be used. Information that verifies that the application equipment (e.g., sprayer) was properly calibrated should be included.* These criteria were mostly met. It was stated that all of the application equipment were calibrated; however, details of the calibration procedure were not provided. The test product was not watered in.

- *The application rate used in the study should be provided and should be the maximum rate specified on the label. However, monitoring following application at a typical application rate is more appropriate in certain cases.* This criterion was not met. The application rate used was 5.5 lbs ai/A. This less-than-maximum application rate was selected to better represent the application rate of typical golf course turf products. The maximum label recommended application rate for a single application was 15.1 pints/A (11.3 lbs ai/A).

- *If multiple applications are made, the minimum allowable interval between applications should be used.* This criterion does not apply. Only one application was made for each test plot.

- *Turf transferable residue (TTR) data should be collected from at least three geographically distinct locations for each formulation. The sites should be representative of the regions (and*

turf types) where the chemical is used. This criterion was not met. TTR residue data were collected from only one location in Oregon.

- *The site(s) treated should be representative of reasonable worst-case climatic conditions expected in intended use areas. Meteorological conditions including temperature, wind speed, daily rainfall, and humidity should be provided for the duration of the study.* These criteria were partially met. It is uncertain if the location used was representative of worst-case climatic conditions. Historical meteorological data were not provided in the Study Report.

- *Sampling should be sufficient to characterize the dissipation mechanisms of the compound (e.g., three half-lives or 72 hours after application, unless the compound has been found to fully dissipate in less time; for more persistent pesticides, longer sampling periods may be necessary). Sampling intervals may be relatively short in the beginning and lengthen as the study progresses. Background samples should be collected before application of the test substance occurs.* These criteria do not apply to this study. However, background (control) samples were collected before the test product was applied to the turf.

- *Triplicate, randomly collected samples should be collected at each sampling interval.* This criterion was not met. Only one turf sample replicate was collected at each sampling interval. However, the worker-specific TTRs were an average samples from 4 to 11 sampling intervals.

- *Samples should be collected using a suitable methodology (e.g., California Cloth Roller, Polyurethane Roller, Drag Sled, etc.) for turf.* This criterion was met. Turf residue samples were collected using the modified California Cloth Roller methodology.

- *Control plots should be established from which sufficient control samples can be collected. Control sites should be upwind and a reasonable distance from the treatment site.* These criteria were not met. A separate control plot was not used at this test site. Control samples were collected from each plot prior to the application.

- *Residues should be dislodged from turf within a reasonable time period (i.e., EPA recommends that dislodging occur within 4 hours). Other transferable method samples should be handled in a manner that is appropriate to the method used.* This criterion was met. The modified California cloth roller was used for the cloth dosimeters. Extraction of the residues from the cloth sample occurred just prior to analysis of the samples.

- *Samples should be stored in a manner that will minimize deterioration and loss of analytes between collection and analysis. Information on storage stability should be provided.* According to the study author, frozen storage stability of chlorothalonil was demonstrated in previous studies for all matrices. However, the data were not provided. The author also stated that the results from the field fortification samples and travel spikes demonstrated the stability of chlorothalonil while in frozen storage.

- *Validated analytical methods of sufficient sensitivity are needed. Information on method efficiency (residue recovery), and limit of quantitation (LOQ) should be provided.* These criteria

were mostly met. The study author stated that the analytical methods were all validated, but the results were not provided in the Study Report. The LOQ for TTR samples was 0.010 µg/sample.

- *Information on recovery samples must be included in the study report. A complete set of field recoveries should consist of at least one blank control sample and three or more each of a low-level and high-level fortification. These fortifications should be in the range of anticipated residue levels in the field study.* These criteria were met.

- *Raw residue data must be corrected if appropriate recovery values are less than 90 percent. Distributional data should be reported, to the extent possible.* This criterion was met. The study author corrected all raw residue values using the mean recovery of the closest field fortification level from all four reentry days. All raw residue values ≥ LOQ were corrected to 100% recovery.

- R*esidue data expressed as ug/cm*^{2}. This criterion was met.

13544

R132529

Chemical: Chlorothalonil

PC Code:
081901

HED File Code: 12000 Exposure Reviews
Memo Date: 9/28/2006
File ID: DPD327361
Accession #: 412-07-0024

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