

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



OFFICE OF PREVENTION,
PESTICIDES AND
TOXIC SUBSTANCES

May12, 2004

Memorandum

SUBJECT: Review of "Dissipation of Transferable Residues of Benefin and Trifluralin on Turf Treated with a Formulation of the Pesticides"

FROM: Shanna Recore, Industrial Hygienist
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Attached is a review of the trifluralin turf transferable residue data submitted by Dow AgroSciences LLC. This review was completed by Versar, Inc. on April 9, 2004, under supervision of HED. It has undergone secondary review in HED and has been revised to reflect Agency policies.

Executive Summary

The data collected, reflecting the turf transferable residues, meet most of the criteria specified by the U.S. Environmental Protection Agency's (US-EPA) 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.**

Summary

This study was designed to characterize dissipation of benefin and trifluralin transferable turf residues when applied to turf at three test sites in California, Indiana, and Mississippi. Team 2G, formulated as a granular containing 1.33% benefin and 0.67% trifluralin was applied one time to separate plots at each site using ground application equipment. Each application was made at the maximum target application rate of 2.0 lbs benefin/1.0 lb trifluralin per acre). Transferable turf residues (TTR) were collected using the modified California Roller Technique. The application method, rate, and frequency (number and timing) were relevant to the use pattern proposed by the product label. Three samples from each treated plot were collected at each location immediately after each application and then at 1, 2, 4, and 7 days after the application. At all three sites (CA, IN, and MS), the raw TTR values did not require correction for field fortification recoveries, as the overall average percent recovery was >90%. At the California site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0026 $\mu\text{g}/\text{cm}^2$ and 0.00138 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, no residues were detectable. At the Indiana site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0021 $\mu\text{g}/\text{cm}^2$ and 0.0011 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, no residues were detectable. At the Mississippi site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0012 $\mu\text{g}/\text{cm}^2$ and 0.00077 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, no residues were detectable.

Conclusion

The study completed in support of the regulatory requirements contained the following omissions and flaws with respect to OPPTS Series 875 Test Guidelines. The most important discrepancies and issues of concern was that:

- separate control plots were not established at each site.

This study met most of the Series 875.2100 Guidelines and the results will be used by HED in the trifluralin Tolerance Reassessment Eligibility Decision Document.

Reviewer: Bill Smith **Date** April 9, 2004

STUDY TYPE: Determination of Transferable Turf Residue Dissipation from Turf Treated with Team 2G

TEST MATERIAL: Team 2G is formulated as a granular containing 1.33% benefin and 0.67% trifluralin as the active ingredients.

SYNONYMS: Benefin: benfluralin, -Butyl-N-Ethyl-2,6-Dinitro-4-(Trofluoromethyl)Benzenamine
Trifluralin: Benzenamine, 2,6-Dinitro-N,N-Dipropyl-4-(Trofluoromethyl)-

CITATION: Authors: E. M. Bargar
Title: *Dissipation of Transferable Residues of Benefin and Trifluralin on Turf Treated with a Formulation of the Pesticides*
Report Date: July 26, 2002 (amended study date)
Analytical Laboratory: Global Environmental Chemistry Laboratory-Indianapolis Lab
Dow AgroSciences LLC
9330 Zionsville Road
Indianapolis, Indiana 46268-1054

Identifying Codes: MRID 457456-01; Laboratory Study ID RES97075

SPONSOR: Dow AgroSciences LLC

EXECUTIVE SUMMARY:

This study was designed to characterize dissipation of benefin and trifluralin transferable turf residues when applied to turf at three test sites in California, Indiana, and Mississippi. Team 2G, formulated as a granular containing 1.33% benefin and 0.67% trifluralin was applied one time to separate plots at each site using ground application equipment. Each application was made at the maximum target application rate of 2.0 lbs benefin/1.0 lb trifluralin per acre). Transferable turf residues (TTR) were collected using the modified California Roller Technique. The application method, rate, and frequency (number and timing) were relevant to the use pattern proposed by the product label. Three samples from each treated plot were collected at each location immediately after each application and then at 1, 2, 4, and 7 days after the application. At all three sites (CA, IN, and MS), the raw TTR values did not require correction for field fortification recoveries, as the overall average percent recovery was >90%. At the California site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0026 $\mu\text{g}/\text{cm}^2$ and 0.00138 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, no residues were detectable. At the Indiana site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0021 $\mu\text{g}/\text{cm}^2$ and 0.0011 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, no residues were detectable. At the Mississippi site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0012 $\mu\text{g}/\text{cm}^2$ and 0.00077 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, no residues were detectable.

This study met most of the Series 875.2100 Guidelines (See Appendix A). The only issue of concern is:

- separate control plots were not established at each site.

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 Report indicated that the study was conducted under EPA Good Laboratory Practice Standards (40 CFR Part 160), with the following exceptions: (1) documentation is incomplete by GLP standards for weather/meteorological data and (2) documentation is incomplete by GLP standards for turf and pesticide history. According to the study author, these GLP deviations did not compromise the scientific integrity of the study.

CONCURRENT EXPOSURE STUDY?: No

GUIDELINE OR PROTOCOL FOLLOWED: According the study authors, an accepted protocol was used; however, the protocol was not provided with the Study Report. 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: Team 2G is a granular formulation that contains 1.33% benefin and 0.67% trifluralin.

Lot/Batch # formulation: No lot or batch number was provided in the Study Report.

Formulation guarantee: The stability and homogeneity of the active ingredients in the formulation were established prior to the conduct of this study (Report No. FA&PC 973042). Detailed results were not provided in the Study Report.

CAS #(s): 1861-40-1 (benefin)
1582-09-8 (trifluralin)

Other Relevant Information: EPA Reg No.: 62719-137

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

According to the Study Report, the test product sent to the field sites was Team 2G containing 1.33% benefin and 0.67% trifluralin. No label was provided with the Study Report; however, using the OPP Pesticide Products Database, Versar located a label for EPA Registration No. 62719-137. This label had the same product name (Team 2G) and active ingredients (1.33% benefin and 0.67% trifluralin) as the test product, thus they appear to be the same products.

B. STUDY DESIGN

According to the Study Report, the deviations to the study protocol (which was not provided with the Study Report) are as follows: (1) values of the percent active ingredient and last analysis date, although known prior to application, were not added to the study file until after application of the test material; (2) Application of the test materials at one site was approximately 8-% of that stated in the protocol; and (3) Protective foot coverings were not changed during the daily sampling because samplers did not walk in the treated areas. The study authors stated that these deviations had no effect on the integrity of the data generated for this study.

As this report is an amended version of a previous report (MRID No. 449983-01), the amendment changes were as follows: (1) in the application section, the range of application rates was changed to reflect the re-calculated values; (2) the applied rate and percent of target application for the CA site were changed to reflect the re-calculated values; and (3) the actual application rate and percent of target application for the CA site were changed to reflect the re-calculated values. These amendments were necessary as calculation errors on the application for the CA site were discovered in the original Study Report. The study authors stated that the corrections had no impact on the study since the corrected values did not affect the interpretation or results of the study.

1. Site Description

Test locations: The field portion of the study was conducted in Fresno County, California (Experiment No. 97075CA), in Hancock County, Indiana (Experiment No. 97075IN), and Washington County, Mississippi (Experiment No. 97075MS).

Areas sprayed and sampled: The test plot at each site measured 100 ft by 10 ft and was divided into three subplots, each measuring 2.5 ft by 6 ft.

Meteorological Data: California
Meteorological data were collected at the California site from a Campbell weather station located one mile from the site. Measurements were collected from June 5 to June 13, 1997. During this time period, the lowest minimum temperature was 54 °F and the highest maximum temperature was 93 °F. There were no precipitation events during the study. Additionally, irrigation was not used. Conditions during the application were as follows: wind speed averaged 2.1 miles per hour (mph) in a southeast direction; air

temperatures averaged 80°F; relative humidity averaged 44%; and the turf surface was dry.

Indiana

Meteorological data were collected at the Indiana site from a Campbell weather station located on-site. Measurements were collected from July 30 to August 7, 1997. During this time period, the lowest minimum temperature was 48°F and the highest maximum temperature was 91°F. There were no precipitation events during the study. Additionally, irrigation was not used. Conditions during the application were as follows: wind speed ranged from 0.9 to 5.1 miles per hour (mph) in an easterly direction; air temperatures averaged 82.0°F; relative humidity averaged 56%; and the turf surface was dry.

Pennsylvania

Meteorological data were collected at the Mississippi site from a Campbell weather station located on-site. Measurements were collected from June 19 to June 27, 1997. During this time period, the lowest minimum temperature was 68°F and the highest maximum temperature was 94°F. One precipitation event occurred on June 24th, totaling 0.15 inches of rainfall at the site. Irrigation was not used at the site. Conditions during the application were as follows: wind speed ranged from 2.0 to 3.0 miles per hour (mph) in a southerly direction; air temperatures averaged 85°F; relative humidity averaged 70%; and the turf surface was dry.

2. Surface Monitored:

California

Turf Species:	Common Bermuda
Residential or Public Area:	Not Provided
Other relevant Characteristics:	The sodding date for the treated plots was unknown. At the time of the application, the grass was considered established turf and was approximately 1.5 inches in height. The grass was mowed just prior to each application.
Other products used on turf (treated plots):	No maintenance chemicals were used on the treated plot for the duration of the study (i.e., control sampling on the day prior to application through the last sampling day).

Indiana

Turf Species:	Bonanza Tall Fescue
Residential or Public Area:	Not Provided
Other relevant Characteristics:	The plots at this site were established in 1992. At the time of the application, the grass was considered established turf and was approximately 3.0 inches in height. The grass was mowed just prior to each application.
Other products used on turf (treated plots):	No maintenance chemicals were used on the treated plot for the duration of the study (i.e., control sampling on the day prior to application through the last sampling day).

Mississippi

Turf Species:	Bermuda/Baryard Grass Mixture (~ 70/30)
Residential or Public Area:	Not Provided
Other relevant Characteristics:	The plots at this site were established in 1997. At the time of the application, the grass was considered established turf and was approximately 3.0 inches in height. The grass was mowed just prior to each application.
Other products used on turf (treated plots):	No maintenance chemicals were used on the treated plot for the duration of the study (i.e., control sampling on the day prior to application through the last sampling day).

3. Physical State of Formulation as Applied

The physical state of the formulation as applied was granular.

4. Application Rates and Regimes

California

Residential or Commercial Applicator: Commercial
Application rate: The target application rate was 2.0 lbs benefin per acre and 1.0 lb trifluralin per acre. The actual application rate was 2.01 lb benefin per acre and 1.0 lb trifluralin per acre.
Application Regime: One application was made to the test site on June 6, 1997.
Application Equipment: Applications were made with a tractor-mounted Gandy Applicator, which was air powered with 4 banders on 30 inch spacing.
Equipment Calibration Procedures: According to the Study Report, the sprayer was calibrated to deposit 16 grams of Team 2G/sec.; however, the raw data for the calibration procedure was not provided.
Was application “watered in”? No
Was total deposition measured? No

Indiana

Residential or Commercial Applicator: Commercial
Application rate: The target application rates were 2.0 lbs benefin per acre and 1.0 lb trifluralin per acre. The actual application rate was 2.02 lb benefin per acre and 1.0 lb trifluralin per acre.
Application Regime: One application was made to the test site on July 31, 1997.
Application Equipment: Applications were made with a tractor-mounted Gandy Applicator, which was air powered with 4 banders on 30 inch spacing.
Equipment Calibration Procedures: Sprayer calibration was performed but the raw data for this calibration was not provided. The sprayer was calibrated to deposit 20.77 grams of Team 2G/sec.
Was application “watered in”? No
Was total deposition measured? No

Mississippi

Residential or Commercial Applicator: Commercial
Application rate: The target application rates were 2.0 lbs benefin per acre and 1.0 lb trifluralin per acre. The actual application rate was 2.02 lb benefin per acre and 1.0 lb trifluralin per acre.
Application Regime: One application was made to the test site on June 20, 1997.
Application Equipment: Applications were made with a tractor-mounted Gandy spreader (drop-granule), with 30 banders on 3 inch spacing.
Equipment Calibration Procedures: Sprayer calibration was performed but the raw data for this calibration was not provided. The sprayer was calibrated to deposit 64.4 grams of Team 2G/sec.
Was application “watered in”? No
Was total deposition measured? No

5. Dislodgeable Residue Sampling Procedures

Method and Equipment: Samples were collected using the California Roller Technique. A weighted foam covered roller (2 ft x 4 in diameter pipe) weighing about 25 lbs was used in this study. The dosimeters were pre-cut, 100% cotton, 200 thread count percale sheets, measuring 2 ft by 3 ft.

Sampling Procedure: The cloth dosimeters were covered by a plastic layer and secured to the sampling media frame. The frame was placed randomly in the subplots. The roller was placed on top of the plastic sheet and rolled back and forth five times without pushing down. The cloth dosimeter was then carefully removed from the surface, and folded with the exposed side inward. They were then placed in a labeled sampling container. Control samples were collected prior to treated samples.

Surface area(s) sampled: Each cloth dosimeter measured 2 ft by 3 ft. However, the laboratory-calculated residue values were based upon an area of 24 inches by 36 inches (5,574 cm²) which represents the area of the cloth in contact with the treated turf when placed in the sampling frame.

Replicates per surface:

- Replicates per sampling time: Cotton cloth samples were collected in duplicate from the treated plots. One sample was also collected from the control plot.
- Number of sampling times: There was a total of 6 sampling events for each plot at each site.

Times of sampling after application: Samples were collected before and after the application and at 1, 2, 4, and 7 days after application (DAT).

6. Sample Handling

Cotton samples were folded (with the exposed part of the cloth inward) and then placed in a labeled sampling container. The samples were put on dry ice or in a freezer within four hours of collection. Samples were maintained under frozen storage until shipped. The samples were shipped in insulated boxes with dry ice by either an overnight or hand delivery to Dow AgroSciences, Sample Management. The samples were stored frozen (approximately -20°C) at Dow AgroSciences until analysis.

7. Analytical Methodology:

Extraction method: Residues of benfenin and trifluralin were extracted from the percale cloth by adding 500 mL of hexane to the cloth samples in 32 ounce plastic coated glass jars. Each sample was mechanically shaken for a minimum of one hour. After the shaking period, an aliquot was removed from each sample and transferred to a gas chromatographic vial and analyzed by gas chromatography (see Table 1).

Detection methods: See Table 1.

Table 1. Summary of GC Operating Conditions

GC Column	J & W Scientific fused silica capillary column, 30 m x 0.25 mm, 0.25 μ m film thickness
Temperatures	Inlet: 250 °C Detector: 325 °C Column Temperatures: Initial = 100 °C, hold 1.5 min.; Final = 300 °C, hold 2 min.
Injection Volume	3 μ L
Run Time	48.5 min.

Method validation: Method validation was performed prior to sample analysis through analysis of matrix blanks (untreated cloth) and analysis of cloth samples fortified with 6, 17, 550 and 8500 μ g of benfenin and trifluralin per cloth sample, respectively. Recovery for the 6, 17, 550 and 8500 μ g benfenin fortification levels were <LOQ, 99 \pm 3.7%, 106 \pm 10.5% and 118 \pm 1.4%, respectively. Recovery for the 6, 17, 550 and 8500 μ g trifluralin fortification levels were <LOQ, 100 \pm 4.1%, 106 \pm 11.1% and 119 \pm 1.3%, respectively. Neither benfenin or trifluralin were detected at concentrations above the LOQ in the matrix blanks. The target LOQ and LOD for both benfenin and trifluralin were 0.003 and 0.001 μ g/cm², respectively. The calculated LOQs and LODs, based on the method validation results, were defined as 0.0012 μ g/cm² and 0.0003 μ g/cm², respectively, for benfenin and 0.0011 μ g/cm² and 0.0003 μ g/cm², respectively, for trifluralin.

Instrument performance and calibration: Calibration standards ranged from 0.003 μ g/cm² to 1.5 μ g/cm².

8. Quality Control:

Lab Recovery: Laboratory recovery samples were analyzed with each analytical sequence of cloth samples. Laboratory recovery values ranged from 908 to 118% for fortification levels from 17 μ g to 8,500 μ g per cloth sample. The overall mean recovery was 106 \pm 8% (n=15) for benfenin and 106 \pm 9% (n=15) for trifluralin.

Field blanks: Single samples were collected from the untreated plot at each field site before application occurred. There were no trifluralin or benfenin residues detected above the LOQ in any of these field blank samples. There were three unfortified field blank samples which were prepared on each of three field fortification dates at each site. Trifluralin or benfenin residues were not detected in these samples at a concentration above the LOQ.

Field recovery: Field fortification samples were prepared in triplicate at three fortification levels (50, 500 and 5,000 $\mu\text{g}/\text{cloth}$) for each field site. The samples used for fortification were subjected to the same rolling technique required for the field samples. The fortification solution was delivered onto the cloth and the solvent was allowed to dry from the cloth as much as possible prior to placing the samples in labeled sample containers and placing them in the freezer prior to shipment to the analytical laboratory. The field fortified samples were shipped and stored frozen for 161 to 236 days under the same conditions as the field samples. Table 2 provides the mean recoveries and standard deviations for each field fortification event at each site. At the 50, 500, and 5,000 μg field fortification levels, overall average recoveries \pm standard deviation were $90 \pm 6.2\%$, $95 \pm 6.0\%$, and $98 \pm 9.8\%$ for benefin and $94 \pm 6.5\%$, $96 \pm 6.2\%$, $98 \pm 9.8\%$ for trifluralin.

Table 2. Summary of Field Fortification Recoveries

Study Site	50 ug Fortification Level		500 ug Fortification Level		5,000 ug Fortification Level	
	Percent Recovery	Average \pm Std Dev	Percent Recovery	Average \pm Std Dev	Percent Recovery	Average \pm Std Dev
Benefin						
California	86	91 ± 9.0	84	91 ± 6.4	82	88 ± 5.5
	101		95		88	
	85		95		93	
Indiana	88	92 ± 6.9	96	99 ± 2.5	113	110 ± 7.0
	88		101		115	
	100		99		102	
Mississippi	86	86 ± 0.6	92	95 ± 7.6	91	92 ± 1.7
	87		104		91	
	86		90		94	
Total Average	90		95		98	
Total Std Dev	6.2		6.0		9.8	
Trifluralin						
California	87	94 ± 11.0	84	92 ± 6.9	84	89 ± 5.5
	107		96		89	
	89		96		95	
Indiana	90	95 ± 6.4	94	97 ± 2.5	112	109 ± 6.4
	92		99		114	
	102		97		102	
Mississippi	93	93 ± 0.57	95	99 ± 8.1	96	97 ± 2.1
	93		108		95	
	92		93		99	
Total Average	94		96		98	
Total Std Dev	6.5		6.2		9.8	

Tank mix: Tank mix samples were not discussed in this Study Report.

Travel Recovery: Travel recovery was not discussed in the Study Report.

Storage Stability: The cloth samples in this study were stored for a maximum of 236 days prior to analysis. Based on the results of the field fortification samples that were stored and analyzed along with the treated samples, benefin and trifluralin residues were found to be stable for the length of frozen storage.

II. RESULTS AND CALCULATIONS:

The statistical summaries for the three sites are provided in Tables 3 and 4. For all three sites (CA, IN, and MS), Versar did not correct the raw TTR values for field fortification recoveries, as the overall average percent recovery was >90%. The raw TTR values were corrected for field fortification recovery by the study author.

At the California site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0026 $\mu\text{g}/\text{cm}^2$ and 0.00138 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, residues were not quantifiable. At the Indiana site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0021 $\mu\text{g}/\text{cm}^2$ and 0.0011 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, residues were not quantifiable. At the Mississippi site, the maximum average TTR values for benefin and trifluralin occurred immediately after the application of the test substance (0.0012 $\mu\text{g}/\text{cm}^2$ and 0.00077 $\mu\text{g}/\text{cm}^2$, respectively). After day 0, residues were not quantifiable.

III DISCUSSION

A. LIMITATIONS OF THE STUDY:

This study met most of the Series 875.2100 Guidelines (See Appendix A). The only issue of concern is:

- separate control plots were not established at each site.

B. CONCLUSIONS:

It was not necessary to perform a linear regression on the data from this study because at all three sites, there were no residues detected after day 0. This may be a result of dry granular formulations not being easily transferable.

Table 3. Transferable Turf Residue Data for Benefin on Turf from Team 2G Applications

Site	Sampling Interval (Days after treatment)	Benefin Residue (ug/sample)	Trifluralin Residue (ug/cm ²)	Average
California	0	19	0.0034	0.0026
	0	10.3	0.0018	
	1	4.8	<LOQ	<LOQ ^a
	1	4.3	<LOQ	
	2	3.3	<LOQ	
	2	3.8	<LOQ	
	4	2.5	<LOQ	
	4	2.2	<LOQ	
	7	0	<LOQ	
	7	0.7	<LOQ	
Indiana	0	9.8	0.0018	0.0021
	0	12.6	0.0023	<LOQ ^a
	1	0.8	<LOQ	
	1	0.7	<LOQ	
	2	1.2	<LOQ	
	2	1.1	<LOQ	
	4	1.3	<LOQ	
	4	1.6	<LOQ	
	7	0.8	<LOQ	
	7	1.2	<LOQ	
Mississippi	0	7.4	0.0013	0.0012
	0	5.8	0.001	<LOQ ^a
	1	4.4	<LOQ	
	1	1.6	<LOQ	
	2	2	<LOQ	
	2	2.3	<LOQ	
	4	0.8	<LOQ	
	4	1.1	<LOQ	
	7	0.5	<LOQ	
	7	0	<LOQ	

a LOQ = 0.0011 μg/cm²

Table 4. Transferable Turf Residue Data for Trifluralin on Turf from Team 2G Applications

Site	Sampling Interval (Days after treatment)	Trifluralin Residue (ug/sample)	Trifluralin Residue (ug/cm ²)	Average
California	0	10.0	0.00179	0.00138
	0	5.4	0.00097	
	1	2.6	<LOQ	<LOQ ^a
	1	2.2	<LOQ	
	2	1.4	<LOQ	
	2	1.7	<LOQ	
	4	1.0	<LOQ	
	4	1.1	<LOQ	
	7	0.0	<LOQ	
7	0.0	<LOQ		
Indiana	0	5.4	0.00097	0.0011
	0	6.9	0.00124	
	1	0.5	<LOQ	<LOQ ^a
	1	0.5	<LOQ	
	2	0.6	<LOQ	
	2	0.7	<LOQ	
	4	0.7	<LOQ	
	4	1.0	<LOQ	
	7	0.5	<LOQ	
7	0.6	<LOQ		
Mississippi	0	4.7	0.00084	0.00077
	0	3.9	0.00070	
	1	2.2	<LOQ	<LOQ ^a
	1	0.8	<LOQ	
	2	0.9	<LOQ	
	2	0.7	<LOQ	
	4	0.0	<LOQ	
	4	0.6	<LOQ	
	7	0.0	<LOQ	
7	0.0	<LOQ		

a LOQ = 0.0012 $\mu\text{g}/\text{cm}^2$

Name:
Evaluator
Occupational Exposure Assessment Section

Date

Name:
Peer Reviewer
Occupational Exposure Assessment Section

Date

Name:
Head,
Occupational Exposure Assessment Section

Date

APPENDIX A

Compliance Checklist for “Dissipation of Transferable Residues of Benefin and Trifluralin on Turf Treated with a Formulation of the Pesticides”

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 itemized checklist below describes compliance with the major technical aspects of OPPTS 875.2100.

- *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. Metabolites, breakdown products, or the presence of contaminants of potential toxicological concern for benfen and trifluralin were not discussed in the Study Report.
- *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 met.
- *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.* This criterion was partly met. The end use product was applied by the application method recommended. The calibration data was not provided for the application equipment.
- *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 met.
- *If multiple applications are made, the minimum allowable interval between applications should be used.* This criterion does not apply to this Study Report
- *Transferable turf 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 met. Transferable turf residue data were collected from sites in California, Indiana, and Mississippi.
- *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.* This criterion was met. Meteorological conditions including temperature and rainfall were recorded for the duration of the study.
- *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 were met.
- *TriPLICATE, randomly collected samples should be collected at each sampling interval.* This criterion was met. TriPLICATE turf sample replicates were collected at each sampling interval.
- *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 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. Separate control plots were not established on-site. Control samples were taken from the plots before application occurred.
- *Residues should be dislodged from turf within a reasonable time period (i.e., Pennsylvania 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 to collect samples. 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.* These criteria were met. The samples were stored frozen shortly after collection and remained frozen until analysis. The field fortification samples verified the stability of the pesticide.
- *Validated analytical methods of sufficient sensitivity are needed. Information on method efficiency (residue recovery), and limit of quantitation (LOQ) should be provided.* This criterion was met.
- *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.* This criterion was 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. Raw residue data were not corrected for all three sites because the corresponding average field fortification values were greater than 90%.
- *Foliar residue data expressed as $\mu\text{g}/\text{cm}^2$ turf leaf surface area.* This criterion was met. All residue data were provided in $\mu\text{g}/\text{cm}^2$.