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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: Occupational and Residential Exposure/Risk Assessment of 1,2,4-Triazole (DP Barcode: 322240; PC Code: 600074)

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HED has determined that risks from the residues of 1,2,4-triazole, triazole alanine and triazole acetic acid should be assessed for their contribution to the risk resulting from the use of 1,2,4-triazole-derivative fungicides. The U.S. Triazole Task Force (USTTF) has submitted an assessment entitled, "1,2,4-Triazole Aggregate Exposure Assessment" (Syngenta Study T022748-04, N. Heard, May 20, 2005) which includes an assessment of the residential exposure to 1,2,4-triazole from triazole-derivative fungicides. In addition, the USTTF presented an occupational handler and postapplication exposure assessment to EPA (meeting held at EPA, June 2, 2003), which included a hardcopy submission of its overhead slides. This document presents HED's occupational and residential exposure/risk assessment for the use of triazole-derivative fungicides, including references to the USTTF submissions, where appropriate.

1.0 Executive Summary

The use of 1,2,4-triazole-derivative (T-D) fungicides results in potential occupational and residential exposures to certain break-down products that are of concern to HED. Specifically, 1,2,4-triazole (1,2,4-T) can be formed in soil following application of T-D fungicides. In addition, dermal, inhalation and incidental oral exposure to a T-D fungicide can lead to an absorbed dose of the parent compound which can be metabolically transformed to 1,2,4-triazole. Two other important degradates of T-D fungicides, i.e., triazole alanine (TA) and triazole acetic acid (TAA), are primarily formed through metabolic conversion in plant tissues. Because TA and TAA residues are believed to remain inside crop commodities, they are not a concern for occupational or residential exposure scenarios.

A separate 1,2,4-T risk assessment is necessary because, under the Food Quality Protection Act (FQPA), regulatory decisions for an individual T-D fungicide also must take into account the dietary contribution of 1,2,4-T from other T-D fungicides used on food crops or in residential settings. This same FQPA concern is not applicable to occupational exposure. Instead, it is presumed that workers will be exposed only to the 1,2,4-T contribution from a single T-D fungicide at any given time. The toxicity endpoints for the particular parent T-D fungicide being assessed are considered to account for the toxicity of any 1,2,4-T that has formed in the exposed worker as a result of metabolic conversion. Under FQPA, other indirect sources of 1,2,4-T (i.e., from food or residential T-D fungicide uses) are not aggregated with worker exposures to 1,2,4-T from the use of a single T-D fungicide in their workday

An assessment of residential exposure to 1,2,4-T was performed for T-D fungicide use on turf. There are a number of T-D fungicides currently registered for turf use, with others in the proposal stage. Rather than assess each turf T-D fungicide individually, worst-case assessments (based on currently registered turf products, as well as, a hypothetical worst-case composite product) were performed for residential handlers and postapplication activities that will stand as screens for all currently registered turf products and, potentially, for any future turf use registration requests.

Occupational Handler/Postapplication Exposure and Risk

A separate 1,2,4-T assessment is not necessary (see discussion in above section).

Residential Handler

Residential handler risks from short-term exposure to 1,2,4-T do not exceed HED's level of concern (LOC) for lawn use of triadimefon (the worst-case currently registered turf-use T-D fungicide). Likewise, the screening level assessment, using a composite of high-end exposure input values, **results in risks that do not exceed HED's LOC** (MOEs range from 1500 to 6400).

Residential Postapplication

The **MOEs for short-term postapplication exposure to the T-D fungicide turf product, triadimefon** are all ≥ 1000 **for individual routes of exposure**, and therefore **do not exceed HED's level of concern. Likewise, for triadimefon, if individual routes** of exposure (e.g., toddler dermal and incidental ingestion activities) **are combined, the MOE** is 2200, and therefore **does not exceed HED's LOC**.

The **MOEs for postapplication exposure to a hypothetical screening level T-D fungicide** are less than 1000 for the dermal route of exposure (e.g., adult dermal MOE = 270; toddler dermal MOE = 160), and therefore **exceed HED's LOC**.

2.0 Hazard Summary

The acute toxicity of 1,2,4-T is presented in Table 1, and a summary of toxicity endpoints in Table 2. All residential exposure scenarios are expected to be short-term (1 - 30 days duration).

Table 1 Acute Toxicity Profile - Test Substance
Note that values on this table are based on submitted summary data; full study reports are not available.

Guideline No.	Study Type	MRID(s)	Results	Toxicity Category
870.1100	Acute oral [rat]	45284004, 45284001	LD_{50} = 1648-3080 mg/kg	III
870.1100	Acute oral [mice]	45284001	LD_{50} = 3650 mg/kg	III
870.1100	Acute oral [rabbit]	45324301	LD_{50} = 666 mg/kg	III
870.1200	Acute dermal [rat]	45284004	LD_{50} = 3129-4200 mg/kg	III
870.1200	Acute dermal [rabbit]	45324301, 45284006	LD_{50} = <2000 mg/kg	II
870.1300	Acute inhalation [mice]	45284011	LC_{50} 4 h =2200 mg/m^3	
870.1300	Acute inhalation [rats]	45284011	LC_{50} 4 h = 2050 mg/m^3	
870.2400	Acute eye irritation [rabbit]	45284004, 45324301, 45284006	severe	
870.2500	Acute dermal irritation [rabbit]	45284004, 45324301, 45284006	not irritating to slightly irritating	IV
870.2600	Skin sensitization [species]		No studies available	unknown

Table 2 Summary of Toxicological Doses and Endpoints for Chemical for Use in Human Risk Assessments			
Exposure Scenario	**Dose Used in Risk Assessment, UF**	**Special FQPA SF and Level of Concern for Risk Assessment**	**Study and Toxicological Effects**
Acute Dietary (females 13-49)	NOAEL = 30 mg/kg UF=1000 **Acute RfD**= 0.03 mg/kg	FQPA SF = 1 **aPAD** = acute RfD / FQPA SF = 0.03 mg/kg/day	**Developmental Toxicity study in rabbits** LOAEL=45 mg/kg based on urinary tract malformations in fetuses
Acute Dietary (general population)	NOAEL = 30 mg/kg UF=1000 **Acute RfD**= 0.03 mg/kg	FQPA SF = 1 **aPAD** = acute RfD / FQPA SF = 0.03 mg/kg/day	**Developmental Toxicity study in rabbits** LOAEL=45 mg/kg based clinical signs and mortality in does starting on GD 6 or 7
Chronic Dietary (all populations)	LOAEL = 15 mg/kg/day UF =3000 **Chronic RfD** = 0.005 mg/kg/day	FQPA SF =1 **cPAD** = chronic RfD / FQPA SF =0.005 mg/kg/day	**Reproductive Toxicity study in rats** LOAEL = 15 based on decreased body weight in adult males, decreased body weight and brain weight in offspring
Incidental Oral Short Term (1-30 days)	NOAEL = 30 mg/kg/day MOE=1000	FQPA SF =1	**Developmental Toxicity study in rabbits** LOAEL=45 mg/kg based clinical signs and mortality in does starting on GD 6 or 7 .
Incidental Oral Intermediate or Long Term (30 days to 6 months)	LOAEL = 15 mg/kg/day MOE =3000	FQPA SF =1	**Reproductive Toxicity study in rats** LOAEL = 15 based on decreased body weight in adult males, decreased body weight and brain weight in offspring
Dermal Short Term (1-30 days)	NOAEL = 30 mg/kg/day MOE=1000		**Developmental Toxicity study in rabbits** LOAEL=45 mg/kg based clinical signs and mortality in does starting on GD 6 or 7
Dermal Intermediate or Long Term (30 days to 6 months)	LOAEL = 15 mg/kg/day MOE =3000		**Reproductive Toxicity study in rats** LOAEL = 15 based on decreased body weight in adult males, decreased body weight and brain weight in offspring

Table 2 Summary of Toxicological Doses and Endpoints for Chemical for Use in Human Risk Assessments			
Exposure Scenario	**Dose Used in Risk Assessment, UF**	**Special FQPA SF and Level of Concern for Risk Assessment**	**Study and Toxicological Effects**
Inhalation Short-Term (1 - 30 days)	NOAEL = 30 mg/kg/day MOE=1000		**Developmental Toxicity study in rabbits** LOAEL=45 mg/kg based clinical signs and mortality in does starting on GD 6 or 7
Inhalation Intermediate or Long Term (30 days to 6 months)	LOAEL = 15 mg/kg/day MOE =3000		**Reproductive Toxicity study in rats** LOAEL = 15 based on decreased body weight in adult males, decreased body weight and brain weight in offspring
Cancer (oral, dermal, inhalation)	**Classification:** Not determined		

UF = uncertainty factor, FQPA SF = Special FQPA safety factor, NOAEL = no-observed-adverse-effect- level, LOAEL = lowest-observed-adverse-effect-level, PAD = population-adjusted-dose (a = acute, c = chronic) RfD = reference dose, MOE = margin of exposure, LOC = level of concern, NA = Not Applicable

3.0 Use Profile

While a number of conazole fungicides are registered for agricultural use sites, this assessment is limited to T-D fungicides that have current or proposed registrations for residential uses. Residential T-D fungicide uses include treatment of ornamentals, treatment of wood that could be used in construction of decks and playground equipment, and treatment of lawns. Lawn treatment is believed to represent the highest residential risk potential, and therefore, this assessment has been limited to lawn care (turf) products. The following table lists a number of the T-D fungicides for which there are currently registered or proposed turf uses, along with readily-available use information and characteristics that are pertinent to the assessment of risks from such uses.

Table 3. T-D Fungicide Exposure-Relevant Characteristics

T-D Fungicide	Max. Single Application Rate (lb ai/acre)	1,2,4-T/Parent Molecular Weight Ratio	Mammalian Metabolic Conversion Rate to 1,2,4-T (%)	Max. Soil Conversion Rate to 1,2,4-T (%)	Dermal Absorption Factor (%)
Myclobutanil*	1.76[1]	0.24[1]	10	18[1]	14[1]
Propiconazole*	1.76[1]	0.20[1]	5	23.6[1]	50[1]
Triadimefon*	2.75[1] (5.4[2])	0.24[1]	22	30.7[1]	8[1]
Paclobutrazol*	0.5	0.24[1]	0	2.6[1]	DG
Cyproconazole*	DG	DG	DG	DG	DG
Fenbuconazole*	DG	DG	DG	DG	DG

Tebuconazole**	1.37[1]	0.22	5.4	9[1]	7[1]
Triticonazole**	1.14	0.22[1]	15	6.6[1]	36
Tetraconazole**	1.4	0.19[1]	77	6.6[1]	DG
Bromuconazole**	DG	DG	DG	DG	DG

1. USTTF 1,2,4-Triazole Aggregate Exposure Assessment. May 20, 2005.
2. "Bayleton 50% WP Fungicide" (reg. no. 264-737). Assumed to be applied by PCO's only. Therefore, this rate is only used for postapplication risk estimates.
* Currently registered for use on residential lawns.
** Proposed for use on residential lawns.
DG = Data Gap. Information has not yet been obtained.

4.0 Residential (Non-Occupational) Exposures and Risks

There is a potential for 1,2,4-T exposure to homeowners during the application of T-D fungicide products on lawns (turf), and from subsequent activities in such treated areas. As a result, risk assessments have been completed for both residential handler and postapplication scenarios.

Toddlers can be exposed directly to 1,2,4-T by ingesting soil where T-D fungicides have been sprayed, and subsequently undergone environmental degradation to 1,2,4-T. Indirect exposure of toddlers to 1,2,4-T can occur dermally from contact with, and absorption of T-D fungicide residues on treated turf, with subsequent internal metabolism to 1,2,4-T. Indirect exposure also can occur through incidental ingestion of parent residues from hand-to-mouth and object-to-mouth activities on T-D fungicide treated turf, with subsequent internal metabolic breakdown to 1,2,4-T. Likewise, indirect 1,2,4-T exposure can occur to adults from internal metabolic conversion, following direct dermal and inhalation of T-D fungicides during application to home lawns, and via the dermal route alone from subsequent contact with those treated lawns.

1,2,4-T exposure is determined by certain key characteristics specific to the parent T-D fungicide from which it is formed. These characteristics can be different for each parent T-D fungicide, and include application rate, environmental and metabolic conversion rates, molecular weight ratio and dermal absorption factors. The USTTF calculated the route-specific risks for individual registered and proposed turf-use T-D fungicides, using an average metabolic conversion rate, empirically derived turf transferrable residue (TTR) data (where available), dermal absorption data (where available), and standard values and procedures from the US EPA Draft Standard Operating Procedures for Residential Exposure Assessment. The USTTF then used results from the T-D fungicide with the highest total toddler postapplication exposure (i.e., dermal plus incidental oral) in its aggregate assessment of turf-use T-D fungicides.

HED has assessed the currently registered turf-use T-D fungicide that results in the highest 1,2,4-T exposure (i.e., triadimefon), as well as the highest 1,2,4-T exposure resulting from a hypothetical T-D fungicide that is characterized by the maximum exposure input characteristics found among all registered and proposed turf-use T-D fungicides (see shaded values in Table 3 for highest input variables). This latter is intended to cover any future proposed turf-use T-D fungicides that may present a greater exposure potential than those currently under consideration.

4.1 Residential Handler Exposures and Risks

4.1.1 Handler Exposure Scenarios

Non-occupational exposure is likely during the handling of T-D fungicides in the treatment of residential lawns, which would include the following major residential exposure scenarios:

(1) M/L/A Liquids: hose-end sprayer;
(2) M/L/A Liquids: low-pressure handwand;

4.1.2 Data and Assumptions For Residential Handler Exposure Scenarios

The following assumptions and factors are specific to the residential assessment:

- Residential handler exposure scenarios are only considered to be short-term in nature due to the episodic uses associated with homeowner products.
- Homeowner handler assessments are completed based on individuals wearing shorts and short-sleeved shirts.
- Homeowner handlers are expected to complete all tasks associated with the use of a pesticide product including mixing/loading, if needed, as well as the application.
- The Agency always considers the maximum application rates allowed by labels in its risk assessments to consider what is legally possible based on the label.
- The Agency based calculations on what would reasonably be treated by homeowners such as the size of a lawn, or the size of a garden.
- A 70 kg body weight is used for adults because the toxicity endpoint is not gender-specific.

4.1.3 Residential Handler Exposure/Risk Estimates

Residential handlers may be exposed dermally and by inhalation during mixing, loading and application of T-D fungicides for short-term durations. Because a common toxicity endpoint was identified for both dermal and inhalation routes, a combined risk from both routes of exposure is assessed. Results from these risk calculations for residential handlers are seen in Table 4 below.

Note: Proprietary data from the Outdoor Residential Exposure Task Force (ORETF) have been used in this assessment. The chemical review manager is encouraged to pursue data compensation in the event the registrant in not a member of this task force.

Table 4. Non-Occupational Handler Exposure and Risk Estimates for T-D Fungicides (Triadimefon)

Exposure Scenario	Personal Protective Equipment	Exposure Route	Application Rate	1,2,4-T to Parent MW Ratio	Metabolic Conversion Rate (%)	Absorption Rate (%)	Amount Treated per day	Unit Exposure (mg/lb ai)	Data Confidence	Daily Dose[1] (mg/kg/day)	MOE[2]	Total Daily Dose (mg/kg/day)	Total MOE[3]
M/L/A Liquids: hose-end sprayer	short sleeves short pants no gloves	Dermal	2.75 lb ai/A	0.24	22	8	0.5 acre	11[4]	High	0.00091	33,000	0.00093	32,000
		Inhalation				100		0.016[4]	High	0.000017	1.8E+6		
M/L/A Liquids: low-pressure handwand	short sleeves short pants no gloves	Dermal	2.75 lb ai/A	0.24	22	8	0.023 acre (1000 ft^2)	56[5]	Low	0.00021	140,000	0.00021	140,000
		Inhalation				100		0.0038[5]	Medium	0.00000018	1.7E+8		

[1] Daily Dose = [Application Rate * MW Ratio * Metabolic Rate * Absorption Rate * Amount Treated * Unit Exposure)]/Body Weight (70 kg)
[2] MOE = NOAEL/Daily Dose. The dermal and inhalation NOAEL = 30 mg/kg/day, was used for all calculations. The LOC = 1000.
[3] Total MOE = NOAEL/(dermal daily dose + inhalation daily dose)
[4] Unit exposure values taken from ORETF study (OMA004), "Mixer/Loader/Applicator: Hose-end Sprayer. Mix your own."
[5] Unit exposure values taken from ORETF study ()MA005), "Resident Mixer/loader/applicator - Handheld Pump Sprayer: Fruit Trees and Ornamentals."

Table 4a. Non-Occupational Handler Exposure and Risk Estimates for T-D Fungicides (Screening Level)

Exposure Scenario	Personal Protective Equipment	Exposure Route	Application Rate	1,2,4-T to Parent MW Ratio	Metabolic Conversion Rate (%)	Absorption Rate (%)	Amount Treated per day	Unit Exposure (mg/lb ai)	Data Confidence	Daily Dose[1] (mg/kg/day)	MOE[2]	Total Daily Dose (mg/kg/day)	Total MOE[3]
M/L/A Liquids: hose-end sprayer	short sleeves short pants no gloves	Dermal	2.75 lb ai/A	0.24	77	50	0.5 acre	11[4]	High	0.019	1600	0.02	1500
		Inhalation				100		0.016[4]	High	0.000058	520,000		
M/L/A Liquids: low-pressure handwand	short sleeves short pants no gloves	Dermal	2.75 lb ai/A	0.24	77	50	0.023 acre (1000 ft^2)	56[5]	Low	0.0047	6400	0.0047	6400
		Inhalation				100		0.0038[5]	Medium	0.00000064	4.7E+7		

[1] Daily Dose = [Application Rate * MW Ratio * Metabolic Rate * Absorption Rate * Amount Treated * Unit Exposure)]/Body Weight (70 kg)
[2] MOE = NOAEL/Daily Dose. The dermal and inhalation NOAEL = 30 mg/kg/day, was used for all calculations. The LOC = 1000.
[3] Total MOE = NOAEL/(dermal daily dose + inhalation daily dose)
[4] Unit exposure values taken from ORETF study (OMA004), "Mixer/Loader/Applicator: Hose-end Sprayer. Mix your own."
[5] Unit exposure values taken from ORETF study ()MA005), "Resident Mixer/loader/applicator - Handheld Pump Sprayer: Fruit Trees and Ornamentals."

4.1.4 Summary of Risk Concerns and Data Gaps for Residential Handlers

Residential handler risks from exposure to 1,2,4-T do not exceed HED's LOC for lawn use of triadimefon. Likewise, the screening level assessment, using a composite of high-end exposure input values, **results in risks that do not exceed HED's LOC**. Dermal absorption factors used in this assessment were taken from the USTTF Aggregate Risk Assessment.

4.2 Residential Postapplication Exposures and Risks

Individuals of varying ages can potentially be exposed from activities on treated turf. Potential routes of exposure include dermal (adults and toddlers) and incidental ingestion (toddlers only). It is believed that most residential uses of T-D fungicides will result in short-term (1 to 30 days) postapplication exposures. The likelyhood of routine lawn mowing is believed to mitigate against the possibility of intermediate-term (> 30 days to 180 days) exposures. Because of the conservative values and methodology used, the residential postapplication assessment is not believed to underestimate risks.

The HED Standard Operating Procedures for Residential Exposure Assessments (Draft, December 18, 1997) were used as a guideline for performing the residential postapplication assessment. Also used in the assessment were interim changes to these SOPs which were adopted by the HED Exposure Science Advisory Council regarding standard values, including, for turf transferrable residues, turf transfer coefficients and hand-to-mouth activities (Policy 11, February 22, 2001). The exposure and risk estimates for the four residential exposure scenarios are assessed for the day of application (day "0") because it is assumed that adults and toddlers could contact the lawn immediately after application. On the day of application, it was assumed that 5 percent of the application rate is available from the turfgrass as transferrable residue (20 percent for object-to-mouth activities).

4.2.1 Residential Postapplication Exposure Scenarios

Assessment of residential postapplication exposure was performed using the same approach as was used for handler exposure above. The assessment was performed for the T-D fungicide, triadimefon, and for a hypothetical worst-case turf-use T-D fungicide (i.e., one which results in the highest 1,2,4-T exposure from using the maximum input variables from current and proposed turf-use T-D fungicides).

4.2.2 Residential Postapplication Exposure/Risk From Turf

A summary of the estimated exposures and risks, along with the algorithms used for each turf exposure scenario are presented below in Tables 5a - 5d for triadimefon, and Tables 6a - 6d for the screening level assessment.

Table 5a. Dermal Exposure and Risk for Adults and Children from Treated Lawns (Triadimefon)

Subgroup exposed	Application Rate (lb ai/A)	Fraction of ai Available	Turf Transferrable Residue at Day "0" (ug/cm^2)[1]	Dermal Transfer Coefficient (cm^2/hr)	Exposure Time (hrs/day)	Absorption Factor	Body Weight (kg)	1,2,4-T to Parent MW Ratio	Metabolic Conversion Rate (%)	Daily Dose[2] (mg/kg/day)	MOE[3]
Adult	5.4	0.05	2.94	14,500	2	8%	70	0.24	22	0.0015	5000
Children	5.4	0.05	2.94	5200	2	8%	15	0.24	22	0.0086	3500

[1] Turf Transferrable Residue (ug/cm^2) = Application rate (lb ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm^2

[2] Daily Dose = (Turf Transferrable Residue x Absorption Factor x 1E-3 mg/ug x Dermal Transfer Coefficient x Exposure Time x MW ratio x Metab. Conv. Rate)/Body weight

[3] MOE = Dermal NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

Table 5b. Oral Hand-to-mouth Exposure and Risk for Children from Treated Lawns (Triadimefon)

Application Rate (lb ai/A)	Fraction of ai Available	Turf Transferrable Residue at Day "0" (ug/cm^2)[1]	Exposure Time (hrs/day)	Extraction by saliva	Hand Surface Area (cm^2/event)	Frequency (events/ hr)	Body Weight (kg)	1,2,4-T to Parent MW Ratio	Metabolic Conversion Rate (%)	Daily Dose[2] (mg/kg/day)	MOE[3]
5.4	0.05	2.94	2	0.5	20	20	15	0.24	22	0.0041	7300

[1] Turf Transferrable Residue (ug/cm^2) = Application rate (lb ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm^2

[2] Daily Dose = (Turf Transferrable Residue x Extraction by Saliva x Hand Surface Area x Frequency x 1E-3 mg/ ug x Exposure Time x MW ratio x Metab. Conv. Rate)/Body Weight.

[3] MOE = Oral NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

Table 5c. Oral Object-to-mouth (Turfgrass) Exposure and Risk for Children from Treated Lawns (Triadimefon)

Application Rate (lb ai/A)	Fraction of ai Available	Grass Residue at Day "0" (ug/cm^2)[1]	Surface Area Mouthed (cm^2/day)	Body Weight (kg)	1,2,4-T to Parent MW Ratio	Metabolic Conversion Rate (%)	Daily Dose[2] (mg/kg/day)	MOE[3]
5.4	0.2	11.8	25	15	0.24	22	0.001	30,000

[1] Grass Residue (ug/cm^2) = Application rate (lb ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm^2

[2] Daily Dose = (Grass residue x Surface Area Mouthed x 1E-3 mg/ug x MW ratio x Metab. Conv. Rate)/Body Weight.

[3] MOE = Oral NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

Table 5d. Exposure and Risk for Children from Ingestion of Soil from Treated Lawns (Triadimefon)

Application Rate (lb ai/A)	Fraction of ai Available	Soil Residue at Day "0" (ug/g)[1]	1,2,4-T to Parent MW Ratio	Max. Soil Conversion Rate to 1,2,4-T (%)	Ingestion Rate (mg/day)	Body Weight (kg)	Daily Dose[2] (mg/kg/day)	MOE[3]
5.4	1	39.4	0.24	30.7	100	15	0.000019	1.6E+6

[1] Soil residue (ug/g) = [Application Rate (lbs ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm^2 x 0.67 cm^3/g soil]

[2] Daily Dose = [Soil residue (ug/g) x Soil Conversion Rate (%) x MW ratio x Ingestion rate (mg/day) x 1E-6 g/ug] / [Body Weight (kg)]

[3] MOE = Oral NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

Table 6a. Dermal Exposure and Risk for Adults and Children from Treated Lawns (Screening Level)

Subgroup exposed	Applic.Rate (lb ai/A)	Fraction of ai Available	Turf Transferrable Residue at Day "0" (ug/cm²)[1]	Dermal Transfer Coefficient (cm²/hr)	Exposure Time (hrs/day)	Absorp. Factor	Body Weight (kg)	1,2,4-T to Parent MW Ratio	Metab Conversion Rate (%)	Daily Dose[2] (mg/kg/day)	MOE[3]
Adult	5.4	0.05	2.94	14,500	2	50%	70	0.24	77	0.11	270
Children	5.4	0.05	2.94	5200	2	50%	15	0.24	77	0.19	160

[1] Turf Transferrable Residue (ug/cm²) = Application rate (lb ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm²
[2] Daily Dose = (Turf Transferrable Residue x Absorption Factor x 1E-3 mg/ug x Dermal Transfer Coefficient x Exposure Time x MW ratio x Metab. Conv. Rate)/Body weight
[3] MOE = Dermal NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

Table 6b. Oral Hand-to-mouth Exposure and Risk for Children from Treated Lawns (Screening Level)

Application Rate (lb ai/A)	Fraction of ai Available	Turf Transferrable Residue at Day "0" (ug/cm²)[1]	Exposure Time (hrs/day)	Extraction by saliva	Hand Surface Area (cm²/event)	Frequency (events/ hr)	Body Weight (kg)	1,2,4-T to Parent MW Ratio	Metabolic Conversion Rate (%)	Daily Dose[2] (mg/kg/day)	MOE[3]
5.4	0.05	2.94	2	0.5	20	20	15	0.24	77	0.014	2100

[1] Turf Transferrable Residue (ug/cm²) = Application rate (lb ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm²
[2] Daily Dose = (Turf Transferrable Residue x Extraction by Saliva x Hand Surface Area x Frequency x 1E-3 mg/ ug x Exposure Time x MW ratio x Metab. Conv. Rate)/Body Weight.
[3] MOE = Oral NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

Table 6c. Oral Object-to-mouth (Turfgrass) Exposure and Risk for Children from Treated Lawns (Screening Level)

Application Rate (lb ai/A)	Fraction of ai Available	Grass Residue at Day "0" (ug/cm²)[1]	Surface Area Mouthed (cm²/day)	Body Weight (kg)	1,2,4-T to Parent MW Ratio	Metabolic Conversion Rate (%)	Daily Dose[2] (mg/kg/day)	MOE[3]
5.4	0.2	11.8	25	15	0.24	77	0.0036	8300

[1] Grass Residue (ug/cm²) = Application rate (lb ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm²
[2] Daily Dose = (Grass residue x Surface Area Mouthed x 1E-3 mg/ug x MW ratio x Metab. Conv. Rate)/Body Weight.
[3] MOE = Oral NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

Table 6d. Exposure and Risk for Children from Ingestion of Soil from Treated Lawns (Screening Level)

Application Rate (lb ai/A)	Fraction of ai Available	Soil Residue at Day "0" (ug/g)[1]	1,2,4-T to Parent MW Ratio	Max Soil Conversion Rate to 1,2,4-T, or [Metab. Conv Rate] (%)	Ingestion Rate (mg/day)	Body Weight (kg)	Daily Dose[2] (mg/kg/day)	MOE[3]
5.4	1	39.4	0.24	30.7	100	15	0.000019	1.6E+6

[1] Soil residue (ug/g) = [Application Rate (lbs ai/A) x Fraction of ai Available x 4.54E+8 ug/lb x 2.47E-8 A/cm² x 0.67 cm³/g soil]
[2] Daily Dose = [Soil residue (ug/g) x Soil Conversion Rate (%) x MW ratio x Ingestion rate (mg/day) x 1E-6 g/ug] / [Body Weight (kg)]
[3] MOE = Oral NOAEL (30 mg/kg/day) /Daily Dose. LOC = 1000.

4.2.2.1 Summary of Residential Postapplication Exposure/Risk From Turf

The **MOEs for postapplication exposure to the T-D fungicide turf product, triadimefon** are all ≥ 1000 **for individual routes of exposure**, and therefore **do not exceed HED's level of concern.** FQPA requires residential exposures that could reasonably be expected to occur on the same day be combined and compared to the appropriate toxicity endpoint. **Likewise, if individual routes** of exposure (e.g., toddler dermal and incidental ingestion by hand-to-mouth, object-to-mouth and soil ingestion activities) **are combined, the MOE** is 2200, and therefore **does not exceed HED's LOC**.

The **MOEs for postapplication exposure to a hypothetical screening level T-D fungicide** are less than 1000 for the dermal route of exposure (e.g., adult dermal MOE = 270; toddler dermal MOE = 160), and therefore **exceed HED's LOC**.

The exposure estimates generated are based on some upper-percentile (i.e., maximum application rate) and some central tendency (i.e., surface area, hand-to-mouth activity, and body weight) assumptions and are, therefore, considered to be representative of central to high-end exposures. The uncertainties associated with this assessment stem from the use of an assumed amount of pesticide available from turf, and assumptions regarding transfer of chemical residues, and hand-to-mouth activity.

5.0 Recreational

T-D fungicides may be used on turf at recreational use sites, and, therefore may result in postapplication exposure to adults and children involved in recreational activities. Exposures to adults and children from the use of T-D fungicides at recreational use sites are assumed to be the same as those assessed for residential use sites, and therefore, a separate recreational exposure assessment was not included. Results from the residential turf exposure assessment are considered upper percentile risk estimates. Therefore, it is not expected that the high-end residential exposure scenario would occur on the same day as a high-end recreational exposure scenario. Exposure from these two exposure scenarios are not aggregated. Rather, the residential risk estimate should serve as a high-end estimate for both residential and recreational exposure

6.0 Spray Drift

While the drifting of agricultural spray applications of T-D fungicides to nearby residential settings is possible, the T-D fungicide turf uses addressed in the above residential risk assessment are considered to be conservative, worst case scenarios, that would cover any potential 1,2,4-T risks from agricultural spraying operations.

Spray drift is always a potential source of exposure to residents nearby to spraying operations. This is particularly the case with aerial application, but, to a lesser extent, could also be a potential source of exposure from the groundboom application. The Agency has been working with the Spray Drift Task Force, EPA Regional Offices and State Lead Agencies for pesticide regulation and other parties to develop the best spray drift management practices. The Agency is now requiring interim mitigation measures for aerial applications that must be placed on product labels/labeling. The Agency has completed its evaluation of the new data base submitted by the Spray Drift Task Force, a membership of U.S. pesticide registrants, and is developing a policy on how to appropriately apply the data and the AgDRIFT computer model to its risk assessments for pesticides applied by air, orchard airblast and ground hydraulic methods. After the policy is in place, the Agency may impose further refinements in spray drift management practices to reduce off-target drift and risks associated with aerial as well as other application types where appropriate.

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R119074

Chemical: 1H-1,2,4-Triazole (A metabolite of tebuconazole & metabolite of acaricidal & fungicidal compounds)

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