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Memorandum

SUBJECT: OCCUPATIONAL AND RESIDENTIAL EXPOSURE ASSESSMENT AND RECOMMENDATIONS FOR THE REREGISTRATION ELIGIBILITY DECISION DOCUMENT FOR FOLPET

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DP Barcode:	D254768
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PHED:	Yes, Version 1.1

This document has been updated in response to FQPA considerations and the registrant's rebuttal. This document replaces the ORE chapter dated May 30, 1997 (DP Barcode D235173).

EXECUTIVE SUMMARY

This document contains the occupational exposure assessment for agricultural uses of folpet (e.g., avocados) along with commercial and residential uses of folpet-containing paints and stains. The document also includes potential risk mitigation measures such as personal protective equipment (PPE) for handlers and proposed restricted entry intervals (REIs) for postapplication activities (e.g., avocados).

Folpet is a fungicide used on avocados and as a fungicide/preservative in paints and stains. Folpet is formulated as a wettable powder, ready-to-use liquid, solid powder, and a soluble concentrate/liquid. Airblast application techniques are used for avocado uses. Folpet-containing paints can be applied by brush, rollers, and airless sprayers. The application rates for avocados are assessed at the typical rate of 1.5 lb ai/acre and the maximum rate of 3 lb ai/acre. Folpet is also added to paints at a maximum concentration of 0.088 lb ai/gallon.

Acute toxicity categories for the technical grade are Toxicity Category IV for oral, dermal, and dermal irritation and II for inhalation and eye irritation. The endpoints used in this document to assess folpet hazards and risks include short- and intermediate-term dermal and inhalation endpoints and it is classified as a B2 carcinogen. Short- and intermediate-term dermal and inhalation NOAEL of 10 mg/kg/day from a developmental toxicity study in rabbits. In addition, a dermal absorption of 2.7 percent has been identified. The lung absorption of 100 percent is used in the calculations. The effects include an increase in number of fetuses and litters with hydrocephaly and related skull malformations at a dose level of 20 mg/kg. An uncertainty factor of 100 is used for all endpoints (i.e., 10x for intraspecies and 10x for interspecies variability) along with an FQPA factor of 3x for females 13+. The exposure duration for short-term assessments is 1 to 7 days. Intermediate-term durations are 7 to 90 days. All uses of folpet are assumed to be of either a short- or intermediate-term duration. No chronic uses have been identified. Folpet is also classified as a B2 carcinogen with a Q_1^* of 1.86E-3 $(mg/kg/day)^{-1}$ (two year feeding study in mice).

Two handler exposure studies (i.e., paint brush and airless sprayer) were conducted by the registrant and submitted to the Agency. The handler data collected included dermal and inhalation passive dosimetry data. These data, along with surrogate data from the Pesticide Handlers Exposure Database (PHED) Version 1.1, were used to assess the potential exposures resulting from handling and applying folpet. Potential exposures and absorbed doses were calculated using unit exposures (i.e., normalized to amount of active ingredient handled -- mg/lb ai handled) from the passive dosimetry data multiplied by the amount of folpet estimated to be handled per day (i.e., lb ai/day). The amount of folpet assumed handled per day was derived from the various application rates and the number of acres (or gallons of spray solution) that could be applied in a single day. Dermal and inhalation margins of exposure (MOEs) are presented separately along with a combined total MOE. The total MOE is used to assess the hazard. Life time average daily doses (LADD) were also calculated to assess the risk.

The results of the short- and intermediate-term handler assessments indicate that all of the potential exposure scenarios provide total MOEs greater than or equal to 100 for occupational and 300 for residential at baseline attire (i.e., long pants, long sleeved shirts, no gloves) or with the use of PPE (i.e., long pants, long sleeved shirts, and chemical resistant gloves while using open systems) for one of the occupational scenarios. Additionally, the cancer risks are less than 10^{-6} using the same clothing assessed for the subchronic endpoints. There are insufficient data to address the handler exposure for paint rollers and on-site wood dip treatments.

A postapplication exposure study was also conducted by the registrant and submitted to the Agency. This study also included passive dosimetry data along with dislodgeable foliar residues (DFRs). Data were collected for avocados. The handler study also provided airborne sampling data after painting in residential settings. These data were used in this assessment to assess potential exposures to workers and residents reentering treated sites.

The results of the short- and intermediate-term along with the cancer assessment for postapplication exposures indicate that a REI of 24 hours is sufficient for avocado harvesting and that the postapplication airborne residues are not of concern (folpet vapor pressure is 1.6E-7 mmHg at 25° C).

1.0 BACKGROUND

Purpose

In this document, which is for use in EPA's development of the Folpet Reregistration Eligibility Decision Document (RED), EPA presents the results of its review of the potential human health effects of agricultural exposure to folpet.

Criteria for Conducting Exposure Assessments

An occupational exposure assessment is required for an active ingredient if (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (mixers, loaders, applicators, etc.) during use or to persons entering treated sites after application is complete. For folpet both criterion are met.

Summary of Toxicity Concerns Relating to Agricultural Exposures

Acute Toxicology Categories

Table 1 presents the acute toxicity categories as outlined in the Hazard Identification Document (dated May 13, 1998).

Table 1. Acute Toxicity of Folpet

TEST	RESULTS	TOXICITY CATEGORY
Oral LD_{50} - Rat	43.8 g/kg(M); 19.5 g/kg(F)	IV
Dermal LD_{50} - Rabbit	>5.0 g/kg	IV
Inhalation LC_{50} - Rat	0.34mg/L(M);1.00mg/L(F);0.48mg/L(M+F)	II
Eye Irritation - Rabbit	irritating	II
Dermal Irritation - Rabbit	non irritating	IV
Dermal Sensitization - Guinea Pig	sensitizing	N/A

Other Endpoints of Concern

The Hazard Identification Committee memo, dated May 13, 1998, indicates that there are toxicological endpoints of concern for folpet. The endpoints, and associated uncertainty factors, used in assessing the risks for folpet are presented in Table 2.

Table 2. Summary of Folpet Endpoints and Uncertainty Factors.

EXPOSURE SCENARIO	DOSE (mg/kg/day)	ENDPOINT	STUDY
Correction for oral to dermal exposure necessary (2.7% dermal absorption factor)			
Short-Term Dermal (1 to 7 days)	Oral NOAEL=10	Increased in number of fetuses and litters with hydrocephaly and related skull malformations at 20 mg/kg	Developmental Toxicity Study in Rabbits
		UF = 10x interspecies 10x intraspecies 3x FQPA (Female 13+)	
Intermediate-Term Dermal (7 to 90 days)	Oral NOAEL=10	Increased in number of fetuses and litters with hydrocephaly and related skull malformations at 20 mg/kg	Developmental Toxicity Study in Rabbits
		UF = 10x interspecies 10x intraspecies 3x FQPA (Female 13+)	
Long-Term Dermal	None	The use pattern and exposure scenario does not indicate a need for long term risk assessment	NA
Short - and Intermediate term Inhalation	Oral NOAEL=10	Increased in number of fetuses and litters with hydrocephaly and related skull malformations at 20 mg/kg	Developmental Toxicity Study in Rabbits
		UF = 10x interspecies 10x intraspecies 3x FQPA (Female 13+)	
Cancer	Q_1^*= 1.86E-3 $(mg/kg/day)^{-1}$	B2 carcinogen	2-year feeding study in mice

UF = Uncertainty Factor.

2.0 OCCUPATIONAL AND RESIDENTIAL EXPOSURE AND RISK CHARACTERIZATION

An occupational and/or residential exposure assessment is required for an active ingredient if (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (mixers, loaders, applicators, etc.) during use or to persons entering treated sites after application is complete.

Use Pattern and Formulation Summary: Folpet, N-((Trichloromethyl)thio) phthalimide, is a fungicide used in agricultural, residential, and commercial settings. Folpet is

used on avocados, as a fungicide/preservative in paints and stains, and the manufacture of various other products. Folpet is formulated as a soluble concentrate/liquid (13 percent active ingredient), liquid-ready to use (0.3 percent active ingredient), as a solid powder (88 percent active ingredient), and as a wettable powder (50 percent active ingredient).

Folpet formulated as a wettable powder is applied to avocados with airblast sprayers. Single application rates for avocados vary from 1.5 to 3.0 pounds active ingredient per acre. Folpet can be applied up to seven times per season with a seasonal maximum of 21 lb ai/A and a minimum application interval of 14 days.

Folpet formulated as a powder is applied to paint in manufacturing settings using a variety of techniques. Folpet-containing paint is applied with handheld painting equipment (e.g., paint brush, roller, compressed-air sprayer, or airless sprayer).

Folpet, formulated as a ready-to-use house/deck stain, is applied with handheld painting equipment (e.g., paint brush, roller, compressed air sprayer, or airless sprayer).

2.1 Occupational and Residential Handler Exposures & Assumptions

HED has determined that there are potential exposures to mixers, loaders, and applicators during usual use-patterns associated with folpet. There are potential exposures from applications in commercial, industrial, and residential settings. HED has identified two levels of handler exposures:

- primary handlers -- persons handling end-use pesticide products containing folpet as an active ingredient.
- secondary handlers -- persons handling paint products to which folpet has been added.

Occupational Handler Exposures

Primary Occupational Handlers: Based on the use patterns, HED has identified eight major folpet exposure scenarios for primary occupational handlers: (1) open-pour applications to paint in the manufacturing process with the solid powder formulation, (1b) metering-pump applications to paint in the manufacturing process with the solid powder formulation (not assessed individually, see assumptions below), (2) mixing/loading wettable powders for airblast application, (3) applying sprays with an airblast sprayer, (4) applying ready-to-use formulation with a paint brush, (5) applying ready-to-use stain formulation with an airless sprayer, (6) applying ready-to-use formulation with a paint roller, and (7) applying ready-to-use formulation as an on-site wood dip treatment.

Secondary Occupational Handlers: Based on the use patterns, HED has identified three major folpet exposure scenarios for secondary occupational handlers: (4) applying paint with a brush, (5) applying paint with an airless sprayer, and (6) applying paint with a roller. If there are any paint/stain products containing folpet that do not make pesticidal claims (i.e., not registered products), then for these products HED has no regulatory authority to impose risk mitigation measures for painters.

Homeowner Handler Exposures

Primary Homeowner Handlers: Based on the use patterns, HED has identified four major folpet exposure scenarios for primary homeowner handlers: (4) applying ready-to-use formulation with a paint brush, (5) applying ready-to-use stain formulation with an airless sprayer, (6) applying ready-to-use formulation with a paint roller, and (7) applying ready-to-use formulation as an on-site wood dip treatment.

Secondary Homeowner Handlers: Based on the use patterns, HED has identified three major folpet exposure scenarios for secondary homeowner handlers: (4) applying paint with a brush, (5) applying stain with an airless sprayer, and (6) applying paint with a roller.

Note that if there are any paint/stain products containing folpet that do not make pesticidal claims (i.e., not registered products), then for these products HED has no regulatory authority to impose risk mitigation measures for painters. EPA can, if applicable, impose risk mitigation measures for handlers of folpet ready-to-use formulations.

Assumptions: The following assumptions are made in the exposure calculations:

- Average body weight of an adult handler is 60 kg for the short-term and intermediate-term dermal and inhalation exposure and 70 kg for the cancer assessments.

- PHED surrogate information for wettable powder is used to estimate exposure to the solid powder used in the paint manufacturing process.

- Area treated in each scenario: paint manufacturing is assumed to prepare batches of 4,000 gallons of paint[1], 10 acres/day for airblast sprayer application, 2 gallons of paint for a homeowner, 5 gallons/day of paint for commercial painters, a homeowner would treat one typical house with stain, and a commercial applicator would treat two typical houses with stain. A typical house dimension is assumed to be 30 ft x 40 ft x 20 ft (2,400 ft^2 living area or 2,800 ft^2 outdoor surface area to be treated).

- Scenario (1a) -- open-pour applications to paint in the manufacturing process with the solid powder formulation is a reasonable worse-case representative for

scenario (1b) -- metering-pump applications to paint in the manufacturing process with the solid powder formulation. Therefore, an exposure and risk assessment will be performed only for scenario (1a) -- open pour applications.

- For scenario (4), the maximum application rate for paint products (0.088 lb ai/gal) is used as a worst case for both paint and stains.

- The exposure data presented in scenario (5) for airless sprayers is assumed to be higher than that for compressed-air type paint/stain sprayers. Therefore, the airless sprayer is a reasonable worse-case representative for all other types of paint/stain sprayers. Also, the maximum application rate for RTU stain products is used here and is expressed in lb ai/ft^2 covered. This product is expected to be used primarily for residential application and not for large scale commercial structures.

- The number of treatment days per year for the cancer assessment are assumed to be as follows: 50 days for the paint manufacturing[1]; 14 days for airblast applications (10 acres/day; 20 acres treated; and a label maximum of 7 treatments per season); 4 days of painting for homeowners; 50 days of painting or 50 days of staining for occupational workers (use of folpet containing paint or stain once per week); and 1 day for staining for homeowners (house treatment once per year).

Handler Exposure Data

Short-term and intermediate-term dermal and inhalation exposures (developed using PHED Version 1.1 surrogate data and chemical-specific data) are presented in Appendix A Table A-1. Two chemical-specific handler studies were submitted. The two studies are identified as *Folpet Worker Exposure Study Using A Paint Containing Folpet Interior Application In Bathrooms Using A Paint Brush* (MRID 414118-01; reviewed by S. Knott/HED 5/22/91) and *Folpet Worker Exposure Study Using Commercial House Stain Containing Folpet Exterior Application By Airless Sprayer* (MRID 414118-02; S. Knott/HED 5/22/91). Table A-2 presents the dermal risk assessment for both the short-term and intermediate-term exposures. Table A-3 presents the total risk assessment (inhalation plus dermal). Table A-4 presents the cancer risk assessment. Table A-5 summarizes the caveats and parameters specific to each exposure scenario and corresponding risk assessment.

MRID 414118-01: Folpet Worker Exposure Study Using A Paint Containing Folpet Interior Application In Bathrooms Using A Paint Brush.

The chemical-specific paint brush exposure study monitored 15 replicates of non-professional painters painting interior bathroom walls. Painting was conducted with 2 and 4-inch paint brushes. The paint used contained 1 percent by weight folpet. Technical grade folpet was added to the paint by the registrant prior to the study to ensure stability.

Because folpet containing paint is packaged as a ready-to-use product, not monitoring the mixing of the folpet into the paint is acceptable. The painters painted at a rate of 500 to 550 ft^2 per gallon and applied approximately ½ gallon of paint per replicate. Application duration ranged from 34 to 94 minutes per replicate. The amount of active ingredient (ai) handled per replicate ranged from 0.0253 to 0.051 lb ai.

Dermal exposure was monitored with multi-layered patches simulating normal work clothing (i.e., long pants and long sleeved shirt) and the hands were monitored with cotton gloves over latex gloves. Inhalation monitoring was performed using personal air monitoring pumps with polyurethane foam filters.

The average concurrent laboratory recovery values, fortified at five levels, were 85±24.4, 87.5±17.5, and 99±24.4 for patches, cotton gloves, and polyurethane foam filters, respectively. The field recovery data, exposed for 1-hour at the site, were generated using one fortification level for each matrix. The field recoveries were 82.8±30.9, 100±20.4, and 105.1±8.5 percent for the patches, cotton gloves, and polyurethane foam filters, respectively. The patch residue values were corrected for field recovery. The following deficiencies were noted in the study: paint rollers instead of paint brushes should have been used in the study for potentially higher exposure results; an insufficient number of replicates were used in the laboratory and field recovery experiments for the cotton gloves and the foam filters; and a range of fortification levels for the field recovery experiments would have been more appropriate.

MRID 414118-02: Folpet Worker Exposure Study Using Commercial House Stain Containing Folpet Exterior Application By Airless Sprayer

The chemical-specific airless sprayer house stain exposure study monitored 15 replicates of workers using a commercial airless sprayer (i.e., Graco GC 5000 Series B88A). The stain used in the study, packaged in ready-to-use 5 gallon containers, contained 0.5 percent by weight folpet. The amount of ai used per replicate was calculated by using the percent folpet and assuming a stain density of 0.8 g/mL or 0.1667 lbs ai per replicate (i.e., 5-gallon stain bucket). Folpet was used at a rate of 750 to 1,250 ft^2 per 5-gallons. Application duration ranged from 11 to 27 minutes per replicate.

Dermal exposure was monitored with multi-layered patches simulating normal work clothing (i.e., long pants and long sleeved shirt) and the hands were monitored with cotton gloves over latex gloves. Inhalation monitoring was performed using personal air monitoring pumps with polyurethane foam filters.

The average concurrent laboratory recovery values, fortified at five levels, were 99±19.6, 90±21.7, and 108±30.5 for patches, cotton gloves, and polyurethane foam filters, respectively. The field recovery data, exposed for an average of 36 minutes at the site, were generated using one fortification level for each matrix. The field recoveries were

73±27.8, 78±20, and 102±18 percent for the patches, cotton gloves, and polyurethane foam filters, respectively. The patch and glove residue values were corrected for field recoveries. The following deficiencies were noted in the study: an insufficient number of replicates were used in the laboratory and field recovery experiments for the cotton gloves and the foam filters; and a range of fortification levels for the field recovery experiments would have been more appropriate.

Exposure Calculations: The following calculations are used to assess the risk to handlers.

Daily Exposure (mg ai/day) is calculated using the following equation:

$$Daily\ Exposure\left(\frac{mg\ AI}{Day}\right) = Unit\ Exposure\left(\frac{mg\ AI}{lb\ AI}\right) \cdot Max.\ Appl.\ Rate\left(\frac{lb\ AI}{Acre}\right) \cdot Max.\ Area\ Treated\left(\frac{Acres}{Day}\right)$$

Absorbed Daily Dose due to Dermal Exposure (mg/kg/day) is calculated using the following formula:

$$Absorbed\ Daily\ Dose\left(\frac{mg}{Kg\ Day}\right) = Daily\ Exposure\left(\frac{mg}{Day}\right) \cdot \left(\frac{1}{Body\ Weight\ (Kg)}\right) \cdot Dermal\ Absorption$$

A dermal absorption rate of percent was used for short- and intermediate-term dermal hazard assessment. For inhalation exposure, an absorption rate of 100 percent is assumed.

Short-Term and Intermediate-Term Risk/Margin of Exposure (MOE) were calculated using the following formula:

$$MOE = \frac{NOEL\left(\frac{mg}{kg\ day}\right)}{Absorbed\ Daily\ Dose\left(\frac{mg}{kg\ day}\right)}$$

The lifetime average daily dose (LADD) is calculated using the following formula:

LADD (mg/kg/day) =
Daily Total Dose (mg/kg/day) * (days worked/365 days per year) * (35 years worked/70 yr lifetime)

where: Daily Total Dose (mg/kg/day) =
Daily Absorbed Dermal Dose (mg/kg/day) + Daily Inhalation Dose (mg/kg/day)

The estimated cancer risk is calculated using the following formula:

Estimated Risk = LADD (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$

Dermal Hazard from Handler Exposures

Short-term and Intermediate-term (from Table A-2)

The calculations of short-term and intermediate-term dermal hazard indicate that the MOEs are more than 100 at **baseline** for the following scenarios:

- (2) mixing/loading wettable powder for airblast applications at both the typical rate (1.5 lb ai/A) and the maximum rate (3.0 lb ai/A);
- (3) applying sprays with an airblast sprayer at both the typical (1.5 lb ai/A) and the maximum (3.0 lb ai/A) rate.
- (4) homeowners and occupational workers applying ready-to-use formulations and paint products with a paint brush; and
- (5) homeowners and occupational workers applying ready-to-use stain formulations with an airless sprayer.

The calculations of short-term and intermediate-term dermal hazard indicate that the MOEs are more than 100 with **additional PPE** for the following scenarios:

- (1) adding wettable powder formulations to paint at the manufacturing process;

There are data gaps for the following scenarios:

- (6) applying ready-to-use paint with a paint roller.
- (7) applying ready-to-use as an on-site wood dip treatment.

Total Hazard from Handler Exposure (Table A-3)

The calculations of short and intermediate term total risk (dermal and inhalation) indicate that the MOEs are more than 100 at **baseline** for the following scenarios:

- (2) mixing/loading wettable powder for airblast applications at both the typical rate (1.5 lb ai/A) and the maximum rate (3.0 lb ai/A);

- (3) applying sprays with an airblast sprayer at both the typical (1.5 lb ai/A) and the maximum (3.0 lb ai/A) rate.

- 4) homeowners and occupational workers applying ready-to-use formulations and paint products with a paint brush; and

- (5) homeowners and occupational workers applying ready-to-use stain formulations with an airless sprayer.

The calculations of total short-term and intermediate-term hazard indicate that the MOEs are more than 100 with **additional PPE** for the following scenarios:

- (1) adding wettable powder formulations to paint at the manufacturing process;

There are data gaps for the following scenarios:

- (6) applying ready-to-use paint with a paint roller.

- (7) applying ready-to-use as an on-site wood dip treatment.

Estimated Cancer Risk From Handler Exposure (Table A-4)

The calculations of cancer risk indicate that the estimated risks are less than 1×10^{-6} at **baseline** for the following handler scenarios:

- (3) applying liquids with an airblast sprayer at the typical (1.5 lb ai/A) and maximum (3.0 lb ai/A) application rate;

- (4) homeowners applying ready-to-use formulation and paint products with a paint brush; and

- (5) homeowners applying ready-to-use stain formulation with an airless sprayer.

The calculations of cancer risk indicate that the estimated risks are between 1×10^{-5} and 1×10^{-6} at **baseline** for the following handler scenarios:

- (2) mixing/loading wettable powder for airblast applications at both the typical rate (1.5 lb ai/A) and the maximum rate (3.0 lb ai/A); and

- (4) occupational workers applying ready-to-use formulation with a paint brush; and

- (5) occupational workers applying ready-to-use stain formulation with an airless sprayer.

The calculations of cancer risk indicate that the estimated risks are between 1 x 10^{-4} and 1 x 10^{-5} at **baseline** for the following handler scenarios:

- (1) adding wettable powder formulations to paint at the manufacturing process;

The calculations of cancer risk indicate that the estimated risks are between 1 x 10^{-5} and 1 x 10^{-6} with **additional personal protective equipment** for the following handler scenarios:

- (1) adding wettable powder formulations to paint at the manufacturing process.

There are data gaps for the following scenarios:

- (6) applying ready-to-use paint with a paint roller.
- (7) applying ready-to-use as an on-site wood dip treatment.

Summary of Occupational Risks

All risk estimates for the occupational uses of folpet (agricultural and paint uses; excluding paint roller and wood dip treatments due to data gaps), are below HED's level of concern for short- and intermediate-term exposures as well as for carcinogenic risk. Scenarios 2 through 5 indicate risks below HED's level of concern with no additional PPE or engineering controls. While risk estimates for handlers adding wettable powders to paint at the manufacturing process results in risks above HED's level of concern when handlers wear baseline clothing (i.e., long sleeved shirt, and long pants). When these handlers wear additional PPE, consisting of chemical resistant gloves, risk estimates are below HED's level of concern.

There are two use scenarios for which **no data have been submitted and no data are available:** Applying ready-to-use paint with a roller and as an on-site wood dip treatment. HED cannot make conclusions regarding risk to either homeowners or occupational applicators due to the data gap. Therefore, HED requests that if these uses are to be supported by the registrant, data be submitted (see HED Recommendations in the section that follows).

2.2 Occupational and Residential Postapplication Exposure & Assumptions

Postapplication exposures are considered to be negligible for persons in or near areas where (1) folpet is being or has recently been added to paint products in a manufacturing setting; (2) folpet ready-to-use products are being or have recently been applied with brushes, rollers, or sprayers, or as a dip; and (3) paints containing folpet are being or have recently been applied. Dermal exposure to paints and stains by non-applicators is expected to be negligible (vapor pressure is 1.6E-7 mmHg at 25° C). Monitoring of airborne residues of folpet in the fourteen days following application of folpet-containing paint in a residential setting showed negligible inhalation exposure potential (MRID 414118-01). While no postapplication inhalation

monitoring data are available for the use of folpet-containing stains and wood treatment products, negligible exposure potential is expected. In addition, the worst case handler inhalation exposure potential to these products, which is experienced by commercial painters using folpet-containing paints and stains results in acceptable exposure and risk (MOEs >100 for commercial painters and MOEs > 300 for residential painters) at baseline (i.e., without the use of a respirator). Postapplication inhalation exposures are expected to be substantially lower than those experienced by occupational handlers.

HED has determined that there are potential postapplication exposures to folpet following application to avocados in agricultural settings, and the calculations and estimated risks for these workers are presented below.

Postapplication Exposure Calculations

The transfer coefficient for cherry picker harvesters was used in the risk assessment instead of the transfer coefficient for harvesters working on the ground or tractors because the cherry picker scenario represents an exposed individual with maximum exposure. The transfer coefficient is calculated as follows:

$$\textit{Transfer Coefficient } (cm^2/hr) = \frac{\textit{Dermal Exposure } (\mu g/hr)}{\textit{Dislodgeable Foliar Residue (DFR) } (\mu g/cm^2)}$$

Potential average daily exposure (ADE) is calculated as follows:

$$\textit{Potential ADE} = \frac{\textit{DFR } (\mu g/cm^2) \times \textit{Transfer Coefficient } (10{,}000\ cm^2/hr) \times \textit{Work Day } (8\ hr)}{\textit{Unit Adjustment from ug to mg } (1{,}000\ \mu g)}$$

Occupational Postapplication Exposures

HED has two chemical-specific studies upon which to assess the exposure of workers entering avocado orchards to perform tasks, such as harvesting, following applications of folpet. However, the studies are based on a single application of folpet and up to 7 applications are permitted annually at a minimum interval of 14 days separating each application. The label allows for seven applications per season, spread 14 days apart. Therefore, the available data represent a best-case characterization of exposures to workers.

As required, dislodgeable foliar residue (DFR) studies and concurrent worker exposure monitoring (inhalation and dermal exposure) were conducted for folpet use in avocado orchards.

The DFR study was entitled *Folpet Dislodgeable Foliar Residue Study in Avocados* (MRID 421220-19; D172924), and the worker exposure study was entitled Folpet: Field Worker Exposure Study in Avocado Harvesting Operations (MRID 421220-20; D172924).

For both the DFR study and the worker exposure study, approximately 3.0 lbs ai/acre of Folpet 50WP (e.g., 47.6% active ingredient by weight), formulated as a wettable powder in 200 gallons of spray solution per acre was applied to avocado trees once using an airblast spray system. Four different sprayers placed on trailers were each hitched to 4 different tractors in order to spray 47.5 acres of avocado trees (i.e., the total acres for the three different sites) located at Goulds, Florida. Applications were made on November 4, 1989. Rainfall was measured as a "trace" amount on November 6, 0.24 inches on November 8, and intermittently throughout the study (trace to 0.44 inches per event).

MRID 421220-19: Folpet Dislodgeable Foliar Residue Study in Avocados

For the DFR study, six avocado leaf samples (e.g., each sample consisting of 50 leaf discs measuring 10 cm^2) were taken at each sampling interval from each site. Three of the samples were used for measuring folpet dislodgeable foliar residues, and three samples were used for measuring total residues. The leaf disc samples were collected from the trees at the height of approximately six feet. The folpet residues were dislodged using a detergent solution (an aqueous dilution of Aerosol OT-75). Foliage samples were collected at 0, 1, 3, 7, 9, 13, 21, 28, and 35 days after treatment (DAT).

Quality control samples were generated and treated identically to the foliage samples. Duplicate blank samples were collected for both the leaf punch and the wash solution before initiating the study to serve as negative controls. In addition, duplicates of the leaf punch and wash solutions were fortified in the field with 10, 100, and 1000 micrograms (μg) of folpet to serve as positive controls. The mean laboratory recovery for the fortified samples was 91.4 percent and the mean field recovery was 63.5 percent. The mean storage stability is 53.3 percent after being stored 114 days. Three aliquots from the tank load were also taken as a control sample.

The study did not meet all of the Subdivision K requirements. Noted deficiencies included one application was used, yet the label allows for seven applications per season, spread 14 days apart; the submission did not indicate how soon after application the day zero sample was collected; and the sample shipping procedure was not described.

MRID 421220-20: Folpet: Field Worker Exposure Study in Avocado Harvesting Operations.

For the worker exposure study, thirty workers were monitored while harvesting avocados from trees that had been treated once with folpet. Ten volunteers worked in each grove. Thus, the study contained a total of 10 replicate measurements for calculating folpet inhalation and dermal exposure at three sampling intervals. The sampling interval was

different at each site. The sampling was performed on 6 days after treatment (DAT) at site one, 9 DAT at site two, and 13 DAT at site three.

Two harvesting techniques were monitored in this study. Using the first technique, workers used a machine similar to a "cherry picker". In this type of harvesting, a worker stands on a platform which is raised and lowered by the "cherry picker" as the worker picks avocados by hand so that he/she can pick avocados at different heights of the tree. The platform contains a bucket where the avocados are stored. When the bucket becomes full, the "cherry picker" lowers the platform so that the worker can empty the bucket of avocados into a set of wooden crates placed in a tractor-drawn trailer. In the second harvesting technique, workers pick avocados from the ground or pick up avocados dropped on the ground by workers using the picker machine (the first harvesting technique), collecting the avocados into crates and driving the trucks containing the crates of avocados to a storage facility.

Each test subject wore whole-body dosimeters (i.e., ankle length tights and a long sleeved t-shirt), a personal air sampling pump fitted with a foam filter (run at a "breathing rate" of 2 L/min.), and two head patches attached to a hat. The whole-body dosimeters were reportedly worn underneath "freshly laundered long pants" and underneath "freshly laundered outer garment or as the upper body garment". A soap solution hand wash was performed on each hand of each test subject after the work period. The work period was approximately 4 hours for each test subject. The dermal dosimeters (i.e., ankle length tights, long-sleeved t-shirt, and head patches) were stored in separate heat sealable bags. Hand wash and filter samples were double-bagged for added integrity during shipment and storage.

Duplicate blanks of each matrix were exposed to the environment at each site, although the duration of exposure was not specified. Field recovery samples were prepared by spiking samples of each matrix with 10, 100, or 1000 μg of folpet. Fortified samples were then placed in heat-sealable bags, placed in ice, and taken to the laboratory. Field recoveries for the polyurethane foam, head patch, cotton t-shirt, and cotton tights ranged from 77.6 to 94.8 percent. Laboratory recoveries were determined for each set of samples analyzed. Control samples were fortified at the method limits and at levels above those measured on field samples. Laboratory recoveries for the polyurethane foam, head patch, cotton t-shirt, and cotton tights ranged from 88.2 to 112.4 percent. A storage stability test was conducted by spiking the matrix at the same fortification levels as the field recovery samples. Storage stability recoveries for all matrixes ranged from 73.5 to 103 percent.

Like the DFR study, the exposure monitoring study did not meet all of Subdivision K requirements. Noted deficiencies include: only one application was used, yet the label allows 7 applications per season, spread 14 days apart; the quantification limit was not provided or described; the study did not indicate the number of field fortifications per monitoring period; and workers wore an *optional* outer garment over the t-shirt

dosimeter, while HED requires that specific clothing attire and material type be provided.

The restricted entry interval (REI) for workers harvesting folpet-treated avocados are presented in Table 3. Dissipation was calculated using measured dislodgeable foliar residue (DFR) data from sites 1 through 3, correcting the data for a field recovery of 63.5 percent, and averaging the results of the three sites together. The table below also provides an MOE assessment based on an average transfer coefficient (Tc) of 30,015 cm^2/hr. The average transfer coefficient is based on the average exposure of cherry harvesters at three different sites. The results of the individual site data are as follows:

- DAT 6: dermal exposure = 16,050 μg/hr; Tc = 42,237 cm^2/hr,
- DAT 9: dermal exposure = 5,210 μg/hr; Tc = 13,359 cm^2/hr, and
- DAT 13: dermal exposure = 17,225 μg/hr; Tc = 34,450 cm^2/hr.

Table 3: Worker Postapplication Exposure to Folpet Following Application to Avocados

Days After Treatment	Best Fit Average DFR ($\mu g/cm^2$)[a]	Daily Dermal Exposure (mg/day)[b]	Daily Absorbed Dermal Dose (mg/kg/day)[c]	Dermal MOE[d]	Dermal LADD (mg/kg/day)[e]	Risk[f]
0	0.97	232.9	0.105	95	3.7E-3	6.9E-6
1	0.93	223.3	0.100	100	3.5E-3	6.5E-6

[a] The average dislodgeable foliar residues from the avocado study MRID No. 421220-19, DFR ($\mu g/cm^2$) were derived by converting the measured DFR data (averaged DFR data from the three sites and corrected for a field recovery of 63.5%) into lognormal then running a linear regression equation to estimate the dissipation over time.

[b] Exposure (mg/day) = [(Best Fit Average DFR x Average Tc (30,015 cm^2/hr)) / 1,000 $\mu g/mg$ unit conversion] x 8 hrs/day.

Where: The transfer coefficients (Tc) were calculated using measured DFR data (corrected for field recovery) and using total dermal residue data ($\mu g/hr$) provided from the worker exposure study MRID No. 421220-20. Transfer Coefficient (cm^2/hr)= [(Total Dermal Residue ($\mu g/hr$)) / site specific DFR ($\mu g/cm^2$)].
- Site one Tc = [16,050 $\mu g/hr$ / 0.38 $\mu g/cm^2$] = 42,237 cm^2/hr;
- Site two Tc = [5,210 $\mu g/hr$ / 0.39 $\mu g/cm^2$] = 13,359 cm^2/hr; and
- Site three Tc = [17,225 $\mu g/hr$ / 0.50 $\mu g/cm^2$] = 34,450 cm^2/hr.

[c] Dose (mg/kg/day) = Exposure (mg/day) x Dermal Absorption (2.7%) / 60 kg.

[d] MOE = NOEL (10 mg/kg/day) / Dose (mg/kg/day). UF = 100.

[e] LADD (mg/kg/day) = Daily Absorbed Dermal Dose (mg/kg/day) * (30 days worked/365 days per year) * (35 years worked/70 year lifetime). Body weight used in the cancer assessment is 70 kg.

[f] Risk = LADD (mg/kg/day) * Q_1^* $(mg/kg/day)^{-1}$. Where the Q_1^* is 1.86E-3 $(mg/kg/day)^{-1}$.

Potential average daily exposure (ADE) is calculated as follows:

$$\textit{Potential ADE} = \frac{\textit{DFR (ug/cm}^2\textit{) x Transfer Coefficient (10,000 cm}^2\textit{/hr) x Work Day (8 hr)}}{\textit{Unit Adjustment from ug to mg (1,000 ug)}}$$

Postapplication MOEs are calculated using the following formula:

MOE = NOAEL (mg/kg/day)/Dose (mg/kg/day)

For folpet, the short- and intermediate-term NOAEL for dermal toxicity is 10 mg/kg/day with a dermal absorption of 2.7 percent.

Postapplication Hazard/Risk

The risk assessment indicates that the MOEs for short- and intermediate-term exposures exceed 100 and **are below HED's level of concern** on day 1 after treatment. Cancer risks are 6.5×10^{-6} on the day of treatment after sprays have dried, which does not trigger the Agency's level of concern. The data may represent a potential underestimate of postapplication risks to avocado workers following folpet applications because of the deficiencies in the data noted above (e.g., only one application was used in the study when up to seven are allowable).

Residential and Other Non-Occupational Exposures

For the homeowner uses of folpet (painting using a brush and airless sprayer), hazard estimates are below HED's level of concern for short- and intermediate-term exposures as well as for carcinogenic risk.

There are two use scenarios for which **no data have been submitted and no data are available:** Applying ready-to-use paint with a roller and as an on-site wood dip treatment. While postapplication exposure from these uses would be expected to present negligible exposure and risks, HED cannot make conclusions regarding hazard/risk to either homeowners or occupational **applicators** due to the data gap. Therefore, HED requests that if these uses are to be supported by the registrant, data need to be submitted (see HED Recommendations in the section that follows).

3.0 HED RECOMMENDATIONS FOR RISK MITIGATION

Handler Studies

There are no data available for two of the registered uses of folpet; applying ready-to-use formulations with a paint roller, and as an on-site wood dip treatment.

Applying ready-to-use formulations with a paint roller is not believed to present a greater exposure or risk than that from that from using a paint brush (worst case dermal), or from using an airless sprayer (worst case inhalation); both of which have been determined to have acceptable risks. Therefore, while handler exposure data are needed to accurately characterize this form of application, the lack of such data should not preclude the registration of this use.

The Agency is concerned that the on-site wood dip treatment use may present a substantial dermal exposure potential. More information on this use is requested. If this use is to be supported by the registrant, handler exposure data are required. See Series 875 Group A for study materials and methods. Additionally, HED requests use information, such as typical use pattern, method(s) of application, and frequency and duration of potential exposure for the wood dip uses.

Postapplication Studies

No additional postapplication studies are required at this time.

References

1. MRID No. 428444-01. Survey of Paint Manufacturers and Use of Folpet. Sponsored by Makhteshim-Agan of North America, Inc.

2. U.S. EPA 1997. Draft Standard Operating Procedures for Residential Exposure Assessments dated December 18, 1997.

3. U.S. EPA 1997. Folpet LUIS Report Run dated April 9, 1997.

APPENDIX A

Handler Exposure/Risk Assessment

Tables A-1 Through A-5

Table A-1: Short-term and Intermediate-term Dermal and Inhalation Exposures to Folpet

Exposure Scenario (Scenario #)	Baseline Dermal Unit Exposure (mg/lb ai)[a]	Baseline Inhalation Unit Exposure (μg/lb ai)	Application Rate[b]	Amount Handled[c]	Daily Dermal Exposure (mg/day)[d]	Daily Inhalation Exposure (mg/day)[e]
Mixer/Loader Exposure						
Adding Wettable Powder Formulation to Paint at the Manufacturing Process (1)	3.7	43.4	0.088 lb ai/gallon	4,000 gallons of Paint	1,300	15
Mixing/Loading Wettable Powder for Airblast Application (2)	3.7	43.4	Typical: 1.5 lb ai/A	10 acres	56	0.65
			Max.: 3.0 lb ai/A		111	1.3
Applicator Exposure						
Applying Liquids with an Airblast Sprayer (3)	0.36	4.5	Typical: 1.5 lb ai/A	10 acres	5.4	0.068
			Max.: 3.0 lb ai/A		10.8	0.135
Applying Ready-to-use Formulation or Paint Product with a Paint Brush (4)	182	284	0.088 lb ai/gallon	(H) 2 gallons	(H) 32	(H) 0.05
				(O) 5 gallons	(O) 80	(O) 0.125
Applying Ready-to-use Stain Formulation with an Airless Sprayer (5)	39	830	0.2952 lb ai/1,000 ft^2	(H) 2,800 ft^2 (0.83 lb ai)	(H) 32.4	(H) 0.69
				(O) 5,600ft^2 (1.65 lb ai)	(O) 64.4	(O) 1.4
Applying Ready-to-use Formulation or Paint Product with a Paint Roller (6)	No Data	No Data	0.088 lb ai/gallon	No Data	No Data	No Data
Applying Ready-to-use Formulation as an On-site Wood Dip Treatment (7)	No Data	No Data	No Data	No Data	No Data	No Data

[a] Baseline dermal unit exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, open cab tractor.

[b] Application rates are maximum values found in the Folpet LUIS report. The paint rate is reported in the LUIS report as 8.8 lb ai/1,000 lb paint; it is assumed that the paint density is 10 lb/gallon. The ready-to-use stain rate, based on the LUIS report, is 0.2952 lb ai/1,000 ft^2 and an assumed house size of 30 ft x 40 ft x 20 ft (2,400 ft^2 living area and 2,800 ft^2 outdoor surface area treated).

[c] Daily acres treated and gallons of paint/stain handled are from the EPA estimates of acreage and gallonage that could be treated in a single day for each exposure scenario of concern.

[d] Daily dermal exposure (mg/day) = Unit exposure (mg/lb ai) * Appl. rate (lb ai/acre or lb ai/gal or lb/ft²) * Acres or gallons or square feet treated.

[e] Daily inhalation exposure (mg/day) = [Unit exposure (μg/lb ai)/1,000 μg/mg conversion] * Appl. rate (lb ai/acre or lb ai/gal or lb/ft²) * Acres or gallons or square feet treated.

Table A-2: Short-term and Intermediate-term Dermal Risks to Folpet

Exposure Scenario (Scen #)	Baseline Absorbed Daily Dermal Dose (mg/kg/day)[a]	Baseline Dermal MOE[b]	Risk Mitigation Measures		
			Additional PPE		
			PPE Dermal Unit Exposure (mg/lb ai)[c]	PPE Absorbed Daily Dermal Dose (mg/kg/day)[a]	PPE Dermal MOE[b]
Mixer/Loader Risk					
Adding Wettable Powder to Paint at the Manufacturing Process (1)	0.59	17	0.17	0.027	370
Mixing/Loading Wettable Powder for Airblast Application (2)	Typical Rate 0.025	400	N/A	N/A	N/A
	Maximum Rate 0.050	200		N/A	N/A
Applicator Risk					
Applying Sprays with an Airblast Sprayer (3)	Typical Rate 0.002	5,000	N/A	N/A	N/A
	Maximum Rate 0.005	2,000		N/A	N/A
Applying Ready-to-use Formulation or Paint Product with a Paint Brush (4)	(H) 0.014	710	N/A	N/A	N/A
	(O) 0.036	280		N/A	N/A
Applying Ready-to-use Stain Formulation with an Airless Sprayer (5)	(H) 0.015	670	N/A	N/A	N/A
	(O) 0.029	350		N/A	N/A
Applying Ready-to-use Formulation or Paint Product with a Paint Roller (6)	No data	No data	No data	No data	No data
Applying Ready-to-use Formulation as an On-site Wood Dip Treatment (7)	No data	No data	No data	No data	No data

[a] Absorbed Daily Dermal Dose (mg/kg/day) = [Dermal Exposure (mg/day) * Dermal Absorption Rate (2.7%)] / Body Weight (60 kg).
[b] Dermal MOE = NOEL (10 mg/kg/day) / Absorbed Daily Dermal Dose (mg/kg/day). A MOE of 300 is required for homeowners (H). A MOE of 100 is required for occupational (O) and all other, unspecified scenarios.
[c] Additional PPE: Scenario 1: Single layer of clothing and chemical resistant gloves.

Table A-3: Total Risks to Folpet (Inhalation plus Dermal)

Exposure Scenario (Scenario #)	Baseline Absorbed Daily Dermal Dose (mg/kg/day)[a]	Baseline Daily Inhalation Dose (mg/kg/day)[b]	Baseline Total Dose (mg/kg/day)[c]	Baseline Total MOE[d]	Risk Mitigation[e]			
					PPE Absorbed Dermal Dose (mg/kg/day)	Daily Inhalation Dose (mg/kg/day)	Total Dose (mg/kg/day)	Total MOE
Mixer/Loader Risk								
Adding Wettable Powder to Paint at the Manufacturing Process (1)	0.59	0.007	0.60	17	0.027	0.050 (dust/mist)	0.077	130
Mixing/Loading Wettable Powder for Airblast Application (2)	Typical Rate 0.025	0.011	0.036	280	N/A	N/A	N/A	N/A
	Maximum Rate 0.050	0.022	0.072	140	N/A	N/A	N/A	N/A
Applicator Risk								
Applying Sprays with an Airblast Sprayer (3)	Typical Rate 0.002	0.001	0.003	3,300	N/A	N/A	N/A	N/A
	Maximum Rate 0.005	0.002	0.007	1,400	N/A	N/A	N/A	N/A
Applying Ready-to-use Formulation or Paint Product with a Paint Brush (4)	(H) 0.014	0.0008	0.015	700	N/A	N/A	N/A	N/A
	(O) 0.036	0.002	0.038	260	N/A	N/A	N/A	N/A
Applying Ready-to-use Stain Formulation with an Airless Sprayer (5)	(H) 0.015	0.012	0.027	407	N/A	N/A	N/A	N/A
	(O) 0.029	0.023	0.052	212	N/A	N/A	N/A	N/A
Applying Ready-to-use Formulation or Paint Product with a Paint Roller (6)	No data	No data	No data	No data	No data	No data	No data	No data
Applying Ready-to-use as an On-site Wood Dip Treatment (7)	No data	No data	No data	No data	No data	No data	No data	No data

N/A Not applicable, previous MOE greater than 100.
(H) Homeowner
(O) Occupational

[a] Baseline Absorbed Daily Dermal Dose (mg/kg/day) = [Unit exposure (mg/lb ai) * Appl. rate (lb ai/acre or lb ai/gal or lb ai/ft2) * Acres or gallons or square feet treated * Dermal Absorption (2.7%)] / 60 kg Body weight. Values are from Table 2.

[b] Baseline Daily Inhalation Dose (mg/kg/day) = [Unit exposure (mg/lb ai) * Appl. rate (lb ai/acre or lb ai/gal or lb ai/ft2) * Acres or gallons or square feet treated] / 60 kg Body Weight.

[c] Baseline Total Dose (mg/kg/day) = Baseline Absorbed Daily Dermal Dose (mg/kg/day) + Baseline Daily Inhalation Dose (mg/kg/day)

[d] Baseline Total MOE = Dermal NOEL (10 mg/kg/day) / Baseline Total Dose (mg/kg/day); A MOE of 300 is required for homeowners (H). A MOE of 100 is required for occupational (O) and all other, unspecified scenarios.

[e] Risk Mitigation: Scenario 1: Single layer of clothing and chemical resistant gloves, and a dust/mist respirator.

Table A-4: Combined Dermal and Inhalation Cancer Risk Assessment for Folpet

Exposure Scenario (Scen #)	Baseline Absorbed Daily Dermal Dose (mg/kg/day)[a]	Baseline Daily Inhalation Dose (mg/kg/day)[b]	Baseline Daily Total Dose (mg/kg/day)[c]	Number of Treatments per year[d]	Baseline (Total) LADD (mg/kg/day)[e]	Baseline (Total) Risk[f]	Risk Mitigation		
							PPE (Total) Dose (mg/kg/day)[g]	PPE (Total) LADD (mg/kg/day)[h]	PPE (Total) Risk[i]
Mixer/Loader Cancer Risk									
Adding Wettable Powder to Paint at the Manufacturing Process (1)	0.50	0.21	0.71	50	0.049	9.1E-5	N/A	N/A	N/A
Mixing/Loading Wettable Powder for Airblast Application (2)	Typical: 0.022	0.009	0.031	14	0.0006	1.1E-6	N/A	N/A	N/A
	Max.: 0.044	0.019	0.063		0.0012	2.2E-6	N/A	N/A	N/A
Applicator Cancer Risk									
Applying Liquid with an Airblast Sprayer (3)	Typical: 0.002	0.001	0.003	14	0.00006	1.1E-7	N/A	N/A	N/A
	Max.: 0.004	0.002	0.006		0.0001	1.9E-7	N/A	N/A	N/A
Applying Ready-to-use Formulation or Paint Product with a Paint Brush (4)	(H) 0.012	0.001	0.013	4	0.00007	1.3E-7	N/A	N/A	N/A
	(O) 0.031	0.002	0.033	50	0.0023	4.3E-6	N/A	N/A	N/A
Applying Ready-to-use Stain Formulation with an Airless Sprayer (5)	(H) 0.012	0.010	0.022	1	0.00003	5.6E-8	N/A	N/A	N/A
	(O) 0.025	0.020	0.045	50	0.003	5.6E-6	N/A	N/A	N/A
Applying Ready-to-use Formulation or Paint Product with a Paint Roller (6)	No data	No data	No data	No data	No data	No data	No data	No data	No data
Applying Ready-to-use Formulation as an On-site Wood Dip Treatment (7)	No data	No data	No data	No data	No data	No data	No data	No data	No data

[a] Baseline Absorbed Daily Dermal Dose (mg/kg/day) = [Baseline Dermal Exposure (mg/day) * Dermal Absorption Rate (2.7%)] / Body Weight (70 kg). Note: The dermal doses differ slightly from the values reported in Table A-2 because of the use of a different body weight.

[b] Baseline Daily Inhalation Dose (mg/kg/day) = Baseline Inhalation Exposure (mg/day) / Body Weight (70 kg). Note: The inhalation doses differ slightly from the values reported in Table A-3 because of the use of a different body weight.

[c] Baseline Daily Total Dose (mg/kg/day) = Baseline Absorbed Daily Dermal Dose (mg/kg/day) + Baseline Inhalation Dose (mg/kg/day).

[d] Number of Treatments per year are based on HED's best estimate.

[e] Baseline LADD (mg/kg/day) = Baseline Total Daily Dose (mg/kg/day) * (number of days per year worked / 365 days per year) * (35 years worked / 70 years lifetime).

[f] Baseline Risk = Baseline LADD (mg/kg/day) * (Q_1^*). Where Q_1^* = 1.86E-3 (mg/kg/day)$^{-1}$

[g] PPE Total Dose (mg/kg/day) = PPE Absorbed Dermal Dose (mg/kg/day) + Baseline Inhalation Dose (mg/kg/day).

Where: Additional PPE is as follows for Scenario 1:Single layer of clothing and chemical resistant gloves.

[h] PPE LADD (mg/kg/day) = PPE Total Daily Dermal Dose (mg/kg/day) * (number of days per year worked / 365 days per year) * (35 years worked / 70 years lifetime).

[i] PPE Risk = PPE LADD (mg/kg/day) * (Q_i^*). Where Q_i^* = 1.86E-3 $(mg/kg/day)^{-1}$

Table A-5: Exposure Scenario Descriptions for the Use of Folpet

Exposure Scenario (Number)	Data Source	Standard Assumptions (8-hr work day)	Comments
Mixer/Loader Descriptors			
Adding Wettable Powder to Paint at the Manufacturing Process (1)	PHED V1.1 MRID428444-01	4,000 gallons of paint treated	**Baseline:** "Best Available" grades: Hands, dermal, and inhalation acceptable grades. Hands = 53 replicates; dermal = 25 to 122 replicates; inhalation = 85 replicates. High confidence in hands, dermal, and inhalation data. **PPE:** "Best Available" grades: Hands and dermal acceptable grades. Hands = 59 replicates; dermal = 25 to 122 replicates. High confidence in hands and dermal data. PHED data used for baseline and PPE, a 5-fold Protection Factor (PF) was used for a dust/mist respirator.
Mixing/Loading Wettable Powder for Airblast Application (2)	PHED V1.1	10 acres for airblast. (Based on registrant-supplied and Agency-verified trends on avocado farm size, and more particularly on the large dilution requirements which restrict daily coverage.)	**Baseline:** "Best Available" grades: Hands and dermal acceptable grades; inhalation = ABC grades. Hands and dermal = 7 to 24 replicates; inhalation = 44 replicates. Low confidence in hands and dermal data; medium confidence for inhalation data. **PPE:** "Best Available" grades: Hands and dermal = ABC grades. Hands 24 replicates; dermal = 22 to 45 replicates. Medium confidence in hands and dermal data. PHED data used for baseline and PPE, no Protection Factors (PFs) were necessary.
Applicator Descriptors			
Applying Sprays with an Airblast Sprayer (3)	PHED V1.1	10 acres. (Based on registrant-supplied and Agency-verified trends on avocado farm size, and more particularly on the large dilution requirements which restrict daily coverage.)	**Baseline:** "Best Available" grades: Hands, dermal, and inhalation = acceptable grades. Hands = 22 replicates; dermal = 32 to 49 replicates; inhalation = 47 replicates. High confidence in dermal and inhalation data. **PPE:** "Best Available" grades: Hands and dermal = acceptable grades. Hands = 18 replicates; dermal = 32 to 49 replicates. High confidence in dermal data. PHED used for baseline data, no PFs necessary. A 50 percent PF representing coveralls was applied to the PPE data to determine the PPE exposure scenario.
Applying Ready-to-use Formulation or Paint Product with a Paint Brush (4)	MRID414118-01	(H) 2 gallons (O) 5 gallons	**Baseline and PPE:** Chemical-specific data are based on the following grades: Hands, dermal, and inhalation = A, B, C grades. Hands = 15 replicates; dermal = 15 replicates; inhalation = 15 replicates. Medium confidence in dermal and inhalation data. Chemical-specific data used for baseline data, no PFs necessary. A 50 percent PF representing coveralls and a 90 percent PF for chemical resistant gloves were applied to the baseline data to determine the PPE exposure scenario.

Exposure Scenario (Number)	Data Source	Standard Assumptions (8-hr work day)	Comments
Applying Ready-to-use Stain Formulation with an Airless Sprayer (5)	MRID414118-02	0.2952 lb ai/1,000 ft^2 (H) 2,800 ft^2 (0.83 lb ai) (O) 5,600 ft^2 (1.65 lb ai)	**Baseline and PPE:** Chemical-specific data are based on the following grades: Hands and dermal acceptable grades; inhalation C grade. Hands = 15 replicates; dermal = 15 replicates; inhalation = 15 replicates. High confidence in dermal data and medium confidence for inhalation data. Chemical-specific data used for baseline data, no PFs necessary. A 50 percent PF representing coveralls and a 90 percent PF for chemical resistant gloves were applied to the baseline data to determine the PPE exposure scenario.
Applying Ready-to-use Formulation or Paint Product with a Paint Roller (6)	No data	No data	No data
Applying Ready-to-use Formulation as an On-site Wood Dip Treatment (7)	No data	No data	No data

[a] Standard Assumptions based on an 8-hour work day as estimated by HED.

[b] "Best Available" grades are defined by EPA SOP for meeting Subdivision U Guidelines. Best available grades are assigned as follows: matrices with grades A and B data and a minimum of 15 replicates; if not available, th grades A, B and C data and a minimum of 15 replicates; if not available, then all data regardless of the quality and number of replicates. Data confidence are assigned as follows:

High = grades A and B and 15 or more replicates per body part
Medium = grades A, B, and C and 15 or more replicates per body part
Low = grades A, B, C, D and E or any combination of grades with less than 15 replicates

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Chemical:	**Folpet (ANSI)**
PC Code:	**081601**
HED File Code	**12000 Exposure Reviews**
Memo Date:	**04/05/99**
File ID:	**DPD254768**
Accession Number:	**412-01-0084**

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