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DEC 7 1995

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: OCCUPATIONAL AND RESIDENTIAL EXPOSURE ASSESSMENT FOR THE CHLOROTHALONIL REREGISTRATION ELIGIBILITY DECISION (RED)

FROM: Jeff Evans, Biologist
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TO: Debra Edwards, Acting Branch Chief
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THRU: Alan Nielsen, Section Head
Reregistration Section (7509C)

Larry C. Dorsey, Chief
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Health Effects Division (7509C)

Please find the OREB review of ....

DP Barcode: D201524

Pesticide Chemical Code: 081901

EPA MRID No.: N/A

Review Time: 35 days

PHED: 1.1

Please find the Occupational and Residential Exposure Assessment for the Chlorothalonil Reregistration Eligibility Decision beginning on page 5. Also please find the following discussion of issues effecting the occupational and residential exposure assessment.

ISSUES:

The intermediate-term endpoint of 1.5 mg/kg/day (adverse kidney effects) is driving the occupational/residential exposure assessment. OREB has determined that this endpoint applies to reentry workers and certain mixer/loader, applicator scenarios.

Based on these concerns, longer Restricted Entry Intervals (REI's) than the current interim REI, imposed by the Worker Protection Standard (WPS) are recommended. Additional PPE for certain handlers are also recommended. It is OREB's understanding that the California Department of Pesticide Regulation (Cal-DPR) is not regulating chlorothalonil by using this intermediate-term endpoint in their risk assessment.

Endpoints other than the intermediate-term NOEL of 1.5 mg/kg/day

There are adequate margins of exposure (>300) for all the exposure scenarios presented in this document, with regard to the short-term endpoint of 175 mg/kg/day. Cancer risks from exposure to HCB (a contaminant of chlorothalonil) are estimated to be acceptable (less than 1×10^{-4}), for all handler and worker scenarios. Therefore, the current label precautions adequately mitigate these effects. Cancer risks, from exposure to chlorothalonil, are estimated to be less than 1×10^{-4} for most scenarios. The exceptions are mixer/loaders handling the wettable powder formulation (when assisting aerial applicators) and reentry workers cutting and bundling cut flowers.

For cancer, handler (mixer/loader) mitigation would consist of recommending the use of a respirator for mixer/loaders supporting aerial applications when using wettable powder formulations. For workers (reentry tasks), an extension of the current WPS-REI would be recommended for workers cutting/bundling greenhouse and field grown flowers. By recommending these mitigating measures, handler and worker cancer risks are expected to be less than 1×10^{-4}.

The intermediate-term end-point

Based on the intermediate-term endpoint, additional PPE are recommended for mixer/loaders supporting aerial applications when using the dry and liquid flowable formulations. These additional PPE include an apron over the currently recommended long-sleeved shirt and long pants and a respirator. Current PPE includes

long-sleeved shirt, long pants, chemical resistant gloves, shoes plus socks, and protective eyewear.

For the wettable powder formulations, OREB recommends that the use of these formulations be limited to ground applications. This is based on low MOE's estimated for mixer/loaders supporting aerial applications. If feasible, the use of water soluble packets is expected to provide acceptable MOE's and risks. If the use of water soluble packets is not feasible, OREB recommends prohibiting aerial applications for this formulation.

OREB recommends increasing the WPS imposed REI for many crops and reentry tasks. The use of PPE is currently not an option based on the Agency's long standing belief that PPE will not be worn by workers. In addition, there are additional concerns regarding heat stress, and because PPE efficacy is questionable when considering the highly ergonomic nature of reentry tasks. Therefore, the use of time, to allow field residues to dissipate to acceptable levels, or the use of reduced rates that result in lower field residues, are potential options for mitigation. Because the use of reduced rates depends on efficacy, and is within the purview of the registrant, OREB will propose REI's based on current label maximum rates. The registrant may wish to propose reduced rates once receiving a draft of the RED.

The increased REI's will be at odds with some of the currently registered uses of chlorothalonil. Most notably, cucurbits and tomatoes which have a zero-day preharvest interval (PHI). In many cases, these crops must be harvested daily regardless of the application schedule. Several exemptions, from chlorothalonil's interim 48-hour REI (based on primary eye irritation) imposed by the Worker Protection Standard (WPS), were submitted to the Agency for the 1995 growing season. These requests were denied based partly on a preliminary risk assessment showing an REI longer than 48 hours may be needed, and based on poorly submitted benefit/use information.

Experience with the WPS has also shown that any increase in the REI beyond 12 hours, for cut floral crops, prompts exemption requests. In fact, the industry as a whole prefers an REI of 4 hours. However, based on available data, there is concern regarding cancer risk for the floral crops (greater than 1×10^{-4}) with an REI of 48 hours in addition to the low MOE's estimated using the intermediate endpoint.

Another factor affecting the REIs is that chlorothalonil does not dissipate quickly. Therefore, longer lengths of time are needed to pass before residues are low enough to allow MOE's to be 100 or more for the intermediate term effect. If the value of the use of this chemical on crops such as tomatoes, is

significant, the Agency may need to accept lower MOE's for workers than for the general public.

The following REIs, based on the intermediate-term endpoint, if MOE's of @100 are desired:

Tomatoes (hand harvesting)	14 days
Cut flowers	11 days
Fruit Orchards (hand-labor) Christmas Trees (pruning) Conifer and other Tree Nurseries Cucurbits (hand harvesting) Beans (hand harvesting)	4 days
Celery Corn	3 days
Cole Crops Cucurbits (mechanical harvesting) Tomatoes (mechanical harvesting) Conifer Seedling Nurseries Sod (harvesting) All Other In-Scope WPS Crops Hoeing	48-hours*

* OREB recommends retaining a minimum 48-hour REI based on eye incidence reports.

For simplicity with respect to labeling language and enforcement, OREB recommends a four day REI for hand harvesting (except tomatoes and cut flowers) and a 2 day (48-hour) REI for machine harvesting, seedling nurseries and hoeing.

CHLOROTHALONIL

(RED SECTION III - TOXICITY, EXPOSURE, AND RISK)

(EXPOSURE)

An occupational and/or residential exposure assessment is required for chlorothalonil is required based on (1) adverse kidney effects including carcinogenicity and (2) because there is potential exposure to handlers (mixers, loaders, applicators, etc.) during use and to persons reentering treated sites.

Use Summary

Use Patterns

Chlorothalonil is a broad spectrum fungicide applied to turfgrass, vegetables, stone fruits, peanuts, soybeans, ornamentals (including greenhouse grown), minor crops (cranberry) and conifers (forestry) to control plant diseases such as powdery mildew, botrytis, rhizoctonia, and phytophthora. Formulations of chlorothalonil include wettable powders, aqueous flowable concentrates, and solid flowables (water dispersable granules). Chlorothalonil is also formulated into paints for interior and exterior applications.

Occupational-Use and Homeowner-Use Products

Most chlorothalonil end-use products are intended primarily for occupational use. However, there are also products intended primarily for "homeowner" use.

Summary of Toxicity Concerns Impacting Occupational and Residential Exposures

Acute Toxicity

The acute toxicity of the chlorothalonil technical grade active ingredient (TGAI) is in Toxicity Category IV, for acute oral toxicity and skin irritation potential, and in Toxicity Category III for acute dermal toxicity. For acute inhalation toxicity and primary eye irritation, it is in Toxicity Category I. Until recently, chlorothalonil was classified as Toxicity Category II for acute inhalation toxicity. This chemical is negative for skin sensitization.

Other End-points of Concern

Chlorothalonil is classified as a probable human carcinogen (Group B2) based on evidence of carcinogenicity in rats and mice (kidney). For risk assessment purposes, a potency factor or Q^{1*} of 0.00766 (mg/kg/day) has been calculated.

In the Chlorothalonil Toxicology Endpoint Selection Document dated August 12, 1994, endpoints of concern were identified for short-term and intermediate term exposure, for occupational and residential exposure. These endpoints are also based on adverse kidney effects.

For short-term occupational or residential exposure (1 - 7 days of exposure) an endpoint of 175 mg/kg/day was chosen primarily because it was the only dose tested (ODT). In the study, serial sacrifices were conducted at day 4 and 7 as well as at weeks 2, 4, 6, 8, 10, 12, and 91 days. Within four days, renal and gastric lesions were observed, which appear to be precursors to kidney and forestomach neoplasms. Because the endpoint is an LOEL, a margin of exposure (MOE) of 300 or greater has been recommended as acceptable for worker/handler exposure. It should also be noted that the RfD is based on renal tubular vacuolization.

For intermediate-term occupational or residential exposure (1 week to several months exposure), a NOEL of 1.5 mg/kg/day was selected. This endpoint is based on an increased number of irregular intracytoplasmic inclusion bodies in the proximal convoluted tubules of all males in a subchronic rat feeding study.

Based on a memorandum from R. Zenzian/Toxicology Branch I to M. Clock/Risk Characterization and Analysis Branch dated 9/15/95, an upper limit 5% of the chlorothalonil that contacts the skin during a working day is absorbed. It is assumed that this rate will over estimate human dermal absorption because the absorption rate is based on data derived from rat studies. This dermal absorption rate is to be used for all chlorothalonil exposure scenarios except the used of paints and stains containing chlorothalonil. For these scenarios, a 1.22% dermal absorption rate (8 hour period) for latex based paints and a 1.34% dermal absorption rate (8 hour period) for alkyd-based stains. The 8-hour rate was selected, since it is assumed professional painters wash with soap and water after using latex paint and paint thinners after using the alkyd stains.

Hexachlorobenzene (HCB) is a potential degradate compound of chlorothalonil and is a carcinogen (HCB Q^{1*} = 1.02 mg/kg/day) The dermal penetration factor is estimated to be 26%. This is based on a previous assessment for dacthal which also is contaminated with HCB. In the past, the Agency has assumed HCB contamination to be approximately 0.05% to that of chlorothalonil. In foliar dislodgeable studies where HCB was monitored, it appears to be approximately 0.02%. Cancer assumptions for reentry workers appear to be less than 1×10^{-5}. Handler risk to HCB based on the worse-case scenario (mixer/loader using the wettable powder formulation for aerial applications) is 5.4×10^{-5}, based on the assumption that

handlers were wearing long-sleeve shirt, long pants, shoes, socks, and chemical resistant gloves. It appears that the HCB endpoint is of limited concern as compared to the risks associated with chlorothalonil.

Incidence Reports

According to EPA's Recognition and Management of Pesticide Poisonings (March 1989), chlorothalonil has caused skin irritation and irritation of mucous membranes of the eye and respiratory tract. Dermal sensitization is reportedly rare and no cases of human systemic poisoning have been reported.

Between 1982 and 1992, 133 incident case reports were received by the California Pesticide Illness surveillance Program. In these reports, health effects were attributed to exposure to chlorothalonil or chlorothalonil used in combination with other pesticides. In most cases, the incidents involved mixer/loaders and applicators and were the result of accidents or carelessness. The symptoms related to chlorothalonil were mostly eye irritations or skin rashes. There were also 13 incidents that were either identified as possible or probable cause for reentry workers exposed to field residues of chlorothalonil. Again, the symptoms included skin and eye irritation. The California Department of Pesticide Regulation has suggested that the large percentage of eye and skin reports is due to the high irritant potential of chlorothalonil. These findings appear at odds with the classification of the TGAI of chlorothalonil as Toxicity Category IV for primary skin irritation.

Handler Exposures & Assumptions

The daily handler exposure is calculated using the following formula:

Daily exposure (mg ai/kg bw/day)

$$\frac{\text{unit exp. (mg ai/lb ai handled)} \times \text{lb ai/A} \times \text{A/day} \times \text{dermal absorp}}{\text{body weight (75.9 kg)}}$$

EPA has determined that there is an exposure potential for mixers, loaders, applicators, or other handlers during usual use-patterns associated with chlorothalonil. Handler exposure scenarios are as follows:

Large scale mixing/loading and applying chlorothalonil for airblast, ground-boom, and aerial application equipment;

Mixing/loading chlorothalonil for applications through irrigation equipment;

Mixer/loader and applicator exposure while using hand-held equipment such as backpack sprayers;

Flaggers supporting aerial applications;

Painting with airless sprayers and paint brushes while using paints and stains containing chlorothalonil.

Mixer/loader/applicator (M/L/A) exposure data were required during Phase IV of the reregistration process. Additional M/L/A data were required in 1991 for painters and greenhouse applicators. The registrant has submitted the following handler exposure monitoring studies to support the reregistration of chlorothalonil:

- A Mixer, Applicator, and Mower Exposure Study with Chlorothalonil for Golf Course Maintenance [MRID 424338-10];
- Potential Exposure of Workers to Chlorothalonil when Handling and Applying Paint containing Chlorothalonil [MRID 436001-02];
- Chlorothalonil Worker Exposure During application of Daconil 2787 Flowable Fungicide in Greenhouses [MRID 436232-01].

Surrogate data (unit exposures) provided in the Pesticide Handlers Exposure Database (PHED) are also available for estimating other handler exposure scenarios. These scenarios include handling tasks associated with the use of aerial, airblast, ground-boom, and hand-held equipment. Where appropriate, the data from handler exposure monitoring studies submitted by the registrant (backpack, paint sprayer, and golf course applications) have been merged with data contained in PHED. These scenarios are shown in Tables 1 to 4 presented at the end of this chapter. Potential options available for mitigating handler exposure include the use of additional PPE and engineering controls are shown in Table 5 presented at the end of this chapter.

There are very limited data regarding professional lawn care applications to residential turf. An "Assessment of Lawn Care Worker Exposure to Dithiopyr" is available in the open literature (Cowell, J.E., Lottman, C.M., and Manning, M.J. 1991. Arch. Environ. Contam. Toxicol. 21:195-201). In this study, applicator exposure was monitored using biological monitoring techniques. Since the dermal absorption rate of dithiopyr is known as is chlorothalonil, an estimation of exposure to handlers using chlorothalonil can be made using these surrogate data.

The registrant is a member of the Outdoor Residential Exposure Task Force (ORETF). Exposure studies addressing data gaps regarding this method of application and other lawn

treatment scenarios will be conducted by the (ORETF). This exposure assessment, if needed, will be reevaluated when those data are generated.

The absorbed dose from the published dithiopyr study is 4.6 x 10^{-5} mg/kg/ lb ai. Therefore, the absorbed dose of chlorothalonil can be estimated as follows:

$$\frac{0.000046 \text{ mg/kg/lb ai} \times 5.6 \text{ lb ai chlorothalonil} \times 2 \text{ A/da} \times 5\%}{1 \text{ lb ai/A dithiopyr} \times 0.08\% \text{ dermal absorption (da)}} =$$

$$= 0.032 \text{ mg/kg/day}$$

Based on conversations with the registrant, chlorothalonil is not used by "Chemlawn" type services. Its use on turf is limited primarily to golf courses. The short-term MOE for this use is estimated to be greater than 5000. Because this scenario is not likely, a risk was not calculated. Also based on conversations with the registrant and other assessments for paint applicator exposure, OREB as assumed that painters using paints treated with fungicides is not an intermediate-term exposure scenario. This is based on the fact that all paints containing any fungicide makes up less than 15% of the market.

Post-Application Exposures and Assumptions

Chlorothalonil is a non-systemic fungicide. When applied to plant tissues, it is strongly bound to leaf and stem cuticular waxes. According to the registrant, dissipation is influenced primarily by rainfall and irrigation. In the absence of rain or irrigation, dissipation is influenced by primarily by leaf expansion. For many crops, repeated applications are made because it is used as a preventative treatment rather than curative treatment.

Chlorothalonil is applied to several crops requiring hand-labor resulting in a significant potential for workers to be exposed to treated foliage. For many crops, frequent applications are made up to and throughout harvest.

Post-application exposure is mitigated by the establishment of restricted entry intervals (REI). REI's allow sufficient time to pass for field residues to dissipate to levels that result in acceptable MOEs for reentry workers. The REI's for chlorothalonil were calculated by using the following:

- Determination of Dislodgeable Foliar Residues of Chlorothalonil and HCB from Bravo 720 Treated Cherry Leaves [MRID 428759-02];

- Determination of Dislodgeable Foliar Residues of Chlorothalonil and HCB from Bravo 720 Treated Broccoli Plants [MRID 428759-03];

- Determination of Dislodgeable Foliar Residues of Chlorothalonil and HCB from Bravo 720 Treated Cucumber Plants [MRID 428759-04];

- A Tomato Harvester Exposure Study with Chlorothalonil [MRID 470025-045];

- A Golfer Exposure Study with Chlorothalonil Used for Golf Course Maintenance [MRID 424338-11];

- A Mixer, Applicator, and Mower Exposure Study with Chlorothalonil for Golf Course Maintenance [MRID 424338-10].

Except for tomatoes, the above referenced FDR studies were conducted without concurrently monitoring worker exposure. Therefore, worker exposure ($\mu g/hr$) to those dislodgeable foliar residues ($\mu g/cm^2$) was estimated using transfer factors (cm^2/hr). Transfer factors bridge worker exposure tasks to field measured residues (FDR's). The transfer factors used in this chapter are based on discussions with personnel at the Cal-DPR. Generic transfer factors to address agricultural reentry exposure are being developed by the Agricultural Reentry Task Force (ARTF). The registrant is a member of this task force. However, EPA believes the transfer factors used in this chapter are reasonable.

The above referenced data do not address post-application exposure to treated turfgrass in occupational or residential situations. Although two of the studies address post-application exposure of golfers and mowers following treatments to golf courses, no measurements of foliar dislodgeable residues were made. This data gap is to be fulfilled by the ORETF of which the registrant is a member. Data for reentry to turfgrass treated with chlorothalonil was required in a recently issued DCI for products registered on turfgrass (3/31/95).

(RISK SECTION OF RED SECTION THREE)

Occupational and Residential

The toxicological endpoints of concern for occupational and residential exposure are systemic toxicity resulting from short-term and intermediate-term exposure.

Short Term Exposure MOE =

$$\frac{\text{LOEL}}{\text{Dose}} = \frac{175 \text{ mg/kg/day}}{\text{Daily Exposure}}$$

An MOE of 300 is required, since this endpoint is an LOEL.

Intermediate Term Exposure MOE =

$$\frac{\text{NOEL}}{\text{Dose}} = \frac{1.5 \text{ mg/kg/day}}{\text{Daily Exposure}}$$

An MOE of 100 is required, since this endpoint is a NOEL.

Risk from a lifetime of exposure to chlorothalonil and HCB with respect to their carcinogenicity =

$$\text{Daily exposure} \times \frac{\text{days exposure/yr}}{365 \text{ days}} \times \frac{40 \text{ years exposure}}{75 \text{ years}} \times Q^*$$

Risk From Handler Exposures

Daily exposure estimates for handlers are provided in five Tables.

Table 1 presents a summary of exposure values for large-scale mixing and loading for aerial, ground-boom, and airblast applications.

Table 2 presents a summary of exposure values for large-scale applications using aerial, ground-boom, and airblast equipment. Tables 1 and 2 are closely matched so that mixer/loader and applicator exposure can be calculated if the same person performs both tasks. These tasks are listed are separately since this is how the worker exposure was monitored, and to enable greater flexibility when mitigating risks.

The daily handler exposure is calculated using the following formula:

$$\frac{\text{unit exposure (mg ai/lb ai handled)} \times \text{lb ai/A} \times \text{acres/day} \times \text{dermal absorption}}{\text{body weight (75.9 kg)}}$$

Table 3 presents smaller scale applications using hand-held equipment. Because it is very likely that persons using these types of equipment perform both mixing/loading and application tasks, these unit exposures combine these tasks. Small scale application scenarios addressed in this table include the use of backpack sprayers, handgun sprayers using water dispersable granules, push-type granular spreaders, hose-end sprayers, paint brushes, and airless paint sprayers.

Table 4 presents flagger exposure, since it is assumed that some pilot-applicators are assisted by human flaggers. The use of a designated flagger is assumed to be the highest exposure.

Table 5 presents possible additional PPE and engineering-control options for each handler scenario having unacceptable MOE's or carcinogenic risks of concern.

Table 1. Summary Exposure Values for Mixer/loaders Using Chlorothalonil

Exposure Scenario	Clothing and PPE Parameters	Unit Dermal Exposure (mg/lb ai)	Unit Inhalation Exposure (mg/lb ai)	Application Rate (lb ai/cycle)	Daily Amt. Treated	Absorbed Daily Dermal Exposure (mg/kg/day)	Daily Inhalation Exposure (mg/kg/day) (with respirator enclosed in parentheses)	Combined Daily Dermal and Inhalation Exposure (mg/kg/day)	Intermediate - Term Margin of Exposure	Lifetime Average Daily Exposure (mg/kg/day) **days worked per year in bold**	Risk to chlorothalonil x 10^{-4}
Mixer/Loader Exposure											
Wettable Powder-Open Bag (Aerial Applications to Tomatoes)	Long-sleeved shirt, long pants, gloves	0.1737	0.0434	1.04 - 2.08	350 acres	0.042 - 0.083	0.208 - 0.416 (0.042 - 0.083)	0.25 - 0.5 (0.084 - 0.166)	3 - 6 (9 - 18)	0.03 - 0.058 **80 days/year** (0.01 - 0.019)	2.3 - 4.4 (0.8 - 1.5)
Wettable Powders-Open Bag (Aerial Applications to Celery)	Long-sleeved shirt, long pants, gloves	0.1737	0.0434	0.78 - 2.21	350 acres	0.031 - 0.089	0.156 - 0.442 (0.031 - 0.088)	0.187 - 0.53 (0.062 - 0.177)	3 - 8 (8 - 24)	0.021 - 0.062 **80 days/year** (0.007 - 0.021)	1.6 - 4.7 (0.54 - 1.6)
Wettable Powders-Open Bag (Ground Applications to Tomatoes)	Long-sleeved shirt, long pants, gloves	0.1737	0.0434	1.04 - 2.08	50 acres	0.006 - 0.012	0.03 - 0.06 (0.006 - 0.012)	0.036 - 0.072 (0.012 - 0.024)	not likely	0.001 - 0.002 **20 days/year** (0.0004 - 0.0007)	0.08 - 0.15 (0.03 - 0.05)
Wettable Powders-Open Bag (Ground Applications to Celery)	Long-sleeved shirt, long pants, gloves	0.1737	0.0434	0.78 - 2.21	50 acres	0.005 0.013	0.022 - 0.063 (0.004 - 0.013)	0.027 - 0.076 (0.01 - 0.026)	not likely	0.0008 - 0.002 **20 days/year** (0.0003 - 0.0008)	0.06 - 0.15 (0.022 - 0.06)
Wettable Powders-Open Bag (Ground Applications to Stone Fruits)	Long-sleeved shirt, long pants, gloves	0.1737	0.0434	2.34 - 4.16	20 acres	0.005 - 0.01	0.027 - 0.048	0.032 - 0.058	not likely	0.0001 - 0.0003 **3 days/year**	0.007 - 0.02

Dry Flowable-Open Pour (Aerial Applications to Tomatoes)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	1.04 - 2.08	350 acres	0.019 - 0.038	0.004 - 0.008	0.023 - 0.046	33 - 65	0.003 - 0.005 **80 days/year**	0.23 - 0.38
Dry Flowable-Open Pour (Aerial Applications to Celery)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	0.78 - 2.21	350 acres	0.014 - 0.041	0.003 - 0.008	0.017 - 0.049	31 - 88	0.002 - 0.006 **80 days/year**	0.15 - 0.46
Dry Flowable-Open Pour (Aerial Applications to Christmas Trees)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	1.04 - 4.16	100 acres	0.006 - 0.01	0.001 - 0.004	0.007 - 0.014	not likely	0.002 - 0.007 **20 days/year**	0.15 - 0.54
Dry Flowable-Open Pour (Ground Applications to Stone Fruits and Christmas Trees)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	1.04 - 4.16	20 acres	0.001 - 0.004	0.0 - 0.001	0.001 - 0.005	not likely	not significant **3 days/year**	not significant
Dry Flowable-Open Pour (Ground Applications to Tomatoes)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	1.04 - 2.08	50 acres	0.003 - 0.005	0.0 - 0.001	0.003 - 0.006	not likely	0.0001 - 0.0002 **20 days/year**	0.007 - 0.015
Dry Flowable-Open Pour (Ground Applications to Celery)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	0.78 - 2.21	50 acres	0.002 - 0.006	0.0 - 0.001	0.002 - 0.007	not likely	0.0001 - 0.0002 **20 days/year**	0.007 - 0.015
Dry Flowable-Open Pour (Ground Applications to Golf Courses)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	2.08 - 4.16	40 acres	0.004 - 0.009	0.001 - 0.002	0.005 - 0.011	not likely	0.00015 - 0.0003 **20 days/year**	0.011 - 0.022
Dry flowable-Open Pour (Ground Applications to Sod Farms)	Long-sleeved shirt, long pants, gloves	0.08	0.0008	2.08 - 4.16	100 acres	0.011 - 0.022	0.002 - 0.004	0.013 - 0.026	not likely	0.0004 - 0.0008 **20 days/year**	0.03 - 0.06

Liquid Flowable-Open Pour (Aerial Applications to Tomatoes)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	1.04 - 2.08	350 acres	0.011 - 0.023	0.006 - 0.012	0.017 - 0.035	43 - 88	0.002 - 0.004 **80 days/year**	0.15 - 0.31
Liquid Flowable-Open Pour (Aerial Applications to Celery)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	0.78 - 2.21	350 acres	0.008 - 0.024	0.004 - 0.012	0.012 - 0.036	42 - 125	0.001 - 0.004 **80 days/year**	0.08 - 0.31
Liquid Flowable-Open Pour (Aerial Applications to Christmas Trees)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	1.04 - 4.16	100 acres	0.0032 - 0.013	0.002 - 0.007	0.0052 - 0.02	not likely	0.0002 - 0.0006 **20 days/year**	0.02 - 0.046
Liquid Flowable-Open Pour (Ground Applications to Stone Fruits and Christmas Trees)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	1.04 - 4.16	20 acres	0.0007 - 0.003	0.0003 - 0.001	0.001 - 0.004	not likely	not significant **3 days/year**	not significant
Liquid Flowable-Open Pour (Ground Applications to Tomatoes)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	1.04 - 2.08	50 acres	0.002 - 0.003	0.001 - 0.002	0.003 - 0.005	not likely	0.0001 - 0.00015 **20 days/year**	0.007 - 0.011
Liquid Flowable-Open Pour (Ground Applications to Celery)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	0.78 - 2.21	50 acres	0.001 - 0.003	0.001 - 0.002	0.003 - 0.005	not likely	0.0001 - 0.00015 **20 days/year**	0.007 - 0.011
Liquid Flowable-Open Pour (Ground Applications to Golf Courses)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	2.08 - 4.16	40 acres	0.003 - 0.005	0.001 - 0.003	0.004 - 0.008	not likely	0.0001 - 0.00023 **20 days/year**	0.007 - 0.017
Liquid Flowable-Open Pour (Ground Applications to Sod Farms)	Long-sleeved shirt, long pants, gloves	0.047	0.0012	2.08 - 4.16	100 acres	0.006 - 0.013	0.003 - 0.007	0.01 - 0.02	not likely	0.0003 - 0.0006 **20 days/year**	0.022 - 0.045

Table 2. Summary Exposure/Risk Values for Applicators Using Chlorothalonil

Exposure Scenario	Clothing and PPE Parameters	Unit Dermal Exposure (mg/lb ai)	Unit Inhalation Exposure (mg/lb ai)	Application Rate (lb ai/cycle)	Daily Amt. Treated	Absorbed Daily Dermal Exposure (mg/kg/day)	Daily Inhalation Exposure (mg/kg/day)	Combined Daily Dermal and Inhalation Exposure (mg/kg/day)	Intermediate - Term Margin of Exposure	Lifetime Average Daily Exposure (mg/kg/day) **days worked per year in bold**	Risk to chlorothalonil x 10^{-4}
Applicator Exposure											
Aerial Applications to Tomatoes	Long-sleeved shirt, long pants, no gloves	0.009	--	1.04 - 2.08	350 acres	0.002 - 0.004	--	0.002 - 0.004	375 - 750	0.0002 - 0.0005 **80 days/year**	0.015 - 0.038
Aerial Applications to Celery	Long-sleeved shirt, long pants, no gloves	0.009	--	0.78 - 2.21	350 acres	0.002 - 0.005	--	0.002 - 0.005	300 - 750	0.0002 - 0.0006 **80 days/year**	0.015 - 0.045
Aerial Applications to Christmas Trees	Long-sleeved shirt, long pants, no gloves	0.009	--	1.04 - 4.16	100 acres	0.001 - 0.002	--	0.001 - 0.002	750 - 1500	0.00003 - 0.00006 **20 days/year**	0.002 - 0.004
Ground-Boom Applications to Tomatoes (Open Cab)	Long-sleeved shirt, long pants, no gloves	0.017	0.0007	1.04 - 2.08	50 acres	0.0005 - 0.001	0.0005 - 0.001	0.001 - 0.002	not likely	0.00002 - 0.00006 **20 days/year**	0.001 - 0.004
Ground-Boom Applications to Celery (Open Cab)	Long-sleeved shirt, long pants, no gloves	0.017	0.0007	0.78 - 2.21	50 acres	0.0087 - 0.025	0.00 - 0.001	0.0004 - 0.002	not likely	0.00001 - 0.00006 **20 days/year**	0.001 - 0.004
Airblast Applications to Stone Fruits and Christmas Trees (Open Cab)	Long-sleeved shirt, long pants, no gloves	0.4	0.0045	1.04 - 4.16	20 acres	0.005 - 0.022	0.001 - 0.005	0.006 - 0.027	not likely	0.00003 - 0.0001 **3 days/year**	0.002 - 0.007

Specialty Airblast Applications to Golf Courses (Open Cab)	Long-sleeved shirt, long pants, no gloves	1.71	0.001	2.08 - 4.16	40 acres	0.094 - 0.187	0.001 0.002	0.095 - 0.189	not likely	0.003 - 0.006 **20 days/year**	0.23 - 0.46
Ground-Boom Applications to Golf Courses (Open Cab)	Long-sleeved shirt, long pants, no gloves	0.075	0.002	2.08 - 4.16	40 acres	0.004 - 0.008	0.002 - 0.004	0.006 - 0.012	not likely	0.0002 - 0.0004 **20 days/year**	0.015 - 0.03
Ground-Boom Applications to Sod Farms (Open Cab)	Long-sleeved shirt, long pants, no gloves	0.017	0.0007	2.08 - 4.16	100 acres	0.002 - 0.005	0.002 - 0.004	0.004 - 0.009	not likely	0.0001 - 0.0003 **20 days/year**	0.08 - 0.022

Table 3. Summary Exposure/Risk Values for Mixer/Loader/Applicators Using Chlorothalonil

Exposure Scenario	Clothing and PPE Parameters	Unit Dermal Exposure (mg/lb ai)	Unit Inhalation Exposure (mg/lb ai)	Application Rate (lb ai/cycle)	Daily Amt. Treated	Absorbed Daily Dermal Exposure (mg/kg/day)	Daily Inhalation Exposure (mg/kg/day)	Combined Daily Dermal and Inhalation Exposure (mg/kg/day)	Intermediate Term Margin of Exposure	Lifetime Average Daily Exposure (mg/kg/day) days worked **per year in bold**	Risk to chlorothalonil x 10^{-4}
Mixer/Loader/Applicator Exposure											
Backpack Sprayer (Greenhouse Application)	Long-sleeved shirt, long pants, gloves, respirator	2.19	0.006	1.04 - 4.16	2 acres	0.003 - 0.012	0.0 - 0.001	0.003 - 0.013	not likely	0.0001 - 0.0005 **30 days/year**	0.007 - 0.038
Backpack Sprayer (Outdoor Applications) - Forestry and Nursery Uses	Long-sleeved shirt, long pants, gloves	2.19	0.06	1.04 - 4.16	2 acres	0.003 - 0.012	0.002 - 0.007	0.005 - 0.019	not likely	0.0001 - 0.0006 **20 days/year**	0.007 - 0.045
Handgun Sprayer using Water Dispersable Granules - Forestry and Nursery Uses	Long-sleeved shirt, long pants, no gloves	0.35	0.001	1.04 - 4.16	2 acres	0.0005 - 0.002	--	0.0005 - 0.002	not likely	0.000015 - 0.00006 **20 days/year**	0.001 - 0.004
Homeowner Push-Type Granular Spreader	Long-sleeves shirt, long pants, no gloves	4.7	0.006	1 - 1.8 lb ai/5,000 sq.ft	5,000 sq.ft	0.003 - 0.006	--	0.003 - 0.006	not likely	0.00002 - 0.00004 **5 days/year**	0.001 - 0.003
Homeowner Hose-End Sprayer	Total deposition	39.1	0.002	1 - 1.8 lb ai/5,000 sq.ft	5,000 sq.ft	0.026 - 0.046	--	0.026 - 0.046	not likely	0.0002 - 0.0003 **5 days/year**	0.015 - 0.022
Paint Brush Application Using Chlorothalonil Treated Paint - Interior Latex	Long-sleeved shirt, long pants, no gloves	290	0.507	0.048 lb ai/gallon	2 gallons	0.005	0.0006	0.006	not likely	0.0001 **10 days/year**	0.007

Paint Brush Application Using Chlorothalonil Treated Paint - Exterior Latex	Long-sleeved shirt, long pants, no gloves	290	0.507	0.096 lb ai/gallon	2 gallons	0.009	0.0014	0.01	not likely	0.0001 **10 days/year**	0.007
Paint Brush Application Using Chlorothalonil Treated Paint - Exterior Alkyd	Long-sleeved shirt, long pants, no gloves	290	0.507	0.11 lb ai/gallon	2 gallons	0.011	0.0015	0.012	not likely	0.0002 **10 days/year**	0.015
Indoor Painting Using an Airless Sprayer - Interior Latex	Long-sleeved shirt, long pants, no gloves	36.22	2.35	0.048 lb ai/gallon	40 gallons	0.011	0.06	0.071	not likely	0.001 **10 days/year**	0.08
Indoor Painting Using an Airless Sprayer - Interior Latex	Long-sleeved shirt, long pants, gloves	12	2.35	0.048 lb ai/gallon	40 gallons	0.004	0.06	0.064	not likely	0.001 **10 days/year**	0.08
Outdoor Painting Using an Airless Sprayer - Exterior Alkyd	Long-sleeved shirt, long pants, no gloves	33.33	0.433	0.11 lb ai/gallon	40 gallons	0.026	0.025	0.051	not likely	0.001 **10 days/year**	0.08
Outdoor Painting Using an Airless Sprayer - Exterior Latex	Long-sleeved shirt, long pants, no gloves	33.33	0.433	0.096 lb ai/gallon	40 gallons	0.021	0.022	0.043	not likely	0.001 **10 days/year**	0.08
Outdoor Painting Using an Airless Sprayer - Exterior Alkyd	Long-sleeved shirt, long pants, gloves	8.87	0.433	0.11 lb ai/gallon	40 gallons	0.007	0.025	0.032	not likely	0.0005 **10 days/year**	0.038

Table 4. Summary Exposure/Risk Values for Flaggers Exposed to Chlorothalonil Sprays

Exposure Scenario	Clothing and PPE Parameters	Unit Dermal Exposure (mg/lb ai)	Unit Inhalation Exposure (mg/lb ai)	Application Rate (lb ai/cycle)	Daily Amt. Treated	Absorbed Daily Dermal Exposure (mg/kg/day)	Daily Inhalation Exposure (mg/kg/day)	Combined Daily Dermal and Inhalation Exposure (mg/kg/day)	Intermediate - Term Margin of Exposure	Lifetime Average Daily Exposure (mg/kg/day) **days worked per year in bold**	Risk to chlorothalonil x 10^{-4}
Flagger Exposure											
Flaggers in the Treatment Area	Long-sleeved shirt, long pants, gloves	0.03	0.0003	0.78 - 2.21	350 acres	0.005 - 0.015	0.001 - 0.003	0.006 - 0.018	83 - 250	0.0007 - 0.002 **80 days/year**	0.053 - 0.15
Flaggers in the Perimeter of the Treatment Area	Long-sleeved shirt, long pants, gloves	0.022	0.0003	0.78 - 2.21	350 acres	0.004 - 0.011	0.001 - 0.003	0.005 - 0.014	107 - 300	0.0006 - 0.0016 **80 days/year**	0.045 - 0.12

Table 5. Proposed Mitigation for Mixer/loaders Supporting Aerial Applications Using Chlorothalonil

Exposure Scenario	Clothing and PPE Parameters	Unit Dermal Exposure (mg/lb ai)	Unit Inhalation Exposure (mg/lb ai)	Application Rate (lb ai/cycle)	Daily Amt. Treated	Absorbed Daily Dermal Exposure (mg/kg/day) with double layers	Daily Inhalation Exposure (mg/kg/day) with respirator	Combined Daily Dermal and Inhalation Exposure (mg/kg/day)	Intermediate - Term Margin of Exposure	Lifetime Average Daily Exposure (mg/kg/day) **days worked per year in bold**	Risk to chlorothalonil x 10^{-4}
Mixer/Loader Exposure											
Wettable Powder-Open Bag (Aerial Applications to Tomatoes)	Long-sleeved shirt, long pants and gloves (corrected for double layers and a respirator)	0.0347	0.0087	1.04 - 2.08	350 acres	0.008 - 0.017	0.042 - 0.083	0.05 - 0.1	15 - 30	0.006 - 0.012 **80 days/year**	0.46 - 0.92
Wettable Powders-Open Bag (Aerial Applications to Celery)	Long-sleeved shirt, long pants and gloves (corrected for double layers and a respirator)	0.0347	0.0087	0.78 - 2.21	350 acres	0.006 - 0.019	0.031 - 0.089	0.036 - 0.108	14 - 42	0.004 - 0.013 **80 days/year**	0.3 - 1.0
Water Soluble Packets	Long-sleeved shirt and long pants	0.01	0.0002	0.78 - 2.21	350 acres	0.002 - 0.005	0.001 - 0.002	0.003 - 0.007	214 - 500	0.0004 - 0.001 **80 days/year**	0.03 - 0.076
Liquid Flowable-Open Pour (Aerial Applications to Tomatoes)	Long-sleeved shirt, long pants and gloves (corrected for double layers and a respirator)	0.0094	0.0002	1.04 - 2.08	350 acres	0.002 - 0.005	0.001 - 0.002	0.003 - 0.007	214 - 500	0.0004 - 0.001 **80 days/year**	0.03 - 0.076

Liquid Flowable-Open Pour (Aerial Applications to Celery)	Long-sleeved shirt, long pants, gloves (corrected for double layers and a respirator)	0.0094	0.0002	0.78 - 2.21	350 acres	0.002 - 0.005	0.001 - 0.002	0.003 - 0.007	214 - 500	0.0004 - 0.001 **80 days/year**	0.03 - 0.076
Dry Flowable-Open Pour (Aerial Applications to Tomatoes)	Long-sleeved shirt, long pants, gloves (corrected for double layers and a respirator)	0.016	0.0002	1.04 - 2.08	350 acres	0.004 - 0.008	0.001 - 0.002	0.005 - 0.01	150 - 300	0.0006 - 0.001 **80 days/year**	0.045 - 0.076
Dry Flowable-Open Pour (Aerial Applications to Celery)	Long-sleeved shirt, long pants, gloves (corrected for double layers and a respirator)	0.016	0.0002	0.78 - 2.21	350 acres	0.003 - 0.008	0.001 - 0.002	0.004 - 0.01	150 - 375	0.0005 - 0.001 **80 days/year**	0.038 - 0.076

Risk From Post-Application Exposures

The current REI for chlorothalonil is an interim 48-hour REI set by the Worker Protection Standard (WPS). Prior to the establishment of the WPS, the reentry interval for chlorothalonil was 24 hours. REI's set by the WPS are based on the acute toxicity of the technical grade active ingredient (TGAI). For chlorothalonil, the 48-hour REI is based on it being in Toxicity Category I for primary eye irritation.

REI's set in REDS are based on the results of the risk assessment. For chlorothalonil, the intermediate-term endpoint (1.5 mg/kg/day) is the limiting factor for setting the REI. Calculations for other adverse effects indicate cancer risks to be equal to or less than 1×10^{-4} (except floral crops), and short-term acute exposure margins of exposure (MOE's) to be greater than 300.

In this section, REI's are proposed for crops having similar exposure potentials. Tables 6 to 13 show the respective MOE's for postapplication/reentry workers for most agricultural and horticultural scenarios. Exposure calculations for greenhouse workers, are presented in Tables 14 and 15.

There are no data to address reentry exposure to residential lawns treated with chlorothalonil. However, there are limited exposure monitoring data for golfers and persons mowing fairways and greens on golf courses. The monitoring data are not applicable to other turfgrass scenarios. This is because FDR data were not collected. Thus, exposures to individuals other than mowers and golfers can not be calculated. Table 16 presents these exposures.

Post-application/reentry daily exposure (mg/kg/day) is calculated as follows:

$$\frac{\text{FDR } (\mu g/cm^2) \times \text{transfer factor } (cm^2/hr) \times 8 \text{ hours/day}}{\text{body weight } (75.9 \text{ kg})} \times \text{dermal absorption}$$

Table 6 presents the daily exposures for workers reentering treated papaya and stone fruit orchards, conifer nurseries (not seedlings), and Christmas tree plantations.

TASKS: For stone fruits, most applications are made early in the growing season (early bloom and shuck-split), except cherries which is treated after harvest. Hand labor tasks include pruning and topping cherry trees, pruning conifers and Christmas trees, balling and burlapping conifers.

ASSUMPTIONS: Eight hour work days (30 work days per year), FDR data from a cherry study, application rates of 2.34 - 4.16 lb ai/acre, a transfer factor of 3,800 cm^2/hr, and a body weight of 75.9 kg.

INCIDENCE: 1990, one possible case involving a worker thinning nectarines for three days - eye irritation. The field was treated with chlorothalonil and triforine.

Table 6

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	1.81	0.036	42
1	1.48	0.03	50
2	1.20	0.024	63
3	0.98	0.02	75
4	0.80	0.016	94
5	0.65	0.013	115

Lifetime cancer risk to these residues ranges from 4.3×10^{-6} to 1.21×10^{-5} and MOE's for short term risk are greater than 4,000.

Table 7 presents the daily exposures for workers reentering treated tomato fields.

TASKS: Hand harvesting tomatoes (not mechanical) and staking.

ASSUMPTIONS: Eight hour work days (120 work days per year), FDR data from a tomato study, application rates of 1.04 - 2.08 lb ai/acre, a transfer factor of 1,300 cm^2/hr from a tomato harvester study, and a body weight of 75.9 kg. There is no preharvest interval for tomatoes.

INCIDENCE: 1989, one possible case involving a worker hoeing weeds - conjunctivitis. The field treated with chlorothalonil, sulfur, and metalaxyl.

1990, one possible case where a worker got rash while harvesting tomatoes treated 12 days prior with an adjuvant, chlorothalonil, esfenvalerate, methomyl, and sulfur.

1990, one worker developed a rash on forearm while moving tomato vines in a field treated with an adjuvant, chlorothalonil, esfenvalerate, methomyl, and sulfur.

Table 7

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	4.19	0.029	52
1	4.01	0.028	54
2	3.83	0.026	58
3	3.66	0.025	60
4	3.50	0.024	63
5	3.34	0.023	65
6	3.19	0.022	68
7	3.05	0.021	71
14	2.22	0.015	100

Lifetime cancer risk to these residues ranges from 2.01 to 3.89×10^{-5} and MOE's for short term risk are greater than 6,000.

Table 8 presents the daily exposures for workers reentering treated cucurbits, snap beans fields.

TASKS: Hand harvesting, vine turning, covering watermelons with vines to prevent sunburn. Hand harvesting snap beans.

ASSUMPTIONS: Eight hour work days (120 days worked per year), FDR data from a cucumber study, application rates of 1.17 - 2.2 lb ai/acre, a transfer factor of 1,000 cm^2/hr, and a 75.9 kg body weight. There is no preharvest interval for cucumbers and a 7 day preharvest interval for snap beans.

INCIDENCE: 1989, one possible case involving a worker developing a rash while picking cucumbers. The rash occurred when the worker removed their plastic picking gloves. These gloves are worn by some workers because the fuzz on cucumbers can cause skin irritation. The field was treated with chlorothalonil and oxydemeton-methyl.

Table 8

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	7.74	0.041	37
1	5.95	0.032	47
2	4.58	0.024	63
3	3.52	0.019	79
4	2.71	0.015	100
5	2.09	0.011	136
7	1.23	0.007	214

Lifetime cancer risk to these residues ranges from 9.3×10^{-6} to 5.51×10^{-5} to and MOE's for short term risk are greater than 4,000.

Table 9 presents the daily exposures for workers reentering treated cole crop fields.

TASKS: Hand harvesting (cutters and packers), terminal point removal (Brussels sprouts), leaf removal (Brussels sprouts), head wrapping (cauliflower).

ASSUMPTIONS: Eight hour work day (120 work days per year) FDR data from a broccoli study, application rates of 1.17 - 1.43 lb ai/acre, a transfer factor of 700 cm^2/hr, and a body weight of 75.9 kg. Chinese cabbage and Chinese broccoli have a 7 day preharvest interval. Packer exposure is expected to be lower.

INCIDENCE: 1985, one possible case involving a worker developing a rash while harvesting cauliflower. The field was treated with chlorothalonil, oxydemeton-methyl, and mevinphos.

1988, one possible case involving a worker developing hives. The field was treated with chlorothalonil and metalaxyl.

Table 9

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	1.84	0.007	214
1	1.51	0.006	250
2	1.25	0.005	300
3	1.03	0.004	375
4	0.84	0.003	500
5	0.69	0.003	500
7	0.47	0.002	750

The study from which these data were taken is considered supplemental. This is because it rained on the day following the last application. This represents a best case scenario. Lifetime cancer risk to these residues ranges from 9.4 to 4 x 10^{-6} and MOE's for short term risk are greater than 25,000.

Table 10 presents the daily exposures for workers reentering treated corn fields (sweet and grown for seed).

TASKS: Hand harvesting sweet corn. Removing tassels and performing other tasks associated with seed corn production.

ASSUMPTIONS: Eight hour work day (60 work days per year), FDR data from the cucumber study, adjusted for an application rate of 0.59 - 1.43 lb ai/acre, a transfer factor of 1,000 cm^2/hr, and a body weight of 75.9 kg. Sweet corn has a 14 day preharvest interval.

INCIDENCE: None.

Table 10

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	5.16	0.027	56
1	3.97	0.021	71
2	3.05	0.016	94
3	2.35	0.013	115
4	1.81	0.01	150
5	1.39	0.008	188
14	0.13	0.001	1,500

Lifetime cancer risk to these residues ranges from 6.0×10^{-7} to 1.8×10^{-5} and MOE's for short term risk are greater than 6,000.

Table 11 presents the daily exposures for workers reentering treated celery fields:

TASKS: Celery cutting and field packing; moving irrigation pipe.

ASSUMPTIONS: Eight hour work days (120 work day per year), FDR data from a cucumber study, application rates of 1.17 - 2.2 lb ai/acre, a transfer factor of 700 cm^2/hr, and a 75.9 kg body weight. Celery has a seven day preharvest interval. Packer exposure is expected to be lower than cutter exposure.

INCIDENCE: 1987, one possible case involving an irrigation worker getting dizzy and feeling itchy around the neck. The worker was wearing rubber pants, jacket, and gloves and had entered the field 2 hours after bacillus thuringiensis, chlorothalonil, mevinphos, and permethrin.

Table 11

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	7.75	0.029	52
1	5.96	0.022	68
2	4.58	0.017	88
3	3.52	0.013	115
4	2.71	0.01	150
5	2.08	0.008	188
6	1.60	0.006	250
7	1.23	0.005	300

Lifetime cancer risk to these residues ranges from 6.7×10^{-6} to 3.9×10^{-5} and MOE's for short term risk are greater than 6,000.

Table 12 presents the daily exposures for workers reentering treated conifer nurseries (seedlings).

TASKS: Packing, and moving irrigation equipment. Other non-hand labor tasks.

ASSUMPTIONS: Eight hour work days (120 work days per year), FDR data from a cherry study, application rates of 2.34 - 4.16 lb ai/acre, a transfer factor of 700 cm^2/hr, and a body weight of 61.5 kg. This reduced body weight was chosen to reflect female exposure since many nursery workers are women.

INCIDENCE: 1989, one probable case involving a nursery worker handling treated conifer seedlings damp form a recent irrigation. The worker was wearing gloves. However, during unloading, some seedlings brushed against the workers face. The seedlings had been treated with chlorothalonil. (300 ppm of chlorothalonil were detected on the seedlings)

Table 12

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	1.81	0.008	188
1	1.48	0.007	214
2	1.20	0.006	250
3	0.98	0.005	300
4	0.80	0.004	375
5	0.65	0.003	500

Lifetime cancer risk to these residues ranges from 4.0×10^{-6} to 1.1×10^{-5} and MOE's for short term risk are greater than 20,000.

Table 13 presents daily exposures showing daily exposure for greenhouse workers following the use of a high application rate.

TASKS: Cutting and bundling field and greenhouse grown flowers.

ASSUMPTIONS: In the Brower study, an application rate of 0.6 lb ai/@ 80 - 100 gallons of water/0.25 acre (@ 2.4 lb ai/A) was applied to carnation sprays and carnations grown for cut flowers. Because greenhouse application rates are expressed in terms of pounds per 100 gallons, the amount of ai applied per acre depends on the density of the crop. Exposure for reentry workers cutting and bundling flowers was 14.4 mg/hour and a transfer factor of 2,900 cm^2/hour was calculated. Based on the worker exposure (μg/hr) and the transfer factor (cm^2/hr) reported by Brower, FDR's are estimated to be @4.97 $\mu g/cm^2$, single sided (2.5 $\mu g/cm^2$ double sided). These measurements were taken from sampling conducted 35 hours after treatment. The MOE for a worker in this situation is estimated to be 16. In the Brower study, it was noted that the residues of chlorothalonil did not dissipate.

For estimating worker exposure while cutting and bundling flowers OREB used FDR data from the cucumber study because sampling was longer (35 vs 7 days) and the applications were similar. Because the FDR data from that study are expressed as double sided the transfer factor of 2900 cm^2/hr (single sided) is converted to a transfer factor of 5800 cm^2/hr (double sided). An eight hour work day is assumed (248 work days per year). A body weight of 61.5 kg was assumed since large numbers of women work in greenhouses.

It should be noted that in the Brower study it was reported that residues did not dissipate in the greenhouse. Since cut flowers are also grown outdoors, OREB used the dissipation data from the cucumber FDR to estimate exposure.

INCIDENCE: 1982, a probable incident occurred when a worker was cutting lilies still wet with spray. Liquid from a stem splashed into the workers eye. The lilies were treated with chlorothalonil.

1991, a possible incident occurred when a worker developed symptoms (not specified) while handling plants treated with chlorothalonil and vinclozolin.

1991, a possible incident involving a flower cutter developing a rash after working with irises. The field was treated either 6 - 14 days prior with an adjuvant, chlorothalonil, and iprodione.

Table 13

Day after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
0	7.74	0.292	5
1	5.95	0.224	7
2	4.58	0.172	9
3	3.52	0.134	11
4	2.71	0.102	15
5	2.09	0.08	19
11	0.43	0.016	94
12	0.33	0.012	125

Lifetime cancer risk to these residues ranges from 3.3×10^{-5} to 7.9×10^{-4} and MOE's for short term risk are greater than 1,000.

Table 14 presents daily exposures for greenhouse workers following the application of a lower application rate.

TASKS: Cutting and bundling.

ASSUMPTIONS: In California, 1.83 lb ai/100 gallons of water per acre were applied to poinsettias. The FDR's measured ranged from 0.54 to 0.74 $\mu g/cm^2$ at 3 to 36 hours after treatment. Because greenhouse application rates are expressed in terms of pounds per 100 gallons, the amount of ai applied per acre depends on the density of the crop. OREB used the transfer factor 5,800 cm^2/hr (double sided) which is based on the transfer factor generated by the Brower study. A body weight of 61.5 kg was used.

Table 14

Hours after application	Field residue ($\mu g/cm^2$)	Daily exposure (mg/kg/day)	Intermediate Term MOE
3	0.54	0.02	75
4	0.74	0.029	52
6	0.7	0.026	58
12	0.62	0.023	65
24	0.55	0.021	71
36	0.6	0.023	65

The Agency does not have these data and they appear to have been collected over too short a period to establish a dissipation curve. However, they are useful for providing estimates of exposure for these scenarios.

Lifetime cancer risk to these residues ranges from 5.4 to 7.8×10^{-5} and MOE's for short term risk are greater than 6,000.

Table 15 presents lifetime risks from applications to golf courses.

ASSUMPTIONS: For golfers OREB assumed 30 days of golf per year and 50 years of golfing.

For mowers, OREB assumed 60 days of mowing per year and 40 years of mowing.

Table 15

Activity	Daily Exposure (mg/kg/day)	Lifetime Average Daily Exposure (mg/kg/day)	RISK $\times 10^{-4}$
Golfer - walking	0.001	0.00005	0.004
Greens mower (2 acres/day)	0.006	0.0006	0.045
Fairways mower (20 acres/day)	0.002	0.0002	0.015

Risks for other golfing scenarios such as using a golf cart are much lower and not included in this table. Intermediate-term MOE's for mowers are greater than 250.

Additional Occupational/Residential Exposure Studies

Handler Studies

There are few data addressing handler exposure when treating residential turf. The registrant is a member of the Outdoor Residential Exposure Task Force (ORETF). Data for mixer/loader/applicator treating turfgrass with chlorothalonil were required in a recently issued DCI for products registered on turfgrass (3/31/95). These data will be used to re-evaluate chlorothalonil handler exposure when they are submitted by the Task Force.

Post-Application Studies

The registrant must submit post-application exposure studies as confirmatory data.

Postapplication/reentry exposure studies are required as confirmatory data to determine definitive REIs for all cole crops and floral crops. The interim REIs established in this document for these crops will be adjusted accordingly upon submission of the additional data. In addition, post-application/reentry exposure studies are required for reregistration of uses on turfgrass at residential sites.

Requirements for such post-application exposure studies are addressed by Subdivision K of the Pesticide Assessment Guidelines. The required data include:

Guidelines:	132-1(a)	Foliar Residue Dissipation
	*133-3	Postapplication Dermal Passive Dosimetry Exposure
	*133-4	Postapplication Inhalation Passive Dosimetry Exposure

*Guidelines 133-3 and 133-4 may be reserved at this time pending completion of the databases on agricultural and residential postapplication/reentry exposure currently being developed by the Agricultural Reentry Task Force and Outdoor Residential Exposure Task Force, since the registrant is a member of both Task Forces.

(SECTION IV - REGULATORY POSITION AND LABELING RATIONALE)

Occupational and Residential Labeling Rationale/Risk Mitigation

The Worker Protection Standard (WPS)

Scope of the WPS

The 1992 Worker Protection Standard for Agricultural Pesticides (WPS) established certain worker-protection requirements (personal protective equipment, restricted-entry intervals, etc.) to be specified on the label of all products that contain uses within the scope of the WPS. Uses within the scope of the WPS include all commercial (non-homeowner) and research uses on farms, forests, nurseries, and greenhouses to produce agricultural plants (including food, feed, and fiber plants, trees, turf grass, flowers, shrubs, ornamentals, and seedlings). Uses within scope include not only uses on plants, but also uses on the soil or planting medium the plants are (or will be) grown in.

At this time some of the registered uses of chlorothalonil are within the scope of the Worker Protection Standard for Agricultural Pesticides (WPS). Uses that are outside the scope of the WPS include use:

- on the portions of agricultural plants that have been harvested, such as in packing houses or on cut timber,
- on plants grown for other than commercial or research purposes, which may include plants in habitations, home fruit and vegetable gardens, and home greenhouses,
- on plants that are in ornamental gardens, parks, golf courses, and public or private lawns and grounds and that are intended only for decorative or environmental benefit. (However, pesticides used on sod farms ARE covered by the WPS), and
- in a manner not directly related to the production of agricultural plants, including, for example, use in paints.

Compliance With the WPS

Any product whose labeling can be reasonably interpreted to permit use in the production of an agricultural plant on any farm, forest, nursery, or greenhouse must comply with the labeling requirements of PR Notice 93-7, "Labeling Revisions Required by the Worker Protection Standard (WPS)," and PR Notice 93-11, "Supplemental Guidance for PR Notice 93-7," which reflect the requirements of EPA's labeling regulations for worker protection statements (40 CFR part 156, subpart K). These labeling revisions are necessary to implement the Worker Protection Standard for Agricultural Pesticides (40 CFR part 170) and must be completed in accordance with, and within the

deadlines specified in, PR Notices 93-7 and 93-11. Unless otherwise specifically directed in this RED, all statements required by PR Notices 93-7 and 93-11 are to be on the product label exactly as instructed in those notices.

- *After April 21, 1994, except as otherwise provided in PR Notices 93-7 and 93-11, the labeling of all products within the scope of those notices must meet the requirements of the notices when the products are distributed or sold by the primary registrant or any supplementally registered distributor.*

- *After October 23, 1995, except as otherwise provided in PR Notices 93-7 and 93-11, the labeling of all products within the scope of those notices must meet the requirements of the notices when the products are distributed or sold by any person.*

Personal Protective Equipment/Engineering Controls for Handlers

For each end-use product, PPE requirements for pesticide handlers are set during reregistration in one of two ways:

1. If EPA determines that no regulatory action must be taken as the result of the acute effects or other adverse effects of an active ingredient, the PPE for pesticide handlers will be based on the acute toxicity of the end-use product. For occupational-use products, PPE must be established using the process described in PR Notice 93-7 or more recent EPA guidelines.

2. If EPA determines that regulatory action on an active ingredient must be taken as the result of very high acute toxicity or to certain other adverse effects, such as allergic effects or delayed effects (cancer, developmental toxicity, reproductive effects, etc.):

- In the RED for that active ingredient, EPA may establish minimum or "baseline" handler PPE requirements that pertain to all or most end-use products containing that active ingredient.
- These minimum PPE requirements must be compared with the PPE that would be designated on the basis of the acute toxicity of the end-use product.
- The more stringent choice for each type of PPE (i.e., bodywear, hand protection, footwear, eyewear, etc.) must be placed on the label of the end-use product.

Personal protective equipment requirements usually are set by specifying one or more pre-established PPE units -- sets of items that are almost always required together. For example, if chemical-resistant gloves are required, then long-sleeve shirts, long pants, socks, and shoes are assumed and are also included in the required minimum attire. If the requirement is for two layers of body protection (coveralls over a long- or short-sleeve shirt and long or short pants), the minimum must also include (for all handlers) chemical-resistant footwear and chemical-resistant headgear for overhead exposures and (for mixers,

loaders, and persons cleaning equipment) chemical-resistant aprons.

Occupational-Use Products

EPA has determined that regulatory action regarding the establishment of active-ingredient-based minimum PPE and engineering-control requirements for occupational handlers must be taken for chlorothalonil for some use-scenarios. The MOEs and carcinogenic margins of risk for many use scenarios are borderline or unacceptable.

EPA is particularly concerned about intermediate-term exposures to mixers and loaders and about attempting to make assumptions as to which use-scenarios might involve such intermediate-term exposures. The risk assessment indicates that mixers and loaders with intermediate-term exposures have unacceptable risks unless additional personal protective equipment or engineering controls are required. As a prudent risk reduction measure for all mixers and loaders handling chlorothalonil, EPA is requiring chemical-resistant gloves and a chemical-resistant apron in addition to baseline protection (long-sleeve shirt, long pants, shoes, and socks).

For mixers and loaders handling wettable powder formulations to support aerial applications, the risks from intermediate-term exposures are unacceptable even with the addition of maximum PPE. In addition, the carcinogenic risks to those mixers and loaders are only marginally acceptable with the addition of maximum PPE. Therefore, EPA is requiring the use of engineering controls (water-soluble packaging) for mixing and loading wettable powder formulations to support aerial applications.

For flaggers supporting aerial applications, the risks from intermediate-term exposures are borderline. In addition, EPA has information about poisoning incidents involving flaggers. Therefore, EPA is requiring that human flaggers be located within enclosed cabs.

For applicators using backpack sprayers, the carcinogenic risks are acceptable provided the applicators are wearing chemical-resistant gloves in additior to baseline protection.

For spray applications in greenhouses and other enclosed areas, EPA is requiring applicators to wear a respirator, since chlorothalonil is classified as toxicity category I for acute inhalation toxicity and chlorothalonil applications in enclosed areas may result in airborne spray droplets.

EPA has determined that persons mixing and applying chlorothalonil-containing paint are unlikely to be subject to intermediate-term exposures. The use of fungicide-containing paints is relatively uncommon and EPA believes it unlikely that painters, even commercial painters, would be exposed for several consecutive days to chlorothalonil-containing paint. The

carcinogenic risk assessment for painters is acceptable based on the worse-case assumption of chlorothalonil exposure by painters for 10 days per year.

The risk assessments for all applicators, except applicators using backpack sprayers, indicate acceptable risks from short-term, intermediate-term (where applicable), and lifetime average daily exposures without additional PPE or engineering control requirements.

Specifically, EPA is requiring, in addition to the baseline PPE requirements of long-sleeve shirt, long pants, shoes, and socks:

- the use of water-soluble packaging for all wettable powder formulations whose labeling permits aerial application,
- human flaggers to be located within enclosed cabs,
- all mixers and loaders to wear a chemical-resistant apron and chemical-resistant gloves,
- all mixers and loaders supporting aerial applications to also wear a respirator,
- applicators using backpack sprayers to wear chemical-resistant gloves,
- applicators using sprayers in greenhouses or other enclosed areas to wear a respirator.

WPS and NonWPS Uses:

Since potential handler exposure is similar for WPS and nonWPS uses, there is only one set of active-ingredient-based minimum (baseline) PPE/engineering controls requirements for occupational uses of chlorothalonil (specified in Section V). These requirements must be followed in the labeling of all chlorothalonil end-use products intended primarily for occupational use.

Homeowner-Use Products

EPA is not establishing minimum (baseline) handler PPE for chlorothalonil end-use products that are intended primarily for homeowner use, because the Agency has determined that the risks to such users does not warrant such risk mitigation measures. EPA believes that intermediate-term exposures to homeowner handlers are unlikely. The risks from short-term exposures and the carcinogenic risks are acceptable for homeowners applying chlorothalonil with a push-type spreader or with a hose-end sprayer.

Post-Application/Entry Restrictions

Occupational-Use Products (WPS Uses)

Restricted-Entry Interval:

Under the Worker Protection Standard (WPS), interim restricted-entry intervals (REI's) for all uses within the scope of the WPS are based on the acute toxicity of the active ingredient. The toxicity categories of the active ingredient for acute dermal toxicity, eye irritation potential, and skin irritation potential are used to determine the interim WPS REI. If one or more of the three acute toxicity effects are in toxicity category I, the interim WPS REI is established at 48 hours. If none of the acute toxicity effects are in category I, but one or more of the three is classified as category II, the interim WPS REI is established at 24 hours. If none of the three acute toxicity effects are in category I or II, the interim WPS REI is established at 12 hours. A 48-hour REI is increased to 72 hours when an organophosphate pesticide is applied outdoors in arid areas. In addition, the WPS specifically retains two types of REI's established by the Agency prior to the promulgation of the WPS: (1) product-specific REI's established on the basis of adequate data, and (2) interim REI's that are longer than those that would be established under the WPS.

During the reregistration process, EPA considers all relevant product-specific information to decide whether there is reason to shorten or lengthen the previously established REI.

The WPS REI in effect until now was 48 hours. This was an interim REI placed on chlorothalonil products by PR Notice 93-7. EPA notes that the 48-hour interim WPS REI was established because early data indicated that chlorothalonil was in toxicity category I for eye irritation potential.

During the reregistration process, EPA determined that the REI established under the WPS should be changed for some uses.

For entry to perform non-hand-labor tasks, the risk assessments associated with post-application exposures indicate that the risks are acceptable as soon as sprays have dried following application. However, EPA has evidence of poisoning incidents and is particularly concerned about eye-irritation incidents, therefore EPA is retaining the 48-hour REI as the minimum REI for all crops/uses within the scope of the WPS.

For entry to perform hand-labor tasks, the risks are not acceptable until approximately 4 days following application for most crops. These results were generally consistent regardless of crop-type and application rate. One exception was the risk assessment associated with cole crops. However, the study from which these data were taken is considered supplemental, because it rained on the day following the last application. Therefore, these risks must be considered to represent a best-case scenario. Two other exceptions are the risk assessments for tomatoes and cut-flowers/foliage. These data indicate that a 14-day and 11-

day REI respectively are required for entry to perform hand-labor tasks.

Based on the post-application risk assessment, EPA is now establishing:

- a 48-hour restricted-entry interval for persons performing *non-hand-labor tasks,* such as crop-advisor tasks or irrigation-related tasks, for all occupational-use products that contain chlorothalonil and are within the scope of the Worker Protection Standard for Agricultural Pesticides (WPS),

- a 14-day REI on tomatoes for persons performing hand labor tasks, including hand-staking and hand-harvesting

- an 11-day REI on greenhouse- and nursery-grown for cut-flowers or cut-foliage crops for persons performing hand labor tasks, including harvesting, pruning, and bundling,

- a 4-day REI for all other crops/uses within the scope of the WPS for persons performing hand labor tasks, including harvesting, thinning, staking, pruning, detasseling, and packing produce in the field. These crops/uses include ornamentals grown in greenhouses and on nurseries, food crops grown in greenhouses and on farms, and turfgrass grown for sod.

Early-Entry PPE:

The WPS establishes very specific restrictions on entry by workers to areas that remain under a restricted-entry interval, if the entry involves contact with treated surfaces. Among those restrictions are a prohibition of routine entry to perform hand labor tasks and a requirement that personal protective equipment be worn. Under the WPS, these personal protective equipment requirements for persons who must enter areas that remain under a restricted-entry interval are based on the acute toxicity category of the active ingredient.

During the reregistration process, EPA considers all relevant product-specific information to decide whether there is reason to set personal protective equipment requirements that differ from those set through the WPS.

The RED requirements for early-entry personal protective equipment are set in one of two ways:

1. *If EPA determines that no regulatory action must be taken as the result of the acute effects or other adverse effects of an active* ingredient, it establishes the early-entry PPE requirements on the basis of the acute dermal toxicity category, skin irritation potential category, and eye irritation potential category of the active ingredient.

2. If EPA determines that *regulatory action on an active ingredient must be taken* as the result of very high acute toxicity or to certain other adverse effects, such as allergic effects or delayed effects (cancer, developmental toxicity, reproductive effects), it may establish early-entry PPE requirements that are more stringent than would be established otherwise.

For non-hand-labor tasks, EPA is establishing PPE for dermal protection on the basis of the acute toxicity of the active ingredient. Chlorothalonil is classified as toxicity category III for acute dermal toxicity and toxicity category IV for skin irritation potential. Since chlorothalonil is classified as category I for eye irritation potential, protective eyewear is required.

For hand labor tasks, EPA is establishing PPE for dermal protection that is more stringent than the PPE that would otherwise be established on the basis of the acute toxicity category of the active ingredient. The intermediate term exposure risks and the carcinogenic risks from such exposures to chlorothalonil make more stringent early-entry PPE a prudent risk-reduction measure. Since chlorothalonil is classified as category I for eye irritation potential, protective eyewear is required. EPA will not require a respirator for early-entry workers, since the Agency believes that existing WPS restrictions on early entry are sufficient to mitigate post-application inhalation exposures of workers.

WPS Notification Statement:

Under the WPS, the labels of some pesticide products must require employers to notify workers about pesticide-treated areas orally as well as by posting of the treated areas. The reregistration process also may decide that a product requires this type of "double notification."

EPA has determined that double notification is not required for chlorothalonil end-use products.

Occupational-Use Products (NonWPS Uses)

The main nonWPS occupational use of chlorothalonil is its use on golf course turfgrass. The risk assessment for golfers, employees mowing greens, and employees mowing fairways indicates that the risks are acceptable for such exposures as soon as sprays have dried following applications. Due to the nature of the tasks, the expected low degree of contact with treated surfaces, and the lack of poisoning incident data for the golf-course setting, EPA is establishing "sprays have dried" entry restriction for nonWPS uses.

Homeowner-Use Products

EPA has serious concerns about post-application exposures to persons after homeowner applications of chlorothalonil, particularly exposures to children. EPA has concerns about intermediate-term exposures and lifetime (carcinogenic-risk) exposures and about the inhalation and eye-irritation effects.

OREB SUGGESTS A MEETING WITH THE REGISTRANT TO DISCUSS THESE EXPOSURE/RISK CONCERNS.

Other Labeling Requirements

The Agency is also requiring other use and safety information to be placed on the labeling of all end-use products containing chlorothalonil. For the specific labeling statements, refer to Section V of this document.

(RED SECTION V - LABELING REQUIREMENTS)

LABELING REQUIREMENTS FOR END-USE PRODUCTS

PPE/Engineering Control Requirements for Pesticide Handlers

For **sole-active-ingredient** end-use products that contain chlorothalonil, the product labeling must be revised to adopt the handler personal protective equipment/engineering control requirements set forth in this section. Any conflicting PPE requirements on the current labeling must be removed.

For **multiple-active-ingredient** end-use products that contain chlorothalonil, the handler personal protective equipment/engineering control requirements set forth in this section must be compared to the requirements on the current labeling and the more protective must be retained. For guidance on which requirements are considered more protective, see PR Notice 93-7.

Products Intended Primarily for Occupational Use (WPS and nonWPS)

Minimum (Baseline) PPE/Engineering Control Requirements

EPA is establishing minimum (baseline) engineering controls for some occupational uses of chlorothalonil end-use products. EPA is requiring:

- Wettable powder formulations whose labeling permits aerial application must be packaged in water-soluble packaging.
- Human flaggers must be within an enclosed cab.

EPA is establishing minimum (baseline) PPE for some occupational uses of chlorothalonil end-use products. EPA is requiring:

"Mixers, loaders, and persons cleaning equipment must wear:
--long-sleeve shirt and long pants,
--chemical-resistant gloves*,
--shoes plus socks,
--chemical-resistant apron
In addition, a respirator** must be worn when mixing and loading for aerial application.

Note: if wettable powder formulations are sold in water soluble packaging, the mixers' and loaders' PPE requirements may be reduced or modified as specified in the WPS.

Applicators using backpack application equipment must wear:

--long-sleeved shirt and long pants,
--chemical-resistant gloves*,
--shoes plus socks,

Applicators using spray application equipment in greenhouses or other enclosed areas must wear:
--long-sleeved shirt and long pants,
--chemical-resistant gloves*,
--shoes plus socks,
--a respirator**

* For the glove statement, use the statement established for chlorothalonil through the instructions in Supplement Three of PR Notice 93-7.

** For the type of respirator, see below.

EPA is not establishing minimum (baseline) PPE for other chlorothalonil handlers.

The following type of respirator is appropriate to mitigate chlorothalonil inhalation concerns:

A dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C).

Determining PPE Requirements for End-use Product Labels

If the acute inhalation toxicity of the **end-use product** is in category I or II and, therefore, a respirator is required for pesticide handlers, the following type of respirator is appropriate to mitigate chlorothalonil inhalation concerns:

"A dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C)."

The PPE that would be established on the basis of the acute toxicity category of the end-use product must be compared to the active-ingredient-based minimum (baseline) personal protective equipment specified above. The more protective PPE must be placed on the product labeling. For guidance on which PPE is considered more protective, see PR Notice 93-7.

Placement in Labeling

The personal protective equipment requirements must be placed on the end-use product labeling in the location specified in PR Notice 93-7, and the format and language of the PPE requirements must be the same as is specified in PR Notice 93-7.

Products Intended Primarily for Homeowner Use

Minimum (baseline) PPE Requirements

EPA is not establishing active-ingredient-based minimum (baseline) handler PPE for chlorothalonil end-use products that are intended primarily for homeowner use.

Determining PPE Requirements for End-Use Product Labels

Any necessary PPE for each chlorothalonil end-use product intended primarily for homeowner use will be established on the basis of the end-use product's acute toxicity category.

Placement in Labeling

The personal protective equipment requirements, if any, must be placed on the end-use product labeling immediately following the precautionary statements in the labeling section "Hazards to Humans (and domestic animals)."

Entry Restrictions

For **sole-active-ingredient** end-use products that contain chlorothalonil the product labeling must be revised to adopt the entry restrictions set forth in this section. Any conflicting entry restrictions on the current labeling must be removed.

For **multiple-active-ingredient** end-use products that contain chlorothalonil the entry restrictions set forth in this section must be compared to the entry restrictions on the current labeling and the more protective must be retained. A specific time period in hours or days is considered more protective than "sprays have dried" or "dusts have settled."

Products Intended Primarily for Occupational Use

WPS Uses

Restricted-entry interval:

"Do not enter or allow worker entry into treated areas to perform **non-hand-labor tasks** (mechanical harvesting, scouting, irrigation-related tasks, etc.) during the restricted entry interval of 48 hours. PPE required for early entry to treated areas to perform non-hand-labor tasks that is permitted under the Worker Protection Standard and that involves contact with anything that has bee treated, such as plants, soil, or water is:

--coveralls,
--chemical-resistant gloves,
--shoes plus socks, and

--protective eyewear."

"Do not enter or allow worker entry into treated areas to perform **hand-labor tasks** (hand harvesting, pruning, staking, thinning, weeding, packing in the field, etc.) during the restricted entry interval (REI) of 4 days (except for tomatoes and cut-flower and cut-foliage crops). Do not enter or allow worker entry into treated areas to perform **hand-labor tasks** (hand harvesting, pruning, staking, bundling, etc.) during the restricted entry interval (REI) of 14 days for tomatoes and 11 days for greenhouse- and nursery-grown cut-flower and cut-foliage crops. PPE required for early entry to treated areas to perform hand-labor tasks that is permitted under the Worker Protection Standard and that involves contact with anything that has bee treated, such as plants, soil, or water is:

--coveralls over short-sleeve shirt and short pants,
--chemical-resistant gloves,
--chemical-resistant footwear plus socks, and
--protective eyewear,
--chemical-resistant headgear for overhead exposure."

Placement in labeling:

The REI and PPE required for early-entry must be inserted into the standardized REI statement required by Supplement Three of PR Notice 93-7.

NonWPS uses

Entry restrictions:

The Agency is establishing the following entry restrictions for nonWPS occupational uses of chlorothalonil end-use products:

"Do not enter or allow others to enter the treated area until sprays have dried."

Placement in labeling:

If WPS uses are also on label -- Follow the instructions in PR Notice 93-7 for establishing a Non-Agricultural Use Requirements box, and place the appropriate nonWPS entry restrictions in that box.

If no WPS uses are on the label -- Place the appropriate nonWPS entry restrictions in the Directions for Use, under the heading "Entry Restrictions."

Products Intended Primarily for Homeowner Use

Entry restrictions:

THIS SECTION WILL BE COMPLETED AFTER THE REQUESTED MEETING WITH THE REGISTRANT.

Placement in labeling: Place the appropriate entry restrictions in the Directions for Use, under the heading "Entry Restrictions."

Other Labeling Requirements

Products Intended Primarily for Occupational Use

The Agency is requiring the following labeling statements to be located on all end-use products containing chlorothalonil that are intended primarily for occupational use.

Application Restrictions

"Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application."

Engineering Controls

"When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR 170.240(d)(4-6), the handler PPE requirements may be reduced or modified as specified in the WPS."

User Safety Requirements

- Discard clothing or other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.
- Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations

- "Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet."

- "Users should remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing."

- "Users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing."

Products Intended Primarily for Home Use

Application Restrictions

"Do not apply this product in a way that will contact any person or pet, either directly or through drift. Keep people and pets out of the area during application."

User Safety Recommendations

- "Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet."

- "Users should remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing."

{Select this only if gloves and/or protective eyewear are required for homeowner users:}

- "Users should remove protective clothing and equipment immediately after handling this product. Wash the outside of gloves before removing. Keep and wash protective clothing and equipment separately from other laundry."

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Chemical File (081901)

13544

R117878

Chemical: Chlorothalonil

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