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Environmental Protection  
Agency

Prevention, Pesticides  
and Toxic Substances  
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# Reregistration Eligibility Decision for Thiram



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

OFFICE OF  
PREVENTION, PESTICIDES  
AND TOXIC SUBSTANCES

**CERTIFIED MAIL**

Dear Registrant:

This is to inform you that the Environmental Protection Agency (hereafter referred to as EPA or the Agency) has completed its review of the available data and public comments received related to the preliminary risk assessments for the fungicide thiram. The enclosed Reregistration Eligibility Decision (RED) document was approved on September 30, 2004. Public comments and additional data received were considered in this decision.

Based on its review, EPA has identified risk mitigation measures that the Agency believes are necessary to address the environmental risks associated with the current use of thiram. EPA is now publishing its Reregistration Eligibility Decision (RED) and risk management decision for thiram and its associated human health and environmental risks.

The RED and supporting risk assessments for thiram are available to the public in EPA's Pesticide Docket **OPP-2004-0183** at: [www.epa.gov.edockets](http://www.epa.gov.edockets). In addition, the Thiram RED may be downloaded or viewed at: [www.epa.gov/pesticides/reregistration/status.htm](http://www.epa.gov/pesticides/reregistration/status.htm). Earlier information on thiram, including public comments, can be found under docket **OPP-2003-0287**.

The Thiram RED was developed through EPA's public participation process, published in the Federal Register on May 14, 2004, which provides opportunities for public involvement in the Agency's pesticide tolerance reassessment and reregistration programs. Developed in partnership with USDA and with input from EPA's advisory committees and others, the public participation process encourages robust public involvement starting early and continuing throughout the pesticide risk assessment and risk mitigation decision making process. The public participation process encompasses full, modified, and streamlined versions that enable the Agency to tailor the level of review to the level of refinement of the risk assessments, as well as to the amount of use, risk, public concern, and complexity associated with each pesticide. Using the public participation process, EPA is attaining its strong commitment to both involve the public and meet statutory deadlines.

Please note that the thiram risk assessment and the attached RED document concern only this particular pesticide. This RED presents the Agency's conclusions on the dietary, drinking water, occupational and ecological risks posed by exposure to thiram alone. This document also contains both generic and product-specific data that the Agency intends to require in Data Call-Ins (DCIs). Note that DCIs, with all pertinent instructions, will be sent to registrants at a later date. Additionally, for product-specific DCIs, the first set of required responses will be due 90 days from the receipt of the DCI letter. The second set of required responses will be due eight months from the receipt of the DCI letter.

As part of the RED, the Agency has determined that thiram will be eligible for reregistration provided that all the conditions identified in this document are satisfied, including implementation of the

risk mitigation measures outlined in Section IV of the document. Sections IV and V of this RED document describe labeling amendments for end-use products and data requirements necessary to implement these mitigation measures. Instructions for registrants on submitting the revised labeling can be found in the set of instructions for product-specific data that accompanies this document.

Should a registrant fail to implement any of the risk mitigation measures outlined in this document, the Agency will continue to have concerns about the risks posed by thiram. Where the Agency has identified any unreasonable adverse effect to human health and the environment, the Agency may at any time initiate appropriate regulatory action to address this concern. At that time, any affected person(s) may challenge the Agency's action.

If you have questions on this document or the label changes necessary for reregistration, please contact the Chemical Review Manager, Craig Doty, at (703) 308-0112. For questions about product reregistration and/or the Product DCI that accompanies this document, please contact Venus Eagle at (703) 308-8045.

Sincerely,

Debra Edwards, Ph.D.  
Director, Special Review and  
Reregistration Division

Attachment

**REREGISTRATION ELIGIBILITY**

**DECISION**

**for**

**Thiram**

**List A  
CASE 0122**



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## GLOSSARY OF TERMS AND ABBREVIATIONS

a.i.	Active Ingredient
aPAD	Acute Population Adjusted Dose
APHIS	Animal and Plant Health Inspection Service
ARTF	Agricultural Re-entry Task Force
BCF	Bioconcentration Factor
CDC	Centers for Disease Control
CDPR	California Department of Pesticide Regulation
CFR	Code of Federal Regulations
ChEI	Cholinesterase Inhibition
CMBS	Carbamate Market Basket Survey
cPAD	Chronic Population Adjusted Dose
CSFIIUSDA	Continuing Surveys for Food Intake by Individuals
CWS	Community Water System
DCI	Data Call-In
DEEM	Dietary Exposure Evaluation Model
DL	Double layer clothing {i.e., coveralls over SL}
DWLOC	Drinking Water Level of Comparison
EC	Emulsifiable Concentrate Formulation
EDSP	Endocrine Disruptor Screening Program
EDSTAC	Endocrine Disruptor Screening and Testing Advisory Committee
EEC	Estimated Environmental Concentration. The estimated pesticide concentration in an environment, such as a terrestrial ecosystem.
EP	End-Use Product
EPA	U.S. Environmental Protection Agency
EXAMS	Tier II Surface Water Computer Model
FDA	Food and Drug Administration
FFDCA	Federal Food, Drug, and Cosmetic Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FOB	Functional Observation Battery
FQPA	Food Quality Protection Act
FR	Federal Register
GL	With gloves
GPS	Global Positioning System
HIARC	Hazard Identification Assessment Review Committee
IDFS	Incident Data System
IGR	Insect Growth Regulator
IPM	Integrated Pest Management
RED	Reregistration Eligibility Decision
LADD	Lifetime Average Daily Dose
LC <sub>50</sub>	Median Lethal Concentration. Statistically derived concentration of a substance expected to causing death in 50% of test animals, usually expressed as the weight of substance per weight or volume of water, air or feed, e.g., mg/l, mg/kg or ppm.
LCO	Lawn Care Operator
LD <sub>50</sub>	Median Lethal Dose. Statistically derived single dose causing death in 50% of the test animals when administered by the route indicated (oral, dermal, inhalation), expressed as a weight of substance per unit weight of animal, e.g., mg/kg.
LOAEC	Lowest Observed Adverse Effect Concentration
LOAEL	Lowest Observed Adverse Effect Level
LOC	Level of Concern
LOEC	Lowest Observed Effect Concentration

mg/kg/day	Milligram Per Kilogram Per Day
MOE	Margin of Exposure
MP	Manufacturing-Use Product
MRID	Master Record Identification (number). EPA's system of recording and tracking studies submitted.
MRL	Maximum Residue Level
N/A	Not Applicable
NASS	National Agricultural Statistical Service
NAWQA	USGS National Water Quality Assessment
NG	No Gloves
NMFS	National Marine Fisheries Service
NOAEC	No Observed Adverse Effect Concentration
NOAEL	No Observed Adverse Effect Level
NPIC	National Pesticide Information Center
NR	No respirator
OP	Organophosphorus
OPP	EPA Office of Pesticide Programs
ORETF	Outdoor Residential Exposure Task Force
PAD	Population Adjusted Dose
PCA	Percent Crop Area
PDCI	Product Specific Data Call-In
PDP	USDA Pesticide Data Program
PF10	Protections factor 10 respirator
PF5	Protection factor 5 respirator
PHED	Pesticide Handler's Exposure Data
PHI	Preharvest Interval
ppb	Parts Per Billion
PPE	Personal Protective Equipment
PRZM	Pesticide Root Zone Model
RBC	Red Blood Cell
RED	Reregistration Eligibility Decision
REI	Restricted Entry Interval
RfD	Reference Dose
RPA	Reasonable and Prudent Alternatives
RPM	Reasonable and Prudent Measures
RQ	Risk Quotient
RTU	(Ready-to-use)
RUP	Restricted Use Pesticide
SCI-GROW	Tier I Ground Water Computer Model
SF	Safety Factor
SL	Single layer clothing
SLN	Special Local Need (Registrations Under Section 24(c) of FIFRA)
STORET	Storage and Retrieval
TEP	Typical End-Use Product
TGAI	Technical Grade Active Ingredient
TRAC	Tolerance Reassessment Advisory Committee
TTRS	Transferable Turf Residues
UF	Uncertainty Factor
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WPS	Worker Protection Standard

## EXECUTIVE SUMMARY

The Environmental Protection Agency (EPA or the Agency) has completed its review of public comments on the human health and environmental risk assessments for thiram and is issuing its risk management decision. EPA has concluded that thiram is eligible for reregistration provided that the registrants implement the actions and mitigation measures outlined in this document. Thiram is a member of the dithiocarbamate class of non-systemic fungicides. It is used as a fungicide to prevent crop damage in the field and to protect harvested crops (apples, peaches, and strawberries) from deterioration in storage or transport. It is also used as a seed protectant (e.g. small seeded vegetables, large seeded vegetables, cereal grains and other seeds, coniferous seeds, cotton seed, ornamental seeds, and soybeans) and to protect turf from fungal diseases. In addition, thiram is used as an animal repellent to protect crops from damage by rabbits, rodents, and deer. Thiram acts by concomitant inhibition of spore germination and mycelial growth through multi-site interference of enzyme processes associated with respiration. As an animal repellent, it creates a taste aversion to deter feeding. It is available in a variety of formulations including dust, wettable powder, water dispersible granule, flowable concentrate, dry flowable, soluble concentrate, and ready-to-use liquid. Thiram is applied both by commercial seed treaters and on-farm applicators. Tolerances for residues in/on food and feed commodities are currently expressed in terms of residues of thiram (CFR §180.132) *per se* and are established at 7 ppm for apples, peaches, and strawberries. Seed treatments are considered to be non-food uses and therefore do not require a tolerance.

Based on available data, an estimated 165,000 pounds of thiram are applied to 35,000 acres of strawberries, apples, and peaches annually. Thiram usage on strawberries and apples accounts for nearly all of this usage. Up to 631,000 pounds of thiram are used to treat approximately 1.3 billion pounds of seed annually.

### ***Overall Risk and Mitigation Summary***

An aggregate risk assessment looks at the combined risk from dietary exposure (food and drinking water pathways) as well as exposures from non-occupational sources (e.g., residential uses). Drinking water exposure to pesticides can occur through ground water and surface water contamination. In assessing drinking water risks, EPA considers acute (one day), chronic (long-term) and cancer exposure, and uses either modeling or monitoring data if available, to estimate those risks. To determine the maximum contribution from water allowed in the diet, EPA first looks at how much of the overall allowable risk is contributed by food and then calculates a “drinking water level of comparison” (DWLOC) to determine whether modeled or monitoring exposure estimates exceed the allowable risk level. Estimated environmental concentrations (EECs) that are above the corresponding DWLOC exceed the Agency’s level of concern.

**Acute Aggregate Risk.** Acute risks from aggregate exposures are not of concern, due to removal of strawberries from the label, a voluntary request for cancellation of apple uses, and requests for voluntary cancellation of most residential uses. Models have been used to estimate ground and surface water concentrations. The DWLOCs calculated to assess the surface water contribution to acute (noncancer) dietary exposure range from 1750 $\mu$ g/L (for the U.S. general population) to less than 500 $\mu$ g/L (infants and children). The surface water EEC (47.8ppb) is significantly less than the acute DWLOC. The groundwater EEC (0.84) is also significantly less than the acute DWLOC. These

DWLOCs were calculated assuming no exposure from food in order to evaluate potential acute risk posed by drinking water alone. However, if dietary exposure due to peach consumption (the only remaining food use) had been included in the DWLOC calculations, the LOCs would have been only approximately 10% lower, i.e., the lowest DWLOC would have been 450 $\mu$ g/L. Thus, the Agency concludes with reasonable certainty that aggregate exposure to food and drinking water will not result in an unacceptable acute risk.

**Short-term Aggregate Risk.** Short-term aggregate risks are not of concern. DWLOCs were calculated based upon average food residues and the residential post-application exposure scenario (adult golfers). Because the inputs to calculate short-term aggregate risks are very low (cPAD=2.8% and the MOE at day 0 for golfers is 794), the Agency concludes with reasonable certainty that aggregate exposure to food, drinking water and residential exposures will not result in an unacceptable risk.

**Chronic Aggregate Risk.** Chronic risks from aggregate exposures are not of concern. The DWLOC calculated to assess the surface water contribution to chronic (noncancer) dietary exposure is a range from 48.30 $\mu$ g/L (for the U.S. general population) to less than 10.80 $\mu$ g/L (infants and children). The surface water EEC (4.3 ppb) is less than the chronic DWLOC, indicating that chronic exposure to thiram in food and drinking water from surface water sources is below the Agency's level of concern. The groundwater EEC (0.84 ppb) is also less than the chronic DWLOC, indicating that chronic exposure to thiram in food and drinking water from groundwater sources is below the Agency's level of concern. Since the model-based estimates for concentrations in surface water and groundwater are below the calculated chronic DWLOC, the Agency concludes with reasonable certainty that aggregate exposure to food and drinking water will not result in an unacceptable chronic risk. The Agency's human health risk assessment indicates no risks of concern.

**Residential Risk.** Thiram will no longer be available for sale or use by homeowner applicators. As such, all residential risks were calculated related to the non-residential turf uses that include golfing for adults and toddler exposures in areas that can be treated with thiram by certified pesticide applicators. MOEs for golfers are not of concern to the Agency (MOE=764 at Day 0), and therefore no risk mitigation measures are required to address this scenario.

To protect children from scenarios of concern (MOE= 4) for exposure to thiram treated turf) and to further protect from exposure to ornamentals treated with thiram as a deer repellent, the Agency is requiring the following label modifications:

Deer Repellent Use:

Use one quart of this product in 3 to 7 gallons of water for application to 1000ft<sup>2</sup>  
Applications to ornamentals will be restricted to the following 17 Northern states and applications will occur during the winter season only (October thru March): OH, PA, NY, MI, CT, MA, IN, IL, NJ, WV, MN, WI, VT, NH, RI, DE, and MD.

Cancellations of Turf/Other Uses:

Turf applications to parks, athletic fields and commercial landscapes.  
All turf applications for turf grown for sale or other commercial use such as sod.  
All homeowner and retail uses on residential lawns and turf

Residential homeowner use as a fungicide on bulbs, flower seeds, greenhouse and nursery cuttings, and pruning paints.

Through these label amendments and voluntary cancellations to remove all homeowner uses from Taminco, the Agency believes exposure to the deer repellent use will be insignificant and therefore not of concern. No additional mitigation is necessary

**Occupational Risk.** The Agency calculated the potential exposure and risk to pesticide handlers from 28 major occupational exposure scenarios based on the types of equipment and techniques that potentially can be used for thiram applications. Worker risk is measured by a Margin of Exposure (MOE) which determines how close the occupational exposure comes to the No-Observed-Adverse-Effect-Level (NOAEL) taken from an animal study. A MOE of 100 or greater, for both the dermal and inhalation route is considered to be protective for thiram. Only short- and intermediate-term exposures are expected and assessed based on label directed use patterns. For occupational handlers, MOEs are greater than or equal to 100 at some level of protection for most scenarios. Current thiram labels typically require that handlers wear long pants, long-sleeved shirts, and gloves. Respirators are generally not required.

Occupational exposure and risk estimates were conducted using maximum application rates and high-end assumptions for amount of seed treated and planted. A target Margin of Exposure (MOE) of 100 is considered adequate for occupational exposure via dermal and inhalation routes. The results of the worker exposure assessment indicate that most potential exposure scenarios result in MOEs  $\geq$  the target MOE of 100 for dermal and inhalation for all of the seed crops treated with thiram products being actively sold in the U.S.

In most scenarios, MOEs meet or exceed the required target MOE of 100 at some level of personal protection. For the most part, current label requirements (for personal protection single layer clothing, gloves, and no respirator) appear to be generally adequate. Scenarios where MOEs do not exceed 100 at any level of personal protection include some loading scenarios for aerial applications, aerial granular applications and an on-farm seed treatment of peanuts. To reduce worker exposure, the Agency has determined that the following measures for specific scenarios are appropriate and required for reregistration eligibility.

- Comply with label changes with updated Worker Protection Standard and other regulations.
- Cancellation of the aerial and hand/spoon applications of granular formulations.
- Require water soluble bags be instituted for all wettable powder formulations.
- Cancellation of on-farm seed treatment for peanuts.

Workers can also be exposed to thiram residues by entering previously treated areas to perform activities. The Restricted Entry Interval (REI) is used by the Agency to manage risks for postapplication workers doing activities that require contact with treated surfaces. The REI is the amount of time required after application before residues decline to a level so entry into the treated area and engaging in any task or activity would not result in exposures which are of concern. Current labels for thiram specify an REI of 24 hours. Risks were calculated based on a scenario approach for low berry (e.g., strawberries), trees/fruit, deciduous (e.g., apples, peaches), and turf/sod (e.g., golf courses, sod farms). Current REIs are protective for most crops, however risks for reentry workers are of

concern for very high exposure activities. The number of days required for MOEs to reach the Agency's level of concern MOE of 100 is 6 to 7 days for apple thinning and 2 days for peach thinning on the East coast. Risks are a concern for high exposure activities such as transplanting and hand weeding sod (MOEs>100 at 12-21 days). The Agency is not concerned with maintaining the current REI of 24 hours because the MOE for peaches is 94. The following mitigation addresses the risks of concern for high exposure activities associated with apples and sod:

- Cancellation of all turf applications for turf grown for sale or other commercial use such as sod.
- Cancellation of all apple uses.

**Ecological Risk.** The ecological risk assessment for birds shows risks for reproductive effects to birds. The chronic risk quotients (RQs) for birds including endangered species that exceed levels of concern (LOCs) range from 26 to 1,237. There is a chronic effect to mammals including endangered species, which results in RQs that range from 3.9 to 6,250. Acute RQs for fish and aquatic invertebrates including endangered species range from 0.1 to 28. The Agency's assessment suggested that a number of endangered species may potentially be impacted by thiram; however, this RED includes only risk mitigation for the Attwater's Prairie Chicken (*Tympanuchus cupido attwateri*). The following mitigation measures address the Agency's ecological risks of concern:

#### Turf

- Cancellation of turf applications to parks, athletic fields, and commercial landscapes.
- Cancellation of all homeowner and retail uses on residential lawns and turf.
- Cancellation of all turf applications for turf grown for sale or other commercial use such as sod.
- Restrict use to golf course tees and greens only.
- Reduce winter golf course treatment from maximum of four applications to maximum of one single application.
- Reduce summer golf course treatment from maximum of eight applications to maximum of three applications.
- Restrict total annual application of thiram to golf courses to 47 pounds active ingredient per acre.
- Increase retreatment interval from seven to 14 days.

#### Apples

- Cancellation of all apple uses.

#### Strawberries

- In California, limit maximum number of applications to five at 2.6 lbs. a.i./A. East of the Mississippi, limit maximum number of applications to twelve at 2.6 lbs. a.i./A. Label statement to indicate that 1.3 lbs. a.i./A should be used when thiram is used in combination with other fungicides.
- Establish a 25-foot vegetation buffer zone from water bodies.



## Seed

Planting Depth Restriction: A specification of 1 inch minimum planting depth for cotton, wheat, barley, oats and sugar beet seed.

To be eligible for reregistration the following language must be added to the label and bag tags:

“ENVIRONMENTAL HAZARDS: Treated seed are hazardous to birds and mammals. Do not plant treated seed by broadcasting to the soil surface. Insure that all planted seed are thoroughly covered with soil, especially in turn areas. Plant cotton, wheat, barley, oats and sugar beet seed a minimum of 1 inch deep. If seed are not thoroughly incorporated by the planter during planting, additional incorporation may be required to reduce exposed seed. Clean-up, bury or cover all spilled seed with soil.”

Cotton Use Rate Reduction: Reduce the maximum treating rate for cotton seed from 2.25 oz. ai/cwt (1406 ppm) when treated with thiram as a single active ingredient to 1.6 oz. ai/cwt (1,000 ppm). Reduce the maximum treating rate for cotton seed for thiram in products containing multiple active ingredients to 1.0 oz. active thiram/cwt (625 ppm thiram).

“This pesticide is toxic to fish. Do not apply to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate or by disposal of wastes. Treated seed exposed on soil surface may be hazardous to birds. Cover or collect spilled seeds.”

“This bag contains seed treated with thiram. This product may have effects on federally listed threatened or endangered species or their critical habitat in some counties. It is a violation of federal law to kill, harm or harass listed animal species without authorization. To limit the potential for such impacts when using this product, consult and follow the instructions provided in the EPA Endangered Species Bulletin for the County or Parish in which you are applying the seed. To determine whether your County or Parish has a Bulletin consult <http://www.epa.gov/espp> before each season's use of this product.”

**Endangered Species.** As discussed above, Agency estimates of exposure indicate risks of reproductive effects to endangered species of birds. The acute endangered species LOC for terrestrial animals (birds and mammals) is 0.1; for aquatic animals (freshwater or marine/estuarine fish and invertebrates) it is 0.05. The foliar and turf uses of thiram may pose an acute risk to endangered fish and invertebrate species, and a chronic risk to endangered mammalian species. However, based on the ecological risk assessment conducted for thiram and implementation of the mitigation procedures described below, EPA has determined that thiram will have no effect on the Attwater Prairie Chicken. Relating to any additional endangered species concerns, these findings are based solely on EPA's screening level assessment and do not constitute "may affect" findings under the Endangered Species Act.

Based on information provided by the U.S. Fish and Wildlife Service, the endangered species profile, and communications with refuge managers, the Attwater's Prairie Chicken (*Tympanuchus cupido attwateri*) may be at risk for consuming thiram-treated seed. The seed foraging behavior of the Attwater's Prairie Chicken, combined with the fact that seed planted in the vicinity of this endangered species are typically incorporated at depths where the chicken is not likely to encounter the treated seed, reduces the likelihood of exposure and risk. To further mitigate risks posed to the Attwater's Prairie Chicken, the Agency will require label and bag tag revisions, specify minimum cotton seed planting depths, and restrict planting of any thiram-treated seed within a one-mile zone around the perimeter of the Attwater's Prairie Chicken preserves. EPA plans to issue new or revised County Specific Bulletins delineating the above mitigation measures.

## **I. Introduction**

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was amended in 1988 to accelerate the reregistration of products with active ingredients registered prior to November 1, 1984. The amended Act calls for the development and submission of data to support the reregistration of an active ingredient, as well as a review of all submitted data by the U.S. Environmental Protection Agency (referred to as EPA or “the Agency”). Reregistration involves a thorough review of the scientific database underlying a pesticide’s registration. The purpose of the Agency’s review is to reassess the potential hazards arising from the currently registered uses of the pesticide; to determine the need for additional data on health and environmental effects; and to determine whether the pesticide meets the “no unreasonable adverse effects” criteria of FIFRA.

On August 3, 1996, the Food Quality Protection Act of 1996 (FQPA) was signed into law. This Act amends FIFRA to require tolerance reassessment. The Agency has decided that, for those chemicals that have tolerances and are undergoing reregistration, the tolerance reassessment will be initiated through this reregistration process. The Act also requires that by 2006, EPA must review all tolerances in effect on the day before the date of the enactment of the FQPA. FQPA also amends the Federal Food, Drug, and Cosmetic Act (FFDCA) to require a safety finding in tolerance reassessment based on factors including consideration of cumulative effects of chemicals with a common mechanism of toxicity. This document presents the Agency’s revised human health and ecological risk assessments; and the Reregistration Eligibility Decision (RED) for thiram.

The implementation of FQPA has required the Agency to revisit some of its existing policies relating to the determination and regulation of dietary risk, and has also raised a number of new issues for which policies need to be created. These issues were refined and developed through collaboration between the Agency and the Tolerance Reassessment Advisory Committee (TRAC), which was later superseded by the Committee to Assist with Reassessment and Transition (CARAT). Both federal advisory committees were composed of representatives from industry, environmental groups, and other interested parties. Although FQPA significantly affects the Agency’s reregistration process, it does not amend any of the existing reregistration deadlines. Therefore, the Agency is continuing its reregistration program while it resolves the remaining issues associated with the implementation of FQPA.

This document consists of six sections. Section I contains the regulatory framework for reregistration/tolerance reassessment; Section II provides a profile of the use and usage of the chemical; Section III gives an overview of the human health and environmental effects risk assessments; Section IV presents the Agency’s decision on reregistration eligibility and risk management; and Section V summarizes the label changes necessary to implement the risk mitigation measures outlined in Section IV. Finally, the Appendices include Data Call-In (DCI) and other information. The revised risk assessments and related addenda are not included in this document, but are available in the public docket, at: <http://docket.epa.gov/edkpub/index.jsp>, and on the Office of Pesticide Programs web page at: <http://www.epa.gov/pesticides/reregistration/>.

## II. Chemical Overview

### A. Regulatory History

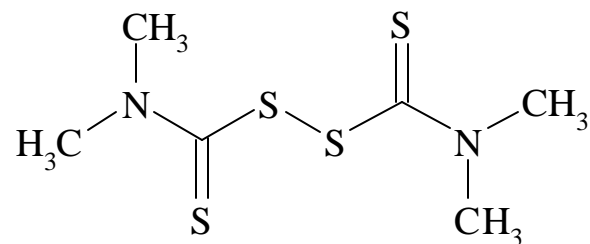
Thiram has been registered in the United States since 1948 for use as a non-systemic, protectant dithiocarbamate fungicide. During the second phase of reregistration, the Agency conducted a review of the scientific data base underlying pesticide registrations and identified missing or inadequate studies. Subsequent Data Call-Ins (DCIs) were issued in 1991 and 1995 for thiram. This Reregistration Eligibility Decision (RED) reflects a reassessment of all data submitted to date.

In an effort to promote transparency of the reregistration process and include the public in developing regulatory decisions, the Agency has developed a public participation process that is used for pesticide tolerance reassessment and reregistration. This public participation process was developed in partnership with USDA, based on EPA's and USDA's experiences with the pilot public participation process used for the organophosphate pesticides, comments received from Tolerance Reassessment Advisory Committee and the public during the public comment period on the proposed process and EPA's experience with the interim process used in developing decisions for a number of non-organophosphate pesticides during the past few years. The public participation process encompasses full and modified versions that enable EPA to tailor the level of review to the level of refinement of the risk assessments, as well as to the amount of use, risk, public concern and complexity associated with each pesticide.

The Agency followed a six-phase public participation process for thiram. Consistent with the process, EPA initiated Phase 1 of the process by transmitting the preliminary human health and ecological risk assessments to the technical registrant for a 30-day error only correction review. In Phase 2, EPA considered the errors that were identified by the registrant and made changes in the risk assessments as appropriate. To initiate Phase 3 of the process on January 26, 2004, the Agency published a *Federal Register* notice announcing the availability of the revised risk assessments and supporting documents for a 60-day public review and comment period. On July 2, 2004, EPA initiated Phase 5 of the process announcing the availability of the refined risk assessments for a 60-day public review and comment period. EPA received approximately 75 comments, which proved to be extremely helpful in further refining the use characterization of thiram and possible risk mitigation options.

### B. Chemical Identification

Thiram:



- **Common name:** Thiram
- **Chemical name:** [tetramethyl thiuram disulfide]
- **Chemical Family:** Dithiocarbamate

- **Empirical formula:** C<sub>6</sub>H<sub>12</sub>N<sub>2</sub>S<sub>4</sub>
- **CAS Registry No.:** 137-26-8
- **Case number:** 0122
- **OPP Chemical Code:** 079801
- **Molecular weight:** 240.4
- **Trade name:** Thiram 65, Thiram 75, Thiram Granuflo, Defiant
- **Basic manufacturer:** Gustafson LLC, Taminco, Inc.

Technical thiram is a crystalline solid with a melting point of 142-150 C, bulk density of 0.32-0.35 g/mL, octanol/water partition coefficient (P<sub>ow</sub>) of 39.5-54.1, and vapor pressure of 1.6-1.8 x 10<sup>-5</sup> Torr at 25 C.

### C. Use Profile

#### *Type of Pesticide*

Thiram is a member of the dithiocarbamate class of non-systemic fungicides.

#### *Summary of Use Sites*

Thiram is used as a fungicide to prevent crop damage in the field. It is used on, and currently has tolerances (CFR §180.132) in/on apples, peaches, and strawberries. It is also used as a seed protectant (e.g. small seeded vegetables, large seeded vegetables, cereal grains, other seeds, coniferous seeds, cotton seed, ornamental seeds, and soybeans) and to protect turf from fungal diseases. In addition, thiram is used as an animal repellent to protect crops from damage by rabbits, rodents, and deer.

Regarding the foliar uses, because thiram is a non-systemic, protectant fungicide which is not subject to pest resistance development, it is typically used throughout most of the crop cycle (especially during the bloom and pre-harvest periods). Thiram is typically alternated or tank-mixed with other fungicides, which are systemic with single-site modes of action and prone to pest resistance problems. Accordingly, thiram is a critical pest resistance management tool used to delay the development of pest strains resistant to the systemic fungicides.

It was also determined that thiram plays a very important role in areas of California and Florida where lengthy growing seasons exist. Thiram is relied upon after the seasonal maximum amounts of other fungicides, primarily captan, has been utilized.

The seed use of thiram on a variety of crops is also important. Thiram controls a wide spectrum of pathogens, is cost-effective, and is widely accepted for use on exported seed.

## ***Target Pests***

**On apples:** apple blotch, apple scab, bitter rot, bitter pox, black rot on fruit/foilage, Brook's spot, Bull's eye rot, fly speck, gray mold rot, sooty blotch, white rot, cedar apple rust, and quince rust;

**On peaches:** brown rot blossom blight and fruit rot, peach leaf curl, rhizopus rot, and peach scab;

**On strawberries:** gray mold;

**On treated seeds (of many varieties):** damping off, seed decay, seedling blights, covered kernel smut of sorghum, and loose smut and bunt of wheat;

**On turf:** dollar spot, brown patch, and fusarium patch.

Thiram acts by concomitant inhibition of spore germination and mycelial growth through multi-site interference of enzyme processes associated with respiration. As an animal repellent, it creates a taste aversion to deter feeding.

## ***Formulation Types Registered***

Formulations include dust, wettable powder, water dispersable granule, flowable concentrate, dry flowable, soluble concentrate, and ready-to-use liquid.

## ***Methods of Application***

Currently, thiram formulations may be applied to apples, peaches, and strawberries using groundboom, aerial equipment, airblast sprayer, soil incorporation equipment, high and low pressure handwand, backpack sprayer, push-type granular spreader, tractor-drawn drop-type spreader, paintbrush, and sprinkler can. Commercial seed applicators use automated machinery that mixes and applies thiram to seeds as they are rotated through a metal drum or cylinder; these systems are used for both liquid and dust treatments. On-farm liquid applicators use a portable mechanical mixing system that applies thiram to seeds as they are rotated through a metal cylinder. On-farm dust applicators pour thiram into the seed chamber of the planter and mix the product by hand with a stick or paddle, just prior to planting. Ornamental bulbs may be treated by dip tank application, drill box, and duster. As discussed above, the thiram technical registrants are no longer supporting aerial and hand/spoon applications of granular formulations, residential (homeowner) use as fungicide on bulbs, flower seeds, greenhouse and nursery cuttings, and pruning paints, or on-farm seed treatment for peanuts.

## ***Label Use Rates***

For foliar spray applications, application rates range from 2.6 to 4.5 lbs. of active ingredient per acre (ai/A) and the maximum number of applications per season ranges from five to 15. The animal repellent rate is 1 lb. ai per 1 gallon spray and the bulb dip rate is 1 lb. ai per 6 gallon dip solution. Seed treatment application rates range from 0.031 to 2 lbs. ai per 100 lbs. (ai/cwt.) of seed.

#### **D. Estimated Usage of Thiram**

Based on available data, approximately 165,000 lbs. of thiram are applied to 35,000 acres of strawberries, apples, and peaches annually and up to 631,000 lbs. ai/year are used to treat about 1.3 billion pounds of seed. The seed treatment use in terms of total pounds active ingredient is allocated as follows: cereal grains (73%), cotton seed (12%), large seeded vegetables (7%), soybeans (4%), and small seeded vegetables (3%). The largest foliar markets for thiram in terms of total pounds active ingredient are strawberries (60%), apples (35%), and peaches (3%). The remaining foliar uses are on ornamentals. Most of the foliar usage is in California, Florida, Michigan, New Jersey, New York, Oregon, Pennsylvania, and Washington.

In 2003, Pennsylvania applied thiram to 17% of the total acres for peaches (646 acres out of 3,800 acres) based on USDA/NASS data. This is likely to be a sporadic incidence because thiram use was not reported in Pennsylvania in other years. Pennsylvania accounts for only about 3% of the total acres for peaches in the United States, while California, Georgia, and South Carolina together comprise more than 80%. However, Pennsylvania is the only state that shows thiram use on peaches in 2003. Even in 2003 with a relatively higher % acres treated with thiram in Pennsylvania, thiram use on peaches are still less than 3% of the total foliar usage of thiram.

### III. Summary of Thiram Risk Assessment

The purpose of this summary is to assist the reader by identifying the key features and findings of the human health and ecological risk assessments, and to enhance understanding of the conclusions reached in the assessments. The list of EPA's human health and ecological risk assessments, and supporting information that were used to formulate the findings and conclusions for the fungicide thiram can be found in the OPP public docket, located in Room 119, Crystal Mall #2, 1801 Bell Street, Arlington, VA or viewed via the Internet at: <http://docket.epa.gov/edkpub/index.jsp> under the docket number **OPP-2004-0183**. In addition, documents may be downloaded or viewed via the Internet at: <http://www.epa.gov/pesticides/reregistration/>.

EPA issued its refined risk assessments on thiram and made them available for public comment on July 2, 2004. The 60-day public comment period on the refined risk assessments ended August 31, 2004. In response to the comments received and additional information, the Agency will issue its reply to comments and will post it, along with this Thiram RED in the OPP public docket.

#### A. Human Health Risk Assessment

##### 1. Dietary Risk from Food

###### a. Toxicity and Carcinogenicity

(For a complete discussion, see section 3.1 of the Human Health Risk Assessment.)

The toxicology data base is adequate to characterize the toxicity of thiram. Thiram exhibits low to moderate acute toxicity via the oral (Toxicity Category III) and dermal (Toxicity Category III) routes of exposure. Thiram is considered to be moderately toxic via the inhalation route of exposure (Toxicity Category II). It is a moderate eye irritant (Toxicity Category II), a slight dermal irritant (Toxicity Category IV) and a moderate skin sensitizer.

**Table 1. Acute Toxicity Data on Thiram**

Guideline No./ Study Type	MRID No.	Results	Toxicity Category
870.1100 Acute oral toxicity	00153548	LD <sub>50</sub> = 1,800 mg/kg/day	III
870.1200 Acute dermal toxicity	00259250	LD <sub>50</sub> ≥ 2,000 mg/kg/day	III
870.1300 Acute inhalation toxicity	00165855	LC <sub>50</sub> ≥ 0.1 mg/L	II
870.2400 Acute eye irritation	00259250	Moderate eye irritant	II
870.2500 Acute dermal irritation	00259250	-	IV
870.2600 Skin sensitization	00153068	Moderate skin sensitizer	

Thiram is a neurotoxicant and can also act as a developmental toxicant. The neurotoxic effects of thiram seen in laboratory animals are lethargy, reduced tail pinch response, no tail pinch response,



reduced brain weights, and reduced motor activity. Developmental effects seen in laboratory animals include severe fetal malformations including central nervous system defects as well as protruding tongue and cleft palates after *in utero* exposure to thiram at dose levels which did not cause maternal toxicity.

The subchronic toxicity profile for thiram indicates that hematology, clinical chemistry and body weight are the parameters affected after subchronic exposure to the compound for all species evaluated.

The chronic toxicity profile for thiram indicates that the liver, blood and urinary system are the target organs for this chemical. In a combined chronic/cancer study in rats, effects included changes in hematology parameters, increased incidence of bile duct hyperplasia, and reduction in body weight gain. At higher doses in this study, the severity of the toxicity described above was increased and changes in clinical chemistry parameters were reported. In a chronic oral toxicity study in dogs, effects were manifested as elevated cholesterol levels and increases in liver-to-body weight ratio. At higher dose levels, the signs of toxicity were more severe. Signs of toxicity in a carcinogenicity study in mice included decreases in body weight gain, anemia, as well as non-cancerous lesions in the eyes, stomach and urinary bladder. At higher doses, the severity of these signs of toxicity was greater.

The results of two multigeneration reproduction toxicity Studies in rats did not reveal increased susceptibility of the young after *in utero* and perinatal exposure to Thiram. In both studies, the effects noted at the Lowest-Observed-Adverse-Effect-Level (LOAEL) in the offspring and parental animals were limited to decreases in body weight and/or body weight gain.

The Agency is requiring a developmental neurotoxicity (DNT) study be conducted and submitted for consideration by the Agency. That recommendation was based on the weight of the evidence including: 1) findings of CNS defects in the developmental study in rats; and 2) neurotoxic effects in the acute and subchronic neurotoxicity study.

Thiram is readily absorbed (via the oral route), distributed, extensively metabolized and eliminated primarily in the expired air mostly within 24 hours of administrations. No significant residues remain after 72 hours.

In carcinogenicity studies, thiram did not demonstrate any biologically significant evidence of carcinogenic potential. Thiram is classified as “not likely to be carcinogenic to humans.”

#### **b. FQPA Safety Factor**

(For a complete discussion, see section 3.2 of the Human Health Risk Assessment.)

An uncertainty factor (UF) of 1000X was initially applied to all populations to account for inter-species extrapolation (10X), intra-species variation (10X), and a database uncertainty factor (10X). A Database Uncertainty Factor (UF<sub>DB</sub>) is applied to all dietary and residential exposure scenarios to account for the lack of a developmental neurotoxicity study (DNT) study. The Agency concluded that a Developmental Neurotoxicity Study (DNT) on thiram is necessary based on a weight of evidence including: 1) findings of central neurological system defects as seen in the Developmental Study in rats (MRID 00259810-02); and 2) neurotoxic effects in the Acute and Subchronic Neurotoxicity Study

(MRID 42912401 and 43012701, respectively). Because the thiram toxicology database does not include a DNT study, a Database Uncertainty Factor is necessary to be protective of children. This Uncertainty Factor is applied only to exposure scenarios that are expected for children or pregnant women, and thus is not applied to occupational exposure scenarios.

The Agency determines the appropriate size of the Database Uncertainty Factor by comparing the NOAEL from an acceptable reproduction study on the subject pesticide with a dose level that the Agency assumes would be the NOAEL from a DNT study on the subject pesticide, if one were available. A recent analysis of data from DNT studies previously submitted to the Agency suggests that NOAELs lower than the lowest dose tested in the reproduction study are unlikely to occur.

In the case of thiram, the lowest dose tested in the rat reproduction study 1.7 mg/kgbw-day. The Agency therefore assumes that a DNT study on thiram would yield a NOAEL of approximately 1.7 mg/kgbw-day. The Agency's determination of the size of the Database Uncertainty Factor is derived by dividing the point of departure used for each exposure pathway by the assumed DNT NOAEL of 1.7 mg/kgbw-day. If the point of departure for a particular risk assessment is higher than the assumed NOAEL, a Database Uncertainty Factor is required. If the difference is in the range of 3X, a 3X factor is used. If it is larger than 3X, a 10X factor is used. If the point of departure is equal to or lower than the assumed NOAEL, a Database Uncertainty Factor is not required since it is concluded that the DNT is unlikely to yield a point of departure more sensitive than that currently being used for that assessment.

Therefore, based on this approach, acute dietary risk estimates will be reduced by approximately 3-fold, with a resulting Database Uncertainty Factor of 3X. Chronic dietary risk estimates will be reduced by 10-fold and the target MOEs for all occupational and residential risk assessments will now be 100.

The HIARC concluded that the Special FQPA Factor could be reduced to 1X. This conclusion is based on the outcome of the degree of concern analysis that failed to identify any residual uncertainties. The Special FQPA Safety Factor recommended by the HIARC assumes that the exposure databases (dietary food, drinking water, and residential) are complete and that the risk assessment for each potential exposure scenario includes all metabolites and/or degradates of concern and does not underestimate the potential risk for infants and children.

### **c. Population Adjusted Dose (PAD) & Reference Dose (RfD)**

(For a complete discussion, see section 4.2 of the Human Health Risk Assessment.)

The acute dietary endpoint was derived from an acute neurotoxicity study in rats. The NOAEL for neurotoxic effects is 5 mg/kg and the LOAEL is 150 mg/kg based on the following effects seen in laboratory animals: lethargy, lower temperature, reduced startle response, no tail pinch response, reduced motor activity, and reduced brain weights.

The FQPA safety factor is 1X, however, a 3X database uncertainty factor was used to account for the lack of a required DNT study. The results of this study could affect the endpoints used for risk assessment. Table 2 below summarizes the toxicological dose and endpoints used in the thiram dietary risk assessment.

**Table 2. Summary of Toxicological Dose and Endpoints for Thiram**

Exposure Scenario	Dose Used in Risk Assessment, UF <sup>1</sup>	Special FQPA Safety Factor and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (All Populations)	NOAEL <sup>3</sup> = 5 mg/kg/day UF = 300* <b>Acute RfD</b> <sup>6</sup> = 0.0167 mg/kg/day	FQPA SF <sup>2</sup> = 1 <b>aPAD</b> = <u>acute RfD</u> FQPA SF = 0.0167 mg/kg/day	Acute Neurotoxicity Study - Rat LOAEL <sup>4</sup> = 150 mg/kg/day based on FOB <sup>9</sup> effects (lethargy, lower temperature, reduced startle response, no tail pinch response), reduced motor activity, and reduced brain weights
Chronic Dietary (All populations)	NOAEL= 1.5 mg/kg/day UF = 100 <b>Chronic RfD</b> = 0.015 mg/kg/day	FQPA SF = 1 <b>cPAD</b> <sup>5</sup> = <u>chronic RfD</u> FQPA SF = 0.015 mg/kg/day	Combined Chronic Toxicity/Carcinogenicity Study - RAT & Chronic Oral Toxicity Study - DOG LOAEL = 7.3 mg/kg/day based on changes in hematology, clinical chemistry incidences of bile duct hyperplasia, and reduction in mean body weight gain seen at 7.9 mg/kg/day in conjunction with elevated cholesterol levels and increased liver weights reported in the Chronic Oral Toxicity Study in Dogs at 2.6 mg/kg/day
Short-Term Incidental Oral (1-30 days)  and  Intermediate-Term Incidental Oral (1- 6 months)	NOAEL= 1.5 mg/kg/day	<b>Residential LOC</b> <sup>8</sup> for MOE <sup>7</sup> = 100  <b>Occupational</b> = NA <sup>10</sup>	Multigeneration Reproduction Toxicity Study and Combined Chronic Toxicity/Carcinogenicity Study - RAT & Chronic Oral Toxicity Study - DOG LOAEL = 4.7 mg/kg/day based on decreased pup weight/pup weight gain.
Short-Term Dermal (1 to 30 days)  and  Intermediate-Term Dermal (1 to 6 months)	NOAEL= 300 mg/kg/day	<b>Residential LOC</b> for MOE = 100  <b>Occupational LOC</b> for MOE = 100	21-Day Dermal Toxicity/Rabbit LOAEL = 1000 mg/kg/day based on decreases in body weight and food consumption as well as alterations in clinical chemistry.

Exposure Scenario	Dose Used in Risk Assessment, UF <sup>1</sup>	Special FQPA Safety Factor and Level of Concern for Risk Assessment	Study and Toxicological Effects
Long-Term Dermal (>6 months)	NOAEL= 1.5 mg/kg/day (dermal absorption rate = 1% when appropriate)	<b>Residential</b> LOC for MOE = 100  <b>Occupational</b> LOC for MOE =100	Combined Chronic Toxicity/Carcinogenicity Study - RAT & Chronic Oral Toxicity Study - DOG LOAEL = 7.3 mg/kg/day based on changes in hematology, clinical chemistry, incidences of bile duct hyperplasia, and reduction in mean body weight gain seen at 7.9 mg/kg/day in conjunction with elevated cholesterol levels and increased liver weights reported in the Chronic Oral Toxicity Study in Dogs at 2.6 mg/kg/day
Inhalation (All durations)	NOAEL= 1.5 mg/kg/day (inhalation absorption rate = 100%)	<b>Residential</b> LOC for MOE = 100  <b>Occupational</b> LOC for MOE = 100	Combined Chronic Toxicity/Carcinogenicity Study - RAT & Chronic Oral Toxicity Study - DOG LOAEL = 7.3 mg/kg/day based on changes in hematology, clinical chemistry, incidences of bile duct hyperplasia, and reduction in mean body weight gain seen at 7.9 mg/kg/day in conjunction with elevated cholesterol levels and increased liver weights reported in the Chronic Oral Toxicity Study in Dogs at 2.6 mg/kg/day.
Cancer (oral, dermal, inhalation)	<b>NOT LIKELY TO BE CARCINOGENIC TO HUMANS</b>		

\*A database uncertainty factor of 3X was applied in addition to the usual inter- and intraspecies safety factor.

1. UF = uncertainty factor. 2. FQPA SF = Special FQPA safety factor. 3. NOAEL = no observed adverse effect level. 4. LOAEL = lowest observed adverse effect level. 5. PAD = population adjusted dose (a = acute, c = chronic). 6. RfD = reference dose. 7. MOE = margin of exposure. 8. LOC = level of concern. 9. FOB = functional observational battery. 10. NA = Not Applicable

#### d. Exposure Assumptions

(For a complete discussion, see section 4.2 of the Human Health Risk Assessment.)

The acute dietary probabilistic assessment was conducted using the Dietary Exposure Evaluation Model (DEEM-FCID™). There are no Food and Drug Administration or U.S. Department of Agriculture Pesticide Data Program (PDP) monitoring data available for thiram because the currently available analytical methodology detects carbon disulfide, a common metabolite for thiram and other dithiocarbamates, and therefore cannot quantify thiram residues with precision. Because field trial data were used, the assessment is considered conservative and could be further refined if sufficient monitoring data were available. However, percent crop treated information, and washing, cooking, and other processing factors were incorporated into the dietary assessment to provide an additional level of refinement.

For the chronic dietary (food) risk assessments, exposure was calculated using field trial residue and percent crop treated data. Estimates of average residues for foods (e.g., orange) or food-forms (e.g., orange-juice) of interest are multiplied by the averaged consumption estimate of each food/food-form of each population subgroup. Exposure estimates are expressed in mg/kg body weight/day and as a percent of the cPAD.

**e. Acute Dietary (Food) Risk**

(For a complete discussion, see section 4.2 of the Human Health Risk Assessment.)

Acute dietary risk is calculated considering what is eaten in one day. Acute dietary exposure that is less than 100% of the acute Population Adjusted Dose (aPAD) does not exceed the Agency’s level of concern. The aPAD is the acute Reference Dose (RfD) adjusted by the FQPA Safety Factor (FQPA SF). The acute RfD is the dose at which an individual could be exposed in a single day with no adverse health effects, which is equal to the NOAEL divided by the uncertainty factor. For thiram, because the FQPA SF is 1, the acute RfD and the aPAD are numerically the same (0.0167 mg/kg/day).

The acute risk estimates are of concern at the 99.9th exposure percentile for the general U.S. population (114% of the aPAD) and all the population subgroups outlined in Table 3. The acute dietary exposure estimate for children 1-2 years old, the highest exposed population subgroup, is 302% of the aPAD.

These risks will be mitigated to acceptable levels (peaches alone at 9% of the aPAD) through voluntary cancellation of apples and removal of strawberries from labels, pending receipt and review of additional data (developmental neurotoxicity and strawberry “processing” studies) and reevaluation of risk.

**Table 3. Results of Acute Dietary Exposure Analysis**

Population Subgroup	aPAD (mg/kg/day)	99.9 <sup>th</sup> Percentile	
		Exposure (mg/kg/day)	% aPAD
General U.S. Population	0.0167	0.019022	<b>114</b>
All Infants (< 1 year old)	0.0167	0.021088	127
Children 1-2 years old	0.0167	0.050268	<b>302</b>
Children 3-5 years old	0.0167	0.043316	260
Children 6-12 years old	0.0167	0.030360	182
Youth 13-19 years old	0.0167	0.013902	83
Adults 20-49 years old	0.0167	0.012330	74
Females 13-49 years old	0.0167	0.014078	84
Adults 50+ years old	0.0167	0.011278	68

## f. Chronic Dietary (Food) Risk

(For a complete discussion, see section 4.2 of the Human Health Risk Assessment.)

Chronic dietary risk is calculated by using the average consumption values for food and average residue values on those foods over a 70-year lifetime. The chronic dietary assessment was based on the Dietary Exposure Evaluation Model (DEEM™) using percent crop treated and anticipated residues based on field trial data. Chronic dietary exposure is then compared to the chronic Population Adjusted Dose (cPAD). A risk estimate that is less than 100% of the cPAD does not exceed the Agency's level of concern. The cPAD is the chronic Reference Dose (RfD) adjusted by the FQPA safety factor. The RfD is the dose at which an individual could be exposed over a lifetime with no adverse health effects.

Estimated chronic dietary exposure and risk are below the Agency's level of concern, with 2.8% or less of the cPAD consumed for all population subgroups. Exposure for the U.S. general population is less than 1% of the cPAD (Table 4).

**Table 4. Chronic Dietary (Food) Exposure Estimate and Percent of Chronic RfD - Tier 1 Exposure Analysis (Assumes Tolerance Level Residues and % Crop Treated with Anticipated Residue Levels based on Field Studies)**

Population Subgroup	cPAD (mg/kg/day)	Exposure (mg/kg/day)	% cPAD
General U.S. Population	0.015	0.000121	<1
All Infants (< 1 year old)	0.015	0.000102	<1
Children 1-2 years old	0.015	<b>0.000422</b>	<b>2.8</b>
Children 3-5 years old	0.015	0.000336	2.2
Children 6-12 years old	0.015	0.000205	1.4
Youth 13-19 years old	0.015	0.000087	<1
Adults 20-49 years old	0.015	0.000079	<1
Females 13-49 years old	0.015	0.000095	<1
Adults 50+ years old	0.015	0.000099	<1

## g. Cancer Dietary Risk Assessment

In carcinogenicity studies in male and female rats and in male and female mice, thiram did not demonstrate any biologically significant evidence of carcinogenic potential. Thiram is classified as “not likely to be carcinogenic to humans.” Therefore, no cancer risk assessment was conducted.

## 2. Dietary Risk from Drinking Water

(For a complete discussion, see section 4.3 of the Human Health Risk Assessment.)

Drinking water exposure to pesticides can occur through groundwater and surface water contamination. EPA considers both acute (one day) and chronic (lifetime) drinking water risks and uses either modeling or actual monitoring data, if available, to estimate those risks. To determine the maximum allowable contribution from water in the diet, EPA first looks at how much of the overall allowable risk is contributed by food and then calculates a drinking water level of comparison (DWLOC). The DWLOC represents the maximum contribution to the human diet (in ppb or ug/L) that may be attributed from residues of a pesticide in drinking water after dietary exposure is subtracted from the acute or chronic PAD. Risks from drinking water are assessed by comparing the DWLOC, to determine whether modeled or monitored estimated environmental concentrations (EECs) in both surface and groundwater exceed this level. EECs that are less than the DWLOC are not of concern. For thiram, because estimates of food-only exposure exceed 100% of the aPAD, the acute DWLOCs are zero; that is, any drinking water exposure would constitute a risk concern. However, a DWLOC calculation was performed assuming no exposure from food to evaluate potential acute risk posed by drinking water alone. Based on this evaluation, drinking water alone does not exceed the Agency's level of concern.

**Table 5. Drinking Water Acute Dietary Exposure**

<b>Population Groups</b>	<b>aPAD (mg/kg/day)</b>	<b>Maximum Allowable Drinking Water Exposure (mg/kg/day)</b>	<b>DWLOC*<sub>acute</sub> (ppb)</b>	<b>PRZM/EXA MS Peak EECs (ppb)</b>	<b>SCIGROW Concentration (ppb)</b>
U.S. General Population	0.0167	0.005	1750	180	0.84
Females 13- 49	0.0167	0.005	1500	180	0.84
Infants and Children	0.0167	0.005	500	180	0.84

**a. Surface Water**

Tier II surface water EECs were generated for non-residential turf, apples, and cotton seed uses using the PRZM/EXAMS model with the Index Reservoir and Percent Crop Area (PCA factor). The Index Reservoir provides a more refined assessment that uses a standard watershed combined with local soils, weather, and cropping practices to represent a vulnerable watershed that could support a drinking water supply for each crop. Comparisons between DWLOCs and the highest EEC of 4.3 ppb in surface water indicate that the level of concern for thiram residues in drinking water is not of concern when assessing chronic dietary risk.

**b. Ground Water**

Groundwater EECs for thiram were estimated using the SCI-GROW model under conditions of maximum exposure. SCI-GROW provides a screening level groundwater concentration and assumes the pesticide is used at the maximum allowed label rate in areas with groundwater that is exceptionally vulnerable to contamination. These vulnerable areas are characterized by high rainfall, rapidly permeable soil, and shallow aquifer. Comparisons between DWLOCs and the highest EECs of 0.84

ppb in groundwater indicate that the level of concern for thiram residues in drinking water has not been exceeded when assessing chronic dietary risk.

The modeled chronic drinking water EECs from surface and groundwater sources used for this risk assessment are presented in Table 6.

**Table 6. Chronic Drinking Water EECs & DWLOCs (Thiram)**

Population Groups	Dietary Exposure from DEEM Analysis (mg/kg/day)	cPAD (mg/kg/day)	Maximum Allowable Drinking Water Exposure (mg/kg/day)	DWLOC <sub>chronic</sub> (ppb)	PRZM/EXAMS 365 day EECs (ppb)	SCIGROW Concentration (ppb)
U.S. General Population	0.000121	0.015	0.015	48.30	4.3	0.84
Females (13-49 years)	0.000095	0.015	0.015	42.15	4.3	0.84
Children (1-2 years)	0.000422	0.015	0.015	10.80	4.3	0.84

### 3. Residential Risk

Thiram is not available for sale or use by homeowner applicators. As such, all residential risks were calculated related to the non-residential turf uses that include golfing for adults and toddler exposures in areas that can be treated with thiram by certified pesticide applicators. MOEs for golfers are not of concern to the Agency (MOE=764 at Day 0), and therefore no risk mitigation measures are required to address this scenario.

To protect children from scenarios of concern (MOE= 4) for exposure to thiram treated turf) and to further protect from exposure to ornamentals treated with thiram as a deer repellent, the Agency is requiring the following label modifications:

Deer Repellent Use:

Use one quart of this product in 3 to 7 gallons of water for application to 1000ft<sup>2</sup>  
 Applications to ornamentals will be restricted to the following 17 Northern states and applications will occur during the winter season only (October thru March):  
 OH, PA, NY, MI, CT, MA, IN, IL, NJ, WV, MN, WI, VT, NH, RI, DE, and MD.

Cancellations of Turf/Other Uses:

Turf applications to parks, athletic fields and commercial landscapes.  
 All turf applications for turf grown for sale or other commercial use such as sod.  
 All homeowner and retail uses on residential lawns and turf  
 Residential homeowner use as a fungicide on bulbs, flower seeds, greenhouse and nursery cuttings, and pruning paints.



Through these label amendments and voluntary cancellations to remove all homeowner uses from Taminco, the Agency believes exposure to the deer repellent use will be insignificant and therefore not of concern. No additional mitigation is necessary.

#### **a. Aggregate Risk**

(For a complete discussion, see section 5.0 of the Human Health Risk Assessment.)

Acute risks from aggregate exposures are not of concern. Models have been used to estimate ground and surface water concentrations. The DWLOCs calculated to assess the surface water contribution to acute (noncancer) dietary exposure range from 1750 $\mu$ g/L (for the U.S. general population) to less than 500 $\mu$ g/L (infants and children). The surface water EEC (47.8ppb) is significantly less than the acute DWLOC. The groundwater EEC (0.84) is also significantly less than the acute DWLOC. These DWLOCs were calculated assuming no exposure from food in order to evaluate potential acute risk posed by drinking water alone. However, if dietary exposure due to peach consumption had been included in the DWLOC calculations, the LOCs would have been only approximately 10% lower, i.e., the lowest DWLOC would have been 450 $\mu$ g/L. Thus, the Agency concludes with reasonable certainty that aggregate exposure to food and drinking water will not result in an unacceptable acute risk.

Short-term aggregate risks are not of concern. DWLOCs were calculated based upon average food residues and the residential post-application exposure scenario (adult golfers). Because the inputs to calculate short-term aggregate risks are very low (cPAD=2.8% and the MOE at day 0 for golfers is 794), the Agency concludes with reasonable certainty that aggregate exposure to food, drinking water and residential exposures will not result in an unacceptable risk.

Chronic risks from aggregate exposures are not of concern. The DWLOC calculated to assess the surface water contribution to chronic (noncancer) dietary exposure is a range from 48.30 $\mu$ g/L (for the U.S. general population) to less than 10.80 $\mu$ g/L (infants and children). The surface water EEC (4.3 ppb) is less than the chronic DWLOC, indicating that chronic exposure to thiram in food and drinking water from surface water sources is below the Agency's level of concern. The groundwater EEC (0.84 ppb) is also less than the chronic DWLOC, indicating that chronic exposure to thiram in food and drinking water from groundwater sources is below the Agency's level of concern. Since the model-based estimates for concentrations in surface water and groundwater are below the calculated chronic DWLOC, the Agency concludes with reasonable certainty that aggregate exposure to food and drinking water will not result in an unacceptable chronic risk.

#### **4. Occupational Risk**

(For a complete discussion, see section 7.0 of the Human Health Risk Assessment.)

There is potential exposure to workers who treat seed with thiram in both commercial and on-farm settings. The Agency calculated the potential exposure and risk to workers from commercial and on-farm seed treatment and from loading and planting treated seed. Risks were calculated using the MOE approach. The level of concern MOE was 100 for all assessments. This is based on the

conventional uncertainty factor of 100X (10X for intraspecies extrapolation and 10X for interspecies variation).

For thiram uses, the Agency identified 28 major occupational exposure scenarios based on the types of equipment and techniques that potentially can be used for thiram applications. Most of the scenarios were classified as having short-term and intermediate-term exposures (up to 30 days and 30 days to several months, respectively), though the hazard components are identical for short- and intermediate-term exposures. The calculated results reflect the risks associated with all expected durations of exposure. Refer to the *Thiram - Revised HED Chapter of the Reregistration Eligibility Document (RED)*, December 16, 2003, for the complete list of scenarios.

**a. Toxicity**

A NOAEL from the 21-day dermal toxicity study in rabbits using technical grade thiram was used to calculate results for short- and intermediate-term durations (i.e., 300 mg/kg/day). A NOAEL based on a chronic study in rats, and a chronic study in dogs (i.e., 1.5 mg/kg/day), was used to calculate inhalation risks and long-term dermal risks.

**b. Occupational Risk Assessment**

Short-term and intermediate-term risks were calculated for different exposure scenarios at different levels of protection.

For occupational handlers, MOEs are greater than or equal to 100 at some level of protection for most scenarios. Current thiram labels typically require that handlers wear long pants, long-sleeved shirts, and gloves. Respirators are generally not required.

The scenarios with the highest associated risk also have high daily chemical use amounts based on application rates, high acreages/amounts treated, and/or the exposures for the scenarios in question are relatively high. Generally, the scenarios with highest risk include some loading scenarios for aerial applications, aerial granular application, some handheld equipment use, and a few commercial and on-farm seed treatment scenarios. Current label requirements appear to be inadequate to keep exposures below the level of concern for most scenarios except for operations where exposures and/or the amount of chemical used is low. Scenarios where MOEs do not exceed 100 at any level of protection, including the use of engineering controls, include some loading scenarios for aerial applications (MOEs 41 to 62), some handheld equipment use (MOEs 8 to 44), and a few commercial and on-farm seed treatment scenarios (MOEs 24 to 80).

The Agency revised the MOEs for certain scenarios. These revisions are reflected in the table below. The ORE assessment for the repellency scenarios was based on the standard assumptions of 40 and 1,000 gallon volumes handled per day for surface and foliar dilute spray applications as outlined in ExpoSAC SOP #9, "Daily Acreage Treated in Agriculture." The Agency revised the MOEs for the repellency scenarios based on data which clarified the sizes of the treated areas. In addition, the ORE assessment for onion seed treatment was revised with by lowering the assumed throughput rate of up to 800,000 lbs. seed treated per day to 88,000 lbs. per day. The revised throughput rate is based on the ExpoSAC SOP #15, "Volume of Seed Treated and Planted per Day." Given that the throughput rate is

nine times lower than originally assumed, the resulting MOEs for the commercial onion seed treatment scenarios are nine times greater and range from 220 to 730 instead of 24 to 81 as originally calculated. Revised minimum required PPE is outlined in Section IV.

**Table 7. Summary of Short-/Intermediate-Term Occupational Handler Risks**

Scenario	Rate (lb ai/acre)  [unless noted]	Area Treated (acres/day)  [unless noted]	Risk Summary	
			MOEs	Min. Req. PPE
<b>Mixer/Loaders</b>				
1a Dry Flowable: Aerial	2.6 (peaches)	350	105	Baseline <sup>1</sup> <b>SL<sup>2</sup>/GL/PF5<sup>5</sup></b> <b>SL/GL/PF5</b>
	3.3-4.5 (apples/strawberries)	350	138-188	
	16.3-24.5* (turf - sod farm)	80	111-166	
1b Dry Flowable: Airblast	2.6-4.5 (apples/peaches)	40	530-917	Baseline
1c Dry Flowable: Groundboom (incl. In-furrow)	3.3 (strawberries)	80	362	Baseline <b>SL/GL/PF5</b> <b>SL/GL/PF5</b> Baseline Baseline
	16.3-24.5 (sod farm turf)	80	111-166	
	16.3 (golf course turf)	40	221	
	24.5 (golf course turf)	40	146	
	0.0025-0.35 (SSV/LSV/cereals/others)	80	3409-477273	
1d Dry Flowable: High Press HW Sprayer	1.3 lb ai/gal (repellency)	1000 gal. (1000 ft <sup>2</sup> )	167 (2004)	<b>SL/GL/PF5</b>
1e Dry Flowable: Right of Way Sprayer	1.3 lb ai/gal (repellency)	1000 gal. (1000 ft <sup>2</sup> )	167 (2004)	<b>SL/GL/PF5</b>
1f Dry Flowable: Paint-on	1.3 lb ai/gal (repellency)	1 gal.	73427	Baseline
2 Granular: Aerial & Ground Applications	16.3-24.5 (sod farm)	80	143-215	<b>SL/GL/PF5</b> <b>SL/GL/PF5</b>
	16.3-24.5 (golf course)	40	286-430	
3a Wettable Powder: Aerial	2.6-4.5 (apples/peaches/strawberries)	350	231-399	<b>EC<sup>3</sup></b> <b>EC</b>
	16.3-24.5 (sod farms/golf courses)	80	185-279	
3b Wettable Powder: Airblast	2.6 (peaches)	40	107	<b>SL/GL/PF5</b> <b>SL/GL/PF10<sup>6</sup></b>
	4.5 (apples)	40	113	
3c Wettable Powder: Groundboom (Incl. In-furrow)	3.3 (strawberry)	80	1376	<b>EC</b> <b>EC</b> Baseline <b>SL/GL/PF5</b>
	16.3-24.5 (sod farm & golf course turf)	40-80	185-557	
	0.0025-0.21 (SSV/LSV/cereals/others)	80	102-8537	
	0.35 (others-peanuts)	80	397	
3d Wettable Powder: High pressure handwand sprayer	1.3 lb ai/gal. (repellency)	1000 gal. (1000 ft <sup>2</sup> )	280 (3360)	<b>EC</b>
3e Wettable Powder: Right-of-way sprayer	1.3 lb ai/gal. (repellency)	1000 gal. (1000 ft <sup>2</sup> )	280 (3360)	<b>EC</b>
3f Wettable Powder: Paint-On	1.3 lb ai/gal. (repellency)	1 gal.	1313	Baseline
4a Liquids: Aerial	2.6-4.5 (apples/peaches/strawberries)	350	188-325	<b>SL/GL/PF5</b> <b>SL/GL/PF5</b>
	16.3-24.5 (sod farm turf)	80	151-227	
4b Liquids: Airblast	2.6-4.5 (apples/peaches)	40	444-768	SL/GL/NR <sup>4</sup>
4c Liquids: Groundboom (incl. In-furrow)	3.3 (strawberries)	80	303	SL/GL/NR <b>SL/GL/PF5</b> SL/GL/NR <b>SL/GL/PF5</b> Baseline
	16.3-24.5 (sod farm turf)	80	151-227	
	16.3 (golf course turf)	40	123	
	24.5 (golf course turf)	40	302	
	0.0025-0.35 (SSV/LSV/cereals/others)	80	239-33440	

Scenario	Rate (lb ai/acre) [unless noted]	Area Treated (acres/day) [unless noted]	Risk Summary	
			MOEs	Min. Req. PPE
4d Liquids: High pressure handwand sprayer	1.3 lb ai/gal. (repellency)	1000 gal. (1000 ft <sup>2</sup> )	228 (2736)	<b>SL/GL/PF5</b>
4e Liquids: Right-of-way sprayer	1.3 lb ai/gal. (repellency)	1000 gal. (1000 ft <sup>2</sup> )	228 (2736)	<b>SL/GL/PF5</b>
4f Liquids: Paint-On	1.3 lb ai/gal. (repellency)	1 gal.	5145	Baseline
4g Liquids: Bulb dip	No Data	No Data	No Data	No Data
<b>Applicators</b>				
5a Aerial: liquid sprays	2.6-4.5 (apples/peaches/strawberries) 16.3-24.5 (turf - sod farm)	350 80	698-1208 561-843	<b>EC</b> <b>EC</b>
5b Aerial: granular applications	16.3-24.5 (turf - sod farm)	80	<b>41-62</b>	<b>MOE&lt;100</b>
6 Airblast: Agricultural uses	2.6 (peaches) 4.5 (apples)	40 40	160 102	Baseline SL/GL/NR
7 Groundboom	3.3 (strawberries) 16.3-24.5 (sod farm turf) 16.3-24.5 (golf course turf) 0.0025-0.35 (SSV/LSV/cereals/others)	80 80 40 80	491 248-369 132-199 4930-648148	Baseline <b>SL/GL/PF5</b> Baseline Baseline
8 Solid broadcast spreader (granular)	16.3-24.5 (sod farm turf) 16.3 (golf course turf) 24.5 (golf course turf)	80 40 40	194-292 129 388	<b>SL/GL/PF5</b> Baseline <b>SL/GL/PF5</b>
9 Right of way sprayer	1.3 lb ai/gal. (repellency)	1000 gal. (1000 ft <sup>2</sup> )	<b>44</b> (528)	<b>MOE&lt;100</b>
10 High pressure handwand	1.3 lb ai/gal. (repellency)	1000 gal. (1000 ft <sup>2</sup> )	<b>8</b> (96)	<b>MOE&lt;100</b>
11 Paint-on	1.3 lb ai/gal. (repellency)	1 gal.	202	SL/GL/NR
12 Dip tank	No Data	No Data	No Data	No Data
13 Granulars & baits applied by hand	16.3 (golf course turf) 24.5 (golf course turf)	1 1	26 17	<b>MOE&lt;100</b> <b>MOE&lt;100</b>
14 Granulars & baits applied by spoon	16.3 (golf course turf) 24.5 (golf course turf)	1 1	117 227	SL/GL/NR <b>SL/GL/PF5</b>
<b>Mixer/Loader/Applicators</b>				
15 Low pressure, high volume turf gun (ORETF Data)	16.3 (golf course turf) 24.5 (golf course turf)	5 5	131 188	SL/GL/NR <b>SL/GL/PF5</b>
16a Wettable powder, low pressure handwand	1.3 lb ai/gallon (repellency)	40	<b>14.3</b>	<b>MOE&lt;100</b>
16b Liquids, low pressure handwand	1.3 lb ai/gallon (repellency)	40	248	<b>SL/GL/PF5</b>
17 Backpack sprayer	1.3 lb ai/gallon (repellency)	40	109	<b>SL/GL/PF5</b>
18 Granular, push-type spreader	16.3 (golf course turf) 24.5 (golf course turf)	5 5	139 330	Baseline <b>SL/GL/PF5</b>
19 Power backpack	No Data	No Data	No Data	No Data
20 Sprinkler can	1.3 lb ai/gallon (repellency)	10	204	SL/GL/NR
<b>Flaggers</b>				

Scenario	Rate (lb ai/acre)  [unless noted]	Area Treated (acres/day)  [unless noted]	Risk Summary	
			MOEs	Min. Req. PPE
21 Flagger: liquid sprays	2.6-4.5 (apples/peaches/strawberries) 16.3-24.5 (turf - sod farm)	350 80	165-285 132-199	Baseline Baseline
22 Flagger: granular applications	16.3-24.5 (turf - sod farm)	80	327-491	Baseline
<b>Seed Treatment (lbs seed/day)</b>				
23 Mixing/loading for commercial seed treatment	0.031-0.25 lb ai/cwt (various) 1.5 lb ai/cwt (onions) 1.5 lb ai/cwt (onions) 0.094-0.25 lb ai/cwt (corn) /cereals/LSV/SSV/cotton/peanuts) 0.10-0.25 lb ai/cwt (cotton/cereals/soybean/SSV/LSV)	330000-800000 (88000) (Agency estimate) 330000 (88000) (Agency estimate) 800000 (88000)(Agency estimate) 88000-718080 (Thiram Task Force) 16250-81192 (Survey Data)	105-167164 111 <b>69</b> (621) 291-1247 993-5144	SL/GL/NR <b>SL/GL/PF5</b> <b>MOE&lt;100</b> SL/GL/NR  SL/GL/NR
24 Bagging commercially treated seed	0.031-1.5 lb ai/cwt (various) 1.5 lb ai/cwt (onions) 0.094-0.25 lb ai/cwt (corn) /cereals/LSV/SSV/cotton/peanuts) 0.10-0.25 lb ai/cwt (cotton/cereals/soybeans/SSV/LSV)	330000-800000 (88000) (Agency estimate) 800000 (88000)(Agency estimate) 88000-718080 (Thiram Task Force) 16250-81192 (Survey Data)	103-408759 <b>43</b> (387) 711-2419 2429-12577	Baseline <b>MOE&lt;100</b> Baseline  Baseline
25 Sewing bags of commercially treated seed	0.031-0.25 lb ai/cwt (various) 1.5 lb ai/cwt (onions) 0.094-0.25 lb ai/cwt (corn) /cereals/LSV/SSV/cotton/peanuts) 0.10-0.25 lb ai/cwt (cotton/cereals/soybeans/SSV/LSV)	330000-800000 (88000) (Agency estimate) 330000-800000 (88000) (Agency estimate) 88000-718080 (Thiram Task Force) 16250-81192 (Survey data)	201-321839 <b>34-81</b> (306-729) 560-2401 1913-9903	Baseline <b>MOE&lt;100</b> Baseline  Baseline
26 Commercially treated seed: combined tasks	0.031-0.25 lb ai/cwt (various) 0.12-0.25 lb ai/cwt (various) 1.5-2.0 lb ai/cwt (onions & conifers) 0.094-0.25 lb ai/cwt (corn) /LSV/SSV/cotton/peanuts) 0.10 lb ai/cwt (cereals) 0.10-0.25 lb ai/cwt (cotton/cereals/soybeans/SSV/LSV)	330000-800000 (88000) (Agency estimate) 330000-800000 (88000) (Agency estimate) 1769-800000 (88000) (Agency estimate) 88000-193600 (Thiram Task Force) 718080 (Thiram Task Force) 16250-81192 (Survey data)	126-567 177-240 <b>24-80</b> (216-720) 120-346  276 276-1428	SL/GL/NR <b>SL/GL/PF5</b> <b>MOE&lt;100</b> SL/GL/NR  <b>SL/GL/PF5</b> SL/GL/NR
27 Loading/planting treated seed	0.0025-1.22 lb ai/A (SSV/LSV/cereals/others/conifers/ornam.)	80 acres	638-112903	SL/GL/NR
28 On-farm seed treatment	0.0025-0.168 lb ai/A (SSV/LSV/cereals/others/ornam.) 0.21lb ai/A (cereals-rice) 0.35-1.22 lb ai/A (peanuts & conifers)	80 acres 80 acres 80 acres	122-8179 103 <b>50-63</b>	Baseline  SL/GL/NR <b>MOE&lt;100</b>
<p>1. Baseline = Long pants, long-sleeved shirts, no gloves  2. SL = Single layer clothing with or without gloves (GL or NG)  3. EC = Engineering controls  4. NR = No respirator  5. PF5 = Protection factor 5 respirator  6. PF10 = Protection factor 10 respirator  Current label = SL/GL/NR</p> <p>*The 24.5 lb ai/acre rate is associated with the Prochimie registration and must be used in the risk assessment in the event that the Prochimie registration suspension is lifted.</p> <p><b>Min. Req. PPE=level of PPE where MOEs &gt; 100, where current label is exceeded or no adequate PPE is found, results are bold. MOEs which never exceed 100 are for highest feasible type of mitigation (e.g., engineering control in most cases).</b></p>				

### **c. Incident Reports**

There were 17 cases reported from the Incident Data System since 1992. Although all of the reported cases occurred since 1995, approximately half of these cases (8 of 17) were reported in 1998. Three of the cases reported affected adults following the occupational handling or clean-up of thiram products. Thirteen of the cases reported affected the general public (3 children and 10 adults) following the non-occupational handling of thiram products. One serious incident (a seizure episode) occurred following the use of thiram after alcohol had been consumed the evening prior to exposure. It was unclear if this was an occupational or non-occupational incident.

Recorded dermal effects for the reported cases were skin rashes, skin reddening, itching and tingling of the hands, thickened skin on the palms and blisters under the skin, small bumps on the hands and other parts of the body, and burning and redness on the face. One case recorded a dry cough following an inhalation exposure while a splash incident to the face resulted in burning of the eyes.

During the period 1982-1996, 15 cases involving the sole use of thiram were reported. Thiram ranked 122<sup>nd</sup> as a cause of systemic poisoning in California. A total of four persons had systemic illnesses from thiram exposure, four experienced eye illnesses, six experienced skin illnesses, and one person experienced a combination of these illnesses. Of the 15 cases, two persons were disabled for one day. The 15 persons were exposed to thiram in the following manner: eight of the persons affected were applicators; one was cleaning or repairing pesticide contaminated equipment; one experienced exposure coincidentally; two were exposed during the shipping, warehousing or retailing of thiram; two were packing, processing or retailing thiram; and one worker was exposed to thiram residue which was neither agricultural or structural. According to these statistics, applicators' exposures accounted for the majority of the recorded illnesses. The illnesses included symptoms of rashes, dermatitis, and itchy, watery or burning eyes.

On the list of the top 200 chemicals for which National Pesticide Information Center received calls from 1984-1991 inclusively, thiram ranked number 101 and was reported to be involved in 33 human incidents and six animal incidents, mostly pets.

## **B. Environmental Risk Assessment**

### **1. Environmental Fate and Transport**

The environmental fate database for thiram is incomplete. However, based in part on supplemental fate data, thiram that is applied foliarly is expected to be sufficiently mobile and persistent in some cases to reach surface waters in concentrations high enough to impact aquatic life. Thiram appears to have low mobility in the environment and degrades rapidly (mean half life ( $t_{1/2}$ ) = 3.5 days in a hydrolysis study). Thiram may thus be most potentially persistent in acidic waters with high turbidity or color, such as in peat bogs, or acidified, eutrophic lakes. Under both aerobic and anaerobic conditions in soil, data indicate that microbial metabolism of thiram is substantially biphasic, with rapid initial degradation for about the first week, followed by a period of much slower degradation. Aerobic aquatic data indicate rapid degradation in water. However, this may be offset by use patterns involving multiple, repeated applications which cause repeated loadings to water bodies over the course of an application season.

In terrestrial field studies conducted in California, thiram (Spotrete™ 75 WDG), broadcast applied eight times as a spray, at a nominal application rate of 10.3 lbs a.i./A/application, dissipated with half-lives of 27.4 days and 14.4 days for bareground and turf plots of sandy loam soil (pH 8.2 to 9.6), respectively. Dissipation was again biphasic in both plots. In terrestrial field studies conducted in North Carolina, thiram (Spotrete® 75WDG), broadcast applied eight times as a spray at a nominal application rate of 10.3 lb a.i./A/application, dissipated with half-lives of 36 days and 62.5 days following the last of eight applications onto a bareground plot of sand soil (pH 4.1 to 4.7) and a turf plot of loamy sand soil (pH 4.4 to 4.5), respectively.

Volatilization is not expected to be a major route of dissipation due to thiram's low vapor pressure (2.3 mPa at 25°C, or  $1.77 \times 10^{-7}$  Torr). The major thiram degradates are volatile, and so are not expected to persist in soil or water.

## **2. Ecological Effects (Toxicity) Assessment**

Toxicity testing reported in this section does not represent all species of bird, mammal, or aquatic organism. Only a few surrogate species for both freshwater fish and birds are used to represent all freshwater fish (2000+) and bird (680+) species in the United States. For mammals, acute studies are usually limited to Norway rat or mice. Estuarine/marine testing is usually limited to a crustacean, a mollusk, and a fish. Also, neither reptiles nor amphibians are tested. The assessment of risk or hazard makes the assumption that avian and reptilian toxicities are similar. The same assumption is used for fish and amphibians.

Thiram is categorized as slightly toxic to practically nontoxic to avian species on an acute oral basis. Because the  $LC_{50}$  falls in the range of 1,000 to 5,000 ppm, thiram is categorized as slightly toxic to practically nontoxic to avian species on a subacute dietary basis.

Study results indicate that thiram is practically nontoxic to small mammals on an acute oral basis (Acute oral  $LC_{50}$  2,600 mg/kg). For chronic toxicity effects a reduction in body weight of mammals was observed at a NOAEC of 1.9 mg/kg/day. Thiram is practically nontoxic to the honeybee ( $LD_{50} > 11 \mu\text{g}/\text{bee}$ ).

**Table 8. Summary of Acute and Chronic Toxicity Data from Core Studies for Terrestrial Organisms Exposed to Thiram**

Species	Acute Toxicity				Chronic Toxicity	
	LD <sub>50</sub>	Acute Oral Toxicity (MRID)	5-day LC <sub>50</sub> (ppm)	Subacute Dietary Toxicity (MRID)	NOAEC/LOAEC (ppm or mg/kg/day) (MRID)	Affected Endpoints
Bobwhite quail ( <i>Colinus virginicus</i> )	--	--	3,950	slightly toxic (022923)	500 / 2,500 (436125-02)	reduced numbers of eggs hatched, reduced survival
Mallard duck ( <i>Anas platyrhynchos</i> )	>2,800 ppm	practically nontoxic (Ba0th103)	5,000	slightly toxic (022923)	9.6 / 39.7 (45441201)	reduced numbers of eggs hatched, reduced survival
Honey bee ( <i>Apis meliferus</i> )	73.7 µg/bee	practically nontoxic (0003635)	--	--	--	--
Laboratory rat ( <i>Rattus norvegicus</i> )	2,600 mg/kg	(00153548)	--	--	1.9 / 3.9 mg/kg/day	body weight

Based on the ecological effect studies, thiram is moderately to very highly toxic to freshwater and estuarine fish on an acute basis (96-hour LC<sub>50</sub>'s 42 to 7 ppb). In addition, thiram on an acute basis is highly toxic to freshwater invertebrates (EC<sub>50</sub>: 210 ppb) and very highly toxic to marine/estuarine invertebrates (EC<sub>50</sub>: 3.6 ppb). The level of concern for risk to aquatic plants is not exceeded.

The Agency has required that chronic toxicity testing be conducted for freshwater and marine/estuarine fish and invertebrates. This chronic toxicity data has not yet been submitted. Therefore, the Agency cannot determine the chronic toxicity to aquatic organisms.

**Table 9. Summary of Acute Aquatic Animal Toxicity Estimates Using Technical Grade Thiram**

Species	Acute Toxicity			Chronic Toxicity	
	96-hr LC <sub>50</sub> (ppb)	48-hr EC <sub>50</sub> (mg/L)	Acute Toxicity (MRID)	NOAEC / LOAEC (mg/L)	Affected Endpoints (MRID)
Bluegill Sunfish ( <i>Lepomis macrochirus</i> )	42	--	very highly toxic (070801)	--	--
Water flea ( <i>Daphnia magna</i> )	--	0.21	highly toxic (164662)	--	--
Mysid ( <i>Americamysis bahia</i> )	3.6		very highly toxic (424883-01)		



Species	Acute Toxicity			Chronic Toxicity	
	96-hr LC <sub>50</sub> (ppb)	48-hr EC <sub>50</sub> (mg/L)	Acute Toxicity (MRID)	NOAEC / LOAEC (mg/L)	Affected Endpoints (MRID)
Eastern oyster ( <i>Crassostrea gigas</i> )	4.7	--	very highly toxic (424883-01)	--	--

Toxicity data for aquatic plants were submitted because thiram has the potential to reach surface water from runoff, spray drift, or direct application. The results are provided in Table 10.

**Table 10. Summary of Acute Phytotoxicity Data for Aquatic Plants Exposed to Thiram**

Species	Acute Toxicity	
	96-hr EC <sub>50</sub>	Acute Toxicity (MRID)
Duckweed ( <i>Lemna gibba</i> )	1.6 mg a.i/L	(45441202)
<i>Selenastrum capricornutum</i>	0.14 ppm	(44086101)

### 3. Ecological Risk Calculations

Risk characterization integrates the results of the exposure and ecotoxicity data to evaluate the likelihood of adverse ecological effects by using risk quotients (RQs). RQs are calculated by dividing exposure estimates by acute and chronic ecotoxicity values:

$$RQ = \text{Exposure/Toxicity}$$

RQs are then compared with OPP's levels of concern (LOCs). LOCs are used by OPP to analyze potential risk to nontarget organisms and the need to consider regulatory action. The criteria indicate that a pesticide used as directed has the potential to cause adverse effects on nontarget organisms. Risk presumptions, along with the corresponding LOCs are summarized in Table 11. The ecotoxicity test values (measurement endpoints) used in the acute and chronic risk quotients are derived from required studies.

**Table 11. Risk Presumptions for Animals and Plants**

<b>Risk Presumption</b>	<b>LOC terrestrial animals</b>	<b>LOC aquatic animals</b>	<b>LOC plants</b>
<b>Acute Risk</b> There is potential for acute risk; regulatory action may be warranted in addition to restricted use classification	0.5	0.5	1.0
<b>Acute Restricted Use</b> There is potential for acute risk, but may be mitigated through restricted use classification	0.2	0.1	NA
<b>Acute Endangered Species</b> Endangered species may be adversely affected; regulatory action may be warranted	0.1	0.05	1.0
<b>Chronic Risk</b> There is potential for chronic risk; regulatory action may be warranted	1	1	NA

#### 4. Ecological Risk Profile

The Agency's ecological risk assessment compares toxicity endpoints from ecological toxicity studies to estimated environmental concentrations (EECs) based on environmental fate characteristics and pesticide use data. To evaluate the potential risk to nontarget organisms from the use of thiram products, the Agency calculates a Risk Quotient (RQ), which is the ratio of the EEC to the most sensitive toxicity endpoint values, such as the median lethal dose (LD<sub>50</sub>) or the median lethal concentration (LC<sub>50</sub>). These RQ values are then compared to the Agency's levels of concern (LOCs) which indicate whether a chemical, when used as directed, has the potential to cause adverse effects on nontarget organisms. When the RQ exceeds the LOC for a particular category, the Agency presumes that a potential risk of concern exists for that category of organisms.

##### a. Risk to Birds

(For a complete discussion, see the Ecological Risk Assessment.)

Birds in the field may be exposed to thiram by ingesting treated seeds, grass, broadleaf plants, small and large insects, fruits, pods, or by other routes, such as incidental ingestion of contaminated soil, dermal contact with treated seed or foliar surfaces and soil during activities in the treated areas, preening activities, inhalation of pesticide vapor and contaminated particulate, and ingestion of drinking water contaminated with the pesticide. This assessment primarily focuses on the four foliar uses mentioned above because these uses involve substantially higher applications rates than the seed and animal repellent uses.

Thiram is practically nontoxic to birds (LD<sub>50</sub> >2,800 mg/kg) from core studies on an acute exposure basis. However, chronic exposure can result in reproductive effects in birds. In a chronic mallard duck feeding study, exposure to thiram resulted in reduced numbers of eggs hatched and reduced survival of hatchlings with the no observable adverse effect concentration (NOAEC) of 9.6

mg/kg of diet. Chronic LOCs (RQ ≥ 1.0) were exceeded for birds at the maximum seed treatment and maximum foliar application rates for all uses evaluated (RQ range: 15 to 1,236).

The level of concern is exceeded for acute risk to birds for foliar and turf uses (Table 12), and the LOC is exceeded for acute restricted risk to birds for use on seeds (Table 13). Table 12 includes RQ values based on mitigated reduced application rates, reduced number of applications, and increased time interval between applications (in parentheses). In addition, the level of concern is exceeded for chronic risk to birds for foliar, turf, and seed uses. The Agency concludes that although thiram exposure from the seed uses may not be continuous or recurring, chronic effects to birds may occur as a result of initial exposure to planted seeds. Furthermore, the chronic risk to birds for any of the uses can only be partially assessed because the chronic toxicity data requirements for birds is only partially fulfilled.

While the RQs exceed the chronic LOC by as much as 1,236-fold, there are a number of reasons why this might be an overstatement of the risk. Thiram should diffuse out of the seed coat and into the soil to some extent which will reduce the concentration. While the chronic avian risk is above the level of concern in this screening assessment, risks may actually be lower if the duration of exposure is short as a result of dissipation processes and birds relying on other food sources in untreated areas.

**Table 12. Summary of Acute and Chronic Avian RQ Values Based on an Adjusted Avian Acute LC<sub>50</sub> and Chronic NOAEC of 3,950 ppm and 9.6 ppm of Diet, Respectively**

Crop	Appl. Rate (lbs. a.i./A)/# of appl./Frequency of appl. (days)	Acute RQ <sup>a</sup> Range	Chronic RQ <sup>b</sup> Range
Apples	4.5/5/7	0.06-1.02 <sup>c</sup>	26-418 <sup>d</sup>
Peaches	2.6/5/7	0.04-0.59 <sup>c</sup>	15-241 <sup>d</sup>
Strawberries	3.3/15/7 (2.6/5/14) (2.6/12/7)	0.08-1.22 <sup>c</sup> (0.26-0.46) (0.51-0.91)	32-504 <sup>d</sup> (12-189) (23-373)
Turf	10.2/8/7 (16.3/1) (10.2/3/14)	0.19-3.0 <sup>c</sup> (0.56-0.9) (0.78-1.39)	77-1,237 <sup>d</sup> (25-407) (36-573)

<sup>a</sup> Acute RQ Method 1 =  $\text{mg} \cdot (\text{kg} \cdot \text{bw} \cdot \text{day})^{-1} / (\text{adjusted LD}_{50})$

<sup>b</sup> Chronic RQ =  $\text{mg} \cdot (\text{kg} \cdot \text{bw} \cdot \text{day})^{-1} / \text{NOAEL}$

<sup>c</sup> Exceeds acute restricted use (RQ ≥ 0.2), and acute endangered species LOC (RQ ≥ 0.1)

<sup>d</sup> Exceeds chronic risk (RQ ≥ 1.0) level of concern

Usual planting practice is to plant the seed one-half to one inch deep in the soil. This practice reduces exposure, and thus risk. In addition, the RQs are based on the maximum seed treatment and foliar application rates and maximum seed planting rates. Not all seeds are treated at the highest application rate nor are all seeds planted at the highest rate.

**Table 13. Acute and Chronic Risk Quotients Calculations for Birds for Seed Uses Only**

Concentration of Thiram as residue on treated seeds (ppm)	LC <sub>50</sub> ppm	NOAEC ppm	Acute RQ <sup>1</sup> (EEC/LC <sub>50</sub> )	Chronic RQ (EEC/NOAEC)
1,000	3,950	9.6	0.25	104

<sup>1</sup>RQ = EEC (ppm)/LD<sub>50</sub> (mg/kg)\* % Body Weight Consumed

### b. Risk to Mammals

(For a complete discussion, see the Ecological Risk Assessment.)

Mammals in the field may be exposed to thiram by ingesting treated seeds, grass, broadleaf plants, small and large insects, fruits, pods, or by other routes, such as incidental ingestion of contaminated soil, dermal contact with treated seed or foliar surfaces and soil during activities in the treated areas, preening activities, inhalation of pesticide vapor and contaminated particulate, and ingestion of drinking water contaminated with the pesticide. This assessment primarily focuses on the four foliar uses mentioned above because these uses involve substantially higher applications rates than the seed and animal repellent uses.

**Table 14. Mammalian (Herbivore/Insectivore) Acute and Chronic Risk Quotients for Application of Thiram on Wheat Seed Uses Based on a Rat Acute LD<sub>50</sub> of 2,600 and a Rat Chronic NOAEL of 1.9 mg/kg**

Concentration as Residue on Seed (ppm)	Body Weight (g)	% Body Weight Consumed	Rat LD <sub>50</sub> (mg/kg)	Rat Chronic NOAEC (1.9 mg/kg/day) converted to ppm)	Acute RQ <sup>1</sup>	Chronic RQ
1,000						
	15	95	2,600	38	0.36	24.97
	35	66	2,600	38	0.25	17.35
	1000	15	2,600	38	0.06	3.94

Although the acute risk quotients indicate that thiram presents an acute restricted use to mammals for the seed uses (Table 14 above) and an acute risk to mammals (Table 15 below) for the foliar uses the Agency concludes that the acute risk to mammals is uncertain. This conclusion is based on the fact that lab studies indicate low toxicity to mammalian species, and that thiram is marketed as an animal repellent to protect treated seeds or foliage against mammals. This repellency may prevent wildlife from oral consumption of concentrations high enough to warrant a concern for acute risk, if multiple seed ingestions are required for a lethal acute dose. Table 15 includes figures in parentheses for RQ values based on mitigated reduced application rates, reduced number of applications, and decreased frequency of applications.

**Table 15. Summary of Acute and Chronic Mammalian RQ Values Based on an Adjusted Mammalian Acute LD<sub>50</sub> and Chronic NOAEL of 2,600 mg/kg and 1.9 mg/kg of Diet, Respectively**

Crop	Appl. Rate (lbs. a.i./A)/# of appl./Frequency of appl. (days)	Acute RQ <sup>a</sup> Range	Chronic RQ <sup>b</sup> Range
Apples	4.5/5/7	0.01 - 1.5 <sup>c</sup>	131-2,110 <sup>d</sup>
Peaches	2.6/5/7	0.01-0.9 <sup>c</sup>	76-1,220 <sup>d</sup>
Strawberries	3.3/15/7 (2.6/5/14) (2.6/12/7)	0.02-1.8 <sup>c</sup> (0.10-0.66) (0.12-1.31)	159-2,540 <sup>d</sup> (60-953) (118-1,884)
Turf	10.2/8/7 (16.3/1) (10.2/3/14)	0.01-4.3 <sup>c</sup> (0.1-1.43) (0.15-2.0)	77-1,237 <sup>d</sup> (129-2,059) (181-2,896)

<sup>a</sup> Acute RQ Method 1 =  $\text{mg} \cdot (\text{kg} \cdot \text{bw} \cdot \text{day})^{-1} / (\text{adjusted LD}_{50})$

<sup>b</sup> Chronic RQ =  $\text{mg} \cdot (\text{kg} \cdot \text{bw} \cdot \text{day})^{-1} / \text{NOAEL}$

<sup>c</sup> Exceeds acute restricted use ( $\text{RQ} \geq 0.2$ ), and acute endangered species LOC ( $\text{RQ} \geq 0.1$ )

<sup>d</sup> Exceeds chronic risk ( $\text{RQ} \geq 1.0$ ) level of concern.

### c. Risk to Aquatic Animals

(For a complete discussion, see the Ecological Risk Assessment.)

Exposure to non-target aquatic animals may occur through spray drift and runoff from adjacent treated sites. The environmental fate database for thiram is incomplete. However, based in part on supplemental fate data, thiram that is applied foliarly is expected to be sufficiently mobile and persistent in some cases to reach surface waters in concentrations high enough to impact aquatic life.

Although the major agricultural use of thiram is as a seed treatment, it is the orchard and turf uses which present the most significant potential risks to endangered and non-endangered aquatic organisms (freshwater and marine/estuarine fish, invertebrates, plants and algae) on an acute basis. This is in part because the application rate of the pesticide to the environment (in terms of lbs./acre) is substantially higher than that for treated seed. In addition to the higher application rate, the orchard and turf uses typically entail multiple applications, unlike seed, which is only “applied” to the environment at planting. A higher application rate means potentially higher thiram concentrations in receiving waters such as low-order streams draining agricultural areas. This explains the level of concern exceedances for acute risk to aquatic organisms from thiram usage on apples and turf. Typical agricultural practices for growing strawberries treated with thiram could increase the risk of thiram entering adjacent aquatic organism habitats. These typical practices include using multiple applications (15 applications at 3.3 lbs. ai/acre), and growing strawberries in plastic-mulch beds. Risks of aquatic habitat contamination exist from these specific practices because the plastic surface underlying the mulch beds will decrease rain infiltration and increase runoff from the site of application. Multiple seasonal applications also increase the probability that thiram could enter water bodies at concentrations high enough to cause adverse effects to aquatic organisms.

The chronic toxicity data requirements for aquatic organisms have not yet been fulfilled. However, since thiram is moderately to very highly toxic to aquatic organisms on an acute basis, has adverse reproductive effects on other organisms, and is expected to reach surface waters and persist, EPA assumes thiram may pose an adverse chronic risk to aquatic organisms.

Below is a summary of the exceedances of the level of concern for acute risks to aquatic organisms (freshwater and estuarine/marine fish, invertebrates, plants and algae) for thiram usage. This summary is based on calculated risk quotients and only applies to thiram usage on non-residential turf, apples, and cotton. (See Section III Integrated Risk Characterization).

EPA has required the chronic studies, fish full life cycle test (Guideline 72-5), and the aquatic invertebrate life-cycle test (guideline 72-4) using the TGAI of thiram. These studies have not yet been submitted. However because of the adverse acute risk expected for aquatic organisms, and of the chronic adverse effects to mammals and birds, EPA assumes high potential chronic risk to aquatic organisms (including endangered species).

### Freshwater Fish

The acute freshwater fish risk quotients are calculated below.

**Table 16. Acute Risk Quotients for Freshwater Fish Based on a Bluegill Sunfish (*Leopmis macrochirus*) LC<sub>50</sub> of 42 ppb**

Site/ Application Method	LC <sub>50</sub> (ppb)	EEC Initial/ Peak (ppb)	Acute RQ (EEC/LC <sub>50</sub> )
Turf/ground	42	100 <sup>A</sup>	2.2 <sup>B</sup>
Apples/aerial foliar application	42	24 <sup>A</sup>	0.57 <sup>B</sup>
Cotton/seed application	42	0.036 <sup>A</sup>	< 0.05 <sup>C</sup>

<sup>A</sup> Tier II Surface Water EECs for thiram (µg/L).

<sup>B</sup> Exceeds the level of concern of acute risk to freshwater fish (including endangered species).

<sup>C</sup> Does not exceed the level concern.

### Freshwater Invertebrates

The freshwater invertebrates acute risk quotients are tabulated below.

**Table 17. Acute Risk Quotients for Freshwater Invertebrates Based on a Water Flea (*Daphnia magna*) LC<sub>50</sub> of 210 ppb**

Site/ Application Method	LC <sub>50</sub> (ppb)	EEC Initial/Peak (ppb)	Acute RQ (EEC/LC <sub>50</sub> )
Turf/ground	210	100 <sup>A</sup>	0.48 <sup>B</sup>
Apples/aerial foliar application	210	24 <sup>A</sup>	0.11 <sup>B</sup>
Cotton/seed application	210	0.036 <sup>A</sup>	< 0.05 <sup>C</sup>

- <sup>A</sup> Tier II Surface Water EECs for thiram (µg/L).
- <sup>B</sup> Exceeds the level of concern of acute risk to freshwater fish (including endangered species).
- <sup>C</sup> Does not exceed the level concern.

### Estuarine and Marine Fish

The estuarine and marine fish acute risk quotients are tabulated below.

**Table 18. Acute Risk Quotients for Estuarine and Marine Fish Based on a Sheepshead minnow (*Cyprinodon variegatus*) LC<sub>50</sub> of 540 ppb**

Site/ Application Method	LC <sub>50</sub> (ppb)	EEC Initial/Peak (ppb)	Acute RQ (EEC/LC <sub>50</sub> )
Turf/ground	540	100 <sup>A</sup>	0.19 <sup>B</sup>
Apples/aerial foliar application	540	24 <sup>A</sup>	< 0.05 <sup>B</sup>
Cotton/seed application	540	0.036 <sup>A</sup>	< 0.05 <sup>B</sup>

- <sup>A</sup> Tier II Surface Water EECs for thiram (µg/L).
- <sup>B</sup> Exceeds the level of concern of acute risk to freshwater fish (including endangered species).
- <sup>C</sup> Does not exceed the level of concern.

### Estuarine and Marine Invertebrates

The estuarine and marine fish acute risk quotients are tabulated below.

**Table 19. Acute Risk Quotients for Estuarine/Marine Aquatic Invertebrates Based on a Mysid Shrimp LC<sub>50</sub> of 3.6 ppb**

Site/ Application Method	LC <sub>50</sub> (ppb)	EEC Initial/Peak (ppb)	Acute RQ (EEC/LC <sub>50</sub> )
Turf/ground	3.6	100 <sup>A</sup>	28 <sup>B</sup>
Apples/aerial foliar application	3.6	24 <sup>A</sup>	6.7 <sup>B</sup>
Cotton/seed application	3.6	0.036 <sup>A</sup>	< 0.05 <sup>C</sup>

- <sup>A</sup> Tier II Surface Water EECs for thiram (µg/L).
- <sup>B</sup> Exceeds the level of concern of acute risk to freshwater fish (including endangered species).
- <sup>C</sup> Does not exceed the level of concern.

### d. Risk to Aquatic Plants

(For a complete discussion, see the Ecological Risk Assessment.)

Exposure to non-target aquatic plants may occur through runoff from adjacent treated sites. Based on environmental concentrations in surface water, no acute LOCs are exceeded for aquatic plants. No chronic toxicity data were available for the Agency to review and based on the use pattern, no chronic exposure for aquatic plants is expected.

The aquatic plant risk assessment was performed using the surrogate duckweed *Lemna gibba*. The non-vascular acute risk assessments uses either algae or a diatom, whichever is the most sensitive species. An aquatic plant risk assessment for acute- endangered species is usually made for aquatic vascular plants from the surrogate duckweed *Lemna gibba* and *Selena strum Capricornutum*. Runoff is computed from environmental concentrations estimated using the GENEEC 2.0 model. The risk quotient is determined by dividing the pesticide's initial or peak concentration in water by the plant EC<sub>50</sub> value. Based on the results of this analysis, no acute levels of concern (RQ ≥ 1.0) are exceeded for aquatic plants. The aquatic plant acute risk quotients are tabulated below.

**Table 20. Acute Risk Quotients for Aquatic plants Based on a *Selenastrum capricornutum* EC<sub>50</sub> of 140 ppb and a *Lemna Gibba* EC<sub>50</sub> of 1600 ppb**

Site/ Application Method	EC <sub>50</sub> (ppb; <i>Selena strum Capricornu tum</i> )	EC <sub>50</sub> (ppb; <i>Lemna Gibba</i> )	EEC Initial/Peak (ppb)	Acute RQ (EEC/LC <sub>50</sub> )	Acute RQ ( <i>Lemna Gibba</i> ; Aquatic Vascular Plants)
Turf/ground	140	1600	100 <sup>A</sup>	< 1 <sup>c</sup>	< 1 <sup>c</sup>
Apples/aerial foliar application	140	1600	24 <sup>A</sup>	< 1 <sup>c</sup>	< 1 <sup>c</sup>
Cotton/seed application	140	1600	0.036 <sup>A</sup>	< 1 <sup>c</sup>	< 1 <sup>c</sup>

<sup>A</sup> Tier II Surface Water EECs for thiram (µg/L).

<sup>B</sup> Exceeds the level of concern of risk .

<sup>C</sup> Does not exceed the level concern.

#### e. Risks to Endangered Species

(For a complete discussion, see the Ecological Risk Assessment.)

The Agency has developed the Endangered Species Protection Program to identify pesticides whose use may cause adverse impacts on endangered and threatened species, and to implement mitigation measures that address these impacts. The Endangered Species Act requires federal agencies to ensure that their actions are not likely to jeopardize listed species or adversely modify designated critical habitat. To analyze the potential of registered pesticide uses to affect any particular species, EPA puts basic toxicity and exposure data developed for REDs into context for individual listed species and their locations by evaluating important ecological parameters, pesticide use information, the geographic relationship between specific pesticide uses and species locations, and biological requirements and behavioral aspects of the particular species. A determination that there is a likelihood of potential impact to a listed species may result in limitations on use of the pesticide, other measures to mitigate any potential impact, or consultations with the Fish and Wildlife Service and/or the National Marine Fisheries Service as necessary.

Thiram's usage on apples, peaches, strawberries, and non-residential turf may potentially present risk to numerous non-target organisms including endangered species. As discussed above, Agency estimates of exposure indicate potential risks of reproductive effects to endangered species of birds. The foliar and turf uses of thiram may pose an acute risk to endangered fish and invertebrate species, and a chronic risk to endangered bird species. The seed treatment use of thiram may pose a risk to an



endangered seed-eating bird species, the Attwater's Greater Prairie Chicken, which inhabits Texas where thiram may be used as a seed treatment. The Agency has chosen the Attwater's Prairie Chicken as a representative granivore to examine. Relating to any additional endangered species concerns, these findings are based solely on EPA's screening level assessment and do not constitute "may affect" findings under the Endangered Species Act.

### **Endangered Aquatic Species**

As discussed above, the Agency has determined that the foliar (including uses on apples, strawberries, and peaches) and turf uses of thiram may pose a risk to endangered fish and invertebrate species. The Agency does not have data on where thiram is used on peaches and turf; therefore, the Agency cannot specify which endangered aquatic organisms may be at risk from the peach and turf uses of thiram. The Agency does however have use location data provided by the USDA, National Agricultural Statistics Service Agricultural (NASS) Chemical Use Database for the strawberry and apple uses of thiram. There are counties where USDA census data confirms thiram's major use locations in recent years up until year 2002 and the possible endangered species which inhabit the counties and which may be at risk of exposure to thiram from the uses. The endangered species list was generated by the EPA OPP Endangered Database (ENDANGERED). The endangered species determined to be at risk of exposure are based on a preliminary endangered species assessment. A more refined endangered species analysis will be needed to determine the likelihood of endangered species risk from thiram's foliar and turf uses. In addition, this preliminary endangered species assessment only represents the major use areas of thiram. There may be other areas in the U.S. where thiram is used. The Agency does not have data on such areas and therefore, can't assess the potential risk to any endangered species inhabiting these areas.

### **Endangered Mammalian Species Risk from Foliar Use**

The Agency determined that thiram's foliar uses may present a risk by minimizing the food sources of small mammals. The foliar uses may contaminate food sources with thiram residue levels that would prevent consumption. Furthermore, the core mammalian chronic toxicity test demonstrated that small mammals may be repelled from consuming thiram treated feed. The study showed that when rats are given a diet of 0, 25, 50 and 150 ppm of thiram treated feed, the animals significantly decreased their feed consumption at the two highest concentrations. This is an indication that the highest concentrations of thiram treated feed in the study repelled the rats from consuming the feed. The ELL-FATE model predicts that the thiram foliar uses at their maximum use rates will contaminate small mammalian food items with residue levels of 145 to 11,847 ppm. Because of the apparent repellency affects of thiram, the Agency presumes that small mammals may avoid consumption of the thiram tainted food items. Consequently, the food supply of these small mammals could be significantly restricted. Many small mammals have very small foraging territories, and may not be likely to migrate and find alternate food sources.

The Agency generated a list of endangered species which inhabit counties where USDA census data confirms thiram's use. The Agency does not have use data on the turf and peach use locations of thiram; therefore, the Agency cannot determine which endangered mammalian species may be at risk from the thiram turf and peach uses. Based on the USDA NASS of the apple and strawberry uses, the strawberry use sites in California are the only use sites where thiram may pose a risk to endangered mammals. This is based on the dietary habits of these endangered mammals in California. Because of the apparent mammalian repellency characteristics (discussed above), the Agency presumes that small

mammals may avoid consumption of thiram tainted mammalian food items (i.e. insects, and nontarget plants). Consequently, their food sources may be restricted. This is because these small mammals have small foraging territories, and may not likely migrate and find alternate food sources. Thus, the Agency presumes that endangered mammals may be indirectly adversely affected by thiram's strawberry use because it may restrict potential food sources. These conclusions on mammalian endangered species risks are based on an a preliminary screening analysis. A more refined endangered species analysis will be needed to determine the likelihood of endangered species risk from thiram's foliar use.

### **Endangered Avian Species from Foliar and Turf Uses**

The Agency has determined that the foliar and turf uses of thiram may pose a risk of causing adverse reproductive effects in endangered birds. This conclusion is based on several premises. The first premise is that the risk quotients indicate that the foliar uses of thiram may cause avian food item contamination that will exceed the Agency level of concern for causing reproductive effects in birds. Another premise for the Agency's conclusions is that even though thiram is marketed as an animal repellent, results of laboratory studies indicate birds may ingest enough thiram-treated feed to cause adverse reproductive effects. A core reproductive toxicity study demonstrated that mallard ducks ingested a sufficient amount of treated feed (39.7 ppm) to cause significant reproductive impairments in birds. The reproductive effects were reductions in embryo development, hatchling survival and number of eggs hatched. In addition, the thiram task force submitted two supplemental laboratory studies testing the avian repellency of thiram. The studies demonstrated that when birds are given an option between untreated feed and thiram treated feed birds prefer the untreated feed; however, they will consume the treated feed in quantities shown to cause adverse reproductive effects. In conclusion, because of the risk quotient calculations and the laboratory tests discussed above, the Agency concludes that thiram's foliar and turf uses may pose a risk of causing adverse reproductive effects in wild bird species including endangered species.

The Agency does not have data on where thiram is used on peaches and turf; therefore, the Agency cannot specify which endangered avian organisms may be at risk from the peach and turf uses of thiram. The Agency does however have use location data provided by the USDA, National Agricultural Statistics Service Agricultural Chemical Use Database for the strawberry and apple uses of thiram. There are counties where USDA census data confirms thiram's major use locations in recent years up until year 2002 and the possible endangered species which inhabit the counties and which may be at risk of exposure to thiram from the uses. The endangered species list was generated by the U.S. EPA OPP Endangered Database (LOCATE). The endangered species determined to be at risk of exposure are based on a preliminary screening level endangered species assessment. A more refined endangered species analysis will be needed to determine the likelihood of endangered species risk from thiram's foliar use. In addition, this preliminary endangered species assessment only represents the major use areas of thiram. There may be other areas in the US where thiram is used. The Agency does not have data on such areas and therefore cannot assess the potential risk to any endangered species inhabiting these areas.

### **Endangered Avian Species Risk from Seed Treatments**

The Agency determined that there is an endangered seed eating bird species, the Attwater's Prairie Chicken, that inhabits Texas where thiram may be used as a seed treatment. Based on information provided by the U.S. Fish and Wildlife Service, the endangered species profile, and communications with refuge managers, the Attwater's Prairie Chicken may be at risk for consuming

unacceptable levels of thiram-treated seed. The seed foraging behavior of the Attwater's Prairie Chicken, combined with the fact that seed planted in the vicinity of this endangered species are typically incorporated at depths where the chicken is not likely to encounter the treated seed, reduces the likelihood of exposure and risk.

### **Attwater's Prairie Chicken**

The Agency has chosen one species, the Attwater's Prairie Chicken as a representative granivore to examine. Relating to any additional endangered species concerns, these findings are based solely on EPA's screening level assessment and do not constitute "may affect" findings under the Endangered Species Act.

The Attwater's Prairie Chicken was formerly located throughout Gulf Coast prairies of southwestern Louisiana and Texas, south to the Nueces River. Today, only two geographically separated small populations totaling approximately 62 individuals remain.

Properly managed coastal prairie grassland, characterized by diversity of vegetation, satisfies every known requirement of Attwater's Prairie Chicken. The bird uses shorter grasses for courtship and feeding, and tall grasses for nesting, feeding, and loafing. The chicken also uses fallow rice fields and other combinations of pasture and croplands. Courtship areas ("booming grounds") may be natural grassy flat with low vegetation, or artificially maintained surfaces such as little-used roads, airport runways, or oil well pads. The birds nest typically in tall grasses.

According to the U.S. Fish and Wildlife Service's recovery plan, the primary threat to the bird's existence is loss, fragmentation, and degradation of coastal prairie habitat, which has been converted to rice cultivation or over-grazed and invaded by brush. Residential and urban development, and oil and gas development also contributed to the habitat loss. Other possible threats include: increased predation as a result of habitat fragmentation, disease, catastrophic weather events, inbreeding, and red imported fire ants.

Although the Attwater's Prairie Chicken has been observed in sorghum, cotton, soybean and peanut crops on or near mating display sites during planting and in fallow rice fields; the birds were apparently not exposed to lethal levels of the pesticides typically used in their vicinity. Pesticides were not determined to affect the endangered prairie chicken in Texas since no mortalities of the chicken could be directly attributed to pesticides (in terms of tissue residues) during the three-year study period (1978 to 1980).

Currently, the vast majority of Attwater's Prairie Chickens are contained on two reserves in Texas, the Attwater Prairie Chicken National Wildlife Refuge (APCNWR) and The Nature Conservancy's Texas City Preserve (TCP). According to reserve managers in Texas (pers. comm: T. Rossignol, APCNWR manager, and B. Crawford, TCP reserve manager; 8/17/04), the APCNWR contains approximately 40 birds and is directly surrounded by agricultural fields, mainly rice with a small amount of cotton. The female birds are known to travel no more than one mile off of the refuge during the time frame when thiram could pose a risk of reproductive effects. Adult prairie chicken diets consist primarily of foliage, exceeding seeds and insects in all seasons. Greatest seed and insect consumption by adults occurs in autumn. Diets of young birds consist primarily of insects. The chickens weigh from one and a half to two pounds. According to the reserve managers, the potential for the chickens to ingest treated seeds is present, however the potential would be greatly reduced if the

birds had to dig for the seeds since the prairie chicken does not typically dig for seeds. The greatest risk of ingesting treated seeds would likely result from spilled seeds left on the ground's surface.

The Texas City Preserve is surrounded by grazing pastures and industry. Containing approximately 22 birds that are not known to venture far from the preserve, the risk of agricultural exposure is minimal. Therefore, the main concern would be for the birds contained on the APCNWR.

As noted by the refuge managers, cotton is grown to a limited extent in the vicinity of the reserves; however, treated cotton seed will be incorporated to a depth of at least one inch. Based on seeding practices and the fact that the prairie chicken does not typically dig for food, the likelihood of exposure to thiram-treated seed is low.

## **IV. Risk Management, Reregistration, and Tolerance Reassessment Decision**

### **A. Determination of Reregistration Eligibility**

Section 4(g)(2)(A) of FIFRA calls for the Agency to determine, after submission of relevant data concerning an active ingredient, whether or not products containing the active ingredient are eligible for reregistration. The Agency has previously identified and required the submission of the generic (i.e., active ingredient-specific) data required to support reregistration of products containing thiram as an active ingredient. The Agency has completed its review of these generic data, and has determined that the data are sufficient to support reregistration of all supported products containing thiram.

The Agency has completed its assessment of the dietary, occupational, residential, and ecological risk associated with the use of pesticide products containing the active ingredient thiram. Based on a review of these data and on public comments on the Agency's assessments for the active ingredient thiram, the Agency has sufficient information on the human health and ecological effects of thiram to make decisions as part of the tolerance reassessment process under FFDCA and reregistration process under FIFRA, as amended by FQPA. The Agency has determined that thiram containing products are eligible for reregistration provided that: (i) current data gaps and confirmatory data needs are addressed; (ii) the risk mitigation measures outlined in this document are adopted; and (iii) label amendments are made to reflect these measures. Label changes are described in Section V. Appendix A summarizes the uses of thiram that are eligible for reregistration. Appendix B identifies the generic data requirements that the Agency reviewed as part of its determination of reregistration eligibility of thiram, and lists the submitted studies that the Agency found acceptable. Data gaps are identified as generic data requirements that have not been satisfied with acceptable data.

Based on its evaluation of thiram, the Agency has determined that thiram products, unless labeled and used as specified in this document, would present risks inconsistent with FIFRA. Accordingly, should a registrant fail to implement any of the risk mitigation measures identified in this document, the Agency may take regulatory action to address the risk concerns from the use of thiram. If all changes outlined in this document are incorporated into the product labels, then all current risks for thiram will be adequately mitigated for the purposes of this determination.

### **B. Public Comments and Responses**

Through the Agency's public participation process, EPA worked with stakeholders and the public to reach the regulatory decisions for thiram. During the public comment period on the risk assessments, which closed on August 31, 2004, the Agency received comments from the following commentors, Gustafson, National Cotton Council, the U.S. Golf Association, the Golf Course Superintendents of America, VJP Consulting, the American Sugarbeet Association, Taminco, the Southern Minnesota Beet Sugar Cooperative, Seminis Vegetable Seeds, Inc., Beta Seed, Inc., Southern Forest Nursery Management Cooperative, Cleary Chemical Corporation, the California Strawberry Commission and the Minnesota Golf Course Superintendents Association. These comments in their entirety are available in the public docket, <http://docket.epa.gov/edkpub/index.jsp>. (OPP-2004-0183).

### **C. Regulatory Position**

#### **1. Food Quality Protection Act Findings**

### **a. Determination of Safety to U.S. Population**

As part of the FQPA tolerance reassessment process, EPA assessed the risks associated with thiram. The Agency has determined that the established tolerances for thiram, with amendments and changes as specified in this document, meet the safety standards under the FQPA amendments to section 408(b)(2)(D) of the FFDCFA, and that there is a reasonable certainty no harm will result to the general population or any subgroup from the use of thiram. In reaching this conclusion, the Agency has considered all available information on the toxicity, use practices and exposure scenarios, and the environmental behavior of thiram.

The Agency has worked with the registrant Taminco to reduce potential exposure to thiram treated strawberries and apples. As a result, Taminco has requested voluntary cancellation of thiram use on apples and will amend its registration to remove strawberries from its label pending Agency receipt, review, and acceptance of additional data (a strawberry processing study and a Developmental Neurotoxicity Study) and reevaluation of risks. Peaches are the only remaining food commodity in the risk cup. Considering that peaches are a low contributor (<9% of the aPAD), the acute dietary risks are not of concern to the Agency.

Acute risks from aggregate exposures are not of concern. Models have been used to estimate ground and surface water concentrations. The DWLOCs calculated to assess the surface water contribution to acute (noncancer) dietary exposure range from 1750ug/L (for the U.S. general population) to less than 500ug/L (infants and children). The surface water EEC (47.8ppb) is significantly less than the acute DWLOC. The groundwater EEC (0.84) is also significantly less than the acute DWLOC. These DWLOCs were calculated assuming no exposure from food in order to evaluate potential acute risk posed by drinking water alone. However, if dietary exposure due to peach consumption had been included in the DWLOC calculations, the LOCs would have been only approximately 10% lower, i.e., the lowest DWLOC would have been 450ug/L. Thus, the Agency concludes with reasonable certainty that aggregate exposure to food and drinking water will not result in an unacceptable acute risk.

Short-term aggregate risks are not of concern. DWLOCs were calculated based upon average food residues and the residential post-application exposure scenario (adult golfers). Because the inputs to calculate short-term aggregate risks are very low (cPAD=2.8% and the MOE at day 0 for golfers is 794), the Agency concludes with reasonable certainty that aggregate exposure to food, drinking water and residential exposures will not result in an unacceptable risk.

Chronic risks from aggregate exposures are not of concern. The DWLOC calculated to assess the surface water contribution to chronic (noncancer) dietary exposure is a range from 48.30ug/L (for the U.S. general population) to less than 10.80ug/L (infants and children). The surface water EEC (4.3 ppb) is less than the chronic DWLOC, indicating that chronic exposure to thiram in food and drinking water from surface water sources is below the Agency's level of concern. The groundwater EEC (0.84 ppb) is also less than the chronic DWLOC, indicating that chronic exposure to thiram in food and drinking water from groundwater sources is below the Agency's level of concern. Since the model-based estimates for concentrations in surface water and groundwater are below the calculated chronic DWLOC, the Agency concludes with reasonable certainty that aggregate exposure to food and drinking water will not result in an unacceptable chronic risk.

### **b. Determination of Safety to Infants and Children**

EPA has determined that the established tolerances for thiram, with amendments and changes as specified in this document, meet the safety standards under the FQPA amendments to section 408(b)(2)(C) of the FFDCA, that there is a reasonable certainty of no harm for infants and children. The safety determination for infants and children considers factors on the toxicity, use practices and environmental behavior noted above for the general population, but also takes into account the possibility of increased dietary exposure due to the specific consumption patterns of infants and children, as well as the possibility of increased susceptibility to the toxic effects of thiram residues in this population subgroup.

No Special FQPA Safety Factor is necessary to protect the safety of infants and children. In determining whether or not infants and children are particularly susceptible to toxic effects from thiram residues, the Agency considered the completeness of the database for developmental and reproductive effects, the nature of the effects observed, and other information. The FQPA Safety Factor has been removed (i.e., reduced to 1X) for thiram based on: 1) the outcome of the degree of concern analysis that failed to identify any residual uncertainties, 2) Exposure databases are complete for thiram and the risk assessment for each potential exposure scenario includes all metabolites and/or degradates of concern and, 3) The risk assessment does not underestimate the potential risk for infants and children.

The Agency has concluded that a Developmental Neurotoxicity Study (DNT) on thiram is necessary based on a weight of evidence including: 1) findings of central neurological system defects as seen in the Developmental Study in rats (MRID 00259810-02); and 2) neurotoxic effects in the Acute and Subchronic Neurotoxicity Study (MRID 42912401 and 43012701, respectively). Because the thiram toxicology database does not include a DNT study, a Database Uncertainty Factor is necessary to be protective of children. This Uncertainty Factor is applied only to exposure scenarios that are expected for children or pregnant women, and thus is not applied to occupational exposure scenarios.

The Agency has determined the appropriate size of the Database Uncertainty Factor for thiram by comparing the NOAEL from an acceptable reproduction study with a dose level that the Agency assumes would be the NOAEL from a DNT study on the subject pesticide if one were available. Thus, the Agency has assumed that if a DNT study were conducted, the NOAEL from that study would be similar to the lowest dose tested in the reproduction study. The assumption is based on an analysis of data from DNT studies previously submitted to the Agency which suggests that NOAELs lower than the lowest dose tested in the reproduction study are unlikely to occur.

The lowest dose tested in the rat reproduction study was 1.7 mg/kgbw-day. The Agency therefore has assumed that a DNT study on thiram would yield a NOAEL of approximately 1.7 mg/kgbw-day. The Agency's determination of the size of the Database Uncertainty Factor has been derived by dividing the point of departure used for each exposure pathway by the assumed DNT NOAEL of 1.7 mg/kgbw-day. If the point of departure for a particular risk assessment is higher than the assumed NOAEL, a Database Uncertainty Factor is typically required. If the difference is in the range of 3X, a 3X factor is used. If it is larger than 3X, a 10X factor is used. If the point of departure is equal to or lower than the assumed NOAEL, a Database Uncertainty Factor is not required since it is concluded that the DNT is unlikely to yield a point of departure more sensitive than that currently being used for that assessment.

Therefore, based on this approach, acute dietary risk estimates will include a Database Uncertainty Factor of 3X. For chronic dietary risk estimates, no Database Uncertainty Factor is needed and the target MOEs for all occupational and residential risk assessments will now be 100.

### **c. Endocrine Disruptor Effects**

EPA is required under the FFDCA, as amended by FQPA, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) “may have an effect in humans that is similar to an effect produced by a naturally occurring estrogen, or other endocrine effects as the Administrator may designate.” Following recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was a scientific basis for including, as part of the program, the androgen and thyroid hormone systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC’s recommendation that EPA include evaluations of potential effects in wildlife. For pesticides, EPA will use FIFRA and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

When the appropriate screening and/or testing protocols being considered under the EDSP have been developed, thiram may be subject to additional screening and/or testing to better characterize effects related to endocrine disruption.

### **d. Cumulative Risks**

Risks summarized in this document are those that result only from the use of thiram. The Food Quality Protection Act (FQPA) requires that the Agency consider “available information” concerning the cumulative effects of a particular pesticide’s residues and “other substances that have a common mechanism of toxicity.” The reason for consideration of other substances is due to the possibility that low-level exposures to multiple chemical substances that cause a common toxic effect by a common toxic mechanism could lead to the same adverse health effect as would a higher level of exposure to any of the substances individually. Unlike other pesticides for which EPA has followed a cumulative risk approach based on a common mechanism of toxicity, EPA has not made a common mechanism of toxicity finding for thiram. For information regarding EPA’s efforts to determine which chemicals have a common mechanism of toxicity and to evaluate the cumulative effects of such chemicals, see the policy statements released by EPA’s Office of Pesticide Programs concerning common mechanism determinations and procedures for cumulating effects from substances found to have a common mechanism on EPA’s website at <http://www.epa.gov/pesticides/cumulative/>.

## **2. Tolerance Summary**

Tolerances are established for residues of thiram *per se* under 40 CFR §180.132 in/on apples, peaches and strawberries. These tolerances are established at 7 ppm. No tolerances have been established for thiram residues in animal and processed food/feed commodities. The Pesticide Analytical Manual (PAM) Vol. II lists a colorimetric method, Method I, for the determination of dithiocarbamate residues in/on plant commodities. Additional methods (Methods II-IV and Method A), which are based on the decomposition of dithiocarbamates with release of carbon disulfide (CS<sub>2</sub>), are also listed in PAM Vol. II. These methods are nonspecific for CS<sub>2</sub>-generating compounds.

### **a. Tolerances Currently Listed Under 40 CFR §180.301**



Pending label revisions for some commodities, adequate residue data are available to support the current established thiram tolerances on the following raw agricultural commodities: apples, strawberries and peaches.

Residue analytical methods for the determination of thiram residues of concern in animal commodities are not available because tolerances for animal commodities have not been established. If the requested ruminant feeding study suggests that tolerances in milk and edible tissues of ruminants are needed, registrants will be required to develop enforcement and data-collection methods capable of determining thiram residues of concern.

As a result of changes to Table 1 of OPPTS 860.1000, Residue Chemistry Test Guidelines, the Agency has determined that tolerances on the following commodities are warranted (Table 21). Following submission of additional data by the registrant (specifically, peach field trial data), EPA intends to evaluate the data and, if adequate, set appropriate tolerances for peaches. In addition, the registrant has voluntarily requested cancellation of use on apples. This tolerance will be revoked at a later date.

**Table 21. Tolerance Reassessment Summary for Thiram**

Commodity	Current Tolerance (ppm)	Tolerance Reassessment (ppm)	Comment/ [Correct Commodity Definition]
<b>Tolerances Listed Under 40 CFR §180.132</b>			
Apples	7	9	[Apple]
Peaches	7	TBD <sup>1</sup>	[Peach]
Strawberries	7	9	[Strawberry]

1) TBD = To be determined. Reassessment of tolerance(s) cannot be made at this time because either additional data or clarification of proposed use patterns are required.

**b. Codex Harmonization**

There are no established or proposed Codex MRLs for thiram residues *per se*, however, Codex limits for dimethyldithiocarbamates fungicides are grouped under dithiocarbamates. Maximum residue limits (MRLs) for the dithiocarbamates are established for several commodities resulting from the use of mancozeb, maneb, metiram, propineb, thiram, and ziram and are currently expressed as ppm carbon disulfide. Harmonization of the U.S. tolerances with Codex MRLs is impractical at the present time. A numerical comparison of the Codex MRLs and the corresponding reassessed U.S. tolerances is presented in Table D of the April 17, 2000, Product and Residue Chemistry Chapter for the Thiram RED Document.

**D. Regulatory Rationale**

The Agency has determined that thiram is eligible for reregistration provided that additional required data confirm this decision and that the risk mitigation measures outlined in this document are adopted, and label amendments are made to reflect these measures.

The following is a summary of the rationale for managing risks associated with the use of thiram. Where labeling revisions are warranted, specific language is set forth in the summary tables of Section V of this document.

## **1. Human Health Risk Management**

### **a. Dietary (Food) Risk Mitigation**

For all supported commodities, the dietary exposure estimates are below the Agency's level of concern. Therefore, no risk mitigation measures are required to address exposure to thiram residues in food.

The refined (Tier 3) acute probabilistic dietary exposure and risk estimates at the 99.9th percentile of exposure is of concern to the general U.S. population and all population subgroups. For children 1-2 years old, the highest exposed population subgroup, the acute dietary exposure risk estimate (aPAD) is 334%. Additional analyses are conducted to determine the contribution of each commodity to the dietary risk. These sensitivity analyses indicate that both strawberries and apples are significant contributors to the dietary risk for children 1-2 year old.

The Agency has worked with the registrant, Taminco to reduce potential exposure to thiram treated strawberries and apples. Subsequently, Taminco has requested voluntary cancellation of thiram use on apples and will amend its registration to remove strawberries from its label pending receipt, review, and acceptability of additional data (a strawberry processing study and a Developmental Neurotoxicity Study). The percent of the aPAD considering dietary contributions from strawberries and peaches only is reduced to 273. Without strawberries, the percent of the aPAD is reduced to 9.

To further reduce dietary concerns, the Agency has determined that the following label changes for specific scenarios are appropriate and required for reregistration eligibility:

“Treated Seed - Do Not Use for Food, Feed, or Oil Purposes.”

### **b. Drinking Water Risk Mitigation**

As previously discussed above, the acute, short-term and chronic risks from aggregate exposures are not of concern to the Agency and no further mitigation is necessary.

### **c. Residential Risk Mitigation**

Thiram is not available for sale or use by homeowner applicators. As such, all residential risks were calculated related to the non-residential turf uses that include golfing for adults and toddler exposures in areas that can be treated with thiram by certified pesticide applicators. MOEs for golfers are not of concern to the Agency (MOE=764 at Day 0), and therefore no risk mitigation measures are required to address this scenario.

To protect children from scenarios of concern (MOE= 4) for exposure to thiram treated turf) and to further protect from exposure to ornamentals treated with thiram as a deer repellent, the Agency is requiring the following label modifications:

### Deer Repellent Use:

Use one quart of this product in 3 to 7 gallons of water for application to 1000ft<sup>2</sup>  
Applications to ornamentals will be restricted to the following 17 Northern states and applications will occur during the winter season only (October thru March): OH, PA, NY, MI, CT, MA, IN, IL, NJ, WV, MN, WI, VT, NH, RI, DE, and MD.

### Cancellations of Turf/Other Uses:

Turf applications to parks, athletic fields and commercial landscapes.  
All turf applications for turf grown for sale or other commercial use such as sod.  
All homeowner and retail uses on residential lawns and turf  
Residential homeowner use as a fungicide on bulbs, flower seeds, greenhouse and nursery cuttings, and pruning paints.

Through these label amendments and voluntary cancellations to remove all homeowner uses from Tamenco, the Agency believes exposure to the deer repellent use will be insignificant and therefore not of concern. No additional mitigation is necessary.

## **d. Occupational Risk Mitigation**

### **1) Handler exposure**

Occupational exposure and risk estimates were conducted using maximum application rates and high-end assumptions for amount of seed treated and planted. A target Margin of Exposure (MOE) of 100 is considered adequate for occupational exposure via dermal and inhalation routes. The results of the worker exposure assessment indicate that most potential exposure scenarios result in MOEs  $\geq$  the target MOE of 100 for dermal and inhalation for all of the seed crops treated with thiram products being actively sold in the U.S.

In most scenarios, MOEs meet or exceed the required target MOE of 100 at some level of personal protection. For the most part, current label requirements (for personal protection single layer clothing, gloves, and no respirator) appear to be generally inadequate except for operations where exposures and/or the amount of chemical used is low. Scenarios where MOEs do not exceed 100 at any level of personal protection include some loading scenarios for aerial applications, aerial granular applications, some handheld equipment use, and a few commercial seed treatment scenarios.

Therefore, to reduce worker exposure, the Agency has determined that the following label changes for specific scenarios are appropriate and required for reregistration eligibility:

Mixers/Loaders/Applicators/Other Handlers (general): wear baseline (long-sleeve shirt, long pants, shoes, socks, no respirator) plus chemical resistant gloves for the following scenarios (mixer/loaders wear a chemical resistant apron):

- liquids or dry flowables applied aerially
- liquids, dry flowables or sprays applied via airblast
- liquids, dry flowables or sprays applied via groundboom
- liquids or dry flowables applied via a high pressure handwand
- liquids or dry flowables applied for rights of way
- liquids applied as a paint-on application

- solid broadcast spreader
- repellent paint brush use
- sprinkler can
- ready-to-use solutions
  - wettable powder paint-on
  - dry flowable paint-on

Mixers/loaders/applicators/other handlers (packaged seed): seed that has been treated with this product that is then packaged or bagged for future use must bear labeling that contains the restricted-entry interval (REI) information and the following text on the outside of the seed package or bag: “Persons opening this bag or loading/pouring the treated seed, must wear long-sleeved shirt, long pants, shoes, socks, and chemical resistant gloves.”

Flaggers: wear baseline (long-sleeve shirt, long pants, shoes, socks, no respirator for the following scenarios:  
sprays applied aerially

In addition to the above mentioned PPE requirements, the registrant has agreed to the following use modifications/amendments to further address the Agency’s concerns:

- Cancellation of the aerial and hand/spoon applications
- Changing all wettable powder formulations to water soluble bag formulations.
- Cancellation of on-farm seed treatment of peanuts

## 2) Post-Application Risk Mitigation

EPA has determined that the current 24 hour REI is appropriate, and labels must contain the following language to be eligible for reregistration:

“After the seeds have been planted, do not enter or allow worker entry into treated areas during the REI of 24 hours. Exception: Once the seeds are planted in soil or other planting media, the Worker Protection Standard allows workers to enter the treated area without restriction if there will be no worker contact with the soil/media subsurface.”

## 2. Environmental Risk Mitigation

Although the major agricultural use of thiram is seed treatment, it is the foliar (strawberries, peaches and apples) and turf uses which present the most significant potential risks to endangered and non-endangered aquatic organisms (freshwater and marine/estuarine fish, invertebrates, plants and algae), on an acute basis. This is in part because the application rate of thiram to the environment is higher than that for treated seed. In addition to the higher application rate, the orchard and turf uses typically entail multiple applications, unlike seed, which is only “applied” to the environment at planting. This means higher thiram concentrations in receiving waters such as low-order streams draining agricultural areas. This explains the level of concern exceedances noted in Chapter 3 for acute risk to aquatic organisms from thiram usage on apples and turf. The following is a summary of the aquatic risks:

- Freshwater fish potential risk
  - acute risk for non-residential turf and apple uses (risk includes endangered species).
  - RQs range from 0.11 to 3.43
- Freshwater invertebrate potential risk
  - acute risk for non-residential turf and apple uses (risk includes endangered species).
  - RQs range from 0.05 to 0.48
- Marine/Estuarine fish potential risk
  - acute risk to non-residential turf uses (risk includes endangered species)
  - RQs range from 0.05 to 0.19
- Marine/Estuarine invertebrate potential risk
  - acute risk for non-residential turf and apple uses (risk includes endangered species).
  - RQs range from 0.05 to 28

The Agency is also concerned with the seed, foliar (strawberries, peaches and apples) and turf uses of thiram and potential risk of causing adverse effects to birds (RQs range from 0.06 to 1,237. Recalculated RQs based on reduced application rates, number of applications, and frequency of applications summarized below range from 12-573). These effects can include reproductive impairments in endangered and non-endangered bird species. This conclusion is based on several premises. The first premise is that the risk quotients indicate that the foliar uses of thiram may cause avian food item contamination that will greatly exceed the Agency's level of concern for causing reproductive effects in birds. Another premise for the Agency's conclusions is that even though thiram is marketed as an animal repellent, results of laboratory studies indicate that birds may ingest enough thiram-treated feed to cause adverse reproductive effects. A third premise is that the diet of some bird species consist largely of seeds (including agriculturally planted seeds). Additionally, the Agency has concluded that the foliar and turf uses of thiram may pose a risk to endangered bird species. The Agency looked specifically at the Attwater's Prairie Chicken in Texas which may be at risk for consuming thiram treated seed and, to be eligible for reregistration, the Agency requires that additional risk mitigation measures be implemented which are discussed in detail below.

Furthermore, the Agency is concerned with potential risk to mammals (RQs range from 0.01 to 6,249). The Agency has determined that thiram's foliar uses may present a risk by minimizing the food sources of small mammals. This is because the foliar uses may contaminate their food sources with thiram residue levels that will prevent consumption. Because of the apparent repellency affects of thiram, the Agency presumes that small mammals may avoid consumption of the thiram tainted food items. Consequently, the food supply of these small mammals could be significantly restricted. This is because many small mammals have very small foraging territories, and they many not be likely to migrate and find alternate food sources.

To reduce risks to mammals, birds, and aquatic species, the Agency, in agreement with the technical registrants of thiram, has developed several mitigation requirements to address the above mentioned concerns. They include:

A statement added to the label "Treated seeds are hazardous to birds and mammals. Do not plant treated seed by broadcasting to the soil surface. Ensure that all planted seed are thoroughly covered with soil, especially in turn areas. Plant cotton, wheat, barley, oats and sugar beet seed a minimum of 1 inch deep. If seeds are not thoroughly incorporated by the planter during planting, additional

incorporation may be required to reduce exposed seeds. Clean-up, bury or cover all spilled seed with soil."

A statement added to the label: "This pesticide is toxic to fish. Do not apply to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate or by disposal of wastes."

Cancellation of thiram use on apples.

Restriction of thiram use on golf courses to tees and greens only.

Reduce the winter golf course treatment from a maximum of four applications to a maximum of one application.

Reduction of summer golf course treatment from a maximum of eight applications to a maximum of three applications.

Restrict the number of annual applications of thiram to golf courses to 47 pounds of active ingredient per acre (this corresponds to a 40% total reduction in thiram use on golf courses).

For the golf course use, increase the re-treatment interval from 7 to 14 days.

For strawberries, limit the maximum number of applications to five at 2.6 lbs ai/Acre.

For strawberries, East of the Mississippi River, limit the maximum number of applications to twelve at 2.6 lbs ai/Acre.

For strawberries, add a label statement to indicate that 1.3 lbs ai/Acre should be used when thiram is used in combination with other fungicides.

For strawberries, the label will establish a 25 foot vegetative buffer zone from water bodies.

For cotton, reduce the maximum treatment rate for cotton seed from 2.25 oz. ai/cwt (1406 ppm) when treated with thiram as a single active ingredient to 1.6 oz. ai/cwt (1,000 ppm) reflecting the global use rate for thiram on imported and exported cotton seed.

For cotton, reduce the maximum treatment rate for cotton seed for thiram in products containing multiple active ingredients to 1.0 oz. ai/cwt (625 ppm).

Upon examining the risks and requiring the above listed mitigation measures, the Agency believes that concerns noted in Chapter 3 and above have been adequately mitigated. No further mitigation is needed at this time.

### **3. Other Labeling Requirements**

In order to be eligible for reregistration, various use and safety information will be included in the labeling of all end-use products containing thiram. For the specific labeling statements and a list of outstanding data, refer to Section V of this RED document.

#### **4. Endangered Species Considerations**

##### **a. The Endangered Species Program**

The Agency has developed the Endangered Species Protection Program to identify pesticides whose use may cause adverse impacts on endangered and threatened species, and to implement mitigation measures that address these impacts. The Endangered Species Act requires federal agencies to ensure that their actions are not likely to jeopardize listed species or adversely modify designated critical habitat. To analyze the potential of registered pesticide uses that may affect any particular species, EPA uses basic toxicity and exposure data developed for the REDs and considers ecological parameters, pesticide use information, geographic relationship between specific pesticide uses and species locations, and biological requirements and behavioral aspects of the particular species.

A determination that there is a likelihood of potential impact to a listed species may result in limitations on use of the pesticide, other measures to mitigate any potential impact, or consultations with the Fish and Wildlife Service and/or the National Marine Fisheries Service as necessary.

##### **b. General Risk Mitigation**

The endangered species risk mitigation strategies described in this document address risks associated with thiram as a sole active ingredient. Thiram end use products (EPs) may also contain other registered pesticides. To address the risks posed by these end use products, the Agency requires that users adopt all endangered species risk mitigation measures for all active ingredients in the product. If a product contains multiple active ingredients with conflicting endangered species risk mitigation measures, the more stringent measure(s) should be adopted.

##### **c. Species-Specific Risk Mitigation**

The Agency's initial assessment suggested that many endangered species may potentially be impacted by thiram. Several of these species are known to consume seeds and may occur near field crops. As listed in Appendix J of the May 19, 2004, EFED Revised Thiram Environmental Risk Assessment, many of the endangered species were fish in Washington and Oregon. The Agency believes that these risks have been reduced since Taminco has requested voluntary cancellation of the apple use. The Agency then looked at additional species listed and chose The Attwater's Prairie Chicken as a representative granivore. This species may be at risk for consuming unacceptable levels of thiram treated seed and, to be eligible for reregistration, the Agency requires that additional risk mitigation measures be implemented.

**Attwater's Prairie Chicken** In addition to the general risk mitigation measures discussed above, the Agency will issue new or revised County Specific Bulletins for the Attwater's Prairie Chicken in Austin, Colorado, and Galveston Counties in Texas. These bulletins will allow the Agency to communicate to users the species-specific mitigation measures discussed in this document as well as any additional or updated measures as necessary. Specifically, the bulletins will prohibit use of thiram-

treated seed within 1 mile of the US Fish and Wildlife Service's Attwater Prairie Chicken National Wildlife Refuge and the Nature Conservancy's Texas City Preserve.

County Specific Bulletins currently exist for Austin and Colorado Counties in Texas. These bulletins address use limitations for aerial and granular pesticide applications, and will be revised to address seed treatments. A County Specific Bulletin does not exist for Galveston County in Texas and will be created. The Agency will ensure that the new or revised bulletins for these three counties include thiram endangered species information before the updated product labels are issued.

To be eligible for reregistration, the Agency requires that the following language be added to product labels:

"This product may have effects on federally listed threatened or endangered species or their critical habitat in some counties. It is a violation of federal law to kill, harm or harass listed animal species without authorization. To limit the potential for such impacts when using this product, consult and follow the instructions provided in the EPA Endangered Species County Bulletin for the county in which you are applying the seed. To determine whether your County has a Bulletin consult <http://www.epa.gov/espp> before each season's use of this product. Bulletins also may be available from local pesticide dealers, extension offices, or State pesticide agencies."

In addition, on bag tags this language will be preceded by the following statement: "This bag contains seed treated with thiram."

EPA plans to require thiram registrants to implement the measures specified above to mitigate the potential risks to Attwater's Prairie Chicken, an endangered species. As discussed in the Federal Register notice describing EPA's proposed Endangered Species Protection Program (ESPP), 67 FR 71,49 (December 2, 2002), such risk mitigation measures would be implemented through changes to pesticide product labeling and county bulletins. Under the ESPP, registrants would amend their labeling to include a statement requiring users to obtain and follow requirements set forth in a bulletin developed for affected counties. The restrictions contained in the bulletin would be designed to protect threatened and endangered species to the extent necessary in each affected county. County bulletins would be available through EPA's website, as well as through local distribution sources. EPA expects to finalize its ESPP in the near future, and the risk mitigation measures described in this RED will be implemented consistent with provisions of the final ESPP.

#### **d. Endangered Species Determination**

Attwater's Prairie Chicken: Based on the ecological risk assessment conducted for thiram and the implementation of the risk mitigation measures described above, EPA has determined that thiram will have no effect on the Attwater's Prairie Chicken.

Other listed Species: EPA will continue to evaluate whether currently identified and/or additional endangered species may be impacted by exposure to thiram. The Agency is working with other federal, state, and local agencies to refine the endangered species risk assessment with the goal of developing any necessary risk mitigation for endangered species. If in the future specific measures are necessary for the protection of listed species, the Agency will comply with the requirements in the consultation regulations promulgated by the US Fish and Wildlife Service and the National Marine Fisheries Service in 50 CFR Part 402.



## V. What Registrants Need to Do

The Agency has determined that thiram is eligible for reregistration provided that: (i) additional data that the Agency intends to require confirm this decision; and (ii) the risk mitigation measures outlined in this document are adopted, and label amendments are made to reflect these measures. To implement the risk mitigation measures, the registrants must amend their product labeling to incorporate the label statements set forth in the Label Changes Summary Table in Section B below (Table 23). The additional data requirements that the Agency intends to obtain will include, among other things, submission of the following:

For thiram technical grade active ingredient products, the registrant needs to submit the following items:

**Within 90 days from receipt of the generic data call in (DCI):**

1. completed response forms to the generic DCI (i.e., DCI response form and requirements status and registrant's response form); and
2. submit any time extension and/or waiver requests with a full written justification.

**Within the time limit specified in the generic DCI:**

1. cite any existing generic data which address data requirements or submit new generic data responding to the DCI.

Please contact Craig Doty at (703) 603-0122 with questions regarding generic reregistration.

By US mail:  
Document Processing Desk (DCI/SRRD)  
Craig Doty  
US EPA (7508C)  
1200 Pennsylvania Ave., NW  
Washington, DC 20460

By express or courier service:  
Document Processing Desk (DCI/SRRD)  
Craig Doty  
Office of Pesticide Programs (7508C)  
Room 266A, Crystal Mall 2  
1801 S. Bell Street  
Arlington, VA 22202

For end use products containing the active ingredient thiram, the registrant needs to submit the following items for each product.

**Within 90 days from the receipt of the product-specific data call-in (PDCI):**

1. completed response forms to the PDCI (i.e., PDCI response form and requirements status and registrant's response form); and
2. submit any time extension or waiver requests with a full written justification.

**Within eight months from the receipt of the PDCI:**

1. two copies of the confidential statement of formula (EPA Form 8570-4);
2. a completed original application for reregistration (EPA Form 8570-1). Indicate on the form that it is an "application for reregistration";
3. five copies of the draft label incorporating all label amendments outlined in Table 15 of this document;
4. a completed form certifying compliance with data compensation requirements (EPA Form 8570-34); and

5. if applicable, a completed form certifying compliance with cost share offer requirements (EPA Form 8570-32); and
6. the product-specific data responding to the PDCI.

Please contact Venus Eagle at (703) 308-8045 with questions regarding product reregistration and/or the PDCI. All materials submitted in response to the PDCI should be addressed as follows:

By US mail:  
 Document Processing Desk (PDCI/PRB)  
 Venus Eagle  
 US EPA (7508C)  
 1200 Pennsylvania Ave., NW  
 Washington, DC 20460

By express or courier service:  
 Document Processing Desk (PDCI/PRB)  
 Venus Eagle  
 Office of Pesticide Programs (7508C)  
 Room 266A, Crystal Mall 2  
 1801 South Bell Street  
 Arlington, VA 22202

## A. Manufacturing Use Products

### 1. Additional Generic Data Requirements

The generic data base supporting the reregistration of thiram for the above eligible uses has been reviewed and determined to be substantially complete. However, the following data requirements listed in Table 22 are necessary to confirm the reregistration eligibility decision documented in this RED.

**Table 22. Data Requirements for the Reregistration Eligibility Decision on Thiram**

Guideline Study Name	New OPPTS Guideline No.	Old Guideline No.
UV/Visible Absorption (Prochimie 98.5% T and Gustafson 97.5% T)	830.7050	None
Hydrolysis of Parent and Degradates as a Function of pH at 25° C	835.2120	161-1
Anaerobic Soil Metabolism	835.4200	162-2
Directions for Use	860.1200	171-3
Residue Analytical Method - Plants (propose new method)	860.1340	171-4C
Soil Column Leaching	835.1240	163-1
Directions for Use	860.1200	171-3
Avian Reproduction - Quail	850.2300	71-4A
Nature of the Residue - Plants	860.1300	171-4A
Nature of the Residue - Livestock	860.1300	171-4B
Multiresidue Method	860.1360	171-4M
Storage Stability Data (Plant and Animal Commodities)	860.1380	171-4E
Fish Early-Life Stage Toxicity Test (Plant Commodities - Animal is reserved)	850.1400	72-4C
Life Cycle Fish	850.1500	72-5
Mysid (Shrimp) Chronic Toxicity Test (Prochimie 98.5% T)	850.1350	72-4B
Developmental Neurotoxicity Study (Prochimie 98.5% T)	870.6300	83-6
Product Identity and Disclosure of Ingredients (Composition) (Prochimie 98.5% T)	830.1550	61-1

Guideline Study Name	New OPPTS Guideline No.	Old Guideline No.
Starting Materials & Manufacturing Process (Description of Materials Used to Produce the Product (Prochimie 98.5% T)	830.1600	61-2A
Description of Production Process (Prochimie 98.5% T)	830.1620	61-2B
Discussion of Formation of Impurities (Prochimie 98.5% T)	830.1670	61-2B
Preliminary Analysis (Prochimie 98.5% T)	830.1700	62-1
Certified Limits (Prochimie 98.5% T)	830.1750	62-2
Enforcement Analytical Method (Prochimie 98.5% T)	830.1800	62-3
Color (Prochimie 98.5% T)	830.6302	63-2
Physical State (Prochimie 98.5% T)	830.6303	63-3
Odor (Prochimie 98.5% T)	830.6304	63-4
Stability to Normal and Elevated Temperatures, Metals, and Metal Ions	830.6313	63-13
Oxidation/Reduction: Chemical Incompatibility (Prochimie 98.5% T and Gustafson 97.5% T)	830.6314	63-14
Flammability (Prochimie 98.5% T)	830.6315	63-15
Explodability (Prochimie 98.5% T)	830.6316	63-16
Storage Stability (Prochimie 98.5% T and Gustafson 97.5% T)	830.6317	63-17
Miscibility (Prochimie 98.5% T)	830.6319	63-19
Corrosion Characteristics (Prochimie 98.5% T and Gustafson 97.5% T)	830.6320	63-20
pH of Water Solutions or Suspensions (Prochimie 98.5% T)	830.7000	63-12
Viscosity (Prochimie 98.5% T)	830.7100	63-18
Melting Point/Melting Range (Prochimie 98.5% T)	830.7200	63-5
Boiling Point/Boiling Range (Prochimie 98.5% T)	830.7220	63-6
Density/Relative Density/Bulk Density (Prochimie 98.5% T)	830.7300	63-7
Dissociation Constants in Water (Prochimie 98.5% T)	830.7370	63-10
Partition Coefficient ( <i>n</i> -octanol/water), Generator Column Method (Prochimie 98.5% T)	830.7550	63-11
Water Solubility: Column Elution Method or Shake Flask Method (Prochimie 98.5% T)	830.7840	63-8
Vapor Pressure (Prochimie 98.5% T)	830.7950	63-9
Magnitude of Residues in Meat/Milk/Poultry/Eggs (milk, fat, meat, and meat byproducts of cattle, goats, horses and sheep)	860.1480	171-4J
Crop Field Trials (Pome fruits group - apple; Stone fruits group - peach)	860.1500	171-4K
Dermal (Passive Dosimetry) Exposure	875.2400	133-3
Inhalation (Passive Dosimetry) Exposure	875.2500	133-4

## 2. Labeling for Technical and Manufacturing-Use Products

To ensure compliance with FIFRA, technical and manufacturing use product (MP) labeling should be revised to comply with all current EPA regulations, PR Notices and applicable policies. The Technical and MP labeling should bear the labeling contained in Table 23, Label Changes Summary Table.

## **B. End-Use Products**

### **1. Additional Product-Specific Data Requirements**

Section 4(g)(2)(B) of FIFRA calls for the Agency to obtain any needed product-specific data regarding the pesticide after a determination of eligibility has been made. The Registrant must review previous data submissions to ensure that they meet current EPA acceptance criteria and if not, commit to conduct new studies. If a registrant believes that previously submitted data meet current testing standards, then the study MRID numbers should be cited according to the instructions in the Requirement Status and Registrants Response Form provided for each product.

A product-specific data call-in, outlining specific data requirements, accompanies this RED.

### **2. Labeling for End-Use Products**

Labeling changes are necessary to implement measures outlined in Section IV above. Specific language to incorporate these changes is specified in Table 23.

Registrants may generally distribute and sell products bearing old labels/labeling for 26 months from the date of the issuance of this Reregistration Eligibility Decision document. Persons other than the registrant may generally distribute or sell such products for 52 months from the approval of labels reflecting the mitigation described in this RED. However, existing stocks time frames will be established case-by-case, depending on the number of products involved, the number of label changes, and other factors. Refer to “Existing Stocks of Pesticide Products; Statement of Policy,” *Federal Register*, Volume 56, No. 123, June 26, 1991.

#### **a. Label Changes Summary Table**

In order to be eligible for reregistration, amend all product labels to incorporate the risk mitigation measures outlined in Section IV. The following table describes how language on the labels should be amended.

**Table 23. Thiram Label Changes Summary Table**

Summary of Required Labeling Changes for Thiram		
Description	Required Labeling	Placement on Label
Manufacturing Use Products		
For All Manufacturing Use Products	<p>“Only for formulation into a fungicide for the following use(s) [fill blank only with those uses that are being supported by MP registrant:]”</p> <p>Labels must be changed by December 31, 2004 to remove foliar treatments to apple, on-farm seed treatments to peanuts, and any directions for use on turfgrass, except golf course tees and greens.”</p> <p>No products can be labeled for homeowner/residential use. All labels must contain the statement: “For sale to and use by professional applicators only. Not for sale to or use by homeowners/consumers.”</p> <p>“All wettable powder formulations <i>except</i> those used exclusively for seed or seed piece treatments must be packaged in water-soluble packets.”</p>	Directions for Use
One of these statements may be added to allow reformulation of the product for specific use or all additional uses supported by a formulator or user group	<p>“This product may be used to formulate products for specific use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s).”</p> <p>“This product may be used to formulate products for any additional use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s).”</p>	Directions for Use
Environmental Hazards Statements required by the RED and Agency label policies	<p>“This chemical is toxic to fish, aquatic invertebrates, oysters and shrimp. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your state Water Board or Regional Office of the EPA.”</p>	Precautionary Statements
<b>End Use Products Intended for Occupational Use (WPS and Non-WPS)</b>		

Summary of Required Labeling Changes for Thiram		
Description	Required Labeling	Placement on Label
Front Panel Statement for all formulations	“For sale to and use by professional applicators only. Not for sale to or use by homeowners/consumers.”	Insert in a prominent position associated with the Brand name on the front panel of the pesticide label
Handler PPE requirements established by the RED <sup>1</sup> for wettable powders formulated in water-soluble packages	<p>“Personal Protective Equipment (PPE)”</p> <p>“Some materials that are chemical-resistant to this product are (registrant inserts correct chemical resistant material). If you want more options, follow the instructions for category [insert A, B, C, D, E, F, G, or H] on an EPA chemical-resistance category selection chart.”</p> <p>“All mixers, loaders, applicators, flaggers, and other handlers must wear:</p> <ul style="list-style-type: none"> <li>- long-sleeved shirt and long pants,</li> <li>- shoes plus socks,</li> <li>- chemical resistant gloves <i>except</i> when flagging to support aerial applications, applying with aircraft, or applying while driving motorized ground equipment, and</li> <li>- chemical resistant apron when mixing, loading, participating in dip treatments*, cleaning up spills, cleaning equipment, or otherwise exposed to the concentrate.</li> </ul> <p>See engineering controls for additional requirements.”</p> <p>* Note: if the directions for use do not contain a dip scenario, the phrase “participating in dip treatments” should be dropped from the chemical-resistant apron statement.</p>	Precautionary Statements: Hazards to Humans and Domestic Animals

<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
<p>Handler PPE requirements established by the RED<sup>1</sup> for liquid concentrate, dry flowable, and water dispersible granules formulations (Except those formulations labeled solely for seed, bulb, and/or seed piece treatments)</p>	<p>“Personal Protective Equipment (PPE)”</p> <p>“Some materials that are chemical-resistant to this product are (registrant inserts correct chemical resistant material). If you want more options, follow the instructions for category [insert A,B,C,D,E,F,G, or H] on an EPA chemical-resistance category selection chart.”</p> <p>“All mixers, loaders, applicators, people participating in dip treatments, and other handlers must wear:</p> <ul style="list-style-type: none"> <li>- long-sleeved shirt and long pants,</li> <li>- shoes plus socks,</li> <li>- chemical resistant gloves, except when flagging to support aerial applications, applying with aircraft, or applying while driving motorized ground equipment,</li> <li>- chemical resistant apron when mixing, loading, participating in dip treatments*, cleaning up spills, cleaning equipment, or otherwise exposed to the concentrate.”</li> </ul> <p>See engineering controls for additional requirements and options.”</p> <p>* Note: if the directions for use do not contain a dip scenario, the phrase “participating in dip treatments” should be dropped from the chemical-resistant apron statement.</p>	<p>Precautionary Statements: Hazards to Humans and Domestic Animals</p>
<p>Handler PPE requirements established by the RED<sup>1</sup> for granular formulations</p>	<p>“Personal Protective Equipment (PPE)”</p> <p>“Some materials that are chemical-resistant to this product are (registrant inserts correct chemical resistant material). If you want more options, follow the instructions for category [insert A,B,C,D,E,F,G, or H] on an EPA chemical-resistance category selection chart.”</p> <p>“All loaders, applicators, and other handlers must wear:</p> <ul style="list-style-type: none"> <li>- long-sleeved shirt and long pants, and</li> <li>- shoes plus socks.”</li> </ul>	<p>Precautionary Statements: Hazards to Humans and Domestic Animals</p>

<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
<p>Handler PPE requirements established by the RED<sup>1</sup> for dust formulations labeled exclusively for seed and/or seed piece treatments</p> <p>NOTE: if wettable powder formulations are applied dry to seed or seed pieces, use this PPE statement</p>	<p>“Personal Protective Equipment (PPE)”</p> <p>“Some materials that are chemical-resistant to this product are (registrant inserts chemical resistant materials). If you want more options, follow the instructions for category [insert A,B,C,D,E,F,G, or H] on an EPA chemical-resistance category selection chart.”</p> <p>“All loaders, applicators and other handlers must wear:</p> <ul style="list-style-type: none"> <li>- long-sleeved shirt and long pants,</li> <li>- shoes plus socks,</li> <li>- chemical resistant gloves <i>except</i> when sewing bags of treated seed,* and</li> <li>- chemical resistant apron when cleaning up spills, or cleaning equipment.”</li> </ul> <p>*Note: if the product is labeled for solely for seed piece treatment, then the “<i>except</i> when sewing bags of treated seed” phrase should be dropped from the chemical-resistant glove statement.</p>	<p>Precautionary Statements: Hazards to Humans and Domestic Animals</p>
<p>Handler PPE requirements established by the RED<sup>1</sup> for liquid, wettable powder*, and dry flowable formulations labeled exclusively for seed and/or seed piece treatments</p> <p>NOTE: if wettable powder formulations are applied dry to seed or seed pieces, use the PPE statements above for dust formulations</p>	<p>“Personal Protective Equipment (PPE)”</p> <p>“Some materials that are chemical-resistant to this product are (registrant inserts chemical resistant materials). If you want more options, follow the instructions for category [insert A,B,C,D,E,F,G, or H] on an EPA chemical-resistance category selection chart.”</p> <p>“All mixers, loaders, applicators and other handlers must wear:</p> <ul style="list-style-type: none"> <li>- long-sleeved shirt and long pants,</li> <li>- shoes plus socks,</li> <li>- chemical resistant gloves <i>except</i> when sewing bags of treated seed, and</li> <li>- chemical resistant apron when cleaning up spills, or cleaning equipment.”</li> </ul> <p>*Note: if the product is labeled for solely for seed piece treatment, then the “<i>except</i> when sewing bags of treated seed” phrase should be dropped from the chemical-resistant glove statement.</p>	<p>Precautionary Statements: Hazards to Humans and Domestic Animals</p>



<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
<p>Handler PPE requirements established by the RED<sup>1</sup> for liquid concentrate, dry flowable, or water-dispersible granule formulations labeled for both seed or seed piece treatment and also for other agricultural treatment scenarios</p>	<p>“Personal Protective Equipment (PPE)”</p> <p>“Some materials that are chemical-resistant to this product are (registrant inserts chemical resistant materials). If you want more options, follow the instructions for category [insert A,B,C,D,E,F,G, or H] on an EPA chemical-resistance category selection chart.”</p> <p>“All mixers/loaders, applicators and other handlers must wear:</p> <ul style="list-style-type: none"> <li>- long-sleeved shirt and long pants,</li> <li>- shoes plus socks,</li> <li>- chemical resistant gloves, except when flagging to support aerial applications, applying with aerial equipment, or sewing bags of treated seed*, and</li> <li>- chemical resistant apron when mixing, loading, participating in dip treatments**, cleaning up spills, cleaning equipment, or otherwise exposed to the concentrate.”</li> </ul> <p>*Note: if the product is not labeled for seed treatment, then the “<i>except</i> when sewing bags of treated seed” phrase should be dropped from the chemical-resistant glove statement.</p> <p>** Note: if the directions for use do not contain a dip scenario, the phrase “participating in dip treatments” should be dropped from the chemical-resistant apron statement.</p>	<p>Precautionary Statements: Hazards to Humans and Domestic Animals</p>
<p>Handler PPE requirements established by the RED<sup>1</sup> for any formulations labeled for seed treatment</p>	<p>“NOTE: Persons involved in bagging treated seed, sewing or moving bags of treated seed, or cleaning up bagging areas or seed treatment equipment are pesticide handlers and must wear the PPE required on this label for pesticide handlers.”</p>	<p>Precautionary Statements: Hazards to Humans and Domestic Animals Immediately Following the PPE Requirements</p>
<p>Handler PPE requirements established by the RED<sup>1</sup> for any formulations labeled for seed piece treatment</p>	<p>“NOTE: Persons involved in handling, cutting, or sorting treated seed pieces are pesticide handlers and must wear the PPE required on this label for pesticide handlers.”</p>	<p>Precautionary Statements: Hazards to Humans and Domestic Animals Immediately Following the PPE Requirements</p>

<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
User Safety Requirements	“Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.”	Precautionary Statements: Hazards to Humans and Domestic Animals after PPE requirements
Engineering controls for formulations with directions for use that permit aerial applications	Enclosed Cockpits  “Engineering Controls:  Pilots must use an enclosed cockpit that meets the requirements listed in the WPS for agricultural pesticides [40 CFR 170.240(d)(6)].”	Precautionary Statements: Hazards to Humans and Domestic Animals immediately following the PPE and User Safety Requirements
Engineering controls for wettable powder formulations packaged in water-soluble packages	“Engineering Controls”  “Water-soluble packets when used correctly qualify as a closed loading system under the WPS. Mixers and loaders using water-soluble packets (1) must wear the PPE specified for mixers and loaders, (2) must be provided, have immediately available, and wear in an emergency, such as a broken package, spill, or equipment breakdown, chemical-resistant footwear, and a NIOSH-approved dust/mist filtering respirator with MSHA/NIOSH approval number prefix TC-21C <i>or</i> a NIOSH-approved respirator with any N <sup>2</sup> , R, P, or HE filter.”	Precautionary Statements: Hazards to Humans and Domestic Animals immediately following the PPE and User Safety Requirements
Restricted-Entry Interval For WPS products as required by Supplement Three of PR Notice 93-7	“Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours.”	Directions for Use, Agricultural Use Requirements Box
WPS REI Exception Statement for Products with Directions for Use as Seed, Seed Piece, and/or Bulb Treatments	Exception: Once treated [seeds, seed pieces, bulbs] are planted in soil or other planting media, the Worker Protection Standard allows workers to enter the treated area without restriction, if there will be no contact with the treated [seeds, seed pieces, or bulbs].”	Directions for Use, Agricultural Use Requirements Box Immediately Following the REI Statement

<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
Early Entry Protective Equipment for products with WPS uses	<p>Early Entry PPE</p> <p>“PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:</p> <ul style="list-style-type: none"> <li>- coveralls,</li> <li>- shoes plus socks,</li> <li>- chemical-resistant gloves made of any waterproof material, and</li> <li>- protective eyewear.”</li> </ul>	Directions for Use, Agricultural Use Requirements Box
User Safety Recommendations	<p>“User Safety Recommendations”</p> <p>“Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.”</p> <p>“Users should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.”</p> <p>“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.”</p>	Precautionary Statements under: Hazards to Humans and Domestic Animals immediately following Engineering Controls (Must be placed in a box)
Environmental Hazards for products used with outdoor uses only	<p>“Environmental Hazards”</p> <p>“This chemical is toxic to fish, aquatic invertebrates, oysters, and shrimp. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when cleaning equipment or disposing of equipment washwaters or rinsate.”</p>	Precautionary Statements under Environmental Hazards
<p>Additional Environmental Hazards for all products labeled for seed, seed piece, and/or bulb treatments</p> <p>Note: if the label doesn't contain directions for use for seeds or seed pieces or bulb treatments, drop that use from the statement.</p>	<p>“Environmental Hazards”</p> <p>“Treated [seeds, seed pieces, bulbs] are hazardous to fish, birds and mammals. Do not plant treated seeds or seed pieces by broadcasting to the soil surface. Ensure that all [seeds, seed pieces, bulbs] are thoroughly covered with soil, especially in turn areas. If [seeds, seed pieces, bulb] are not thoroughly incorporated by the planter during planting, additional incorporation may be required to thoroughly cover exposed seeds, seed pieces, bulbs.”</p>	Precautionary Statements under Environmental Hazards

<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
Endangered Species Statement	<p>Endangered Species</p> <p>“This bag contains seed treated with thiram. This product may have effects on federally listed threatened endangered species or their critical habitat in some counties. It is a violation of federal law to kill, harm or harass listed animal species without authorization. To limit the potential for such impacts when using this product, consult and follow the instructions provided in the EPA Endangered Species Bulletin for the County or Parish in which you are applying the seed. To determine whether your County or Parish has a Bulletin consult <a href="http://www.epa.gov/espp">http://www.epa.gov/espp</a> before each season's use of this product.”</p>	Precautionary Statements immediately following the User Safety Recommendations
Application Restrictions for formulations applied as a spray	“Do not apply this product using a high pressure handwand or a rights-of-way sprayer.”	Directions for Use
Application Restrictions for granular products	“Application by hand, spoon, or cup or with aerial or bellygrinder equipment is prohibited. Apply this product with a motorized ground spreader, a push-type spreader, or a granular backpack spreader.”	Directions for Use
Application Restrictions for all products except products labeled exclusively for seed or seed piece treatment.	“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.”	Directions for Use
Application Restrictions for products labeled exclusively for seed or seed piece treatment.	“Do not apply this product in a way that will contact workers or other persons. Only protected handlers may be in the area during application.”	Directions for Use

Summary of Required Labeling Changes for Thiram		
Description	Required Labeling	Placement on Label
Other Use/Application Restrictions	<p><u>Cotton Seed</u> When <b>cotton seed</b> is treated in products containing thiram as the <b>single</b> active ingredient: “The maximum application rate for cotton seed is 1.6 oz ai/cwt (1,000 ppm).”</p> <p>When <b>cotton seed</b> is treated with thiram in products containing <b>multiple</b> active ingredients: “The maximum application rate for cotton seed is 1.0 oz ai/cwt (625 ppm).”</p> <p>“Plant treated cotton seed a minimum of 1 inch deep.”</p> <p><u>Barley Seed</u> “Plant barley seed a minimum of 1 inch deep.”</p> <p><u>Oat Seed</u> “Plant oat seed a minimum of 1 inch deep.”</p> <p><u>Sugar Beet Seed</u> “Plant sugar beet seed a minimum of 1 inch deep.”</p> <p><u>Wheat Seed</u> “Plant wheat seed a minimum of 1 inch deep.”</p> <p><u>Onion Seed</u> “When 1.5 lbs ai/cwt is used, the onion seed must undergo pelletized treatment.”</p>	Directions for Use under General Precautions and Restrictions and/or Applications Instructions

Summary of Required Labeling Changes for Thiram		
Description	Required Labeling	Placement on Label
If strawberries are reinstated on the label, then the following language must be on the label under Other Use/Application Restrictions	<p><u>Strawberries</u> For all products applied to strawberries: “Leave 25 foot untreated buffer between treatment area and native plant communities and water bodies.”</p> <p>When <b>strawberries</b> are treated in products containing thiram as the <b>single</b> active ingredient: “The maximum application rate for strawberries is 2.6 lbs ai/acre . Limit to 5 applications per year areas west of the Mississippi River. Limit to 12 applications per year areas east of the Mississippi River.”</p> <p>When <b>strawberries</b> are treated with thiram in products containing <b>multiple</b> active ingredients: “The maximum application rate for strawberries is 1.3 lbs ai/acre. Limited to 5 applications per year areas west of the Mississippi River. Limit to 12 applications per year areas east of the Mississippi River.”</p>	Directions for Use under General Precautions and Restrictions and/or Applications Instructions
Other Use/Application Restrictions for products used as a mammal repellent	“The maximum application rate for products applied as a mammal (deer) repellent is one quart of product in 3 - 7 gallons of water applied in an area of 1000 square feet.”	Directions for Use under specific directions for animal repellent
Other Use/Application Restrictions for all uses except seed treatment	<p><u>Golf Course Tees and Greens</u> “The maximum winter application rate for turf is a single application of 16.3 lbs ai/ acre or 0.374 lbs. ai/1000 sq ft. The maximum summer application rate for turf is 3 applications of 10.2 lbs ai/ acre or 0.234 lbs ai/1000 sq ft. The maximum annual application rate is 47 lbs ai/acre or 1.08 lbs ai/1000 sq ft.”</p>	Directions for Use under General Precautions and Restrictions and/or Applications Instructions

<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
Entry Restrictions for products containing directions for use on golf course tees and greens	“Do not enter or allow others to enter until sprays have dried.”	<p>If no WPS uses on the label, place the statements in the Directions for Use Under General Precautions and Restrictions</p> <p>If WPS uses are also on the labeling, place these statements in a Nonagricultural Use Requirements box as specified in PR Notice 93-7 and 93-11</p>
Environmental Hazards Statements Required by the RED and Agency Label Policies for seeds, seed pieces, or bulbs that are treated with this product that is then packed or bagged for future use	<p>“[Seeds, Bulbs, Seed Pieces] that are treated with this product and are then packaged or bagged for future use must contain the following labeling on the outside of the [seed, bulb, seed piece] package or bag:”</p> <p>Endangered Species</p> <p>“This bag contains seed treated with thiram. This product may have effects on federally listed threatened or endangered species or their critical habitat in some counties. It is a violation of federal law to kill, harm or harass listed animal species without authorization. To limit the potential for such impacts when using this product, consult and follow the instructions provided in the EPA Endangered Species Bulletin for the County or Parish in which you are applying the seed. To determine whether your County or Parish has a Bulletin consult <a href="http://www.epa.gov/espp">http://www.epa.gov/espp</a> before each season's use of this product.”</p>	<p>Directions for Use under the specific instructions for treating seeds, bulbs, and seed pieces.</p>

<b>Summary of Required Labeling Changes for Thiram</b>		
<b>Description</b>	<b>Required Labeling</b>	<b>Placement on Label</b>
Application Restrictions for seeds, seed pieces, and bulbs that are treated with this product and then packaged or bagged for future agriculture or research use	<p>“[Seed, [Bulbs, Seed Pieces] that are treated with this product and are then packaged or bagged for future use by growers or researchers must contain the following labeling on the outside of the [seed, bulb, seed piece] package or bag:”</p> <p>&gt;“This bag contains [seeds, bulbs, seed pieces] treated with thiram. When opening this bag or loading/pouring the treated [seeds, bulbs, seed pieces], wear long-sleeved shirt, long pants, shoes, socks and chemical resistant gloves.”</p> <p>&gt;“Treated [Seeds, Bulbs, Seed Pieces] - Do Not Use for Food, Feed, or Oil Purposes.”</p> <p>&gt;“After the [seeds, bulbs, seed pieces] have been planted, do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 24 hours. Exception: Once the [seeds, bulbs, seed pieces] are planted in soil or other planting media, the Worker Protection Standard allows workers to enter the treated area without restriction if there will be no worker contact with the [seeds, bulbs, seed pieces].”</p>	<p>Directions for Use under the specific instructions for treating seeds, bulbs, and seed pieces.</p> <p>and</p> <p>areas</p>
Application Restrictions for seeds, seed pieces, and bulbs that are treated with this product and are then packaged or bagged for future homeowner or residential use	<p>“[Seed, bulbs, seed pieces] that are treated with this product and are then packaged or bagged for future use by homeowners or other residential users must contain the following labeling on the outside of the [seed, bulb, seed piece] package or bag:”</p> <p>&gt;“Treated [Seed , Bulbs, Seed Pieces] - Do Not Use for Food, Feed, or Oil Purposes.”</p>	<p>Directions for Use under the specific instructions for treating seeds, bulbs, and seed pieces.</p>
Environmental Hazards Statements Required by the RED and Agency Label Policies for seeds, bulbs, or seed pieces that are treated with this product and are then packed or bagged for future use	<p>“[Seeds, Bulbs, Seed Pieces] that are treated with this product and are then packaged or bagged for future use must contain the following labeling on the outside of the [seed, bulb, seed piece] package or bag:”</p> <p>&gt;“Treated [seeds, bulbs, seed pieces] are hazardous to fish, birds and mammals. Do not plant treated seeds [bulbs, seed pieces] by broadcasting to the soil surface. Ensure that all planted seeds [bulbs, seed pieces] are thoroughly covered with soil, especially in turn areas. If [seeds, bulbs, seed pieces] are not thoroughly incorporated by the planter during planting, additional incorporation may be required to thoroughly cover exposed [seeds, bulbs, seed pieces]. Do not apply to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate or by disposal of wastes.”</p> <p>In addition for cotton, wheat, barley, oats, and sugar beets include the statement:  &gt;“Plant [cotton, wheat, barley, oats, and sugar beet] seed a minimum of 1 inch deep.”</p>	<p>Directions for Use under the specific instructions for treating seeds, bulbs, and seed pieces.</p> <p>are</p>



Summary of Required Labeling Changes for Thiram		
Description	Required Labeling	Placement on Label
Spray Drift language for products applied outdoors as a spray	<p>“SPRAY DRIFT MANAGEMENT”</p> <p>“Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.”</p> <p>“Apply only as a medium or coarser spray (ASAE standard 572) or a volume mean diameter of 300 microns or greater for spinning atomizer nozzles.”</p> <p>“Apply only when the wind speed is 2-10 mph at the application site.”</p> <p><i>Additional requirements for aerial applications:</i></p> <p>“The boom length must not exceed 75% of the wingspan or 90% of the rotor blade diameter.”</p> <p>“Release spray at the lowest height consistent with efficacy and flight safety. Do not release spray at a height greater than 15 feet above the crop canopy.”</p> <p>“When applications are made with a crosswind, the swath will be displaced downwind. The applicator must compensate for this displacement at the downwind edge of the application area by adjusting the path of the aircraft upwind.”</p> <p>“Do not make applications into temperature inversions.”</p> <p><i>Additional requirements for ground boom application:</i></p> <p>“Do not apply with a nozzle height greater than 4 feet above the crop canopy.”</p>	Directions for Use

<sup>1</sup> PPE that is established on the basis of Acute Toxicity of the end-use product must be compared to the active ingredient PPE in this document. The more protective PPE must be placed in the product labeling. For guidance on which PPE is considered more protective, see PR Notice 93-7.

<sup>2</sup> The registrant must drop the N type filter from the respirator statement if the pesticide product contains or is used with oil.



## **VI. APPENDICES**



**Appendix A: THIRAM USE PATTERNS ELIGIBLE FOR REREGISTRATION**

<b>Site</b> Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Foliar Uses</b>						
<b>Apple</b>						
Foliar or delayed dormant (including prebloom through first cover spray and preharvest) Ground or aerial	75% DF [45728-21]	4.5 lb/A (concentrate)	Not specified (NS)	22.5 lb/A	14	Use limited to eastern U.S. (East of the Rockies); use prohibited in CA. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 400 gal/A), or aerial applications may be made in a minimum of 10 gal/A. The grazing or feeding of cover crops from treated orchards is prohibited.
		1.125 lb/100 gal (dilute)		21 lb/A	7	Use limited to western U.S. (West of the Rockies); use prohibited in CA. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 400 gal/A), or aerial applications may be made in a minimum of 10 gal/A. The grazing or feeding of cover crops from treated orchards is prohibited.
Foliar or delayed dormant (including prebloom, bloom, calyx, petal fall, and cover periods) Ground or aerial	65% WP [45728-24]	5.2 lb/A (concentrate) or 1.3 lb/100 gal (dilute)	NS	NS	NS	Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 400 gal/A), or aerial applications may be made in a minimum of 10 gal/A. The grazing or feeding of cover crops from treated orchards is prohibited.

<b>Site</b> Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Peach</b>						
Foliar or delayed dormant (from pink through early cover spray and preharvest) Ground or aerial	75% DF [45728-21]	2.625 lb/A (concentrate)  0.9 lb/100 gal (dilute)	NS	13.125 lb/A	7	Use prohibited in CA. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 300 gal/A), or aerial applications may be made in a minimum of 10 gal/A. The grazing or feeding of cover crops from treated orchards is prohibited.
Dormant (postharvest in late fall after leaf drop and/or late winter prior to bud swell) and foliar (at bloom and petal fall) Ground or aerial		3.825 lb/A (concentrate)  1.275 lb/100 gal (dilute)	NS	NS	NS	
Dormant, delayed dormant, or foliar Ground or aerial	65% WP [45728-24]	4.5 lb/A (concentrate) or 1.5 lb/100 gal (dilute)	NS	NS	7	Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 300 gal/A), or aerial applications may be made in a minimum of 10 gal/A. The grazing or feeding of cover crops from treated orchards is prohibited.

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Strawberry</b>						
Foliar (beginning at early blossom stage through preharvest) Ground or aerial	75% DF [45728-21]	3.3 lb/A (concentrate)  3.3 lb/100 gal (dilute)	5	NS	5	Use limited to eastern U.S. (East of the Rockies); use prohibited in FL. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 100 gal/A), or aerial applications may be made in a minimum of 10 gal/A with a 10-day retreatment interval.
					3	Use limited to western U.S. (West of the Rockies); use prohibited in CA. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 100 gal/A), or aerial applications may be made in a minimum of 10 gal/A with a 10-day retreatment interval.

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Strawberry (continued)</b>						
Foliar (when new growth begins in the spring and before fruit starts to form) Ground or aerial	65% WP [45728-24]	3.315 lb/A (concentrate) or 1.69 lb/100 gal (dilute)	5	NS	5	Use limited to eastern U.S. (East of the Rockies); use prohibited in FL. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 100 gal/A), or aerial applications may be made in a minimum of 10 gal/A with a 10-day retreatment interval.
					3	Use limited to FL. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 100 gal/A), or aerial applications may be made in a minimum of 10 gal/A with a 10-day retreatment interval.
		2.21 lb/A (concentrate) or 1.105 lb/100 gal (dilute)	5	NS	1	Use limited to FL. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 100 gal/A), or aerial applications may be made in a minimum of 10 gal/A with a 10-day retreatment interval.



<b>Site</b> Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Strawberry (continued)</b>						
Foliar (when new growth begins in the spring and before fruit starts to form) Ground or aerial	65% WP [45728-24]	3.315 lb/A (concentrate) or 1.69 lb/100 gal (dilute)	5	NS	3	Use limited to western U.S. (West of the Rockies); use prohibited in Santa Maria and Fallbrook counties of CA. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 100 gal/A), or aerial applications may be made in a minimum of 10 gal/A with a 10-day retreatment interval.
		2.21 lb/A (concentrate) or 1.105 lb/100 gal (dilute)	5	NS	5	Use limited to Santa Maria and Fallbrook counties of CA. Concentrate ground applications may be made in a minimum of 20 gal/A, dilute applications may be made in 100 gals (based on a finished spray of 100 gal/A), or aerial applications may be made in a minimum of 10 gal/A with a 10-day retreatment interval.

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Seed Treatments <sup>2</sup></b>						
<b>Alfalfa and other small seed legumes</b>						
Seed treatment Slurry	30% FIC [7501-17]	44.1 fl.oz product/cwt	Not applicable (NA)	NA	NA	
	2.4 lb/gal SC [7501-125]	1.8 oz/bushel	NA	NA	NA	
<b>Barley</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.05 oz/cwt	NA	NA	NA	
Seed treatment Dry	20% D [7501-44]	0.8 oz/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting is prohibited.
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.2 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	12.8 fl.oz product/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Barley (continued)</b>						
Seed treatment Slurry (undiluted)	1.17 lb/gal RTU [7501-141] [MT90006]	0.88 oz/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting is prohibited.
	13.2% FIC [7501-133]	5.0 fl.oz product/cwt	NA	NA	NA	
	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	
	1.33 lb/gal RTU [7501-80]	1.5 oz/cwt	NA	NA	NA	Application rates less than 1 oz ai must be diluted with water. The grazing of green forage within 40 days of seeding is prohibited.
Seed treatment Slurry (diluted)	1.84 lb/gal FIC [7501-151]	1.06 oz/cwt	NA	NA	NA	The grazing of barley within 31 days after planting is prohibited.
<b>Bean (dry and succulent)</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.0 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	11.0 fl.oz product/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Bean (dry and succulent)(continued)</b>						
Seed treatment Slurry (undiluted)	13.2% FIC [7501-133]	4.0 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of livestock on vines grown from treated seed is prohibited.
	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of bean forage to livestock within 60 days after treated seed is planted is prohibited.
<b>Bean, Lima</b>						
Seed treatment Dry or slurry	50% WP/D [7501-105]	1.5 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.4 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.5 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	16.4 fl.oz product/cwt	NA	NA	NA	
<b>Bean, snap</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.5 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.0 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	11.0 fl.oz product/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Beet, garden</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Beet, sugar</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Broccoli</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Brussels sprouts</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Cabbage</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Canola</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	3.2 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	3.2 oz/cwt	NA	NA	NA	
Seed treatment Slurry	4 lb/gal FIC [7501-14]	3.2 oz/cwt	NA	NA	NA	
	6.57% FIC [ID930004]	34.6 fl.oz product/cwt	NA	NA	NA	Use limited to ID for canola seed/rapeseed destined for export to Canada.

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Carrot</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Castor bean</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.3 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.25 oz/cwt	NA	NA	NA	
Seed treatment Slurry	4 lb/gal FIC [7501-14]	2.25 oz/cwt	NA	NA	NA	
<b>Cauliflower</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Celery</b>						
Seed treatment Slurry	4 lb/gal FIC [CA970027]	3.36 oz/cwt <sup>3</sup>	NA	NA	NA	Use limited to CA for celery seed destined for export only.
<b>Chicory</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.6 oz/cwt	NA	NA	NA	Use prohibited in CA.
Seed treatment Slurry	4 lb/gal FIC [7501-14]	2.25 oz/cwt	NA	NA	NA	
<b>Clover and other small seeded legumes</b>						
Seed treatment Slurry	30% FIC [7501-17]	44.1 fl.oz product/cwt	NA	NA	NA	
	2.4 lb/gal SC [7501-125]	1.8 oz/bushel	NA	NA	NA	
<b>Collards</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Coriander</b>						
Seed treatment Slurry	4 lb/gal FIC [WA970032]	2.5 oz/cwt	NA	NA	NA	Use limited to WA for coriander seed destined for export to Mexico.



<b>Site</b> Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Corn, field</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.5 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.5 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	0.75 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	0.75 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	15.2 fl.oz product/cwt	NA	NA	NA	
Seed treatment Slurry (undiluted)	13.2% FIC [7501-133]	5.0 fl.oz product/cwt  11.5 fl.oz product/cwt for control of corn head smut	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting grain crops is prohibited.

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Corn, sweet</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.5 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.5 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.5 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	2.5 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	16.2 fl.oz product/cwt	NA	NA	NA	
Seed treatment Slurry (undiluted)	13.2% FIC [7501-133]	5.0 fl.oz product/cwt  11.5 fl.oz product/cwt for control of corn head smut	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting grain crops is prohibited.

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Cottonseed (acid and machined delinted, fuzzy, and reginned)</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.3 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.25 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.2 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	2.25 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	22.3 fl.oz product/cwt	NA	NA	NA	
Seed treatment Slurry (undiluted)	1.33 lb/gal RTU [7501-80]	2.0 oz/cwt	NA	NA	NA	Application rates less than 1 oz ai must be diluted with water. The grazing of green forage within 40 days of seeding is prohibited.
	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	
<b>Cowpea</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	11.0 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Cucurbits (including cantaloupe, cucumber, pumpkin, squash, and watermelon)</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.3 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.25 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.28 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	2.25 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	14.2 fl.oz product/cwt	NA	NA	NA	
<b>Eggplant</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	3.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	3.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	19.8 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	3.25 oz/cwt	NA	NA	NA	

<b>Site</b> Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Endive</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Flax</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.6 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.65 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.4 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.5 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	15.5 fl.oz product/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Grasses</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
	10% RTU [OR950034]	14.0 fl.oz product/cwt	NA	NA	NA	Use limited to OR for grass seed destined for export only.
<b>Kale</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Kohlrabi</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Legume (small-seeded)</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Lentils</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.5 oz/cwt	NA	NA	NA	Use prohibited in CA.
Seed treatment Slurry	30% FIC [7501-17]	16.4 fl.oz product/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Lettuce</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Millet</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	13.5 fl.oz product/cwt	NA	NA	NA	
<b>Mustard</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	



Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Oats</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.7 oz/cwt	NA	NA	NA	Use prohibited in CA.
Seed treatment Dry	20% D [7501-44]	0.8 oz/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting is prohibited.
Seed treatment Slurry (diluted)	1.84 lb/gal FIC [7501-151]	1.06 oz/cwt	NA	NA	NA	The grazing of oats within 30 days after planting is prohibited.
	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
Seed treatment Slurry (undiluted)	13.2% FIC [7501-133]	5.0 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting grain crops is prohibited.
	1.17 lb/gal RTU [7501-141] [MT90006]	0.73 oz/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting is prohibited.
	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	
	1.33 lb/gal RTU [7501-80]	1.5 oz/cwt	NA	NA	NA	Application rates less than 1 oz ai must be diluted with water. The grazing of green forage within 40 days of seeding is prohibited.
<b>Okra</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	3.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	3.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	4 lb/gal FIC [7501-14]	3.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Onion</b>						
Seed treatment Dry	50% D [CA850026] [NJ940001] [WA840070]	1.25 lb/cwt	NA	NA	NA	Use limited to CA, NJ, and WA for onion seed destined for export to Canada.
	50% WP/D [AZ920005] [CA890029] [MI880007] <sup>4</sup>	3.0 oz/cwt	NA	NA	NA	Use limited to AZ and CA.
Seed treatment Dry or slurry	75% DF [45728-21]	3.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	3.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	19.8 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	3.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
<b>Peanut (shelled and unshelled)</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.3 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.25 oz/cwt	NA	NA	NA	
Seed treatment Slurry (undiluted)	4 lb/gal FIC [7501-14]	1.5 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Pea</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.5 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.5 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.4 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.5 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	16.4 fl.oz product/cwt	NA	NA	NA	
<b>Pepper</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Radish</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Rice</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.2 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.15 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	0.75 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	0.75 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	35.1 fl.oz product/cwt	NA	NA	NA	
Seed treatment Slurry	4 lb/gal FIC [7501-14]	2.0 oz/cwt	NA	NA	NA	Use limited to CA.
Seed treatment Slurry (undiluted)	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Rye</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.9 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.85 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	0.98 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	10.8 fl.oz product/cwt	NA	NA	NA	
Seed treatment Slurry (undiluted)	1.33 lb/gal RTU [7501-80]	1.5 oz/cwt	NA	NA	NA	Application rates less than 1 oz ai must be diluted with water. The grazing of green forage within 40 days of seeding is prohibited.
<b>Safflower</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	2.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	2.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	10.8 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
	17% FIC [MT850002]	4.0 fl.oz product/cwt	NA	NA	NA	Use limited to MT.

<b>Site</b> Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Sesame</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.5 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.5 oz/cwt	NA	NA	NA	
Seed treatment Slurry	4 lb/gal FIC [7501-14]	1.5 oz/cwt	NA	NA	NA	
<b>Sorghum</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.4 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.35 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	1.6 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	13.5 fl.oz product/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Soybean</b>						
Seed treatment Dry	26.6% D [7501-117]	1.0 oz/bushel	NA	NA	NA	
Seed treatment Dry or slurry	75% DF [45728-21]	1.7 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.65 oz/cwt	NA	NA	NA	
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	0.72 oz/cwt	NA	NA	NA	
	2.4 lb/gal SC [7501-125]	0.6 oz/bushel	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/cwt	NA	NA	NA	
	30% FIC [7501-17]	11.0 fl.oz product/cwt	NA	NA	NA	
Seed treatment Slurry (undiluted)	13.2% FIC [7501-133]	4.0 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of livestock on vines grown from treated seed is prohibited.
	6.4% RTU [7501-95]	10.0 fl.oz product/cwt	NA	NA	NA	
	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of livestock on soybean forage or soybean hay from treated areas is prohibited.
	1.25 lb/gal RTU [7501-158]	0.625 oz/bushel	NA	NA	NA	
	1.2 lb/gal RTU [7501-121] [7501-123]	0.6 oz/bushel	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Soybean (continued)</b>						
Seed treatment Slurry (undiluted or diluted)	1.1 lb/gal RTU [7501-135]	0.91 oz/cwt	NA	NA	NA	The grazing or feeding of livestock on soybean forage or soybean hay from treated areas is prohibited.
<b>Spinach</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Sunflower</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.1 oz/cwt	NA	NA	NA	Use prohibited in CA.
Seed treatment Slurry	30% FIC [7501-17]	11.0 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	



Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Swiss chard</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	
<b>Tomato</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	3.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	3.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	19.8 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Triticale</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	1.7 oz/cwt	NA	NA	NA	Use prohibited in CA.
Seed treatment Slurry	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
Seed treatment Slurry (undiluted)	13.2% FIC [7501-133]	3.0 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting grain crops is prohibited.
	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting is prohibited.
<b>Turnip</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	4.0 oz/cwt	NA	NA	NA	
Seed treatment Slurry	30% FIC [7501-17]	26.5 fl.oz product/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	4.0 oz/cwt	NA	NA	NA	

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Wheat</b>						
Seed treatment Dry or slurry	75% DF [45728-21]	4.0 oz/cwt	NA	NA	NA	Use prohibited in CA.
	50% WP/D [7501-105]	1.65 oz/cwt	NA	NA	NA	
Seed treatment Dry	20% D [7501-44]	0.8 oz/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting is prohibited.
Seed treatment Slurry	2.9 lb/gal SC [7501-64]	0.93 oz/cwt	NA	NA	NA	
	4 lb/gal FIC [7501-14]	1.0 oz/bushel	NA	NA	NA	
	30% FIC [7501-17]	10.1 fl.oz product/cwt	NA	NA	NA	
Seed treatment Slurry (undiluted)	13.2% FIC [7501-133]	5.0 fl.oz product/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting grain crops is prohibited.
	1.17 lb/gal RTU [7501-141] [MT90006]	0.73 oz/cwt	NA	NA	NA	The grazing or feeding of livestock on treated areas for six weeks after planting is prohibited.
	10% RTU [7501-114]	6.8 fl.oz product/cwt	NA	NA	NA	
	1.33 lb/gal RTU [7501-80]	1.5 oz/cwt	NA	NA	NA	Application rates less than 1 oz ai must be diluted with water. The grazing of green forage within 40 days of seeding is prohibited.

Site Application Timing Application Type Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Application Rate, ai	Maximum Number of Applications Per Season	Maximum Seasonal Rate, ai	Preharvest Interval, Days	Use Directions and Limitations <sup>1</sup>
<b>Wheat (continued)</b>						
Seed treatment Slurry (undiluted or diluted)	1.1 lb/gal RTU [7501-135]	0.91 oz/cwt	NA	NA	NA	
Seed treatment Slurry (diluted)	1.84 lb/gal FIC [7501-151]	1.06 oz/cwt	NA	NA	NA	The grazing of wheat within 30 days after planting is prohibited.

<sup>1</sup> Only crops with registered thiram uses may be rotated is specified on the product label for the 75% DF (EPA Reg. No. 45728-21) formulation.

<sup>2</sup> The Thiram Task Force II has submitted metabolism studies derived from seed treatment of soybean, sugar beets, and wheat. Because these data indicate breakdown of thiram in soil followed by incorporation into natural components, the Agency has concluded that thiram seed treatment uses are non-food uses and that no tolerances are required for seed treatment uses of thiram.

<sup>3</sup> The parent registration is a 4 lb/gal FIC (42% thiram) formulation, however, the label rate is expressed in ounces of product. The maximum single application rate was calculated from percent active ingredient.

<sup>4</sup> Contents of registration jacket copied for SLN No. MI880007, however, no label was available for review.

## Appendix B. TABLE OF GENERIC DATA REQUIREMENTS AND STUDIES USED TO MAKE THE REREGISTRATION DECISION

### GUIDE TO APPENDIX B

Appendix B contains listing of data requirements which support the reregistration for active ingredients within case #0022 (thiram) covered by this RED. It contains generic data requirements that apply to thiram in all products, including data requirements for which a "typical formulation" is the test substance.

The data table is organized in the following formats:

1. Data Requirement (Column 1). The data requirements are listed in the order in which they appear in 40 CFR part 158. The reference numbers accompanying each test refer to the test protocols set in the Pesticide Assessment Guidance, which are available from the National technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 (703) 487-4650.
2. Use Pattern (Column 2). This column indicates the use patterns for which the data requirements apply. The following letter designations are used for the given use patterns.
  - A. Terrestrial food
  - B. Terrestrial feed
  - C. Terrestrial non-food
  - D. Aquatic food
  - E. Aquatic non-food outdoor
  - F. Aquatic non-food industrial
  - G. Aquatic non-food residential
  - H. Greenhouse food
  - I. Greenhouse non-food
  - J. Forestry
  - K. Residential
  - L. Indoor food
  - M. Indoor non-food
  - N. Indoor medical
  - O. Indoor residential
3. Bibliographic Citation (Column 3). If the Agency has acceptable data in its files, this column list the identify number of each study. This normally is the Master Record

Identification (MIRD) number, but may be a "GS" number if no MRID number has been assigned. Refer to the Bibliography appendix for a complete citation of the study.

## **Appendix B. Data Supporting Guideline Requirements for the Reregistration of Thiram**

<b>New Guideline Number</b>	<b>Old Guideline Number</b>	<b>Requirement</b>	<b>Use Pattern</b>	<b>Bibliographic Citation(s)</b>
<b>PRODUCT CHEMISTRY</b>				
830.1550	61-1	Product Identity and Composition	A,B,C,K	00143624, 00161985, 40224501, 41006301, 41006302, 41006303, 4112401, 44550808, 44550809, 44550810, 44550811, Data Gap
830.1600	61-2a	Start. Mat. & Mfg. Process	A,B,C,K	00148170, 00149379, Data gap
830.1620	61-2b	Description of Production Process	A,B,C,K	00148170, 00149379, Data gap
830.1670	61-2b	Discussion of Impurities	A,B,C,K	00148170, Data gap
830.1700	62-1	Preliminary Analysis	A,B,C,K	00148170, 00149379, Data gap
830.1750	62-2	Certification of limits	A,B,C,K	00148170, Data gap
830.1800	62-3	Analytical Method	A,B,C,K	00162015, 00161985, Data gap
830.6302	63-2	Color	A,B,C,K	00148170, 00149379, Data gap
830.6303	63-3	Physical State	A,B,C,K	00148170, 00149379, Data gap
830.6304	63-4	Odor	A,B,C,K	00148170, 00149379, 00148415, Data gap
830.6313	63-13	Stability - temp and ions	A,B,C,K	00149379, 44550811, Data gap
830.6314	63-14	Oxidation and Reduction	A,B,C,K	Data gap
830.6315	63-15	Flammability	A,B,C,K	Data gap
830.6316	63-16	Explosibility	A,B,C,K	Data gap
830.6317	63-17	Storage stability	A,B,C,K	42910401, Data gap
830.6319	63-19	Miscibility	A,B,C,K	Data gap
830.6320	63-20	Corrosion Characteristics	A,B,C,K	42910201, Data gap
830.7000	63-12	pH	A,B,C,K	00148170, 00149379, Data gap
830.7050	none	UV/Visible absorption	A,B,C,K	Data gap
830.7100	63-18	Viscosity	A,B,C,K	Data gap
830.7200	63-5	Melting point/melting range	A,B,C,K	00148170, 00149379, 00148415, Data gap

**Appendix B. Data Supporting Guideline Requirements for the Reregistration of Thiram**

<b>New Guideline Number</b>	<b>Old Guideline Number</b>	<b>Requirement</b>	<b>Use Pattern</b>	<b>Bibliographic Citation(s)</b>
830.7220	63-6	Boiling point/range	A,B,C,K	<b>Data gap</b>
830.7300	63-7	Density	A,B,C,K	<b>00148170, 00149379, Data gap</b>
830.7370	63-10	Dissociation Constants in Water	A,B,C,K	<b>00151609, 00152557, Data gap</b>
830.7550	63-11	Partial Coefficient, shake flask method	A,B,C,K	<b>00147102, 00148170, 00149379, 00148415, Data gap</b>
830.7840 830.7860	63-8	Water Solubility	A,B,C,K	<b>00147102, 00148170, 00149379, 00148415, Data gap</b>
830.7950	63-9	Vapor Pressure	A,B,C,K	<b>00148487, 00152557, Data gap</b>
<b>ECOLOGICAL EFFECTS</b>				
850.2100	71-1	Avian Acute Toxicology	A,B,C,K	<b>BAOTH103, 00075683</b>
850-2200	71-2	Avian Subacute Dietary	A,B,C,K	<b>00022923</b>
850.2300	71-4a	Avian Reproduction - quail	A,B,C,K	<b>43612502</b>
850.2300	71-4b	Avian Reproduction - duck	A,B,C,K	<b>43612501, 45441201, Data gap</b>
850.2500	71-5a	Simulated or Actual Field Testing	A,B,C,K	<b>43612505, 43612506</b>
850.1075	72-1	Fish Acute Toxicity	A,B,C,K	<b>00070801, BAOTH102, 00090293, 00034713</b>
850.1010	72-2	Acute Toxicity to Freshwater Invertebrates	A,B,C,K	<b>00164662</b>
850.1055	72-3	Acute Toxicity to Estuarine/Marine Organisms (fish, mollusk, shrimp)	A,B,C,K	<b>42514401, 42488301, 42488302</b>
850.1300	72-4a	Fish- Early Life Stage	A,B,C,K	<b>Data Gap</b>
850.1350	72-4b	Life cycle freshwater, aquatic invertebrate	A,B,C,K	<b>00164662, Data Gap</b>
850.1500	72-5	Life cycle fish	A,B,C,K	<b>42514401, Data Gap</b>
850.4400	122-2	Aquatic Plant Toxicity	A,B,C,K	<b>45444202, 44086101</b>



## **Appendix B. Data Supporting Guideline Requirements for the Reregistration of Thiram**

<b>New Guideline Number</b>	<b>Old Guideline Number</b>	<b>Requirement</b>	<b>Use Pattern</b>	<b>Bibliographic Citation(s)</b>
<b>OCCUPATIONAL/RESIDUE EXPOSURE</b>				
875.2100 and 875.2200	132-1a and b	Dissipation of Dislodgeable Foliar and Soil Residues	A,B,C,K	<b>Data Gap</b>
875.2400	133-3	Dermal Passive Dosimetry Exposure	A,B,C,K	<b>Data Gap</b>
875.2500	133-4	Inhalation Passive Dosimetry Exposure	A,B,C,K	<b>Data Gap</b>
NONE	85-3	Dermal Absorption	A,B,C,K	<b>Data Gap</b>
875.1100	None	Dermal Exposure Study	A,B,C,K	<b>45442701, Data gap</b>
875.1300	None	Inhalation Exposure Study	A,B,C,K	<b>45442701, Data gap</b>
875.1600	236	Application Exposure Monitoring Data	A,B,C,K	<b>45250701, 45250702, 45654501, 42251901, 42251902, 44904526, 43080049, 47031611</b>
875.1100 875.1200	231 233	Estimation of Dermal Exposure	A,B,C,K	<b>45442701,</b>
875.1300 875.1400	234 235	Estimation of Inhalation Exposure	A,B,C,K	<b>45442701</b>
<b>TOXICOLOGY</b>				
870.1100	81-1	Acute Oral Toxicity-Rat	A,B,C,K	<b>00163854, 00153548, 42095901</b>
850.3020	144-1	Acute Contact Toxicity - Insect	A,B,C,K	<b>00001999</b>
870.1200	81-2	Acute Dermal Toxicity-Rabbit/Rat	A,B,C,K	<b>00147099, 42642501, 00259250</b>
870.1300	81-3	Acute Inhalation Toxicity-Rat	A,B,C,K	<b>00152556, 00165855</b>
870.2400	81-4	Primary Eye Irritation-Rabbit	A,B,C,K	<b>00147100, 00259250</b>
870.2500	81-5	Primary Skin Irritation	A,B,C,K	<b>00147101, 00259250</b>

**Appendix B. Data Supporting Guideline Requirements for the Reregistration of Thiram**

<b>New Guideline Number</b>	<b>Old Guideline Number</b>	<b>Requirement</b>	<b>Use Pattern</b>	<b>Bibliographic Citation(s)</b>
870.2600	81-6	Dermal Sensitization	A,B,C,K	<b>00153068</b>
870.6200	81-8	Acute Neurotoxicity Screen in Rats	A,B,C,K	<b>45589101, 42912401</b>
870.6300	83-6	Developmental Neurotoxicity Study - Cholinesterase Activity Assessment Screening Assay	A,B,C,K	<b>Data Gap</b>
870.3100	82-1a	90-Day Feeding - Rodent	A,B,C,K	<b>43012701</b>
870.3200	82-2	21-Day Dermal - Rabbit/Rat	A,B,C,K	<b>42642501</b>
?	82-5b	90-day neurotox - mammal	A,B,C,K	<b>42095901,</b>
870.4100	83-1a	Chronic Feeding Toxicity - Rodent	A,B,C,K	<b>42157601</b>
870.4100	83-1b	Chronic Feeding Toxicity - Non-Rodent	A,B,C,K	<b>41503608, 41967901</b>
870.4200	83-2a	Oncogenicity - rat	A,B,C,K	<b>42313401</b>
870.3700	83-3a	Developmental Toxicity (Teratogenicity) - rat	A,B,C,K	<b>00259810, 40534101, 42095901, 42223601, 41498301</b>
870.3700	83-3b	Developmental Toxicity (Teratogenicity) - rabbit	A,B,C,K	<b>42223601, 40577301, 40444702, Data Gap</b>
870.3800	83-4	2-Generation Reproduction - Rat	A,B,C,K	<b>45441203, 42095901</b>
870.4300	83-5	Combined Chronic Toxicity/ Carcinogenicity	A,B,C,K	<b>42157601, 41967901</b>
870.5375	84-2b	Structural chrom. aberration	A,B,C,K	<b>40510901,</b>
870.7485	85-1	General Metabolism	A,B,C,K	<b>42235701, 42235702</b>
<b>ENVIRONMENTAL FATE</b>				
835.2120	161-1	Hydrolysis	A,B,C,K	<b>41840601, 45714101, Data gap</b>
835.2240	161-2	Photodegradation - Water	A,B,C,K	<b>45651201, 41753801</b>
835.2410	161-3	Photodegradation - Soil	A,B,C,K	<b>45724501, 43661801</b>

**Appendix B. Data Supporting Guideline Requirements for the Reregistration of Thiram**

<b>New Guideline Number</b>	<b>Old Guideline Number</b>	<b>Requirement</b>	<b>Use Pattern</b>	<b>Bibliographic Citation(s)</b>
835.4100	162-1	Aerobic Soil Metabolism	A,B,C,K	<b>43734901</b>
835.4200	162-2	Anaerobic Soil Metabolism	A,B,C,K	<b>Data Gap</b>
835.4400	162-3	Anaerobic Aquatic Metabolism	A,B,C,K	<b>43628501</b>
835.4300	162-4	Aerobic Aquatic Metabolism	A,B,C,K	<b>45243401</b>
835.1240	163-1	Leaching/Adsorption/Desorption	A,B,C,K	<b>43787501, Data gap</b>
835.6100	164-1	Terrestrial Field Dissipation	A,B,C,K	<b>44724501, 44724502</b>
<b>RESIDUE CHEMISTRY</b>				
860.1200		Directions for Use		<b>Data gap</b>
860.1300	171-4a	Nature of Residue in Plants	A,B,C,K	<b>43562201, 43741901, 00162142, 40216502, 44992501, Data gap</b>
860.1300	171-4b	Nature of Residue in Livestock	A,B,C,K	<b>41006201, 42677501, 41006202, 42943701, 42954201, Data gap</b>
860.1340	171-4c	Residue Analytical Method - plant	A,B,C,K	<b>00098143, 00098190, 00041997, 00085531, 00098644, 40495201, 42399601, 40216502, 00002931, 00086910, 00090174, 0098132, 00098135, 00098137, 41065001, 41065002, 41065003, 41065004, 41065005, 41065006, 41065007, 4153601, 41503602, 41503603, 41503604, 41503605, Data gap</b>
860.1340	171-4d	Residue Analytical Method - livestock	A,B,C,K	<b>41006201, 41006202, 42677501, 42943701, 42954201, Data gap</b>
860.1360	171-4m	Multiple Residue Methods	A,B,C,K	<b>00002931, 00072406, 00090174, Data gap</b>
860.1380	171-4e	Storage stability	A,B,C,K	<b>42399601, 43762601, Data Gap</b>
860.1480	171-4j	Residues on Meat/Milk/Poultry/Egg	A,B,C,K	<b>Data Gap</b>
860.1500	171-4k	Cropfield Residue (general)	A,B,C,K	<b>00045165, 00089408</b>
860.1500	171-4k	Cropfield Residue (Celery)	A,B,C,K	<b>00090157, 00098135, 00098190</b>
860.1500	171-4k	Cropfield Residue (Lettuce)	A,B,C,K	<b>41503601</b>

**Appendix B. Data Supporting Guideline Requirements for the Reregistration of Thiram**

<b>New Guideline Number</b>	<b>Old Guideline Number</b>	<b>Requirement</b>	<b>Use Pattern</b>	<b>Bibliographic Citation(s)</b>
860.1500	171-4k	Cropfield Residue (Cabbage)	A,B,C,K	<b>42399603</b>
860.1500	171-4k	Cropfield Residue (Bean, Dry and Succulent)	A,B,C,K	<b>41065004, 41065005, 43835201</b>
860.1500	171-4k	Cropfield Residue (Soybean)	A,B,C,K	<b>00162142, 40216502, 41065006, 43835208</b>
860.1500	171-4k	Cropfield Residue (Pea)	A,B,C,K	<b>41503602</b>
860.1500	171-4k	Cropfield Residue (Tomatoes)	A,B,C,K	<b>42399605, 00098190</b>
860.1500	171-4k	Cropfield Residue(Cucumber)	A,B,C,K	<b>42399604</b>
860.1500	171-4k	Cropfield Residue (Apple)	A,B,C,K	<b>00075880, 00089610, 00098140, 43757401, 43813101, 43846301, 447244505, 44992501, Data Gap</b>
860.1500	171-4k	Cropfield Residue (Peach)	A,B,C,K	<b>00045165, 00089408, 00098190, 00098132, 00098150, 43759101, 44550814, 44724503, Data Gap</b>
860.1500	171-4k	Cropfield Residue (Strawberry)	A,B,C,K	<b>00098150, 43762601, 43762602, 44550816, 44724504, 45560301, 00045165, 00098190,</b>
Cereal Grains Group				
860.1500	171-4k	Cropfield Residue (Sweet Corn)	A,B,C,K	<b>41065003, 43835202</b>
860.1500	171-4k	Cropfield Residue (Field Corn)	A,B,C,K	<b>41065002</b>
860.1500	171-4k	Cropfield Residue (Wheat)	A,B,C,K	<b>00162142, 40216502, 41065007, 43835210</b>
Forage, Fodder, and Straw of Cereal Grains Group				
860.1500	171-4k	Cropfield Residue (Field Corn)	A,B,C,K	<b>41065002, 43835206</b>
860.1500	171-4k	Cropfield Residue (Sweet Corn.)	A,B,C,K	<b>41065003</b>
860.1500	171-4k	Cropfield Residue (Wheat, Forage, Hay, and Straw)	A,B,C,K	<b>00162142, 40216502, 41065007</b>
Non-Grass Animal Feeds (Forage, Fodder, Straw, and Hay) Group				
860.1500	171-4k	Cropfield Residue (Alfalfa)	A,B,C,K	<b>42399602</b>
860.1500	171-4k	Cropfield Residue (Sugar and table beets)	A,B,C,K	<b>41503604, 41503605</b>

**Appendix B. Data Supporting Guideline Requirements for the Reregistration of Thiram**

<b>New Guideline Number</b>	<b>Old Guideline Number</b>	<b>Requirement</b>	<b>Use Pattern</b>	<b>Bibliographic Citation(s)</b>
860.1500	171-4k	Cropfield Residue (Safflower)	A,B,C,K	<b>41503603</b>
860.1500	171-4k	Cropfield Residue (banana)	A,B,C,K	<b>00047581, 00098137, 00098143</b>
860.1500	171-4k	Cropfield Residue (bulb and green onion)	A,B,C,K	<b>00041997, 00085531, 43835203, 43835204</b>
860.1500	171-4k	Cropfield Residue (Cotton)	A,B,C,K	<b>00162142, 41065001, 40216502</b>
860.1500	171-4k	Seed Crops- Multiple	A,B,C,K	<b>41065001, 41065002, 41065003, 41065004, 41065005, 41065006, 41065007, 41503601, 41503602, 41503603, 41503604, 41503605, 42399602, 42399603, 42399604, 42399605, 43835201, 43835202, 43835203, 43835204</b>
860.1520	171-4 L	Processed Food/Feed - Crops with Seed Treatment	A,B,C,K	<b>43835205, 43835206, 43835207, 43835208, 43835209, 43835210</b>
860.1520	171-4 L	Processed Food/Feed (cotton)	A,B,C,K	<b>43835205</b>
860.1520	171-4 L	Processed Food/Feed (Field corn)	A,B,C,K	<b>43835206</b>
860.1520	171-4 L	Processed Food/Feed (Safflower)	A,B,C,K	<b>43835207</b>
860.1520	171-4 L	Processed Food/Feed (Sugar beet)	A,B,C,K	<b>43835209</b>
860.1520	171-4 L	Processed Food/Feed (Soybean)	A,B,C,K	<b>43835208</b>
860.1520	171-4 L	Processed Food/Feed (Wheat)	A,B,C,K	<b>43835210</b>
860.1520	171-4 L	Processed Food/Feed (Apples)	A,B,C,K	<b>43846301</b>
860.1850		Confined Rotational Crops	A,B,C,K	<b>43974091</b>



## Appendix C: Technical Support Documents

Additional documentation in support of this RED is maintained in the OPP docket, located in Room 119, Crystal Mall #2, 1801 S. Bell St., Arlington, VA. It is open Monday through Friday, excluding legal holidays, from 8:30 a.m. to 4:00 p.m.

The docket initially contained preliminary risk assessments and related documents as of January 26, 2004. Sixty days later the first public comment period closed. The EPA then considered comments, revised the risk assessment, and added the formal "Response to Comments" documents and the revised risk assessments to the docket on July 2, 2004. Following a third 60-day comment period, EPA further revised the EFED risk assessment, and added formal "Response to Comments" documents.

All documents, in hard copy form, may be viewed in the OPP docket room or downloaded or viewed via the Internet at the following site:

<http://docket.epa.gov/edkpub/index.jsp>

These documents include:

Thiram Revised HED Chapter of the Reregistration Eligibility Decision Document (RED). December 16, 2003.

Thiram. [HED] Response to Phase 5 Comments. September 20, 2004.

Thiram Revised Phase 5 Occupational and Residential Exposure Assessment and Recommendations for the Reregistration Eligibility Decision Document. April 24, 2003.

EFED Revision of Thiram Environmental Fate Risk Assessment in Response to Phase 5 Public Comment for Thiram (PC Code 079801). September 30, 2004.

EFED Response to Public Comment for Thiram (PC Code 079801). September 30, 2004.

Addendum to Preliminary Analysis of Thiram Use, Usage, and Alternatives. October 6, 2004.

Thiram - [BEAD] Response to Phase 5 Comments. October 6, 2004.





**Appendix D. CITATIONS CONSIDERED TO BE PART OF THE DATA BASE  
SUPPORTING THE REREGISTRATION DECISION (BIBLIOGRAPHY)**

**GUIDE TO APPENDIX D**

1. **CONTENTS OF BIBLIOGRAPHY.** This bibliography contains citations of all studies considered relevant by EPA in arriving at the positions and conclusions stated elsewhere in the Reregistration Eligibility Document. Primary sources for studies in this bibliography have been the body of data submitted to EPA and its predecessor agencies in support of past regulatory decisions. Selections from other sources including the published literature, in those instances where they have been considered, are included.
2. **UNITS OF ENTRY.** The unit of entry in this bibliography is called a "study." In the case of published materials, this corresponds closely to an article. In the case of unpublished materials submitted to the Agency, the Agency has sought to identify documents at a level parallel to the published article from within the typically larger volumes in which they were submitted. The resulting "studies" generally have a distinct title (or at least a single subject), can stand alone for purposes of review and can be described with a conventional bibliographic citation. The Agency has also attempted to unite basic documents and commentaries upon them, treating them as a single study.
3. **IDENTIFICATION OF ENTRIES.** The entries in this bibliography are sorted numerically by Master Record Identifier, or "MRID" number. This number is unique to the citation, and should be used whenever a specific reference is required. It is not related to the six-digit "Accession Number" which has been used to identify volumes of submitted studies (see paragraph 4(d)(4) below for further explanation). In a few cases, entries added to the bibliography late in the review may be preceded by a nine character temporary identifier. These entries are listed after all MRID entries. This temporary identifying number is also to be used whenever specific reference is needed.
4. **FORM OF ENTRY.** In addition to the Master Record Identifier (MRID), each entry consists of a citation containing standard elements followed, in the case of material submitted to EPA, by a description of the earliest known submission. Bibliographic conventions used reflect the standard of the American National Standards Institute (ANSI), expanded to provide for certain special needs.
  - a. **Author.** Whenever the author could confidently be identified, the Agency has chosen to show a personal author. When no individual was identified, the Agency has shown an identifiable laboratory or testing facility as the author. When no author or laboratory could be identified, the Agency has shown the first submitter as the author.
  - b. **Document date.** The date of the study is taken directly from the document. When the date is followed by a question mark, the bibliographer has deduced the date from the evidence contained in the document. When the date appears as (1999), the Agency was unable to determine or estimate the date of the document.
  - c. **Title.** In some cases, it has been necessary for the Agency bibliographers to create or enhance a document title. Any such editorial insertions are contained between square brackets.
  - d. **Trailing parentheses.** For studies submitted to the Agency in the past, the trailing parentheses include (in addition to any self-explanatory text) the following elements describing the earliest known submission:

- (1) Submission date. The date of the earliest known submission appears immediately following the word "received."
- (2) Administrative number. The next element immediately following the word "under" is the registration number, experimental use permit number, petition number, or other administrative number associated with the earliest known submission.
- (3) Submitter. The third element is the submitter. When authorship is defaulted to the submitter, this element is omitted.
- (4) Volume Identification (Accession Numbers). The final element in the trailing parentheses identifies the EPA accession number of the volume in which the original submission of the study appears. The six-digit accession number follows the symbol "CDL," which stands for "Company Data Library." This accession number is in turn followed by an alphabetic suffix which shows the relative position of the study within the volume.

**MRID            CITATION**

- 00001416    Natti, J.J. (1965) Fungicide Treatments of Soil for Control of Bean Root Rots. (Unpublished study received Jul 8, 1968 under 8F0657; prepared by New York State Agricultural Station, Dept. of Plant Pathology, submitted by E.I. du Pont de Nemours & Co., Inc., Wilmington, Del.; CDL:091146-M)
- 00001417    E.I. du Pont de Nemours & Company, Incorporated (1966) Demosan Efficacy Studies on Beans. (Unpublished study received Jul 8, 1968 under 8F0657; CDL:091146-N)
- 00001419    E.I. du Pont de Nemours & Company, Incorporated (1966) Demosan Efficacy Studies on Peas, Soybeans and Sugarbeets. (Unpublished study received Jul 8, 1968 under 8F0657; CDL:091146-P)
- 00001448    Paulus, A.O. (1972) Cotton Seedling Trial--Rhizoctonia. (Unpublished study including letter dated Jun 29, 1972 from A.O. Paulus to Bill Reische, received Sep 5, 1974 under 352-312; prepared by Univ. of California--Riverside, Agricultural Extension Service, submitted by E.I. du Pont de Nemours & Co., Inc., Wilmington, Del.; CDL:002466-G)
- 00001452    E.I. du Pont de Nemours & Company, Incorporated (1972) Data Supporting the Use of Demosan®T Seed Fungicide as a Cottonseed Treatment. (Unpublished study received Apr 3, 1972 under 352-360; CDL:003095-A)
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- 45416311 McFadden, P. (2001) Determination of Residues of GUS 7025-01 in Canola: Lab Project Number: 0004019: ADPEN-MI-0004019-1001. Unpublished study prepared by Gustafson Research and Development Center and Adpen Labs., Inc. 505 p. {OPPTS 860.1340}
- 45416312 McFadden, D. (2001) Use and Occupational Exposure Information for Titan FL: Final Report: Lab Project Number: 01-101. Unpublished study prepared by Gustafson LLC. 31 p.
- 45416313 McFadden, D. (2001) Environmental Chemistry and Fate of Titan FL: Final Report: Lab Project Number: 01-102. Unpublished study prepared by Gustafson LLC. 11 p.
- 45416314 McFadden, D. (2001) Metabolism/Toxicokinetic Information for Titan FL: Final Report: Lab Project Number: 01-103. Unpublished study prepared by Gustafson LLC. 8 p.
- 45430500 Gustafson LLC (2001) Submission of Efficacy and Toxicity Data in Support of the Application for the Registration of Titan FL. Transmittal of 3 Studies.
- 45430501 McFadden, D. (2001) Final Report Titan FL (RTU TI 435) Efficacy Trials: Lab Project Number: 01-100. Unpublished study prepared by Gustafson LLC. 606 p.
- 45430502 McFadden, D. (2001) Final Report Tier III Summary for Titan FL: Lab Project Number: 01-104. Unpublished study prepared by Gustafson LLC. 178 p.

- 45430503 McFadden, D. (2001) Final Report Tier II Summary for Titan FL: Lab Project Number: 01-105. Unpublished study prepared by Gustafson LLC. 22 p.
- 45441200 Thiram Task Force II (2001) Submission of Toxicity and Fate Data in Support of the Reregistration of Thiram Technical. Transmittal of 3 Studies.
- 45441201 Gallagher, S.; Martin, K.; Beavers, J. (2001) Thiram Technical: A Reproduction Study with the Mallard: Final Report: Lab Project Number: 357-107. Unpublished study prepared by Wildlife International, Ltd. 143 p.
- 45441202 Sutherland, C.; Kendall, T.; Krueger, H. (2001) Thiram Technical: A 7-Day Toxicity Test with Duckweed (*Lemna gibba* G3): Final Report: Lab Project Number: 357A-101. Unpublished study prepared by Wildlife International. Ltd. 79 p. {OPPTS 850.4400}
- 45441203 Turck, P. (1997) Two Generation Reproduction/Fertility Study in Rats with Thiram: Lab Project Number: 399-180. Unpublished study prepared by MPI Research. 1579 p.
- 45490500 Gustafson (2001) Submission of Product Chemistry Data in Support of the Registration of RAXIL-Thiram Flowable Fungicide. Transmittal of 1 Study.
- 45490501 Dunn, N. (2000) Validation of a Method for the Determination of Tebuconazole and Thiram in Raxil Thiram Flowable Fungicide by High Performance Liquid Chromatography: Lab Project Number: GRL-11725: 2000-001. Unpublished study prepared by Uniroyal Chemical Co. 40 p.
- 45534700 EBDC/ETU Task Force (2001) Submission of Toxicity and Fate Data in Support of the Reregistration of Ethylenebisdithiocarbamates and Other Dithiocarbamates. Transmittal of 1 Study.
- 45534701 Lamb, IV, J.; Hentz, K.; Matthews, S.; et al. (2001) Analysis of Common Mechanisms of Toxicity for Ethylenebisdithiocarbamates and Other Dithiocarbamates. Unpublished study prepared by BBL Sciences. 111 p.
- 45556100 USEPA (2001) Submission of Toxicology, Environmental Fate, Residue, Risk and Exposure, and Safety Data. Transmittal of 50 Studies.
- 45556146 Grey, W.; Marthre, D.; Rogers, S. (1983) Potential Exposure of Commercial Seed Treating Applicators to the Pesticides Carboxin, Thiram and Lindane. Bulletin Environmental Contamination and Toxicology 31(2):244-250.
- 45560300 UBC Chemicals (2001) Submission of Environmental Fate Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45560301 Merricks, D. (2001) Dissipation of Dislodgeable Foliar Residues of Thiram after Application of Thiram 65% Wettable Powder to Strawberries in the USA: Lab Project

- Number: 1301: 1: 2. Unpublished study prepared by Agrisearch Incorporated. 123 p.
- 45587300 UCB Chemicals Corp. (2002) Submission of Residue Data in Support of the Reregistration of Thiram Fungicide. Transmittal of 2 Studies.
- 45587301 Roland, L. (1996) HPLC Method for the Determination of Thiram in Fruits: Validation of Some Critical Points. Unpublished study prepared by UCB Chemicals Corp. 22 p.
- 45587302 Roland, L. (1992) Thiram: Determination of Thiram in Fruits by High-performance Liquid Chromatography. Unpublished study prepared by UCB Chemicals Corp. 22 p.
- 45589100 UCB Chemicals Corp. (2002) Submission of Toxicity Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45589101 Williams, J. (2001) Thiram: Acute Neurotoxicity Study in Rats: Lab Project Number: AR7090: CTL/AR7090/REGULATORY/REPORT. Unpublished study prepared by Central Toxicology Laboratory. 327 p. {OPPTS 870.6200}
- 45596100 UCB Chemicals Corp. (2002) Submission of Environmental Fate Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45596101 Shelper, K.; Runes, H. (2001) Photodegradation of (Carbon-14) Thiram in Sterilized Buffer at pH 5 by Artificial Light: Lab Project Number: 1042W. Unpublished study prepared by PTRL West, Inc. 116 p.
- 45651200 UCB Chemicals Co. (2002) Submission of Environmental Fate Data in Support of the Reregistration for Thiram. Transmittal of 1 Study.
- 45651201 Shepler, K.; Runes, H. (2002) Photodegradation of (Carbon 14) Thiram in Sterilized Buffer at pH 5 by Artificial Light: Lab Project Number: 1042W. Unpublished study prepared by PTRL West, Inc. 117 p.
- 45651300 UCB Chemicals (2002) Submission of Residue Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45651301 Dykeman, R. (2002) Determination of the Magnitude of Residues of Thiram in Peach RAC's From Trees Treated with a Thiram 75% Water-Dispersible Granule Formulation: Lab Project Number: 01001. Unpublished study prepared by Compliance Services International. 134 p. {OPPTS 860.1340}
- 45674500 Gustafson (2002) Submission of Product Chemistry Data in Support of the Application for Registration of Gaucho CS Flowable. Transmittal of 5 Studies.
- 45674501 Brown, M. (2001) Determination of the Storage Stability and Corrosion Characteristics of Gaucho CS FL in Blue HDPE Drums: Final Report: Lab Project Number: GRL-

- 11745: 2000-003: GRL-FR-11745. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 830.6320}
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- 45674503 Brown, M. (2001) Determination of the Storage Stability and Corrosion Characteristics of Gaucho CS FL in Non-Fluorinated HDPE Jugs: Final Report: Lab Project Number: GRL-11747: 2000-005: GRL-FR-11747. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 830.6320}
- 45674504 Brown, M. (2001) Determination of the Storage Stability and Corrosion Characteristics of Gaucho CS FL in Stainless Steel Totes: Final Report: Lab Project Number: GRL-11748: 2000-006: GRL-FR-11748. Unpublished study prepared by Crompton Co. 45 p. {OPPTS 830.6317, 830.6320}
- 45674505 Brown, M. (2001) Determination of the Storage Stability and Corrosion Characteristics of Gaucho CS FL in Plastic Totes: Final Report: Lab Project Number: GRL-11749: 2000-007: GRL-FR-11749. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 830.6320}
- 45695600 UCB Chemicals Corporation (2002) Submission of Toxicity Data in Support of the Reregistration of Thiram. Transmittal of 2 Studies.
- 45695601 Wilkinson, C. (2002) The Acute Neurotoxicity of Thiram: Lab Project Number: THIRAM-02-01: 02-01. Unpublished study prepared by C. Wilkinson LLC. 7 p.
- 45695602 Wilkinson, C. (2002) Thiram: Developmental Toxicity: Lab Project Number: THIRAM-02-02: 02-02. Unpublished study prepared by C. Wilkinson LLC. 14 p.
- 45701500 UCB Chemicals Corporation (2002) Submission of Residue Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45701501 Dykeman, R. (2002) Determination of the Change in Magnitude of Thiram Residues on Strawberry RAC's Upon Washing: Lab Project Number: 01003: ML02-1004-UCB: METH-7. Unpublished study prepared by Compliance Services International, University of Florida and Morse Laboratories, Inc. 110 p.
- 45714100 UCB Chemicals Corp. (2002) Submission of Environmental Fate Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45714101 Shepler, K.; Runes, H. (2002) Hydrolysis of (Carbon 14) Thiram at pH 5, 7, and 9: Lab Project Number: 1041W. Unpublished study prepared by PTRL West, Inc.



110 p.

- 45724500 UCB Chemicals Corp. (2002) Submission of Environmental Fate Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45724501 Shepler, K.; Runes, H. (2002) Photodegradation of (Carbon 14) Thiram in/on Soil by Artificial Light: Lab Project Number: 1043W: 1043W-1: 1042W-004. Unpublished study prepared by PTRL West, Inc. 115 p.
- 45736200 UCB Chemicals Corp. (2002) Submission of Residue Data in Support of the Reregistration of Thiram. Transmittal of 1 Study.
- 45736201 Spanogle, T. (2002) Determination of Residues of Thiram After Application of Thiram 80WG (Containing 80% Thiram) in Apples in Germany: Lab Project Number: UCB-THIRAM 2002-03: G00W004P: 20003003/G2-FPAP. Unpublished study prepared by Arbeitsgemeinschaft GAB. 93 p. {OPPTS 860.1340 and 860.1520}
- 45750300 Gustafson LLC (2002) Submission of Product Chemistry Data in Support of the Application for Registration of Titan FL. Transmittal of 5 Studies.
- 45750301 Vanstone, C. (2002) Determination of the Storage Stability and Corrosion Characteristics of GUS 7047-01 in Blue HDPE Drums: 1 Year Study: Final Report: Lab Project Number: GRL-11799: 2000-012: GRL-FR-11799. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 830.6320}
- 45750302 Vanstone, C. (2002) Determination of the Storage Stability and Corrosion Characteristics of GUS 7047-01 in Florinated HDPE Jugs: 1 Year Study: Final Report: Lab Project Number: GRL-11800: 2000-013: GRL-FR-11800. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 830.6320}
- 45750303 Vanstone, C. (2002) Determination of the Storage Stability and Corrosion Characteristics of GUS 7047-01 in Non-Florinated HDPE Jugs: 1 Year Study: Final Report: Lab Project Number: GRL-11801: 2000-014: GRL-FR-11801. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 830.6320}
- 45750304 Vanstone, C. (2002) Determination of the Storage Stability and Corrosion Characteristics of GUS 7047-01 in Stainless Steel Totes: 1 Year Study: Final Report: Lab Project Number: GRL-11802: 2000-015. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 830.6320}
- 45750305 Vanstone, C. (2002) Determination of the Storage Stability and Corrosion Characteristics of GUS 7047-01 in Plastic Totes: 1 Year Study: Final Report: Lab Project Number: GRL-11803: 2000-016. Unpublished study prepared by Crompton Co. 43 p. {OPPTS 830.6317, 83.6320}
- 45874300 Gustafson LLC (2003) Submission of Product Chemistry Data in Support of the Amended Registration of Gustafson Thiram Technical. Transmittal of 1 Study.

- 45874301 McFadden, D. (2003) Product Identity and Composition; Description of Materials Used to Produce the Product; Description of Production Process; and Discussion of Formation of Impurities: (Gustafson Thiram Technical): Final Report: Lab Project Number: 03-100. Unpublished study prepared by Gustafson LLC. 49 p. {OPPTS 830.1550, 830.1600, 830.1620, 830.1670}
- 45880700 Gustafson LLC (2003) Submission of Product Chemistry Data in Support of the Amended Registration of Gustafson Thiram Technical. Transmittal of 1 Study.
- 45880701 Sun, G. (2002) Preliminary Analysis and Storage Stability Test of Thiram Technical Grade Active Ingredient: Final Report: Lab Project Number: 01.05951.01.002. Unpublished study prepared by Southwest Research Institute. 26 p. {OPPTS 830.1700}
- 45926000 Crompton Manufacturing Company, Inc. (2003) Submission of Toxicity Data in Support of the Registration of Vitaflo-280. Transmittal of 1 Study.
- 45926001 Dow, P. (2003) The In Vivo Dermal Absorption of (Carbon 14) Carboxin from Vitaflo-280 in the Rat: Lab Project Number: 014756: 017456-1: 014756-0. Unpublished study prepared by Ricerca Bioscience, LLC. 236 p. {OPPTS 870.7600}
- 46021300 Crompton Corporation (2003) Submission of Toxicity Data in Support of the Reregistration of Vitavax. Transmittal of 1 Study.
- 46021301 Lengen, M. (2003) Compilation of Studies to Determine the Palatability and/or Repellency of Carboxin Mixtures to Avian Species and Small Mammals. Project Number: URO/013/984969, URO/013. Unpublished study prepared by The Crompton Manufacturing Company, Inc. 93 p.

## **Appendix E. GENERIC DATA CALL-IN**

Note that a complete Data Call-In (DCI), with all pertinent instructions, will be sent to registrants under separate cover.































## **Appendix F. PRODUCT SPECIFIC DATA CALL-IN**

Note that a complete Data Call-In (DCI), with all pertinent instructions, will be sent to registrants under separate cover.





















## **Appendix G: EPA'S BATCHING OF THIRAM PRODUCTS FOR MEETING ACUTE TOXICITY DATA REQUIREMENTS FOR REREGISTRATION**

In an effort to reduce the time, resources and number of animals needed to fulfill the acute toxicity data requirements for reregistration of products containing **THIRAM** as the active ingredient, the Agency has batched products which can be considered similar for purposes of acute toxicity. Factors considered in the sorting process include each product's active and inert ingredients (identity, percent composition and biological activity), type of formulation (e.g., emulsifiable concentrate, aerosol, wettable powder, granular, etc.), and labeling (e.g., signal word, use classification, precautionary labeling, etc.). Note that the Agency is not describing batched products as "substantially similar" since some products within a batch may not be considered chemically similar or have identical use patterns.

Using available information, batching has been accomplished by the process described in the preceding paragraph. Notwithstanding the batching process, the Agency reserves the right to require, at any time, acute toxicity data for an individual product should the need arise.

Registrants of products within a batch may choose to cooperatively generate, submit or cite a single battery of six acute toxicological studies to represent all the products within that batch. It is the registrants' option to participate in the process with all other registrants, only some of the other registrants, or only their own products within a batch, or to generate all the required acute toxicological studies for each of their own products. If a registrant chooses to generate the data for a batch, he/she must use one of the products within the batch as the test material. If a registrant chooses to rely upon previously submitted acute toxicity data, he/she may do so provided that the data base is complete and valid by today's standards (see acceptance criteria attached), the formulation tested is considered by EPA to be similar for acute toxicity, and the formulation has not been significantly altered since submission and acceptance of the acute toxicity data. Regardless of whether new data is generated or existing data is referenced, registrants must clearly identify the test material by EPA Registration Number. If more than one confidential statement of formula (CSF) exists for a product, the registrant must indicate the formulation actually tested by identifying the corresponding CSF.

In deciding how to meet the product specific data requirements, registrants must follow the directions given in the Data Call-In Notice and its attachments appended to the RED. The DCI Notice contains two response forms which are to be completed and submitted to the Agency within 90 days of receipt. The first form, "Data Call-In Response," asks whether the registrant will meet the data requirements for each product. The second form, "Requirements Status and Registrant's Response," lists the product specific data required for each product, including the standard six acute toxicity tests. A registrant who wishes to participate in a batch must decide whether he/she will provide the data or depend on someone else to do so. If a registrant supplies the data to support a batch of products, he/she must select one of the following options: Developing Data (Option 1), Submitting an Existing Study (Option 4), Upgrading an Existing Study (Option 5) or Citing an Existing Study (Option 6). If a registrant depends on another's data, he/she must choose among: Cost Sharing (Option 2), Offers to Cost Share (Option 3) or Citing an Existing Study (Option 6). If a registrant does not want to participate in a batch, the choices are Options 1, 4, 5 or 6. However, a registrant should know that choosing not to participate in a batch does not preclude other registrants in the batch from citing his/her studies and offering to cost share (Option 3) those studies.

Fifty three products were found which contain **Thiram** as the active ingredient. These products have been placed into five batches and a "No Batch" category in accordance with the active and inert ingredients and type of formulation. Furthermore, the following bridging strategies are deemed acceptable for this chemical:

Batch 3: EPA Reg. No. 5481-308 may not cite data generated with EPA Reg. No. 5481-311

No Batch: Each product in this Batch should generate their own data.

NOTE: The technical acute toxicity values included in this document are for informational purposes only. The data supporting these values may or may not meet the current acceptance criteria.

Batch 1	EPA Reg. No.	% Active Ingredient
	8236-02	98.5
	45728-01	98.5

Batch 2	EPA Reg. No.	% Active Ingredient
	1001-60	75.0
	45728-21	75.0
	51036-53	75.0

Batch 3	EPA Reg. No.	% Active Ingredient
	5481-308	Thiram: 30 PCNB: 30
	5481-311	Thiram: 10 PCNB: 10

Batch 4	EPA Reg. No.	% Active Ingredient
	769-866	20.0
	769-907	20.0

Batch 5	EPA Reg. No.	% Active Ingredient
	400-112	Thiram: 17.0 Carboxin: 17.0
	400-116	Thiram: 17.0 Carboxin: 17.0

No Batch	EPA Reg. No.	% Active Ingredient
	4-136	11.0
	4-180	10.0
	4-184	Thiram: 10.0 Methoxychlor: 5.0
	264-499	Thiram: 4.04 Naphthalenacetamide: 0.20
	264-672	Thiram: 12.5 Triticonazole: 1.25
	358-105	20.0
	400-92	Thiram: 37.5 Carboxin: 37.5
	400-156	Thiram: 5.7 Carboxin: 5.7
	400-434	42.0
	400-435	Thiram: 50.0 Carboxin: 30.0
	769-652	75.0
	769-910	50.0
	1381-162	Thiram: 12.62 Thiabendazole: 0.35
	1381-163	Thiram: 11.54 Thiabendazole: 0.33
	7501-14	42.0

No Batch	EPA Reg. No.	% Active Ingredient
	7501-17	30.0
	7501-64	29.52
	7501-80	Thiram: 15.3 Baytan: 5.0
	7501-105	50.0
	7501-114	Thiram: 10.0 Carboxin: 10.0
	7501-117	26.60
	7501-121	14.66
	7501-123	12.71
	7501-125	23.05
	7501-133	Thiram: 13.2 Carboxin: 14.9
	7501-141	Thiram: 12.0 Carboxin: 14.0 Lindane: 8.0
	7501-151	Thiram: 20.0 Raxil: 0.6
	7501-187	Thiram: 7.0 Carboxin: 3.5 Imidacloprid: 21.0
	7501-190	Thiram: 9.49 Carboxin: 4.43 Clothianidin: 9.49
	7501-194	Thiram: 10.0 Carboxin: 10.0 Metalaxyl: 28.35
	8660-25	75.0
	9195-197	Thiram: 40.76 Triadimefon: 1.59
	11625-01	35.0

No Batch	EPA Reg. No.	% Active Ingredient
	11715-341	7.0
	19713-309	25.0
	42056-02	12.41
	42056-04	35.0
	42056-10	14.29
	42056-22	Thiram: 14.29 Metalaxyl: 1.61
	42056-23	Thiram: 10.0 Carboxin: 10.0 Metalaxyl: 1.62
	45728-24	65.0
	45728-26	42.11





**Appendix H. List of Registrants Sent this Data Call-In Notice**



**Appendix I. LIST OF AVAILABLE RELATED DOCUMENTS AND ELECTRONICALLY AVAILABLE FORMS**

**Pesticide Registration Forms are available at the following EPA internet site:**

[http://www.epa.gov/opprd001/forms/.](http://www.epa.gov/opprd001/forms/)

Pesticide Registration Forms (These forms are in PDF format and require the Acrobat reader)

Instructions

1. Print out and complete the forms. (Note: Form numbers that are bolded can be filled out on your computer then printed.)
2. The completed form(s) should be submitted in hardcopy in accord with the existing policy.
3. Mail the forms, along with any additional documents necessary to comply with EPA regulations covering your request, to the address below for the Document Processing Desk.

DO NOT fax or e-mail any form containing 'Confidential Business Information' or 'Sensitive Information.'

If you have any problems accessing these forms, please contact Nicole Williams at (703) 308-5551 or by e-mail at [williams.nicole@epamail.epa.gov](mailto:williams.nicole@epamail.epa.gov).

The following Agency Pesticide Registration Forms are currently available via the internet: at the following locations:

8570-1	Application for Pesticide Registration/Amendment	<a href="http://www.epa.gov/opprd001/forms/8570-1.pdf">http://www.epa.gov/opprd001/forms/8570-1.pdf.</a>
8570-4	Confidential Statement of Formula	<a href="http://www.epa.gov/opprd001/forms/8570-4.pdf">http://www.epa.gov/opprd001/forms/8570-4.pdf.</a>
8570-5	Notice of Supplemental Registration of Distribution of a Registered Pesticide Product	<a href="http://www.epa.gov/opprd001/forms/8570-5.pdf">http://www.epa.gov/opprd001/forms/8570-5.pdf.</a>
8570-17	Application for an Experimental Use Permit	<a href="http://www.epa.gov/opprd001/forms/8570-17.pdf">http://www.epa.gov/opprd001/forms/8570-17.pdf.</a>
8570-25	Application for/Notification of State Registration of a Pesticide To Meet a Special Local Need	<a href="http://www.epa.gov/opprd001/forms/8570-25.pdf">http://www.epa.gov/opprd001/forms/8570-25.pdf.</a>
8570-27	Formulator's Exemption Statement	<a href="http://www.epa.gov/opprd001/forms/8570-27.pdf">http://www.epa.gov/opprd001/forms/8570-27.pdf.</a>
8570-28	Certification of Compliance with Data Gap Procedures	<a href="http://www.epa.gov/opprd001/forms/8570-28.pdf">http://www.epa.gov/opprd001/forms/8570-28.pdf.</a>

8570-30	Pesticide Registration Maintenance Fee Filing	<a href="http://www.epa.gov/opprd001/forms/8570-30.pdf">http://www.epa.gov/opprd001/forms/8570-30.pdf</a>
8570-32	Certification of Attempt to Enter into an Agreement with other Registrants for Development of Data	<a href="http://www.epa.gov/opprd001/forms/8570-32.pdf">http://www.epa.gov/opprd001/forms/8570-32.pdf</a>
8570-34	Certification with Respect to Citations of Data (in PR Notice 98-5)	<a href="http://www.epa.gov/opppmsd1/PR_Notices/pr98-5.pdf">http://www.epa.gov/opppmsd1/PR_Notices/pr98-5.pdf</a>
8570-35	Data Matrix (in PR Notice 98-5)	<a href="http://www.epa.gov/opppmsd1/PR_Notices/pr98-5.pdf">http://www.epa.gov/opppmsd1/PR_Notices/pr98-5.pdf</a>
8570-36	Summary of the Physical/Chemical Properties (in PR Notice 98-1)	<a href="http://www.epa.gov/opppmsd1/PR_Notices/pr98-1.pdf">http://www.epa.gov/opppmsd1/PR_Notices/pr98-1.pdf</a>
8570-37	Self-Certification Statement for the Physical/Chemical Properties (in PR Notice 98-1)	<a href="http://www.epa.gov/opppmsd1/PR_Notices/pr98-1.pdf">http://www.epa.gov/opppmsd1/PR_Notices/pr98-1.pdf</a>

## Pesticide Registration Kit

[www.epa.gov/pesticides/registrationkit/](http://www.epa.gov/pesticides/registrationkit/)

Dear Registrant:

For your convenience, we have assembled an online registration kit which contains the following pertinent forms and information needed to register a pesticide product with the U.S. Environmental Protection Agency's Office of Pesticide Programs (OPP):

1. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug and Cosmetic Act (FFDCA) as Amended by the Food Quality Protection Act (FQPA) of 1996.
2. Pesticide Registration (PR) Notices
  - a. 83-3 Label Improvement Program--Storage and Disposal Statements
  - b. 84-1 Clarification of Label Improvement Program
  - c. 86-5 Standard Format for Data Submitted under FIFRA
  - d. 87-1 Label Improvement Program for Pesticides Applied through Irrigation Systems (Chemigation)
  - e. 87-6 Inert Ingredients in Pesticide Products Policy Statement
  - f. 90-1 Inert Ingredients in Pesticide Products; Revised Policy Statement
  - g. 95-2 Notifications, Non-notifications, and Minor Formulation Amendments
  - h. 98-1 Self Certification of Product Chemistry Data with Attachments (This document is in PDF format and requires the Acrobat reader.)

Other PR Notices can be found at [http://www.epa.gov/opppmsd1/PR\\_Notices](http://www.epa.gov/opppmsd1/PR_Notices).

3. Pesticide Product Registration Application Forms (These forms are in PDF format and will require the Acrobat reader.)

- a. EPA Form No. 8570-1, Application for Pesticide Registration/Amendment
  - b. EPA Form No. 8570-4, Confidential Statement of Formula
  - c. EPA Form No. 8570-27, Formulator's Exemption Statement
  - d. EPA Form No. 8570-34, Certification with Respect to Citations of Data
  - e. EPA Form No. 8570-35, Data Matrix
4. General Pesticide Information (Some of these forms are in PDF format and will require the Acrobat reader.)
- a. Registration Division Personnel Contact List
    - Biopesticides and Pollution Prevention Division (BPPD) Contacts
    - Antimicrobials Division Organizational Structure/Contact List
  - d. 53 F.R. 15952, Pesticide Registration Procedures; Pesticide Data Requirements (PDF format)
  - e. 40 CFR Part 156, Labeling Requirements for Pesticides and Devices (PDF format)
  - f. 40 CFR Part 158, Data Requirements for Registration (PDF format)
  - g. 50 F.R. 48833, Disclosure of Reviews of Pesticide Data (November 27, 1985)

Before submitting your application for registration, you may wish to consult some additional sources of information. These include:

1. The Office of Pesticide Programs' Web Site
2. The booklet "General Information on Applying for Registration of Pesticides in the United States", PB92-221811, available through the National Technical Information Service (NTIS) at the following address:

National Technical Information Service (NTIS)  
5285 Port Royal Road  
Springfield, VA 22161

The telephone number for NTIS is (703) 605-6000. Please note that EPA is currently in the process of updating this booklet to reflect the changes in the registration program resulting from the passage of the FQPA and the reorganization of the Office of Pesticide Programs. We anticipate that this publication will become available during the Fall of 1998.

3. The National Pesticide Information Retrieval System (NPIRS) of Purdue University's Center for Environmental and Regulatory Information Systems. This service does charge a fee for subscriptions and custom searches. You can contact NPIRS by telephone at (765) 494-6614 or through their Web site.
4. The National Pesticide Telecommunications Network (NPTN) can provide information on active ingredients, uses, toxicology, and chemistry of pesticides. You can contact NPTN by telephone at (800) 858-7378 or through their Web site: [ace.orst.edu/info/nptn](http://ace.orst.edu/info/nptn).

The Agency will return a notice of receipt of an application for registration or amended registration, experimental use permit, or amendment to a petition if the applicant or

petitioner encloses with his submission a stamped, self-addressed postcard. The postcard must contain the following entries to be completed by OPP:

Date of receipt  
EPA identifying number  
Product Manager assignment

Other identifying information may be included by the applicant to link the acknowledgment of receipt to the specific application submitted. EPA will stamp the date of receipt and provide the EPA identifying File Symbol or petition number for the new submission. The identifying number should be used whenever you contact the Agency concerning an application for registration, experimental use permit, or tolerance petition.

To assist us in ensuring that all data you have submitted for the chemical are properly coded and assigned to your company, please include a list of all synonyms, common and trade names, company experimental codes, and other names which identify the chemical (including "blind" codes used when a sample was submitted for testing by commercial or academic facilities). Please provide a CAS number if one has been assigned.

#### **Documents Associated with this RED**

The following documents are part of the Administrative Record for this RED document and may be included in the EPA's Office of Pesticide Programs Public Docket. Copies of these documents are not available electronically, but may be obtained by contacting the person listed on the respective Chemical Status Sheet.

Health and Environmental Effects Science Chapters.  
Detailed Label Usage Information System (LUIS) Report.