United States
Environmental Protection
Agency

Prevention, Pesticides
and Toxic Substances
(7510P)

EPA739-R-05-003
August 2006

Reregistration Eligibility Decision for 2-(Thiocyanomethylthio)-benzothiazole (TCMTB)

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 antimicrobial 2-(thiocyanomethylthio) benzothiazole (TCMTB). The Reregistration Eligibility Decision (RED) for TCMTB was approved on August 1, 2006. Public comments and additional data received were considered in this decision.

Based on its review, EPA is now publishing its Reregistration Eligibility Decision (RED) and risk management decision for TCMTB and its associated human health and environmental risks. A Notice of Availability will be published in the *Federal Register* announcing the publication of the RED.

The RED and supporting risk assessments for TCMTB are available to the public in EPA's Pesticide Docket EPA-HQ-OPP-2006-0320 at: www.regulations.gov.

The TCMTB RED was developed through EPA's public participation process, published in the Federal Register on September 10, 2004, which provides opportunities for public involvement in the Agency's pesticide tolerance reassessment and reregistration programs. 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 TCMTB 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 TCMTB 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 TCMTB will be eligible for reregistration provided that all the conditions identified in this document are satisfied, including implementation of the risk mitigation measure outlined in Section IV of the document. Sections IV and V of this RED document describe the labeling amendments for end-use products and data requirements necessary to implement this mitigation measure. 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 TCMTB. 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 relevant to this reregistration decision, please contact the Chemical Review Manager, K. Avivah Jakob, at (703) 305-1328. For questions about product reregistration and/or the Product DCI that will follow this document, please contact Marshall Swindell at (703)-308-6341.

Sincerely,

Frank T. Sanders
Director, Antimicrobials Division

REREGISTRATION ELIGIBILITY
DECISION
for
2-(Thiocyanomethylthio) benzothiazole (TCMTB)
List B
CASE 2625

Approved By:

Frank T. Sanders
Director, Antimicrobials Division
August 1, 2006

Attachment

Table of Contents

TCMTB Reregistration Team……..... i
Glossary of Terms and Abbreviations……...…… ii
Abstract……..…….……..... iv

I. Introduction…….. 1

II. Chemical Overview……... 3
A. Regulatory History……..... 3
B. Chemical Identification ……... 3
C. Use Profile……... 4

III. Summary of TCMTB Risk Assessments……. 7
A. Human Health Risk Assessment……... 7
1. Toxicity of TCMTB ……..... 7
2. Metabolite Assessment ……... 12
3. FQPA Safety Factor…… 13
4. Population Adjusted Dose (PAD)……... 14
a. Acute PAD…… 14
b. Chronic PAD…… 14
5. Dietary Exposure Assumptions…… 14
6. Dietary Risk Assessment……. 15
a. Dietary Risk from Food and Drinking Water…….. 15
b. Dietary Risk from Drinking Water …….. 17
7. Residential Risk Assessment…...…… 18
a. Residential Toxicity……..……..……. 18
b. Residential Handlers…….. …..….. 20
i. Exposure Assessment…. ……. 20
ii. Risk Assessment…….…….……. 21
c. Residential Post-Application…..…… 21
i. Exposure Assessment…. ……. 21
ii. Risk Assessment…….…….……. 22
8. Aggregate Risk……. 23
a. Acute Aggregate Risk…….……... 24
b. Chronic Aggregate Risk ……...….. 24
9. Occupational Risk……... 25
a. Occupational Toxicity……. 26
b. Occupational Handler Exposure…… 26
c. Occupational Handler Risk Summary……... 30
d. Occupational Post-application Risk Summary……. 34
9. Human Incident Data……...……... 37
B. Environmental Risk Assessment…….. 38
1. Environmental Fate and Transport……... 38
a. Bioaccumulation in Aquatic Organisms…… 40
2. Ecological Risk……. 40

a. Environmental Toxicity...……... 40
b. Ecological Exposure and Risk …….……. 44
c. Risk to Listed Species…….……. 47

IV. Risk Management, Reregistration, and Tolerance Reassessment Decision… 49
A. Determination of Reregistration Eligibility……. 49
B. Public Comments and Responses…….. 49
C. Regulatory Position…… 50
1. Food Quality Protection Act Findings……... 50
a. "Risk Cup" Determination……. 50
b. Determination of Safety to U.S. Population…….. 50
c. Determination of Safety to Infants and Children……. 50
d. Endocrine Disruptor Effects…….. 51
e. Cumulative Risks……. 52
2. Tolerance Summary…… 52
a. Currently Established Tolerances Under 40 CFR 180.288 & Tolerance Reassessment of TCMTB……... 52
b. Codex Harmonization……. 53
D. Regulatory Rationale…….. 53
1. Human Health Risk Management……. 54
a. Dietary (Food) Risk Mitigation…….. 54
b. Drinking Water Risk Mitigation…… 54
c. Residential Risk Mitigation…… 54
i. Handler Risk Mitigation ……. 54
ii. Post-Application Risk Mitigation…….……. 54
d. Occupational Risk Mitigation…… 55
i. Handler Risk Mitigation ……. 55
ii. Post-Application Risk Mitigation….……. 56
2. Environmental Risk Management……...….. 56
3. Other Labeling Requirements…… 57
4. Listed Species Considerations……..…….. 57
a. The Endangered Species Act…….……. 57
b. General Risk Mitigation……...…….. 58

V. What Registrants Need to Do…… 60
A. Manufacturing-Use Products…… 62
1. Additional Generic Data Requirements…… 62
2. Labeling for Technical and Manufacturing Use Products…….. 64
B. End-Use Products……...…… 64
1. Additional Product-Specific Data Requirements……..... 64
2. Labeling for End-Use Products…….. 64
a. Label Changes Summary Table……. 64

VI. Appendices……. 66
A. Table of Use Patterns for TCMTB …….…. 67

B. Table of Generic Data Requirements and Studies Used to Make the Reregistration Decision……..... 86
C. Technical Support Documents…….. 94
D. Bibliography Citations……... 96
E. Generic Data Call-In…….. 108
F. Product Specific Data Call-In…… 109
G. Batching of End-Use Products…….. 110
H. List of All Registrants Sent the Data Call-In……... 111
I. List of Available Forms……... 112

TCMTB Reregistration Team

Health Effects Risk Assessment
Deborah Smegal
Robert Quick
Siroos Mostaghimi
Jonathan Chen
Charles Smith
Samuel Ary
Timothy McMahon
Chris Jiang

Ecological Risk Assessment
Kathryn Montague

Environmental Fate Risk Assessment
Srinivas Gowda
James Lin

Risk Management
K. Avivah Jakob
Diane Isbell

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
CSFII	USDA 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_{50}	Median Lethal Concentration. Statistically derived concentration of a substance expected to cause 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_{50}	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	Protection factor 10 respirator
PF5	Protection factor 5 respirator
PHED	Pesticide Handler's Exposure Data
PHI	Pre-harvest 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 24C 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

ABSTRACT

The Environmental Protection Agency (EPA or the Agency) has completed the human health and environmental risk assessments for 2-(thiocyanomethylthio) benzothiazole (TCMTB) and is issuing its risk management decision and tolerance reassessment. The risk assessments, which are summarized below, are based on the review of the required target database supporting the use patterns of currently registered products and additional information received through the public docket. After considering the risks identified in the revised risk assessments, comments received, and mitigation suggestions from interested parties, the Agency developed its risk management decision for uses of TCMTB that pose risks of concern. As a result of this review, EPA has determined that TCMTB-containing products are eligible for reregistration, provided that risk mitigation measures are adopted and labels are amended accordingly. That decision is discussed fully in this document.

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 and amended again by the Pesticide Registration Improvement Act of 2003 to set time frames for the issuance of Reregistration Eligibility Decisions. 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 (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 or not 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 2-(thiocyanomethylthio) benzothiazole (TCMTB).

As an antimicrobial pesticide, TCMTB has several uses. TCMTB is used as a wood preservative for antisapstain control, a microbiocide/microbiostat and bacteriocide/bacteriostat in industrial processes and water systems (e.g., pulp and paper mill systems, sewage systems) and in industrial/residential materials preservatives (e.g., pulp/paper products, leather products and hides, paint, latex, carpet, textiles, wallpaper). TCMTB is also used as an agricultural pesticide for seed treatment (e.g., barley, oats, rice, wheat, safflower, cotton and sugar beets).

The Agency has concluded that the FQPA Safety Factor for TCMTB should be removed (equivalent to 1X) based on: (1) the toxicology data base is complete with respect to assessing the increased susceptibility to infants and children as required by FQPA for TCMTB; (2) there is no concern for developmental neurotoxicity resulting from exposure to TCMTB in the rat and rabbit prenatal developmental studies and 2-generation reproduction study; (3) there is no evidence of increased susceptibility to the fetus following *in utero* exposure in the prenatal developmental toxicity studies or to the offspring when adults are exposed in the two-generation reproductive study; and (4) the risk assessment does not underestimate the potential exposure for infants and children.

Risks summarized in this document are those that result only from the use of the active ingredient, TCMTB. 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 that would occur at 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 TCMTB and any other substances**.** TCMTB does not appear to produce a toxic metabolite produced by other substances. For the purposes of this action, therefore, EPA has not assumed that TCMTB has a common mechanism of toxicity with other substances. 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.

This document presents the Agency's decision regarding the reregistration eligibility of the registered uses of TCMTB. In an effort to simplify the RED, the information presented herein is summarized from more detailed information which can be found in the technical supporting documents for TCMTB referenced in this RED. The revised risk assessments and related addenda are not included in this document, but are available in the Public Docket at http://www.regulations.gov (Docket ID #EPA-HQ-OPP-2006-0320).

This document consists of six sections. Section I is the introduction. Section II provides a chemical overview, a profile of the use and usage of TCMTB and its regulatory history. Section III, Summary of TCMTB Risk Assessments, gives an overview of the human health and environmental assessments, based on the data available to the Agency. Section IV, Risk Management, Reregistration, and Tolerance Reassessment Decision, presents the reregistration eligibility and risk management decisions. Section V, What Registrants Need to Do, summarizes the necessary label changes based on the risk mitigation measures outlined in Section IV. Finally, the Appendices list all use patterns eligible for reregistration, bibliographic information, related documents and how to access them, and Data Call-In (DCI) information.

II. Chemical Overview

A. Regulatory History

TCMTB was first registered as an active ingredient by the United States Environmental Protection Agency (EPA) on January 21, 1980. Currently, there are 27 products containing TCMTB. TCMTB products are used in commercial/institutional premises and residential and public access areas. As an antimicrobial pesticide, TCMTB is used largely as a materials preservative (e.g., leather products and hides, pulp/paper products, latex, wallpaper, paints, carpets). TCMTB is a slimicide regulated by the FDA (21 CFR 176.300) for controlling bacteria, fungi and yeasts, which cause deterioration of paper and paperboard products.

TCMTB is also used as a fungicide for commercial and on-farm seed treatment. TCMTB has 23 tolerances in the 40 CFR 180.288 for use as a fungicide on barley, sugar beets, cotton, oats, rice, safflower and wheat. Seed treatment use of TCMTB are not being supported by the technical registrant but are being supported by end-users.

B. Chemical Identification

Technical TCMTB

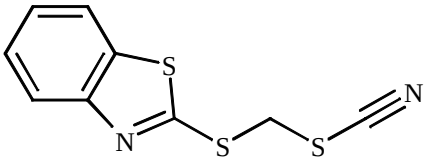

Figure 1. Molecular Structure of TCMTB

Common name:	TCMTB or TCMB
Chemical name:	2-(thiocyanomethylthio)benzothiazole
Chemical family:	Thiazole
Empirical formula:	$C_9H_6N_2S_3$
CAS Registry No.:	21564-17-0
Case number:	2625
OPP Chemical Code:	035603
Molecular weight:	238 g/mol
Other names:	2-(Benzothiazolythio)methyl thiocyanate, TCMTB, TCMB, Busan 72

Basic manufacturers: Buckman Laboratories

Chemical properties: TCMTB is a vivid orange liquid with a strong sour and pungent odor (like mineral oil). TCMTB is a liquid and, therefore, has no melting point. It has a boiling point of 191^0C, and decomposition begins at 741.9 mm Hg. TCMTB has a log K_{ow} of 3.23 at 20^oC.

C. Use Profile

The following information is a description of the currently registered uses of TCMTB products and an overview of use sites and application methods. A detailed table of the uses of TCMTB eligible for reregistration is contained in Appendix A.

Type of Pesticide: Microbiocide/microbiostat, bacteriocide/bacteriostat, slimicide, fungicide, algecide.

Summary of Use:

Materials Preservatives:
For use in industrial premises and residential & public access areas as a materials preservative in leather processing liquors/extracts (preservative incorporation), leather products and hides (preservative incorporation), textiles/fibers/cordage (preservative/additive incorporation), paints, sealants, emulsions/slurries/solutions, adhesives (preservative incorporation), coatings (preservative incorporation), , metalworking cutting fluids (preservative incorporation), oil recovery drill muds/packer fluids (preservative incorporation), nonfood pulp/paper and paper products (preservative/additive incorporation), wet-end/ industrial process chemicals (preservative incorporation), caulking compounds, vinyl wallpaper pastes, latex, dispersed colors, fuels (additive incorporation) and paper/paperboard surface treatments.

Wood Preservative:
TCMTB is used to control sapstain and mold in commercial/industrial premises and residential & public access areas on forest products (seasoned, unseasoned, unpainted), lumber, poles/posts, timbers, wood walls, wood (particleboard), wood shingles (roof), wood pressure treatment, wood millwork, wood products, wood sashes, wet lap/sheet pulp, wood surfaces, wood porches/decks, wood fences, wood homes/houses, wood steps, window frames, wood doors, wood siding and wood barns.

Industrial Processes and Water Systems:
For use in commercial and industrial water cooling tower systems, pulp and paper mill systems, secondary oil recovery injection water, sewage

systems, non-potable water storage tanks, fuel and oil storage tanks bottom water, industrial disposal water, waste water systems, sewage effluent water, storage tanks, metalworking cutting fluids and water-based cutting fluid mixes.

Agricultural:
TCMTB is used as a fungicide for treating seeds (barley, oats, rice, wheat, safflower, cotton and sugar beets) in commercial and on-farm settings.

Target Pests: Bacteria (unspecified); bacterial blight (xanthomonas); bacterial slime (of paper mills, water systems); basal rot (fusarium); brown rot; bunt (smut) (tilletia); covered kernel smut (sphacelotheca); covered smut (ustilago kolleri/ ustilago); damping-off (fusarium/ pythium/ rhizoctonia/ thielviopsis), deterioration/spoilage bacteria; dry rot; dry rot fungi; false loose smut (ustilago avenae/u. nigra); fungal decay/rot; fungal slime (of paper mills/water systems); fungi (coatings/ leather/ metal working coolants); fusarium blight; rot/ SPP; helminthosporium blight; mildew/ mold; rhizopus; rust (puccinia); sapstain; scab (head blight); seed and seedling diseases/ decay/ rot/ fungi; slime forming bacteria; sulfate-reducing bacteria.

Formulation Types: Liquid ready-to-use, soluble concentrate, emulsifiable liquid, suspended-emulsion, formulation intermediate, wettable powder.

Method and Rates of Application:

Equipment for Antimicrobial Use:

TCMTB end use products are added during the manufacturing process of treated articles and materials. Examples include: TCMTB being added directly to pulp slurry by chemical metering pump; dipping/pressure impregnation or brush/low pressure spraying of TCMTB for sapstain control; TCMTB directly mixed into solution for leather preservation.

Equipment for Agricultural Use:
There are two primary methods for treating seeds: the batch system and the continuous flow system. There are various pieces of equipment used for on-nursery seed treatment such as drum mixers, other devices using augers, cement mixers, hand cranked revolving drums, and gravity feed systems. TCMTB treated seed can be planted with a wide range of equipment.

Application Rates: For details about specific use sites for TCMTB, refer to Appendix A.

- Dosage rates of 0.025-0.2% (250-2,000 ppm) TCMTB solution can be used during various stages of leather processing.
- Application rates can range from 0.026 lbs ai/100 lbs seed to 0.093 lbs ai/100 lbs of seed for seed treatment.
- Application rates can range from 5.6 to 44.0 kg antisapstain product/100 L. of water for antisapstain treatment.

Use Classification: General use.

III. Summary of TCMTB Risk Assessments

The purpose of this summary is to assist the reader by identifying the key features and findings of these risk assessments and to help the reader better understand the conclusions reached in the assessments. The human health and ecological risk assessment documents and supporting information listed in Appendix C were used to formulate the safety finding and regulatory decision for TCMTB. While the risk assessments and related addenda are not included in this document, they are available from the OPP Public Docket EPA-HQ-OPP-2006-0320, and may also be accessed from www.regulations.gov. Hard copies of these documents may be found in the OPP public docket. The OPP public docket is located in Room S-4900, One Potomac Yard, 2777 South Crystal Drive, Arlington, VA 22202, and is open Monday through Friday, excluding Federal holidays, from 8:30 a.m. to 4:00 p.m.

The Agency's use of human studies in the TCMTB risk assessment is in accordance with the Agency's Final Rule promulgated on January 26, 2006, related to Protections for Subjects in Human Research, which is codified in 40 CFR Part 26.

A. Human Health Risk Assessment

1. Toxicity of TCMTB

A brief overview of the toxicity studies used for determining endpoints in the risk assessment is outlined below in Table 1. Further details on the toxicity of TCMTB can be found in the "Toxicology Disciplinary Chapter for the Reregistration Eligibility Decision (RED) Risk Assessment," dated April 4, 2006; "2-(Thiocyanomethylthio) benzothiazole (TCMTB) Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated August 1, 2006; and "2-(Thiocyanomethylthio) benzothiazole (TCMTB)-Report of the Antimicrobials Division Toxicity Endpoint Selection Committee (ADTC)," dated April 19, 2006. These documents are available on the Agency's website in the EPA Docket at: http://www.regulations.gov (Docket ID #EPA-HQ-OPP-2006-0320).

The Agency has reviewed all toxicity studies submitted for TCMTB and has determined that the toxicological database is sufficient for reregistration. The studies have been submitted to support guideline requirements.

Major features of the toxicology profile are presented below. TCMTB exhibits low acute oral and dermal toxicity (toxicity category III). However, it is highly irritating to the eyes and skin (toxicity category I and II, respectively) and is also considered to be highly toxic via the inhalation route of exposure (toxicity category I). TCMTB is a dermal sensitizer.

Table 1. Summary of Acute Toxicity Data for TCMTB

Guideline No.	Study Type	MRID #(s)	Results	Toxicity Category
Acute Toxicity				
870.1100	Acute oral toxicity	41583801	LD_{50} = 750 mg/kg (M+F); 80% ai	III
870.1200	Acute dermal toxicity	41515401	LD_{50} > 2000 mg/kg (M+F); 80% ai	III
870.1300	Acute inhalation toxicity	41640601	LC_{50}=0.07 mg/L; 80% ai	I
870.2400	Acute eye irritation	Acc No. 111991	Diluted Busan 72 (60 % ai): Primary Irritation Score (PIS)=2/110 (slight conjunctival redness, no corneal opacity); Undiluted Busan 72 (60% ai) PIS=34/110 (blanched conjunctivae, chemosis, corneal opacity not reversible by day 7)	I
870.2500	Acute dermal irritation	41583701	Primary Irritation Index (PIS)=7.42 with severe erythema and edema observed at 72 hours; 80% ai	II
870.2600	Skin sensitization	MRID 42349201 Acc No. 259676	Busan 74 (80% ai) caused delayed contact hypersensitivity in guinea pigs when induced and challenged by a 40% w/v aqueous concentration of active ingredient. Sensitizer.	--

Notes: LC = Lethal Concentration; LD = Lethal Dose; NA = Not Applicable

The doses and toxicological endpoints selected for the dietary exposure scenarios are summarized in Table 2 below:

Table 2. Dietary Toxicological Endpoints for TCMTB

Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF* and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (all populations, including infants and children)	NOAEL= 25.1 mg/kg/day 83.55% ai purity	UF = 100 (10x inter-species extrapolation and intra-species variation) FQPA SF = 1x **Acute PAD** = 0.25 mg TCMTB/kg/day	Developmental toxicity study in rats (MRID 00154295, 92179009 (1985)) Maternal LOAEL = 76.5 mg TCMTB/kg/day, based on clinical signs of toxicity (ventral alopecia, rough coat, dyspnea/wheezing, oral discharge, diarrhea/loose stool, urine staining, piloerection, and hunched gait).
Acute Dietary (females 13-49)	An endpoint specific for females 13-49 was not identified because the Acute Dietary endpoint for all populations is protective of developmental effects.		
Chronic Dietary (all populations)	LOAEL = 3.8 mg/kg/day 81.6% ai purity	UF = 300 (10x inter-species extrapolation and intra-species variation, 3x for use of a LOAEL) FQPA SF = 1x **Chronic PAD** = 0.01 mg ai/kg/day	Chronic toxicity study in dogs (MRID 41342201, 92179008 (1989)) LOAEL = 3.8 mg/kg/day (males), based on decreased body weight gain, decreased white cells, monocytes, and plasma ALT; decreased uterine weight in females.
Carcinogenicity	The Agency concluded that TCMTB should be classified as Group C - possible human carcinogen - and recommended that for the purpose of risk characterization, the Reference Dose (RfD) approach should be used for quantitation of human risk. This was based on statistically significant increases in tumors in both sexes of the Sprague-Dawley rat: testicular interstitial cell adenomas in males and thyroid C-cell adenomas in females.		

Notes: UF = uncertainty factor, FQPA SF = FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose (a = acute, c = chronic) RfD = reference dose
(a) Note: an additional UF of 10X is used for route extrapolation from an oral endpoint to determine if a confirmatory inhalation study is warranted. If results are below a MOE of 1,000, a confirmatory inhalation study may be required.

Developmental toxicity studies were available in both the rat and rabbit for TCMTB. Rabbits appear to be more sensitive to the toxicity of TCMTB than rats. In rabbits, the maternal NOAEL and LOAEL were significantly lower than those for rats. However, no developmental effects were noted in the rabbit at the highest dose tested (32 mg ai/kg/day). In the rat, adverse developmental effects including increased fetal and litter incidence of fused/wavy ribs,

rudimentary cervical, thoracic and lumbar ribs and increased incidence of sternebrae and pelvic girdle anomalies were noted at doses of 105 mg ai/kg/day, which was maternally toxic.

In a two-generation rat reproduction study, there were no treatment related effects noted at the highest dose tested for parental toxicity or on reproductive parameters examined in this study.

General Toxicity Observations

Following subchronic oral exposures to rodents, TCMTB caused increased incidence of mild to severe stomach lesions characterized by inflammation, hyperplasia, necrosis, and ulceration. TCMTB resulted in decreased body weight gains (78 to 84% of control), food consumption (87-95% of control) and food efficiency. In a 21-day rat dermal toxicity study, TCMTB produced dose-dependant dermal irritation in all dose groups beginning on treatment days 3-4, which progressed to eschar formation. Rats in the mid and high dose group had ulcers, hemorrhages and chronic dermatitis. Decreased body weight gain, food consumption, and hematological (changes in hemoglobin, hematocrit, and segmented neutrophils) and clinical chemistry changes (blood urea nitrogen, glucose, globulins, and elevated serum aspartate aminotransferase (AST) were also noted. However, the clinical chemistry changes did not correspond to any treatment-related findings in the liver or kidney.

The available toxicity data do no indicate neurotoxicity in the experimental animals exposed to TCMTB by either oral or derma routes.

Dogs appear to be the most sensitive species to TCMTB toxicity following chronic exposure. In the chronic dog toxicity study, adverse effects were noted at the lowest dose tested of 3.8 mg/kg/day. Adverse effects included decreased body weight gain, hematological effects (changes in white blood cells, monocytes), alterations in clinical chemistry parameters (plasma ALT) and decreased uterine weight in females.

In the chronic rat toxicity/carcinogenicity study, no adverse effects were noted at the highest dose tested of 20 mg/kg/day. However, there was a statistically significant increase in the incidence of testicular interstitial cell adenomas in males of mid- and high-dose levels that had a highly significant positive dose-related trend. Treatment was also associated with a possible increased incidence of thyroid C-cell adenomas in females of the mid- and high-dose levels, which had a highly significant positive dose-related trend, but did not attain a statistically significant level in the pairwise comparison with concurrent controls.

In the chronic mouse toxicity/carcinogenicity study, decreased body weight gain was noted in both sexes, while there was a statistically increased incidence of focal and diffuse hyperplasia of duodenal mucosa in males. There was no evidence of carcinogenicity.

Dietary

The acute RfD of TCMTB is 0.25 mg/kg/day. The acute RfD was determined by using a no-observed effect level (NOAEL) of 25.1 mg/kg/day for all populations based on clinical signs

of toxicity in maternal rats in a rat developmental study (ventral alopecia, rough coat, dyspnea/wheezing, oral discharge, diarrhea/loose stool, urine staining, piloerection, and hunched gait). An uncertainty factor of 100 (10X for inter-species extrapolation, 10X for intra-species variability) was applied to the NOAEL.

The chronic RfD is 0.013 mg/kg/day for all populations. The chronic RfD was established by using a LOAEL of 3.8 mg/kg/day, which is based on a chronic dog study that observed decreased body weight gain, decreased white cells, monocytes and plasma ALT and decreased uterine weight in females. An uncertainty factor of 300 was applied (10X for inter-species extrapolation and intra-species variation, and 3X for subchronic to chronic extrapolation).

Incidental Oral

The NOAEL for the short- and intermediate-term incidental oral endpoint is 16 mg/kg/day, based on a rabbit developmental study. The target margin of exposure (MOE) is 100 (10X for inter-species extrapolation and intra-species variation).

Short-, Intermediate- and Long-term Dermal

The short-, intermediate- and long-term dermal NOAEL is 25 mg/kg/day, which is based on a dermal toxicity study. The uncertainty factor, or "target" MOE, for TCMTB dermal exposure is 100 for short- and intermediate-term durations and 300 for long-term durations (10X for inter-species extrapolation and intra-species variation, and 3X for subchronic to chronic extrapolation).

Short- and Intermediate-term Inhalation

The short- and intermediate-term inhalation endpoint is based on an oral rabbit developmental toxicity study NOAEL of 16 mg/kg/day. The long-term inhalation endpoint is LOAEL of 3.8 mg/kg/day, based on a chronic toxicity study in dogs. In the absence of route-specific data, it was conservatively assumed that inhalation absorption is equivalent to oral absorption (100%). The target MOE for TCMTB is 100 for short- and intermediate-term durations and 300 for long-term durations (10X for inter-species extrapolation and intra-species variation, 3X for subchronic to chronic extrapolation).

Carcinogenicity Classification

TCMTB has been classified as group C, possible human carcinogen. In the chronic toxicity/carcinogenicity study in rats there was a statistically significant increase in the incidence of testicular interstitial cell adenomas in males of mid (8 mg/kg/day) and high-dose (20 mg/kg/day) levels, that had a highly significant positive dose-related trend. Treatment was also associated with a possible increased incidence of thyroid C-cell adenomas in females of the mid- and high-dose levels, which had a highly significant positive dose-related trend, but did not attain a statistically significant level in the pairwise comparison with concurrent controls. No historical data were available for review.

The Agency recommended that for the purpose of risk characterization the Reference Dose (RfD) approach be used for quantifying the TCMTB cancer risk. The RfD approach is considered to be protective of any carcinogenic effect (the chronic dietary endpoint is .01 mg/kg/day compared to .08 mg/kg/day). Further, the RfD approach was recommended because there is no apparent compound-related increase in tumors in the mouse carcinogenicity study and there is no apparent concern for mutagenicity.

Mutagenicity Potential

TCMTB was found to be negative for mutagenicity in the gene mutation assay with bacteria and did not cause an increase in unscheduled DNA synthesis (UDS) in the rat hepatocytes assay. TCMTB was also found to be negative for chromosomal aberrations in the *in vivo* micronucleus assay in mice. Therefore, TCMTB is not mutagenic or genotoxic.

Endocrine Disruption Potential

EPA is required under the Federal Food Drug and Cosmetic Act (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 such endocrine effects as the Administrator may designate." Following recommendations of its Endocrine Disruptor 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 the Program include evaluations of potential effects in wildlife. For pesticide chemicals, 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 Agency's Endocrine Disrupting Screening Program (EDSP) have been developed, TCMTB may be subjected to additional screening and/or testing to better characterize effects related to endocrine disruption.

2. Metabolite Assessment

TCMTB has several metabolites, including 2-mercaptobenzothiazole (2-MBT) and 2-benzothiazolesulfonic acid (2-BTSA). The Agency's Risk Assessment Review Committee (RARC) met and determined that the residue of concern for tolerance expression and risk assessment is TCMTB in/on plants. 2-MBT and other TCMTB metabolites were not found at significant levels to be considered residues of concern. The determination of the residues of concern in plant commodities was based on tomato and melon metabolism studies and available toxicity data. 2-BTSA was found at significant levels (62% in tomato fruit); however, it was determined that it should be excluded as a residue of concern because it is expected to be less toxic than the parent TCMTB. 2-BTSA does not contribute significantly to the chronic toxicity of the parent. This decision is considered preliminary pending the results of confirmatory metabolism data that are required to support the currently registered uses of TCMTB.

For drinking water, the residues of concern included TCMTB and 2-MBT, based on an available aerobic soil metabolism study (MRID 43532201). Although 2-MBT is distinctly less toxic than the parent, it was conservatively included in the drinking water assessment because it is a toxic metabolite of concern. All other metabolites were not found at significant levels; and are not to be considered residues of concern.

A summary of the decisions concerning the residues of concern in plants and drinking water are presented below in Table 3. For further information regarding the metabolism assessment of TCMTB please refer to, 3.0 Metabolism Assessment in the "2-(Thiocyanomethylthio) benzothiazole (TCMTB) Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated August 1, 2006.

Table 3. Summary of TCMTB Residues to be Included in the Risk Assessment and Tolerance Expression

Matrix		Residues Included in Risk Assessment	Residues Included in Tolerance Expression
Plants	Primary crop - barley, cotton, oat, rice, safflower, sugar beet, and wheat	TCMTB	TCMTB
	Rotational crop	NA = not applicable	NA
Livestock	Ruminant	NA	NA
	Poultry	NA	NA
Drinking water		TCMTB and 2-MBT	NA

NA= Not applicable

3. FQPA Safety Factor

The FQPA Safety Factor (as required by the Food Quality Protection Act of 1996) is intended to provide an additional 10-fold safety factor (10X), to protect for special sensitivity in infants and children to specific pesticide residues in food, drinking water, or residential exposures, or to compensate for an incomplete database. The Agency has concluded that the FQPA Safety Factor should be removed (i.e., reduced to 1X) for TCMTB based on: (1) a complete toxicology data base with respect to assessing the increased susceptibility to infants and children as required by FQPA; (2) a lack of evidence that TCMTB will induce neurotoxic effects; (3) no evidence of increased susceptibility to the fetus following *in utero* exposure in the prenatal developmental toxicity studies; (4) no evidence of increased susceptibility to the offspring when adults are exposed in the two-generation reproductive study; and (5) the risk assessment does not underestimate the potential exposure for infants and children. Based on the analysis of submitted developmental toxicity studies, the Agency determined that no special FQPA Safety Factor was needed since there were no residual uncertainties for pre- and/or post-natal toxicity.

4. Population Adjusted Dose (PAD)

Dietary risk is characterized in terms of the Population Adjusted Dose (PAD), which reflects the reference dose (RfD), either acute or chronic, that has been adjusted to account for the FQPA Safety Factor (SF). This calculation is performed for each population subgroup. A risk estimate that is less than 100% of the acute or chronic PAD is not of concern. The Agency has conducted a dietary exposure and risk assessment for the use of TCMTB as a fungicide for seed treatment as well as a slimicide and materials preservative in pulp and paper manufacturing.

a. Acute PAD

Acute dietary risk for TCMTB is assessed by comparing acute dietary exposure estimates (in mg/kg/day) to the acute Population Adjusted Dose (aPAD). Acute dietary risk is expressed as a percent of the aPAD. The aPAD is the acute reference dose (0.25 mg/kg/day) modified by the FQPA safety factor. The TCMTB acute reference dose was derived from a developmental toxicity study in rats in which a NOAEL (25 mg/kg/day) was determined. Acute dietary exposure was estimated for all populations, including infants and children. The TCMTB aPAD is 0.25 mg/kg/day based on a reference dose of 0.25 mg/kg/day and an FQPA safety factor of 1X.

b. Chronic PAD

Chronic dietary risk for TCMTB is assessed by comparing chronic dietary exposure estimates (in mg/kg/day) to the chronic Population Adjusted Dose (cPAD). Chronic dietary risk is expressed as a percent of the cPAD. The cPAD is the chronic reference dose (0.01 mg/kg/day) modified by the FQPA safety factor. The cPAD was derived from a chronic toxicity study in dogs in which the LOAEL (3.8 mg/kg/day) was determined. The TCMTB cPAD is 0.01 mg/kg/day based on a reference dose of 0.01 mg/kg/day, which incorporates the FQPA safety factor (1X) for the overall U.S. population and all population subgroups.

5. Dietary Exposure Assumptions

Acute and chronic dietary exposure assessments were conducted for the use of TCMTB as a fungicide for seed treatment as well as an antimicrobial pesticide for pulp and paper products.

<u>Seed Treatment Use</u>

For the seed treatment use of TCMTB, conservative acute and chronic dietary exposure assessments incorporated maximum theoretical concentration factors for all commodities, existing tolerance level residues, and 100% crop treatment. These exposure assessments were conducted using the Dietary Exposure Evaluation Model software with the Food Commodity Intake Database (DEEM-FCID™, Version 2.03), which uses food consumption data from the USDA's Continuing Surveys of Food Intakes by Individuals (CSFII) from 1994-1996 and 1998.

Antimicrobial Use

The dietary risk assessment conducted for the antimicrobial use of TCMTB considered only potential food exposures from the antimicrobial uses of TCMTB because this use is expected to have minimal impact on drinking water exposure. In the absence of residue data, the Agency estimated antimicrobial residue levels that may occur in food that contacts treated pulp and paper products from the maximum application rates on TCMTB product labels. When assessing the antimicrobial dietary risks of TCMTB the Agency used FDA's Center for Food Safety & Applied Nutrition's (CFSAN) screening-level approach as presented in the "Preparation of Food Contact Notifications and Food Additive Petitions for Food Contact Substances: Chemistry Recommendations" dated April 2002. Using the maximum application rates and US FDA's default assumptions, "worst-case" dietary concentration values were calculated by the Agency. This model was used to determine the estimated daily intake (EDI).

In addition, the Agency estimated a total cumulative dietary intake of TCMTB that could result from simultaneous exposure from the three antimicrobial uses that were assessed (pulp/paper slimicide use; paper coating use; and paper adhesive preservative use).

6. Dietary Risk Assessment

The Agency conducted a dietary exposure/risk assessment for the use of TCMTB as a fungicide for seed treatment as well as an antimicrobial pesticide in pulp and paper products. Generally, a dietary risk estimate that is less than 100% of the acute or chronic PAD (aPAD or cPAD) does not exceed the Agency's risk concerns. A summary of acute and chronic risk estimates are shown in Tables 4 and 5.

a. Dietary Risk from Food and Drinking Water

Seed Treatment Use

The Agency has determined that the acute dietary risk estimates do not exceed the Agency's level of concern (less then 100% of the aPAD) at the 95th exposure percentile for the United States population (less than 1% of the aPAD) and all population subgroups. The highest exposed population subgroup was children 3-5 years old at 2% of the aPAD.

The chronic dietary risk assessment concluded that for all supported agricultural uses of TCMTB, the chronic risk estimates are below the Agency's level of concern (less than 100% of the cPAD) for the general U.S. population (7% of the cPAD) and all population subgroups. The highest exposed population subgroup was children 3-5 years old at 17% of the cPAD.

Table 4. Seed Treatment Use Summary of Dietary Exposure and Risk for TCMTB Using DEEM-FCID (Food and Water)

Population Subgroup	Acute Dietary (95th Percentile)		Chronic Dietary	
	Dietary Exposure (mg/kg/day)	% aPAD [b]	Dietary Exposure (mg/kg/day)	% cPAD [b]
General U.S. Population	0.002430	<1	0.000888	7
All Infants (< 1 year old)	0.003256	1	0.000994	8
Children 1-2 years old	0.004467	2	0.002054	16
Children 3-5 years old [a]	**0.004581**	**2**	**0.002226**	**17**
Children 6-12 years old	0.003370	1	0.001625	13
Youth 13-19 years old	0.002109	<1	0.000936	7
Adults 20-49 years old	0.001547	<1	0.000680	5
Adults 50+ years old	0.001192	<1	0.000542	4
Females 13-49 years old	0.001529	<1	0.000671	5

[a] The **bolded** values represent the highest exposed populations for each percentile.
[b] %PAD = dietary exposure (mg/kg/day) / aPAD or cPAD, where aPAD= 0.25 mg/kg/day (for all populations) and cPAD=0.013 mg/kg/day (for all populations)

Antimicrobial Use

TCMTB is used as a slimicide and paper coating preservative for controlling bacteria, fungi and yeasts that cause deterioration of paper and paperboard products and used to preserve paper-adhesive formulations.

The results of the acute dietary risk estimates for the antimicrobial use of TCMTB are below the Agency's level of concern for all population subgroups (<1% of the aPAD for all use sites). The highest dietary risk estimate was at 0.66% of the aPAD for infants and children. The chronic dietary analysis indicates that all risk estimates are below the Agency's level of concern for all population subgroups (<13% of cPAD for all use sites). The highest dietary risk estimate was at 12.8% of the cPAD, for combined exposure to infants and children.

Table 5. Antimicrobial Use Summary of Dietary Exposure and Risk for TCMTB

Population Subgroup	Acute Dietary		Chronic Dietary	
	Dietary Exposure (mg/kg/day) [a]	% aPAD [b]	Dietary Exposure (mg/kg/day) [a]	% cPAD [b]
Pulp/Paper Slimicide				
Adult Male	0.00024	0.096	0.00024	1.8
Adult Female (13-50 years old)	0.00028	0.11	0.00028	2.2
Infants/Children	0.00056	0.22	0.00056	4.3
Paper Coating Preservative				
Adult Male	0.00017	0.07	0.00017	1.31
Adult Female (13-50 years old)	0.0002	0.08	0.0002	1.54
Infants/Children	0.0004	0.16	0.0004	3.08
Paper Adhesive Preservative				
Adult Male	0.00030	0.12	0.00030	2.3
Adult Female (13-50 years old)	0.00035	0.14	0.00035	2.7
Infants/Children	0.0007	0.28	0.0007	5.38
Cumulative				
Adult Male	0.00071	0.29	0.00071	5.41
Adult Female (13-50 years old)	0.00083	0.33	0.00083	6.44
Infants/Children	0.0017	0.66	0.0017	12.8

[a] Acute and chronic exposure analysis based on body weights of 70kg, 60 kg, and 15 kg for adult males, females and children, respectively.
[b] %PAD = dietary exposure (mg/kg/day) / aPAD or cPAD, where aPAD= 0.25 mg/kg/day (for all populations) and cPAD=0.013 mg/kg/day (for all populations)

b. Dietary Risk from Drinking Water

The Agency estimated drinking water exposures for the seed treatment use of TCMTB, only. There are no antimicrobial uses associated with TCMTB that are expected to impact either surface or groundwater resources.

The seed treatment drinking water estimates were incorporated directly into the dietary risk assessment. Thus, the drinking water and food assessments are combined into the acute and chronic dietary risk estimates where risk is shown as %PAD**.** The drinking water analysis was

based on a derivation of estimated upper bound Tier I drinking water concentrations from TCMTB seed treatment uses, which were based on the FQPA Index Reservoir Screening Tool (FIRST). Both TCMTB and its' degradate, 2-MBT, were included in the drinking water estimates. 2-MBT is distinctly less toxic than the parent; but was conservatively included in the drinking water assessment because it is considered a toxic metabolite of concern.

A number of conservative assumptions related to runoff and leaching were utilized as inputs including: a maximum application rate of 0.041 lb ai/acre, no potential degradation and transformation reactions occur, no partitioning between the liquid phase and the solid phase occurs, and that TCMTB does not sorb to the seed coat (only to the soil).

For surface drinking water, results from FIRST indicate that the peak (acute) concentration of TCMTB and its' degradates is not likely to exceed 0.94 ug/L (ppb) and that the average annual (chronic) concentration is not likely to exceed 0.67 ug/L (ppb). These drinking water concentrations were used in the acute and chronic dietary risk assessment for the agricultural uses of TCMTB as was discussed above.

For further details regarding the dietary risk assessment conducted for the seed treatment use of TCMTB, refer to the "Drinking Water Assessment for the Use of the Fungicide of 2-(Thiocyanomethylthio) benzothiazole (TCMTB) as a Seed Treatment on Cotton, Wheat, Barley, Oats, Rice, Sugar Beets, and Safflower," dated January 31, 2006.

It should be noted that the Agency estimated higher concentrations for exposure to aquatic animals resulting from the antisapstain use than were used in the drinking water assessment. These levels were not considered appropriate for use in the drinking water assessment due to the very conservative nature of the model used, that the model estimates runoff concentrations and not water body concentrations, and the fact that the model does not account for dilution.

7. Residential Risk Assessment

Residential exposure from TCMTB can occur from the antimicrobial uses of TCMTB. The residential exposure assessment considers all potential pesticide exposure, other than exposure due to residues in food and drinking water. Exposure may occur during and after application methods including painting via brush/roller and airless sprayer. Each route of exposure (oral, dermal, inhalation) is assessed, where appropriate, and risk is expressed as a Margin of Exposure (MOE), which is the ratio of estimated exposure to an appropriate No Observed Effect Level (NOAEL) dose. Based on the application methods, TCMTB has been assessed for the residential mixing/loading/applicator (or "handler") exposure.

a. Residential Toxicity

The toxicological endpoints and associated uncertainty factors used for assessing the non-dietary, residential and occupational risks for TCMTB are listed in Table 6.

A MOE greater than or equal to 100 is considered adequately protective for the residential exposure assessment for the dermal and inhalation routes of exposure. The MOE of 100 includes 10x for inter-species extrapolation, 10x for intra-species variation.

Table 6. Residential and Occupational Toxicological Doses and Endpoints for TCMTB

Exposure Scenario	Dose Used in Risk Assessment (mg/kg/day)	Target MOEs/UFs FQPA Safety Factor for Risk Assessment	Study and Toxicological Effects
Short-Term and Intermediate-Term Incidental Oral (1-30 days; 30 days-6months)	NOAEL= 16.2 mg ai/kg/day 81% ai purity (20 mg TCMTB/kg/day)	**MOE = 100 (ST and IT)** (10X for inter-species extrapolation and intra-species variation)	Developmental toxicity study in rabbits (MRID 40075101, 40075102, 92179011, (1986)) LOAEL = 32 mg ai/kg/day (40 mg TCMTB/kg/day) based on decreased body weight gain and food consumption in maternal animals.
Short-Term, Intermediate-Term and Long-Term Dermal Exposure	NOAEL=25 mg/kg/day 82.33% ai purity (20.6 mg ai/kg/day)	**MOE = 100 (ST and IT)** **MOE = 300 (LT)** (10X for inter-species extrapolation and intra-species variation, and 3X for duration of exposure)	21-Day dermal toxicity study in rats (MRID 41655801) LOAEL = 100 mg TCMTB/kg/day (82.3 mg ai/kg/day) based on decreased body weight gain, food consumption and hematological and clinical chemistry changes
Short-Term and Intermediate-Term Inhalation Exposure	NOAEL = 16.2 mg ai/kg/day 81% ai purity (20 mg TCMTB/kg/day) Absorption = 100% (inhalation and oral equivalent)	**MOE = 100 (ST and IT)** (10X for inter-species extrapolation and intra-species variation)	Developmental toxicity study in rabbits (MRID 40075102) LOAEL = 32 mg ai/kg/day (40 mg TCMTB/kg/day) based on decreased body weight gain and food consumption in maternal animals.
Long-Term Inhalation Exposure	LOAEL = 3.8 mg/kg/day 81.6% ai purity Absorption = 100% (inhalation and oral equivalent)	**MOE = 300 [(a)] (LT)** (10X for inter-species extrapolation and intra-species variation and 3X for use of a LOAEL)	Chronic toxicity study in dogs (MRID 41342201, 92179008 (1989)) LOAEL = 3.8 mg/kg/day (males) based on decreased body weight gain, decreased white cells, monocytes, and plasma ALT. Decreased uterine weight in females.

Exposure Scenario	Dose Used in Risk Assessment (mg/kg/day)	Target MOEs/UFs FQPA Safety Factor for Risk Assessment	Study and Toxicological Effects
Short- and Intermediate-Term Incidental Oral (1-30 days; 30 days-6 months)	NOAEL= 16.2 mg ai/kg/day 81% ai purity (20 mg TCMTB/kg/day)	**MOE = 100** (10X for inter-species extrapolation and intra-species variation)	Developmental toxicity study in rabbits (MRID 40075101, 40075102, 92179011 (1986)) LOAEL = 32 mg ai/kg/day (40 mg TCMTB/kg/day), based on decreased body weight gain and food consumption in maternal animals.
Cancer	The Agency concluded that TCMTB should be classified as a "Group C- Possible Human Carcinogen" and recommended that for the purpose of risk characterization, the Reference Dose (RfD) approach should be used for quantitation of human risk. The chronic RfD is protective of any potential carcinogenic effect. This decision was based on statistically significant increases in tumors in both sexes of the Sprauge-Dawley rat (testicular interstitial cell adenomas in males and thyroid C-cell adenomas in females).		

Notes: UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, LOC = level of concern, MOE = margin of exposure
(a) Note: An additional uncertainty factor (UF) of 10X is used for route extrapolation from an oral endpoint to determine if a confirmatory inhalation study is warranted. If results are below a MOE of 1,000 a confirmatory inhalation study may be required.

b. Residential Handlers

i. Exposure Assessment

Residential exposure can occur through the application of TCMTB preserved paint via airless sprayer or paintbrush. EPA selected high-end scenarios for each use site for the residential handler exposure assessment. These scenarios are listed below:

- Painting with an airless sprayer
- Painting with a brush/roller

There was no chemical-specific exposure data to assess paint application with a brush roller or airless sprayer. Therefore, dermal and inhalation exposures were assessed for these scenarios using the Pesticide Handler Exposure Database (PHED, Version 1.1) and values were found in the Residential Exposure SOPs (U.S. EPA, 1997a, 2001). The dermal and inhalation exposures from these techniques have been normalized by the amount of active ingredient handled and reported as unit exposures (UE), which are expressed as mg/lb of active ingredient handled.

Maximum application rates, related use information and Agency standard values were used to assess residential handler exposure. For example, it was conservatively assumed that a resident applies 15 gallons of paint per day using an airless sprayer and 2 gallons of paint per day using a brush/roller. The residential handler scenarios were assumed to be of short-term duration (1-30 days).

ii. Risk Assessment

Based on toxicological criteria and potential for exposure, the Agency has conducted dermal and inhalation exposure assessments. A MOE greater than or equal to 100 is considered adequately protective for the residential exposure assessment for the dermal and inhalation routes of exposure. The MOE of 100 includes 10x for inter-species extrapolation, 10x for intra-species variation.

All of the inhalation MOEs for residential handlers are above the target MOE of 100 and, therefore, are not of concern. For the residential handler dermal risk assessment, dermal MOEs are below the target of 100 and, therefore, are of concern (MOE of 10 for airless sprayer, MOE of 25 for paint brush). In addition, total dermal and inhalation risk estimates were of concern primarily because of the dermal route of exposure. A summary of the residential handler exposures and risks are presented on Table 7.

Table 7. Residential Handler Risk Summary (Short-Term Duration)

Exposure Scenario	Use site	Dermal Dose (mg/kg/day)[a]	Inhalation Dose (mg/kg/day)[b]	Dermal MOE[c]	Inhalation MOE[d]	Total Dermal and Inhalation MOE
Airless Sprayer	Residential/ Household Premises	2.54	0.0267	**10**	600	**9.8**
Paintbrush/ Roller	Residential/ Household Premises	0.986	0.00122	**25**	13,000	**25**

[a] Dermal Dose (mg/kg/day) = [Unit dermal exposure (mg/lb ai) * Use rate (lb ai/lb product or lb ai/gal product) * Amount handled per day (lb product/day)] / Body weight (kg)
[b] Inhalation Dose (mg/kg/day) = [Unite inhalation exposure (mg/lb ai) * Use rate (lb ai/lb product or lb ai/gal product) * Amount handled per day (lb product/day) * inhalation absorption (1.0)] / Body Weight (kg)
[c] Dermal MOE = Dermal NOAEL (mg/kg/day) / Dermal Dose (mg/kg/day), where the NOAEL is 25 mg/kg/day from the sub-chronic rat dermal toxicity study
[d] Inhalation MOE = Inhalation NOAEL (mg/kg/day) / Inhalation Dose (mg/kg/day), where the inhalation NOAEL of 16 mg/kg/day is from an oral rabbit developmental study. In absence of data, inhalation absorption is assumed to be equivalent to oral absorptions.

c. Residential Post-application

i. Exposure Assessment

Residential post-application exposures result when adults and children come in contact with TCMTB in areas where pesticide end-use products have recently been applied (e.g., treated textiles/carpeting), or when children incidentally ingest the pesticide residues through mouthing the treated end products/treated articles (i.e., hand-to-mouth or object-to-mouth contact). The residential post-application scenarios considered in this assessment are from exposure to residues on carpets that have been treated with TCMTB and wearing clothing that was treated with TCMTB.

There is the potential for dermal exposure to toddlers crawling on carpets preserved with TCMTB. Short-term dermal risks to children have been identified, as the preservative is applied only during the manufacturing of the carpet. In addition to dermal exposure, infants crawling on treated floors will also be exposed to TCMTB via incidental oral exposure through hand-to-mouth transfer. To calculate incidental ingestion exposure to TCMTB due to hand-to-mouth transfer, the scenarios established in EPA's "Standard Operating Procedures (SOPs) for Residential Exposure Assessments" were used.

The Agency evaluated the following three post-application scenarios, which are considered to be representative of all possible residential exposure scenarios:

- Contact with treated carpets by children (incidental oral and dermal exposure to children);
- Wearing treated textiles/leather products (dermal exposure to children and adults);
- Mouthing treated textiles such as clothing/blankets/leather products (incidental oral exposure to children).

For treated textiles/leather products, the Agency believes exposures are primarily short-term because residents are assumed to be exposed to treated textiles with varying active ingredients and that these textiles have not exclusively been treated with TCMTB. However, if the products are used on a routine basis (i.e., once a week or impregnated into carpets as materials preservative) and the active ingredient has a long indoor half-life, exposures may occur over an intermediate-term (30 days-6 months). The Agency did not have residue dissipation data or reliable use pattern data, including the frequency and duration use of antimicrobial products in residential settings. Because of this lack of data, intermediate-term exposure was assessed to provide an upper-bound estimate of exposure to treated textiles.

A number of conservative assumptions were used in assessing post-application risks including maximum application rates from TCMTB product labels. In addition, quantities handled/treated were estimated based on information form various resources, including the Draft Standard Operating Procedures (SOPs) for Residential Exposure Assessments (USEPA 2000, 2001) and standard Agency residential SOP assumptions. Standard values were not available for the textile and treated leather product uses. For these scenarios, it was assumed that either 100% or 5% of TCMTB could transfer and be available for dermal contact.

ii. Risk Assessment

Based on toxicological criteria and potential for exposure, the Agency has conducted dermal and incidental oral exposure assessments. A MOE greater than or equal to 100 is considered adequately protective for the residential exposure assessment for the dermal, incidental oral and inhalation routes of exposure. The MOE of 100 includes 10x for inter-species extrapolation and 10x for intra-species variation.

The residential post-application risk assessment identifies short-term (1-30 days) and intermediate-term (1-6 month) exposure doses based on the reported toxicology endpoints for TCMTB. Because the toxicological endpoints are identical for short- and intermediate-term

durations for both dermal and incidental oral exposures, the Agency calculated a total MOE for children.

The short-term and intermediate-term MOEs for dermal contact with treated clothing/leather products are of concern for both young children and adults (MOEs are less than 1, assuming a 100% transfer factor; MOEs are less than 10, assuming a 5% transfer factor). In addition, the dermal MOE is of concern for young children crawling on treated carpets (MOE of 2). TCMTB is a dermal sensitizer and thus, there is a potential for adverse dermal allergic reactions from direct skin contact of treated textiles.

The short- and intermediate-term MOEs for incidental oral ingestion of treated carpets by children exceeds the Agency's level of concern (MOE of 4). In addition, the short-term oral MOE for children mouthing treated textiles/leather products is also a risk of concern as the MOE (MOE of 21) is below the target of 100.

As shown in Table 8, the total MOE for children who may contact TCMTB treated carpet and treated clothing/leather products is less then 1 and, therefore, the total (oral and dermal exposures combined) MOE for children is of concern.

Table 8 presents a summary of the short-term and intermediate-term residential post-application exposures and risk estimates.

Table 8. Antimicrobial Short- and Intermediate-term Residential Post-application Exposures and Risk Summary

Scenario	Dose [a] (mg/kg/day)		MOE[b] (Target MOE>100)	
	Child	**Adult**	**Child**	**Adult**
Dermal Exposure				
Treated carpets	15.6 mg/kg/day	NA	**2**	NA
Treated clothing/leather products	4.3 mg/kg/day (5% transfer)	2.7mg/kg/day (5% transfer)	**5.8** (5% transfer)	**9.1** (5 % transfer)
	86 mg/kg/day (100% transfer)	55 mg/kg/day (100% transfer)	**<1** (100% transfer)	**<1** (100% transfer)
Incidental Oral Exposure				
Treated carpets	3.81 mg/kg/day	NA	**4.2**	NA
Treated clothing/leather products	0.758 mg/kg/ day	NA	**21**	NA
TOTAL MOE RISK ESTIMATE		NA	**<1** [c]	**NA**

NA= Not applicable
[a] Dose calculations for each scenario above are outlined in the attached Occupational/Residential Assessment (memo from S. Mostaghimi, February 2006).
[b] MOE= NOAEL (mg/kg/day) / PDR (mg/kg/day). Oral NOAEL is 16 mg/kg/day; dermal NOAEL is 25 mg/kg/day.
[c] Total MOE includes carpet (dermal and oral) and clothing (dermal and oral) exposures using the exposure estimates based on 5% residue transfer.

8. Aggregate Risk Assessment

The Food Quality Protection Act amendments to the Federal Food, Drug, and Cosmetic Act (FFDCA, Section 408(b)(2)(A)(ii)) require "that there is a reasonable certainty that no harm will result from aggregate exposure to pesticide chemical residue, including all anticipated

dietary exposures and other exposures for which there are reliable information." Aggregate exposure typically includes exposures from food, drinking water, residential uses of a pesticide, and other non-occupational sources of exposure.

The acute aggregate risk assessment is designed to provide estimates of risks likely to result from exposures to the pesticide or pesticide residues in food, water, and from residential (or other non-occupational) pesticide uses. As previously mentioned in section six of this document, "Residential Risk Assessment," the antimicrobial residential uses evaluated for TCMTB have risks of concern for residential handlers applying paint via airless sprayer or brush roller; children playing on, or mouthing treated carpets; and, adults and children wearing treated textiles/leather products. An aggregate assessment for short- and intermediate-term residential exposures was not conducted, because risks of concern were previously identified for individual residential exposure scenarios. An aggregate assessment would only reflect the identified individual risks of concern and, therefore, was unnecessary. There are no long-term residential exposure scenarios for TCMTB.

However, the Agency conducted both acute and chronic dietary aggregate assessments, which considered food (antimicrobial and agricultural) and drinking water (agricultural only) exposures, for the registered antimicrobial and agricultural uses.

In the case of TCMTB, a cancer aggregate assessment is not needed, as the chemical has been classified by the Agency as having "Possible Human Carcinogen." Because an RfD approach was used to evaluate chronic dietary risk and is considered protective of any cancer risk concern, only the results of the chronic analysis are given.

a. Acute Aggregate Risk

The acute aggregate risk assessment considered the 95th percentile dietary exposure (food and drinking water) from the agricultural seed treatment uses, as well as the acute dietary exposure (food only) from the antimicrobial uses in pulp and paper. While it is standard to use the chronic drinking water exposure estimate for acute aggregate risk assessments this was not done in this case. Since the acute food and drinking water exposures were combined into a single exposure estimate for the acute dietary assessment, this value was used in the aggregate assessment. Using the acute drinking water estimate is a more conservative approach than the standard method of conducting such an assessment. As shown in Table 9, the acute dietary aggregate risk is 2.5% of the aPAD for children and less than 1.3% of the aPAD for adults. These risk estimates are below the Agency's level of concern.

Table 9. TCMTB Acute Aggregate Risk Estimates

Exposure Scenario	Dose [a] (mg/kg/day)		% aPAD[b]	
	Child (15 kg)	Adult	Child (15 kg)	Adult
Dietary Exposure				
Agricultural Seed Treatment (Food and Water)	0.004581	0.00243	1.8%	<1%
Antimicrobial Uses Total Pulp/Paper/Adhesive (Food)	0.0017	0.00083	0.66%	0.33
Total Aggregate Dose and Risk	0.00628	0.00328	2.5%	<1.3%

NA= Not applicable
(a) Acute dietary exposure for females 13-50 years for antimicrobials uses.
(b) % aPAD = dietary exposure (mg/kg/day) / aPAD, where aPAD -= 0.25 mg/kg/day for all populations.

b. Chronic Aggregate Risk

The chronic aggregate risk assessment considered average dietary exposure (food and drinking water) from the agricultural seed treatment uses of TCMTB, as well as dietary exposure (food only) from the antimicrobial uses of TCMTB in pulp and paper. As shown in Table 10, the chronic dietary aggregate risk estimate of TCMTB is 30% of the cPAD for children and is 13.4% of the cPAD for adults. These risk estimates are below the Agency's level of concern.

Table 10. TCMTB Chronic Aggregate Risk Estimates

Exposure Scenario	Dose [a] (mg/kg/day)		% cPAD[b]	
	Child (15 kg)	Adult	Child (15 kg)	Adult
Dietary Exposure				
Agricultural Seed treatment (Food and Water)	0.002226	0.000888	17%	7%
Antimicrobial Uses Total Pulp/Paper/Adhesive (Food)	0.0017	0.00083	12.8%	6.44
Total Aggregate Dose and Risk	0.003926	0.001718	30%	13.4%

NA= Not applicable
(a) Chronic dietary exposure for females 13-50 years for antimicrobials uses.
(b) % cPAD = dietary exposure (mg/kg/day) / cPAD, where cPAD -= 0.013 mg/kg/day for all populations.

9. Occupational Risk

Workers can be exposed to a pesticide through mixing, loading, and/or applying a pesticide, or re-entering treated sites. TCMTB is used as an antimicrobial pesticide (e.g., materials preservative, industrial processes and water systems, wood preservative and paint application) and as a seed treatment. Potential occupational exposure can occur in various use sites, which include commercial/industrial premises, industrial process and water systems, from wood preservation, and from metal working fluid uses.

Occupational handlers of TCMTB include handlers applying TCMTB treated paint via airless sprayer or paint brush/roller; handlers pouring TCMTB liquid preservative for paint preservation, textile preservation, drilling fluids, metal working fluids and small process water systems; handlers pumping (metering) liquid preservative for metal working fluid, pulp and paper and cooling water systems, paint and textiles preservation, and small process water systems; and wood preservative handlers.

For the seed-treatment use of TCMTB, occupational handlers include workers in agricultural seed treatment settings (commercial and on-farm settings) and workers handling seed previously treated (post-application worker exposure).

a. Occupational Toxicity

The toxicological endpoints used in the occupational handler assessment of TCMTB can be found in Table 6, "Residential and Occupational Toxicological Doses and Endpoints for TCMTB", of this document.

b. Occupational Handler Exposure

Occupational risk for all potentially exposed populations is measured by a Margin of Exposure (MOE), which determines how close the occupational exposure comes to a No Observed Adverse Effect Level (NOAEL) from toxicological studies. Occupational risk is assessed for exposure at the time of application (termed "handler" exposure). Application parameters are generally defined by the physical nature of the formulation (e.g., formula and packaging), by the equipment required to deliver the chemical to the use site and by the application rate required to achieve an efficacious dose.

The Agency evaluated representative scenarios using maximum application rates as recommended on TCMTB product labels. To assess handler risk, the Agency used surrogate unit exposure data from both the proprietary Chemical Manufacturers Association (CMA) Antimicrobial Exposure Study (USEPA, 1999) and the Pesticide Handlers Exposure Database (PHED), (USEPA, 1998). The duration of exposure to TCMTB is expected to be short-term or intermediate-term (1 day to 6 months) for most occupational scenarios. Wood preservation and metal working fluid uses were assumed to be long-term exposure durations.

For more information on the assumptions and calculations of potential agricultural and antimicrobial risks of TCMTB to workers, see the Occupational Exposure Assessment (Sections 9.0-9.2) in the "2-(Thiocyanomethylthio) benzothiazole (TCMTB) Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated August 1, 2006, the antimicrobial "Occupational and Residential Exposure Assessment for 2-(Thiocyanomethylthio) benzothiazole TCMTB," dated April 19, 2006 and the "TCMTB [2-(Thiocyanomethylthio)benzothiazole]: Third Revision of the Occupational and Residential Exposure Assessment for the Reregistration Eligibility Decision Document" for the agricultural uses of TCMTB, dated July 27, 2006.

Antimicrobial Use

Inhalation and dermal exposures to TCMTB (as an antimicrobial pesticide) were addressed for occupational populations for both short- and intermediate-term durations. The Agency used surrogate unit exposure data from the proprietary Chemical Manufacturers Associated (CMA) antimicrobial exposure study (USEPA, 1999) and the Pesticide Handlers Exposure Database (PHED) to assess handler risks (USEPA, 1998). MOEs for material preservation of paints, textiles, adhesives and metalworking fluid were calculated using unit exposure values from the cooling tower CMA data-set (USEPA, 1999) because exposure data were not available for ungloved handlers. Handler exposures were assessed for the application of TCMTB-preserved paint.

For the airless sprayer scenario, PHED dermal and inhalation unit exposure values for a residential handler applying a pesticide using an airless sprayer were used. These unit un-gloved exposure values (79 mg/lb a.i. for dermal and 0.83 mg/lb a.i. for inhalation) represent a handler wearing short pants and a short sleeve shirt, with no gloves. It was assumed that 15 gallons (or 150 lb/day, assuming paint has a density of 10 lb/gal) of treated paint were to be used per day.

For the brush/roller scenario, PHED dermal and inhalation unit exposure values for a residential handler applying a pesticide using an airless sprayer were used. These unit exposure values (230 mg/lb a.i. for dermal and 0.284 mg/lb a.i. for inhalation) represent a handler wearing short pants and a short sleeve shirt, with no gloves. It was assumed that for the brush/roller paint applications 2 gallons (or 20 lb/day, assuming paint has a density of 10 lb/gal) of treated paint were to be used per day.

The duration of exposure for most homeowner applications of paint is believed to be best represented by the short-term duration (1 to 30 days). The reason that short term duration was chosen to be assessed is because the different handler and post-application scenarios are assumed to be episodic, not daily. In addition, homeowners are assumed to use different products with varying activities, not exclusively TCMTB treated products.

The dermal and inhalation wood unit exposure values for wood preservation were based on two replicates where the test subjects were wearing a single layer of clothing and chemical resistant gloves. Surrogate unit exposures were taken from the CMA study (USEPA, 1999). The quantity of the wood being treated was derived from other wood preservative estimates (USEPA, 2004) for the amount of wood slurry treated because no chemical specific data were available for TCMTB. It was assumed that batches of wood slurry are treated in 10,000 gallon tanks and that eight batches of wood slurry are treated per day (one per hour for an 8-hr work shift). Additionally, it was assumed that each batch requires 3,000 gallons of preservatives and the remainder volume of the tank consists of wood slurry (7,000 gallons of wood slurry per batch). Wood chips have a density of approximately 380 kg/m^3 (SIMetric, 2005) and, therefore, the total amount of wood slurry treated per day would be 178,000 lbs (8 batches/day * 7,000 gallons/batch * 0.003785 m^3/gallon * 380 kg/m^3 * 2.2 lb/kg). The assumptions used for batch sizes and the quantity of preservative needed are consistent with an assessment performed previously by the EPA. For this assessment, an application rate of 0.003 TCMTB w/w was used.

Based on the antimicrobial use patterns of TCMTB, the exposure scenarios in Table 11 were assessed:

Table 11. TCMTB Antimicrobial Occupational Handler Scenarios

Category	Scenario
Commercial Institutional Premises	Airless sprayer and paint brush/roller may be used as methods of application for paint application of TCMTB treated paint.
Materials Preservative	Pouring or pumping TCMTB preservative into vats or tanks for preservation of textiles/leather products, paints, adhesives and metal working fluid.
Industrial Processes and Water Systems	**Occupational Handler Scenarios:** Metered pumping, pouring or liquid pumping TCMTB into vats or tanks for drilling fluids, pulp and paper, and small process water systems/cooling towers. **Post-application Occupational Handler Scenarios:** Exposure can occur after the chemical has been incorporated into the cutting fluid and a machinist is using/handling this treated end-product.
Wood Preservative	**Occupational Handler Scenarios:** • ***Blender/spray operators*** are workers that add the wood preservative into a blender/sprayer system for composite wood via closed-liquid pumping. • ***Diptank Operators*** can be in reference to wood being lowered into the treating solution through an automated process (i.e., elevator diptank, forklift diptank). This scenario can also occur in a smaller scale treatment facility in which the worker can manually dip the wood into the treatment solution. • ***Chemical operators*** for a spray box system consist of chemical operators, chemical assistants, chemical supervisors, and chemical captains. These individuals maintain a chemical supply balance along with flushing and cleaning spray nozzles. **Post-application Occupational Handler Scenarios:** • ***Graders***, positioned right after the spray box, grade dry lumber by hand (i.e. detect faults). In the DDAC study, graders graded wet lumber; therefore, the exposures to graders using TCMTB are worst-case scenarios. • ***Millwrights*** repair all conveyer chains and general up-keep of the mill. • ***Clean-up crews*** perform general cleaning duties at the mill. • ***Trim saw operators*** operate the hula trim saw and consist of operators and strappers. In the DDAC study, hula trim saw operators handled dry lumber. • ***Construction workers*** install treated plywood, oriented strand board, medium density fiberboard, and others.

Agricultural Seed Treatment Uses

EPA has assessed the exposure to handlers' mixing/loading/applying products containing TCMTB. Inhalation and dermal exposure scenarios were addressed for occupational populations for both short- and intermediate-term exposure durations. Occupational handler exposure estimates were based on surrogate data from the "Health Effects Division Science Advisory Committee on Exposure (HED ExpoSAC) SOP #15: Amount of Seed Treated or Planted per

Day", which was completed on March 2, 2004. Generic protection factors (PFs) were used to calculate exposures when data were not available. For example, an 80 percent protection factor was assumed for the use of a respirator equipped with a quarter-face dust/mist filter. It was assumed that on-farm treaters and planters are expected to have short-term exposure duration (less than 30 days) for all seed crops. It was also assumed that personal protective equipment for on-nursery and commercial mixer/loader/applicators and planter includes a single layer and gloves. Personal protective equipment for commercial baggers and sewers includes baseline attire only - no gloves. Personal protective equipment for performing multiple activities in a commercial operation includes a single layer of clothing and gloves.

Exposure data used for the TCMTB seed treatment assessment are taken primarily from the Agency's recently developed seed treatment standard operating procedure (SOPs for Seed Treatment, 6/1/03). The seed treatment SOP contains representative scenarios for worker exposure associated with seed treatment facilities and planting treated seed. These scenarios were used to describe the various types of handler exposures that may occur from TCMTB. Information from the current labels, use and usage information, toxicology data, and exposure data were all key components in the development of the exposure scenarios. Exposure estimates were taken from actual seed treatment studies and were based on exposure factors associated with occupational handler scenarios (commercial seed treatment, on-nursery seed treatment, planting of treated seed). Assessed application rates range from 0.026 lbs active ingredient/100 lbs of seed to 0.13 lbs active ingredient/100 lbs of seed.

Four categories of commercial seed treatment activities and two categories for on-nursery activities were assessed and are shown in Table 12.

Table12. TCMTB Seed Treatment Occupational Handler Scenarios

Category	Scenario
Agricultural Seed Treatment	**Commercial Seed Treatment Scenarios:** (S-1) Loading and applying liquid formulations with commercial seed-treatment equipment. (S-2) Commercial sewer stitching bags of seed. (S-3) Bagging and otherwise handling treated seeds with commercial equipment. (S-4) Multiple commercial seed treatment activities. **On-Nursery Seed Treatment and Planting Post Application Scenarios:** (S-5) On-nursery loading/applying seed treatment. (S-6) On-nursery loading/planting previously treated seeds.

c. Occupational Handler Risk Summary

Antimicrobial Use

The occupational handler risk assessment, for the antimicrobial use of TCMTB, included both inhalation and dermal exposure scenarios. The target MOE for short- and intermediate term- inhalation and dermal exposures was 100. The target MOE for long-term dermal and inhalation exposures was 300. All but two of the short- and intermediate-term dermal and inhalation scenarios assessed were not of concern (MOEs greater than 100). The following two dermal exposure scenarios indicate risks of concern even with the addition of chemical resistant gloves:

- Paint Application: Airless Sprayer
  (ST/IT Dermal MOE = 6.1 ungloved, **MOE = 17 gloved**)

- Paint Application: Paintbrush
  (ST/IT Dermal MOE = 30 ungloved, **MOE = 97 gloved**)

Risks of concern were identified for six use scenarios (paint preservation liquid pour, paint preservation liquid pump, textile preservation liquid pour, textile preservation liquid pump, cutting fluid preservation liquid pour, pulp and paper liquid pump) at the baseline level of evaluation (no PPE gloves). However, the dermal MOEs are greater than 100 with the addition of PPE (gloves). Therefore, the use of PPE gloves eliminates all risks of concern for these six use scenarios.

The total dermal and inhalation MOEs with added PPE (gloves) are not of concern for all but two of the scenarios evaluated. The following scenarios have remaining total dermal and inhalation MOEs that are less than 100 and are of concern:

- Paint Application: Airless Sprayer
  (**Total Dermal and Inhalation MOE = 16**)

- Paint Application: Paintbrush
  (**Total Dermal and Inhalation MOE = 95**)

For further information regarding the short- and intermediate-term risks associated with occupational handlers, refer to Tables 13 and 14.

Table 13. Antimicrobial Use Short- and Intermediate-Term Risks Associated with Occupational Handlers

Exposure Scenario	Method of Application	Application Rate (% a.i. by weight)	Quantity Handled/ Treated per day	ST/IT MOE [c] (Target MOE ≥ 100)			
				Baseline Dermal[a]	PPE-Glove Dermal [b]	Inhalation	TOTAL MOE (dermal and inhalation)
Paint Application	Airless Sprayer	0.015 a.i. weight fraction	500 lb/day	**6.1**	**17**	180	**16**
	Paintbrush		50 lb/day	**30**	**97**	5,300	**95**
Paint Preservation	Liquid Pour		2,000 lb/day	**1.2**	430	11,000	414
	Liquid Pump		10,000 lb/day	**26**	1900	19,000	1,727
Textiles/ Leather Products	Liquid Pour	0.006 a.i. weight fraction	10,000 lb/day	**<1**	220	5,400	211
	Liquid Pump			**64**	4,600	46,000	4,182
Cutting Fluid	Liquid Pour	0.00125 a.i. weight fraction	2,502 lb/day	**11**	3,000	42,000	2,800
	Liquid Pump			1,200	1,800	1.00×10^{5}	1,768
Drilling Fluids	Liquid Pour	0.00075 a.i. weight fraction	ST = 45.9 lb/day	ST = 1000	ST = 380,000	ST = 9.40×10^{-6}	365,235
			IT = 22.9 lb/day	IT = 2,000	IT = 7.60×10^{5}	IT = 1.90×10^{7}	730,769
Pulp and Paper	Liquid Pump		1,000,000 lb/day	**5**	510	5,600	467
Small Process Water Systems/ Cooling Tower	Liquid Pour	0.000009 a.i. weight fraction	90 lb/day	43,000	21,000	3.10×10^{6}	20.858
	Liquid Pump		180,000 lb/day	2,400	13,000	1.60×10^{5}	12,023

ST = short-term; IT = intermediate-term

a Baseline Dermal: Long-sleeve shirt, long pants, no gloves.

b PPE Dermal with gloves: baseline dermal plus chemical-resistant gloves.

c MOE = NOAEL (mg/kg/day) / Absorbed Daily Dose [Where ST/IT NOAEL = 25 mg/kg/day for dermal and 16 mg/kg/day for inhalation].

Table 14 provides short- and intermediate-term doses and MOEs for workers adding TCMTB preservative to wood slurry. When wearing single layer clothing and chemical resistant gloves, all MOEs are above the target MOE of 100 for ST/IT dermal and inhalation and above 300 for LT dermal and inhalation exposures and, therefore, are not of concern.

Table 14. Short-, Intermediate- and Long-term Risks Associated with Wood Preservative Blender/Spray Operators

Dermal Unit Exposure[a] (mg/lb ai)	Inhalation Unit Exposure[b] (mg/lb ai)	App. Rate[c] (fraction ai in solution/ day)	Wood Slurry Treated[d] (lb/day)	Absorbed Daily Dose[e] (mg/kg/day)		MOE[f]				
						Dermal	Inhalation		Total MOE	
				Dermal	Inhal.	ST/IT/LT	ST/IT	LT	ST/IT	LT
Occupational Handler										
0.00629	4.03×10^{-4}	0.00300	1.78×10^{5}	0.0480	0.00307	520	5200	1200	478	364

ST = Short-term duration; IT = Intermediate-term duration; and LT = long-term.
a. Dermal unit exposure: Single layer clothing with chemical resistant gloves.
b. Inhalation unit exposure: Baseline.
c. The maximum application rate for the "immersion" application method is a solution containing 0.3% a.i.
d. Wood slurry treated = (8 batches/day * 7,000 gallons/batch * 0.003785 m^3/gallon * 380 kg/m^3 * 2.2 lb/kg)
e. Absorbed Daily Dose = unit exposure (mg/lb ai) x App Rate (fraction ai/day) x Quantity treated (lb/day) / BW (70 kg)
f. MOE = NOAEL (mg/kg/day)/ Daily dose [Where dermal ST/IT/LT NOAEL = 25 mg/kg/day, ST/IT inhalation NOAEL = 16 mg/kg/day, and LT inhalation NOAEL = 3.8 mg/kg/day]. Target MOE is 100 for ST/IT dermal exposures and 300 for LT dermal and 100 for ST/IT and 300 for LT inhalation exposures.

Agricultural Seed Treatment Uses

The occupational handler assessments were conducted using increasing levels of protection. The Agency typically evaluates all exposures with minimal protection and then considers additional protective measures using a tiered approach (going from minimal to maximum levels of protection) in an attempt to obtain an adequate MOE. The lowest tier is represented by the baseline clothing scenario (i.e., single layer clothing, socks and shoes), followed by, if MOEs are of concern, increasing levels of risk mitigation such as personal protective equipment (PPE) and engineering controls (EC).

The occupational handler risk assessment for the agricultural seed treatment use of TCMTB included both inhalation and dermal exposures. The target MOE for both the inhalation and dermal exposures was 100. Scenarios with an MOE less than 100 indicate a risk of concern. The Agency evaluated occupational risks to workers that use TCMTB as a fungicide for treating seeds in commercial and on-nursery/on-farm settings.

For commercial seed treatment, all individual dermal and inhalation MOEs met or exceeded the target MOE of at the baseline level of mitigation (single layer of clothing with gloves and no respirator). MOEs were above the target of 100 for the combined inhalation and dermal exposure scenarios at the baseline level of mitigation (single layer of clothing with gloves and no respirator). Please refer to Tables 15 and 16 for further details regarding the estimated worker exposures and risks from commercial and on-nursery seed treatment.

Table 15. Estimated Worker Exposure and Risk from Commercial Seed Treatment

Crop	Exposure Scenario	Application Rate (lb ai/100 lb)[a]	Amount Handled per Day (lb ai/day)[b]	Short- and Intermediate-term Risk Estimates			Level of Mitigation[c]
				Dermal MOE (Target MOE≥100)	Inhalation MOE (Target MOE≥100)	Total MOE [c] (Target MOE≥100)	
Barley, Oat, Rice, Wheat Seeds	Loader/Applicator	0.026	187	410	18,000	400	SL, G+NR
	Sewer			1,500	26,000	1,400	SL + NR
	Bagger			1,000	37,000	970	SL + NR
	Multiple Activities			220	3,700	210	SL, G+ NR
Cotton Seeds	Loader/Applicator	0.13	208	370	16,000	360	SL, G+ NR
	Sewer			1,400	23,000	1,300	SL + NR
	Bagger			920	34,000	900	SL + NR
	Multiple Activities			200	3,400	190	SL, G+ NR
Safflower Seeds	Loader/Applicator	0.041	294	260	11,000	250	SL, G+ NR
	Sewer			960	17,000	910	SL + NR
	Bagger			650	24,000	630	SL + NR
	Multiple Activities			140	2,400	130	SL, G+ NR
Sugar Beet Seeds	Loader/Applicator	0.041	36	2,100	91,000	2,100	SL, G+ NR
	Sewer			7,800	130,000	7,400	SL + NR
	Bagger			5,300	190,000	5,200	SL + NR
	Multiple Activities			1,200	19,000	1,100	SL, G+ NR

ND = No Data; NF = Not Feasible; NR=No respirator

a Application rates are the maximum application rates determined from EPA registered labels for TCMTB

b Amount handled per day calculated from the maximum application rate and the lbs of seed treated or planted/day and: for barley, rice, safflower, and wheat seed - 718000 lb/day; for cotton seed – 160000 lb/day; and sugar beet seed – 88000 lb/day.

c Baseline Dermal: Long-sleeve shirt, long pants, no gloves.
Baseline Inhalation: no respirator.
SL, G = Single layer w/gloves is baseline attire plus chemical-resistant gloves.
DL, G = Double layer w/gloves is coveralls worn over long-sleeve shirt and long pants, plus

Table 16. Estimated Worker Exposure and Risk from On-nursery Seed Treatment

Crop	Acres treated/ day	App Rate (lb ai/ 100 lb)[a]	Amount Handled per day[b] (lb ai/day)	Unit Exposures							Short- and Intermediate-term MOEs			
				Baseline		Personal Protective Equipment			Engineering Controls		Baseline	Personal Protective Equipment		
				Dermal[c] (mg/lb ai)	Inhalation[d] (□g/lb ai)	Dermal (mg/lb ai)	Inhalation (ug/lb ai)		Dermal[h] (mg/lb ai)	Inhalation[i] (ug/lb ai)	Inhalation	Dermal	Inhalation	
						SL w/ gloves[e]	80% R[f]	90% R[g]				SL w/ gloves	80% R	90% R
LOADING/APPLYING LIQUID SEED TREATMENTS														
Cotton	125	0.051	0.64	ND[j]										

ND = No Data

D On-nursery seed treatment with liquid formulations is generally done with automated equipment, essentially miniature versions of commercial treaters.

d. Occupational Post-application Risk Summary

Occupational post-application exposures may occur from both antimicrobial and agricultural use scenarios. Occupational handlers may be exposed to TCMTB by handling treated wood; handling metal working/cutting fluids; and loading/planting previously treated seeds.

Antimicrobial Use

TCMTB is used in products that are intended to preserve wood through non-pressure treatment methods. It can be applied as a sapstain control to freshly-cut wood, incorporated into particle board, or used to treat wood chips. When used as a sapstain control, the product may be dipped, sprayed, or impregnated into the wood via pressure treatment (up to 0.3% a.i. solution). When used in particle board, the pesticide is incorporated into the resin or binding agent (0.3% a.i., based on dry weight of wood). As very little chemical specific data were available regarding typical exposures to TCMTB as a wood preservative, surrogate data were used to estimate exposure risks. The blender/spray operator position was assessed using CMA unit exposure data and the remaining handler and post-application positions were assessed using data from a DDAC study (Bestari et al., 1999).

Post-application exposures to chemical operators, graders, millwrights, trim saw operators, and clean-up crews were assessed using surrogate data from the DDAC study (Bestari et al., 1999). The DDAC study examined individuals' exposure to DDAC while working with antisapstains and performing routine tasks at 11 sawmills/planar mills in Canada. Dermal and inhalation exposure monitoring data were gathered for each job function of interest using dosimeters and personal sampling tubes. Dosimeters and personal air sampling tubes were analyzed for DDAC. Exposure data for individuals performing the same job functions were averaged together to determine job specific averages. Monitoring was conducted using 2 trim saw workers, 13 grader workers, 11 chemical operators, 3 millwrights, and 6 clean-up staff.

Exposures to diptank operators were also assessed using surrogate data from the DDAC study (Bestari et al., 1999). The diptank scenario assessment was conducted differently than for the other job functions because the concentration of DDAC in the diptank solution was provided. The exposure data for diptank operators wearing gloves were converted into unit exposures in terms of mg a.i. for each 1% of concentration of the product. Dermal and inhalation unit exposures were 2.99 and 0.046 mg/1% solution, respectively. The air concentrations presented in the DDAC study were converted to unit exposures using an inhalation rate of 1.0 m^3/hr (light activity) and a sample duration of 8 hrs/day.

There are no risks of concern for the short-, intermediate- or long-term occupational handler dermal and inhalation wood preservative exposure scenarios (ST/IT dermal and inhalation MOEs > 100; LT dermal and inhalation MOEs > 300). The combined dermal and inhalation scenarios also met or exceeded the target MOE of 100 when handlers were wearing short sleeve shirts, cotton work trousers, and cotton glove dosimeter gloves under chemical resistant gloves and, therefore, are not of concern.

Table 17. Short-, Intermediate- and Long-Term Exposures and Risk for Occupational Handlers for Wood Preservative Use

Exposure Scenario[a] (number of volunteers)	MOEs[c](Target MOE ≥ 100 for ST/IT, 300 for LT)				
	Dermal	Inhalation		TOTAL MOE (dermal and inhalation)	
	ST/IT/LT	ST/IT	LT	ST/IT	LT
Blender/Spray Operator (b)	520	5,200	1,200	478	364
Chemical Operator (n=11)	48,000	1.10×10^{7}	2.50×10^{6}	47,790	47,095
Grader (n=13)	1.50×10^{5}	1.00×10^{7}	2.40×10^{6}	147,783	141,176
Trim Saw (n=2)	3.40×10^{5}	4.90×10^{6}	1.20×10^{6}	317,940	264,935
Millwright (n=3)	36,000	5.20×10^{6}	1.20×10^{6}	35,752	34,951
Clean-Up (n=6)	8,400	4.90×10^{5}	1.20×10^{5}	8,258	7,850
Diptank Operator	1,900	8.10×10^{4}	19,000	1,856	1,727

ST = Short-term duration; IT = Intermediate-term duration; and LT = long-term

a. Unless specified, the exposure scenario represents a worker wearing short sleeve shirts, cotton work trousers, and cotton glove dosimeter gloves under chemical resistant gloves. Volunteers were grouped according to tasks they conducted at the mill.

b. Single layer clothing with chemical resistant

c MOE = NOAEL (mg/kg/day)/ Daily dose [Where ST/IT/LT dermal NOAEL = 25 mg/kg/day, ST/IT NOAEL for inhalation is 16 mg/kg/day and LT NOAEL for inhalation is 3.8 mg/kg/day]. Target MOE is 100 for ST/IT dermal and inhalation exposures, 300 for LT dermal and inhalation exposure.

Not enough data exists to estimate the amount of exposure associated with construction workers who install treated wood. In particular, values for the transfer coefficient associated with a construction worker handling the wood could not be determined. It is believed that the construction worker using a trim saw will have larger dermal and inhalation exposures than the installer, due to the amount of sawdust generated and the greater amount of hand contact that would be necessary to handle the wood when using a saw compared to installing the wood. Because the dermal and inhalation MOE's are well above the target of 100 for trim saw operators and handler exposure is expected to be greater for trim saw operation, risks of concern are not anticipated for construction workers installing treated wood.

Occupational workers may also be exposed to TCMTB when handling previously treate metal working/cutting fluids. For the metal working/cutting fluids scenario, dermal exposure estimates were derived using the two-hand immersion model from ChemSTEER. A screening level intermediate- and long-term inhalation exposure estimate for treated metal working fluids was developed using the OSHA Permissible Exposure Limit (PEL) for oil mist. Post-application dermal and inhalation exposure occurs after the chemical has been incorporated into the metal working fluid and a machinist is using/handling this treated end-product. It was assumed that a machinist is exposed to the metal working fluid 8 hours a day, for 5 days a week and that the body weight of an adult is 70 kg (US EPA1997).

For the metal working fluid scenario, all combined dermal and inhalation scenarios met or exceeded the target MOE of 100 and, therefore, are not of concern. However, there are human incident data related to the occupational handler post-application use of TCMTB as an antimicrobial product. This and other data indicate dermal irritation from exposure to TCMTB and that TCMTB is a dermal sensitizer (toxicity category I for eye irritation and toxicity category II for dermal irritation).

Table 18. Short-, Intermediate and Long-Term Risks Associated with Post-application Exposure to Metal Working Fluids Treated with TCMTB (Machinist)

Weight Fraction a.i. in Fluid	Dermal Inputs			Inhalation Inputs			MOE (Target MOE ≥ 100 for ST/IT, 300 for LT)[c,d]				
	Hand Surface Area (cm^2)	Film thickness (mg/cm^2)	Frequency (event/day)	OSHA PEL (mg/m^3)	Inhal. rate (m^3/hr)	Exposure Duration (hrs/day)	Dermal MOE	Inhalation MOE		TOTAL MOE (dermal and inhalation)	
							ST/IT/LT	ST/IT	LT	ST/IT	LT
0.00125	840	1.75	1	5	1	8	950	22000	5300	910	806

a Absorbed Dermal Daily Dose (mg/kg/day) = [fraction a.i. in treated fluid * hand surface area* film thickness (mg/cm^2)* Frequency (event/day)] / Body weight (70 kg).

b Absorbed Inhalation Daily Dose (mg/kg/day) = fraction a.i. in treated fluid * OSHA PEL (mg/m^3) * Inhalation rate (m^3/hr) * exposure duration (hr/day) / body weight (70 kg)

c Dermal MOE = NOAEL (mg/kg/day) / Absorbed Daily Dose (mg/kg/day) [Where: ST/IT/LT dermal NOAEL = 25 mg/kg/day].

d Inhalation MOE = NOAEL (mg/kg/day) / Absorbed Daily Dose (mg/kg/day) [Where: ST/IT inhalation NOAEL = 16 mg/kg/day and LT Inhalation NOAEL = 3.8 mg/kg/day].

Agricultural Seed Treatment Use

For the agricultural seed treatment use, the post-application occupational risk assessment considered exposure to TCMTB from entering nurseries after plants had been treated. On-nursery seed treatment scenarios were assessed for loading/planting previously treated seeds.

Dermal and inhalation exposures were evaluated in the post-application worker assessment. For the on-nursery seed treatment scenarios, individual dermal and inhalation MOEs are all greater than the target of 100 without the use of PPE, and thus are not of concern. The combined dermal and inhalation on-nursery seed treatment MOEs are also all above the target of 100 with PPE, single layer baseline attire and chemical-resistant gloves. Table 19 list the worker risk estimates for the post-application on-nursery seed treatment.

Table 19. Estimated Worker Exposure and Risk from On-Nursery Seed Treatment (Post-application)

Crop	Acres treated/ day	App Rate (lb ai/ 100 lb)[a]	Amount Handled per day[b] (lb ai/day)	Short- and Intermediate-term Risk Estimates			
				Inhalation MOE (Target MOE≥100)	Dermal MOE SL w/ gloves (Target MOE≥100)	**Total MOE** (Target MOE≥100)	Level of Mitigation
LOADING/PLANTING PREVIOUSLY TREATED SEEDS							
Barley	35	0.026	0.64	360,000	7,700	7,500	SL, G + NR
Beet; Sugar	80	0.041	0.26	1,300,000	27,000	26,000	SL, G + NR
Cotton	200	0.13	4.68	70,000	1,500	1,500	SL, G + NR
Oats	200	0.026	6.66	49,000	1,100	1,100	SL, G+ NR
Rice	200	0.026	7.80	42,000	900	880	SL, G+ NR
Safflower	80	0.041	3.28	100,000	2,100	2,100	SL, G + NR
Wheat	200	0.026	7.80	42,000	900	880	SL, G+ NR

ND = No Data; NF = Not Feasible; NR = no respirator
SL, G = Single layer w/gloves is baseline attire plus chemical-resistant gloves.

a Application rates are the maximum application rates determined from EPA registered labels for TCMTB
b Amount handled per day calculated from the acres treated/day and the maximum lb of seed planted per acre.
c On-nursery seed treatment with liquid formulations is generally done with automated equipment, essentially miniature versions of commercial treaters.
d Amount handled per day calculated from the maximum application rate and the lbs of seed treated or planted/day for: barley, rice, safflower and wheat seed- 718000 lb/day; for cotton seed 160000 lb/day; and for sugar beet seed 88000 lb/day.

9. Human Incident Data

The Agency reviewed available sources of human incident data for incidents relevant to TCMTB. EPA consulted the following sources of information for human poisoning incidents related to TCMTB use: (1) OPP Incident Data System (IDS) - The Office of Pesticide Programs (OPP) Incident Data System contains reports of incidents from various sources, including registrants, other federal and state health and environmental agencies and individual consumers, submitted to OPP since 1992; (2) California Department of Pesticide Regulation (1982-2004) – The California Department of Pesticide Regulation pesticide poisoning surveillance program consists of reports from physicians of illness suspected of being related to pesticide exposure since 1982; (3) National Pesticide Information Center (NPIC) - NPIC is a toll-free information service supported by OPP That provides a ranking of the top 200 active ingredients for which telephone calls were received during calendar years 1984-1991.

For TCMTB, dermal, inhalation, ocular and oral exposures were reported. Most of the incidents reported were irritation type reactions. The primary routes of exposure for these incidents were dermal and inhalation; though oral ingestion incidents were reported. The most common symptoms reported for each exposure route are as follows:

- *Dermal exposure:* skin irritation/burning, rash, itching, skin discoloration/redness and blistering.
- *Inhalation exposure:* respiratory irritation/burning, irritation to mouth/throat/nose, coughing/chocking, shortness of breath and sore throat.
- *Ocular exposure:* eye irritation/burning, eye pain and swelling of eyes.
- *Ingestion/oral exposure:* irritation to mouth/throat/nose, abdominal pain, kidney failure, hypothermia and loss of consciousness.

In addition, a cross-sectional study was conducted to observe the health effects associated with the use of TCMTB in the British Columbia sawmill industry (Teschke, 1992). Workers in five costal sawmills were asked to complete a self-administered questionnaire about symptoms they experienced after fungicide exposure and about injuries commonly reported in sawmills. The reported symptoms related to TCMTB consistently included dry skin around the eyes, blood-stained mucus from the nose, nose bleed, peeling skin, burning or itching skin, and skin redness or rash.

B. Environmental Risk Assessment

A summary of the Agency's environmental risk assessment is presented below. TCMTB has several registered use sites that could result in environmental exposures. Indoor uses were not assessed as the Agency does not anticipate exposure, given the current use patterns of TCMTB. The following risk characterization is intended to describe the magnitude of the estimated environmental risks for TCMTB use sites and any associated uncertainties.

For a detailed discussion of all aspects of the environmental risk assessment, refer to the Environmental Risk Assessment (Section 10.1) in the "2-(Thiocyanomethylthio) benzothiazole (TCMTB) Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated August 1, 2006; the "2-(Thiocyanomethylthio) benzothiazole (TCMTB) Ecological Hazard and Environmental Risk Assessment Chapter-Revised," dated August 1, 2006; and the "Environmental Fate Assessment of 2-(Thiocyanomethylthio) benzothiazole (TCMTB) for the Reregistration Eligibility Decision (RED) Document," dated March 30, 2006.

1. Environmental Fate and Transport

The environmental fate assessment for TCMTB was based on guideline data required by the Agency for an environmental fate assessment. These studies were submitted by the technical registrant. However, not all of these studies fulfill guideline requirements. For additional

information, please refer to the "Environmental Fate Assessment of 2-(Thiocyanomethylthio) benzothiazole (TCMTB) for the Reregistration Eligibility Decision (RED) Document," dated March 30, 2006. Several metabolites are formed during the biotic degradation of TCMTB, including 2-benzothiazolesulfonic acid (BTSA) and 2-mercaptobenzothiazole (2-MBT). BTSA is not of toxicological concern because it has negligible toxicity and is completely excreted. 2-MBT is generally less toxic than parent TCMTB; therefore, the environmental risk assessment was conducted for TCMTB only. Please note that although the environmental assessment does not include 2-MBT for the reasons stated above, 2-MBT was included in the drinking water assessment as a conservative approach to conducting the assessment.

An assessment of the submitted guideline studies indicates the hydrolysis of TCMTB to be pH dependent. TCMTB is hydrolytically stable under abiotic and buffered conditions at pH 5 and slowly degrades at pH 7. Under more alkaline conditions, hydrolysis proceeds more rapidly with a calculated half-life ranging from 1.8 to 2.1 days. Photolytically, TCMTB degrades in pH 5 buffered aqueous solutions with a calculated half-life of 1.5 hours. Based on its degradation in the environment, TCMTB is not likely to pose a concern for surface water run-off.

Aquatic metabolism under aerobic and anaerobic conditions, as well as aerobic soil metabolism, are major routes of dissipation for TCMTB. TCMTB's calculated degradation half-life in flooded lake sediment is 6.9 days; however, the apparent half-life occurs between 2 and 4 days. Similarly, TCMTB shows a tendency of degrading anaerobically in flooded sediment within 2.7 days. Under aerobic conditions in sandy loam soil, a representative agricultural soil, TCMTB degrades with a calculated half-life of 1.4 days. Because of the biodegradation in water and soils, TCMTB is not likely to contaminate surface and ground waters.

TCMTB's tendency to bind with agricultural soils varies according to soil type. TCMTB is mobile-very mobile in various soils; however, because of its tendency to biodegrade in water and soils, TCMTB is not likely to contaminate surface and ground waters. TCMTB is very mobile in clay loam, sand, and sandy loam soil, and mobile in clay and silt loam soil. K_ds are 3.5 for clay loam soil, 0.99 for sand soil, 9.9 for sandy loam soil, 22.1 for clay soil, and 62.7 for silt loam soil. There may be a water/sediment partitioning issue and an acute adverse impact on benthic organisms. However, TCMTB degrades fairly rapidly in freshwater and soils and the impacts may be short-lived.

Additional information on the aqueous availability of TCMTB from treated wood, indicates that the use of TCMTB as a wood preservative may result in minimal releases to the environment. Nevertheless, the Agency conducted modeling to estimate TCMTB concentrations in surface water from the antisapstain use. Based on conservative assumptions, the Agency estimated runoff concentrations that range from 8.5 to 32.7 ppb.

a. Bioaccumulation in Aquatic Organisms

Bioconcentration testing was conducted for TCMTB. Results from this study conducted with fish indicate that the bioaccumulation potential of TCMTB is minimal and, therefore, not of concern to the Agency.

2. Ecological Risk

The Agency's ecological risk assessment compares toxicity endpoints from ecological toxicity studies to estimated environmental concentrations based on environmental fate characteristics and pesticide use data. A summary of the submitted data is provided below.

a. Environmental Toxicity

Available data indicate that TCMTB is slightly toxicity to birds on an acute oral basis and subacute dietary basis. Because birds are not expected to come into contact with TCMTB on a chronic basis, avian reproduction studies were not required for TCMTB.

Based on the results of mammalian studies conducted to meet human toxicity data requirements, TCMTB exhibits low acute oral and dermal toxicity (toxicity category III); however, it is highly irritating to the eyes and skin (toxicity category I and II, respectively). TCMTB is also considered to be highly toxic via the inhalation route of exposure (toxicity category I). TCMTB is a dermal sensitizer.

On an acute basis, TCMTB is very highly toxic to freshwater fish, freshwater invertebrates, estuarine/marine fish, and estuarine/marine invertebrates. TCMTB is generally more toxic then its' degradate, 2-MBT, and therefore, only TCMTB was evaluated in the risk assessment. Published literature reports (MRID# 424053-01) indicate that TCMTB may cause sublethal effects in fish, which could result in an increase in predation and a decreased ability to survive. These studies demonstrate that exposure to TCMTB at levels of 8-10 ppb cause gill damage and behavioral changes, which can severely reduce the ability of fish to survive in the wild (Chew., *Proceedings of the Seventeenth Annual Aquatic Toxicity Workshop Vol. 1)*. The toxicity values used in the TCMTB ecological risk assessment (8.7 Mg/L) are comparable to the levels described in the published literature where sublethal effects occur. Therefore, the TCMTB risk assessment is protective of these sublethal effects.

A summary of submitted acute ecological toxicity data for TCMTB and 2-MBT along with, avian sub-acute dietary toxicity data, chronic freshwater fish toxicity data and aquatic plant toxicity data for TCMTB are provided in Tables 20, 21, 22 and 23, respectively.

Table 20. Acute Ecological Toxicity for TCMTB and 2-MBT

Species	Chemical	% active ingredient (ai)	Endpoint	Toxicity Category (TGAI)	Other Effects Noted	Reference/Status
Birds						
Northern bobwhite *(Colinus virginianus)*	TCMTB	80.4%	LD_{50} = 660 mg/kg NOEL < 292 mg/kg	Slightly toxic	Signs of toxicity and reduction of body weight and feed consumption at 292 mg/kg	MRID: 41780901 (Campbell 1991)/Acceptable
	2-MBT	98.2%	LD_{50} > 2150 mg/kg NOEL < 1000 mg/kg	Practically non-toxic	Some evidence of dose-related abnormalities upon gross necropsy (friable livers, resorbed eggs, fluid-filled sacs in abdomen)	MRID: 42267101 (Pedersen end Helsten 1992a)/ Acceptable
Mammals						
Laboratory rat *(Rattus norvegicus)*	TCMTB	80% ai	LD50=750 mg/kg	Moderately toxic		41583801/ Acceptable
Freshwater Fish						
Rainbow trout *Oncorhynchusmykiss*)	TCMTB	90%	96hr static LC50 = 55.2 ug/L (ppb)	Very highly toxic	None reported	TN 2437 (USEPA 1980)/ Supplemental
	TCMTB	80.4%	96hr flow through LC50 = 20.91 ug/L (ppb)	Very highly toxic	NOEC = 8.7 µg/L (ppb) due to mortality and lethargy and loss of equilibrium in surviving fish at higher levels	41818101 (Machado 1991b)/ Acceptable
	TCMTB	75%	96hr static LC50 = 29 ug/L (ppb)	Very highly toxic	Loss of equilibrium and lying on sides observed	ACC+0916 24 (Knott and Woodard 1968b)/ Supplemental
Bluegill sunfish (*Lepomis macrochirus*)	TCMTB	90%	96hr static LC50 = 32 ug/L (ppb)	Very highly toxic	None reported	TN 2432 (USEPA 1979)/ Supplemental
	TCMTB	80.4%	96hr flow through LC50 = 8.7 ug/L	Very highly toxic	NOEC = 5.1µg/L (ppb) due to signs of toxicity at	41804201 (Machado 1991a)/ Acceptable

Species	Chemical	% active ingredient (ai)	Endpoint	Toxicity Category (TGAI)	Other Effects Noted	Reference/Status
			(ppb)		higher levels	
	TCMTB	75%	96hr static LC50 = 47 ug/L (ppb)	Very highly toxic	Loss of equilibrium and lying on sides observed	ACC#091624 (Knott and Woodard 1968b)/ Supplemental
Rainbow trout *Oncorhynchus mykiss*)	2-MBT	98.2%	96 hr static LC50 = 730 ug/L (ppb)	Very highly toxic	NOEC = 310 µg/L (ppb) due to mortality at higher treatment levels	42232201 (Collins 1992)/ Acceptable
Freshwater Invertebrates						
Waterflea *(Daphnia magna)*	TCMTB	90%.	48-hr. static EC_{50} = 23 ug/L (ppb)	Very highly toxic		TN 2427 (USEPA 1979)/ Supplemental
	TCMTB	80.4%	48-hr. flow through EC_{50} = 22 ug/L (ppb); NOEC = 8.7 ug/L (ppb)	Very highly toxic		41838201 (McNamara 1991)/ Acceptable
	2-MBT	100%	48-hr. static EC_{50} = 2,900 ug/L (ppb)	Moderately toxic		42226001 (Collins 1992b)/ Acceptable
Estuarine/Marine Fish						
Sheepshead minnow *(Cyprinodon variegates)*	TCMTB	80%	96 hr. static LC50 = 60 ug/L (ppb)	Very highly toxic		40363601 (Suprenant 1986a)/ Acceptable
Estuarine/Marine Invertebrates						
Quahog clam *(Mercenaria mercenaria)*	TCMTB	80%	48-hr. static EC_{50} = 13.9 ug/L (ppb); NOEC < 13 ug/L (ppb)	Very highly toxic		40363603 (Suprenant 1986) / Acceptable
Mysid *(Americamysis bahia, formerly Mysidopsis bahia)*	TCMTB	80%	96-hour static LC50= 20.3 ug/L (ppb); NOEC < 7.8 ug/L (ppb)	Very highly toxic		40363602 (Suprenant 1987) / Acceptable

Table 21. Avian Sub-acute Dietary Toxicity of TCMTB and 2-MBT

Test Type (Chemical and % a.i.)	Chemical (% a.i.)	Species	Endpoint	Results	Other Effects Noted	Reference/Status
Avian acute dietary, 850.2200/71-2	TCMTB (80-83% a.i.)	Mallard duck (Anas platyrhynchos)	Mortality	8-day LC50 > 10000 ppm "practically non-toxic"	Feed consumption and 10% mortality at 5,000 and 10,000 ppm	Accession #009869 (Booden, 1974)/ Acceptable
	TCMTB (75 % a.i.)	Bobwhite quail (Colinus virginianus)	Mortality	LC50 > 10000 ppm "Practically non-toxic"	Huddling and depression at levels > 1000 ppm	Accession #091624 (Knott and Woodard, 1968a)/Supplemental
	TCMTB (80% a.i.)	Mallard duck (Anas platyrhynchos)	Mortality	8-day LC50 >4496 ppm "Slightly toxic"	NOEC < 450 ppm based on reduction in body weight gain and food consumption	415956-01 (Long et al., 1990/Acceptable
	TCMTB (80% a.i.)	Bobwhite quail (Colinus virginianus)	Mortality	8-day LC50 >4496 ppm "Slightly toxic"	NOEC = 450 ppm, based on reduction of average body weight gain at higher levels	415956-02 (Long et al., 1990/Acceptable
	2-MBT (98.22% a.i.)	Bobwhite quail (Colinus virginianus	Mortality	8-day LC50 >3387 ppm "Slightly toxic"	NOEC = 3387 ppm – no signs of toxicity at any level	424285-01(Pedersen and Helsten, 1992b)/Acceptable

Table 22. Freshwater Fish Chronic Toxicity of TCMTB

Study Type	Species	Endpoint	NOEC g a.i./l	LOEC g a.i./l	MRID# (reference)/Status
Freshwater fish Early life-stage toxicity (72-4a/850.1300) (83.78% a.i.)	Rainbow trout (*Oncorhynchus mykiss*)	Reproduction, post-hatch survival, growth	0.34 ppb based on growth and egg hatchability	0.56 ppb based on growth	425959-01 (Rhodes, 1992)/Acceptable

Table 23. TCMTB Aquatic Plant Toxicity

Test	Species/% a.i.	Endpoint	Toxicity	NOEC/other effects noted	MRID (reference)	Status
Aquatic Vascular Plant Acute Toxicity, Tier II (dose-response), 123-2/850.4400	Duckweed *(Lemna gibba)*/83.5% a.i.	Frond growth	14-day static renewal EC50 = 0.43 (0.29 – 0.65) mg/L (ppm)	0.15 mg/L (ppm)	442009-01 (Thompson and Swigert, 1996)	Acceptable

b. Ecological Exposure and Risk

The Agency has evaluated the outdoor uses of TCMTB being considered for reregistration. Environmental exposure modeling was conducted for both the agricultural and antimicrobial uses of TCMTB.

Terrestrial Organisms

Modeling was performed to address the exposure and risk to birds and mammals consuming seeds treated with TCMTB using the Terrestrial Residue Exposure Model (TREX) (http://www.epa.gov/oppefed1/models/terrestrial) for the treatment on safflower, which has the highest application rate of 0.041 lb ai/A. The Agency determined that acute risk to birds and mammals from consuming TCMTB-treated seeds are below the Agency's level of concern (LOC). The following Risk Quotients (RQs) for acute and chronic avian exposure to TCMTB treated seeds were calculated:

Avian Acute: 0.02 as (mg ai/kg/day)/LD50
Avian Chronic: Not required

The avian RQ was calculated with no toxicity scaling factor. Scaling factors are used when it is likely that a pesticide will be proportionally more toxic to smaller organisms than larger ones. TREX recommended a default scaling factor of 1.15, based on Mineaue et al. (1996). This scaling factor was developed based on 37 conventional pesticides, most of which are cholinesterase inhibitors. There is no information available indicating that such an adjustment is necessary or appropriate for TCMTB. The following Risk Quotients (RQs) for acute and chronic mammalian exposure to TCMTB treated seeds were calculated:

Mammalian Acute: 0.05 as (mg ai/kg/day)/LD50,
0.02 as (mg ai/ft2)/(LD50*BW)
Mammalian Chronic: 0.53 as (mg/kg seed)/reproduction NOAEC

All of the agricultural use RQs are below any LOCs for avian and mammalian acute risk and mammalian chronic risk. Avian chronic data are not available or required for the currently registered uses of TCMTB, therefore chronic avian risk was not assessed.

Terrestrial risks from the wood preservative uses of TCMTB were not addressed due to a lack of available models to estimate terrestrial exposure from antisapstain treatments. The

Agency conducted environmental exposure modeling for the antisapstain wood preservation use. Runoff concentrations of TCMTB were estimated for facilities that treat wood with antisapstain chemicals. The concentrations were estimated using an approach developed to determine runoff concentrations of pesticides from antisapstain facilities in British Columbia, Canada (Krahn and Strub, 1990).

Predictions of leaching behavior (as would be observed in a study following the Krahn and Strub (1990) protocol) were made based on the chemical properties of TCMTB and a number of assumptions.

Krahn and Strub (1990) assume that leachate entering the storm drain is diluted with extra runoff water at a 1:15 ratio. This is based on measurements of runoff in storm drains at facilities using antisapstain chemicals in British Columbia. Use of the ratios 1:6 and 1:23 were also suggested by Krahn and Strub (1990) to determine a "general industry wide" predicted runoff concentration. These values were used in this assessment. The estimated leachate concentration (0.196 ppm) was used in conjunction with these dilution factors to estimate runoff concentrations.

Table 24. Estimated Runoff Concentrations for TCMTB from Antisapstain Use

Parameter	Dilution Factor	Estimated Runoff Concentration (ppm)[a]
High-end dilution	23.0	0.00852
Typical dilution	15.0	0.0131
Low-end dilution	6.00	0.0327

[a]Estimated Runoff Concentration = Estimated Leachate Concentration (0.196 ppm) / Dilution Factor.

Aquatic Organisms

To develop risk quotients (RQs), the estimated environmental concentrations (EECs) determined by modeling were compared to the most sensitive endpoint for each taxa. For seed treatment, no levels of concern (LOCs) were exceeded. The seed treatment use of TCMTB poses minimal risk to aquatic organisms and, therefore, is below the Agency's level of concern.

The Agency has also conducted environmental exposure modeling for the antisapstain wood preservative use. Based on the Tier I screening model used for the antisapstain use, there are risks of concern to aquatic organisms. Acute LOCs were exceeded for all taxa except aquatic plants. Chronic LOCs for fish were also exceeded. However, chronic risk to invertebrates could not be addressed due to lack of chronic invertebrate toxicity data. Additional information regarding the TCMTB ecological assessment can be found in the "2-(Thiocyanomethylthio) benzothiazole (TCMTB) Risk Assessment for the Reregistration Eligibility Decision (RED) Document," dated August 1, 2006; and the "2-(Thiocyanomethylthio) benzothiazole (TCMTB) Ecological Hazard and Environmental Risk Assessment Chapter-Revised," dated August 1, 2006.

Please refer to Table 25 for a comprehensive list of the identified aquatic organism risk quotients for the seed treatment and antimicrobial uses of TCMTB.

Table 25. Aquatic Organism Risk Quotients for Seed Treatment and Antisapstain Uses of TCMTB

Taxa/Endpoint	Seed treatment EEC	Seed Treatment RQ	Antisapstain EEC Low dilution High dilution	Antisapstain RQ
Freshwater fish Acute 8.7 µg/L	0.28 ppb	0.03	32.7 ppb 8.5 ppb	**3.76** **0.98**
Freshwater Invertebrates Acute 22 µg/L	0.28 ppb	0.01	32.7 ppb 8.5 ppb	**1.49** **0.39**
Marine/Estuarine Fish Acute 60µg/L	0.28 ppb	0.00	32.7 ppb 8.5 ppb	**0.54** **0.14**
Marine/Estuarine Bivalve Acute 13.9µg/L	0.28 ppb	0.02	32.7 ppb 8.5 ppb	**2.35** **0.61**
Marine/Estuarine Invertebrate Acute 20.3 µg/L	0.28 ppb	0.01	32.7 ppb 8.5 ppb	**1.61** **0.42**
Green Algae Acute EC50 430 µg/L	0.28 ppb	0.00	32.7 ppb 8.5 ppb	0.08 0.02
Green Algae NOEC 150µg/L	0.28 ppb	0.00	32.7 ppb 8.5 ppb	0.22 0.06
Fish Chronic 0.34µg/L	0.12 ppb	0.35	13.1 ppb 8.5 ppb	**38.53** **25.00**
Invertebrate Chronic – DATA GAP	0.20 ppb	-----	13.1 ppb	-----

Plants

A single aquatic plant study was submitted for TCMTB, the results of which are summarized in Table 23. Results indicate that TCMTB exposure impairs growth of aquatic vascular plants at levels greater than 0.15 ppm (150 ppb). Further data are required to support the antimicrobial and agricultural uses of TCMTB.

Non-target Insects (Honeybee)

Honeybees could potentially be exposed to pesticide residues if treated wood is used to construct hives or hive components. These residues may be toxic to the bees or result in residues in honey or other hive products intended for human use/consumption. Therefore, a special honeybee study is required for all wood preservative uses unless a statement prohibiting the use of treated wood in hive construction is added to the label such as, "Wood treated with TCMTB shall not be used in the construction of beehives." This study is a combination of Guidelines 171-4 and 850.3030 (see information regarding residue data requirements for uses in beehives in the residue chemistry section of 40 CFR part 158). Numbers of bees used in this study and methods for collection/introduction of bees into hives, feeding, and observations for toxicity and mortality should be consistent with those described in OPPTS Guideline 850.3030, "Honey Bee Toxicity of Residues on Foliage." The toxicity portion of this study is in lieu of the honeybee contact LD50 test.

c. Risk to Listed Species

Section 7 of the Endangered Species Act, 16 U.S.C. Section 1536(a)(2), requires all federal agencies to consult with the National Marine Fisheries Service (NMFS) for marine and anadromous listed species, or the United States Fish and Wildlife Services (FWS) for listed wildlife and freshwater organisms, if they are proposing an "action" that may affect listed species or their designated habitat. Each federal agency is required under the Act to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. To jeopardize the continued existence of a listed species means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species" (50 C.F.R. § 402.02).

To facilitate compliance with the requirements of the Endangered Species Act subsection (a)(2) the Environmental Protection Agency, Office of Pesticide Programs has established procedures to evaluate whether a proposed registration action may directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of any listed species (U.S. EPA 2004). After the Agency's screening-level risk assessment is performed, if any of the Agency's Listed Species LOC Criteria are exceeded for either direct or indirect effects, a determination is made to identify if any listed or candidate species may co-occur in the area of the proposed pesticide use. If determined that listed or candidate species may be present in the proposed use areas, further biological assessment is undertaken. The extent to which listed species may be at risk then determines the need for the development of a more comprehensive consultation package as required by the Endangered Species Act.

For certain use categories, the Agency assumes there will be minimal environmental exposure, and only a minimal toxicity data set is required (Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs U.S. Environmental Protection Agency - Endangered and Threatened Species Effects Determinations, 1/23/04, Appendix A, Section IIB, pg.81). Chemicals in these categories therefore do not undergo a full screening-level risk assessment, and are considered to fall under a no effect determination. The active ingredient uses of TCMTB, with the exception of the seed treatment and antisapstain wood preservation uses, fall into this category. Using Tier I screening modeling to assess potential exposure from seed treatment risks to Listed Species were not identified. Using Tier I screening modeling to assess potential exposure from antisapstain wood preservation uses of TCMTB, risks to Listed Species are indicated. Since the model is only intended as a screening-level model, and, as such, has inherent uncertainties and limitations which may result in inaccurate exposure estimations, further refinement of the model is recommended before any regulatory action is taken regarding the antisapstain uses of TCMTB. Additionally, impacts from the antisapstain use could potentially be mitigated with precautions to prevent leaching and runoff when wood is stored outdoors (see General Risk Mitigation, below). Due to these circumstances, the Agency defers making a determination for the antisapstain uses of TCMTB until additional data and modeling

refinements are available. At that time, the environmental exposure assessment of the antisapstain use of TCMTB will be revised, and the risks to Listed Species will be reconsidered.

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 TCMTB 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 TCMTB.

The Agency has completed its assessment of the dietary, occupational, drinking water, and ecological risks associated with the use of pesticide products containing the active ingredient TCMTB. Based on a review of these data and on public comments on the Agency's assessments for the active ingredient TCMTB, the Agency has sufficient information on the human health and ecological effects of TCMTB 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 TCMTB-containing products are eligible for reregistration provided that: (i) current data gaps and confirmatory data needs are addressed; (ii) the risk mitigation measure outlined in this document is adopted; and (iii) label amendments are made to reflect this measure. Label changes are described in Section V. Appendix A summarizes the uses of TCMTB 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 TCMTB 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 TCMTB, the Agency has determined that TCMTB products, unless labeled and used as specified in this document, would present risks inconsistent with FIFRA. Accordingly, should a registrant fail to implement the risk mitigation measure identified in this document, the Agency may take regulatory action to address the risk concerns from the use of TCMTB. If all changes outlined in this document are incorporated into the product labels, then all current risks for TCMTB will be substantially mitigated for the purposes of this determination. Once an Endangered Species assessment is completed, further changes to these registrations may be necessary as explained in Section III of this document.

B. Public Comments and Responses

Through the Agency's public participation process, the EPA worked with stakeholders and the public to reach the regulatory decision for TCMTB. EPA released its preliminary risk assessment for TCMTB for public comment on April 26, 2006. The Agency received no comments during the 60-day public comment period on the TCMTB risk assessment and supporting science documents, which closed on June 26, 2006.

C. Regulatory Position

1. Food Quality Protection Act Findings

a. "Risk Cup" Determination

As part of the FQPA tolerance reassessment process, EPA assessed the risks associated with TCMTB use. The Agency has determined that, if the mitigation described in this document is adopted and labels are amended, human health risks as a result of exposures to TCMTB are within acceptable levels. In other words, EPA has concluded that the tolerances for TCMTB meet FQPA safety standards. In reaching this determination, EPA has considered the available information on the special sensitivity of infants and children, as well as exposures to TCMTB from all possible sources.

b. Determination of Safety to U.S. Population

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

Dietary risk assessments were conducted for adults and children, with the highest risks (children at 2% aPAD for seed treatment use and children at 0.66% aPAD for antimicrobial use; children at 17% of cPAD for seed treatment use and children at 12.8% cPAD) being below the Agency's level of concern.

The Agency conducted acute and chronic aggregate assessments that considered food and drinking water exposures from the registered agricultural and antimicrobial uses of TCMTB. The residential uses of TCMTB were not included in the aggregate assessment because all of the residential uses evaluated have risks of concern (MOEs <100). Thus, the short- and intermediate-term aggregate assessment that included the residential uses would also show risks of concern.

The subpopulation with the greatest risk for both the acute and chronic aggregate risk assessments was children (2.5% of aPAD for children and 40% of cPAD for children). These risk estimates are below the Agency's level of concern.

c. Determination of Safety to Infants and Children

EPA has determined that the currently registered uses of TCMTB, with 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 of the toxicity, use

practices, and environmental behavior noted above for the general population, but also takes into account the possibility of increased susceptibility to the toxic effects of TCMTB 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 TCMTB 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 TCMTB based on: (1) the toxicology database is complete with respect to assessing the increased susceptibility to infants and children as required by FQPA; (2) there is no concern for developmental neurotoxicity resulting from exposure to TCMTB in the rat and rabbit prenatal developmental studies and the 2-generation reproduction study; (3) there is no evidence of increased susceptibility to the fetus following *in utero* exposure in the prenatal developmental toxicity studies or to the offspring when adults are exposed in the two-generation reproductive study; and (4) the risk assessment does not underestimate the potential exposure for infants and children.

d. 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).

In the chronic rat toxicity/carcinogenicity study, TCMTB was associated with thyroid C-cell adenomas. Although these results were not seen as statistically significant, they may indicate an association with endocrine disruption. When the appropriate screening and/or testing protocols being considered under the EDSP have been developed, TCMTB may be subject to additional screening and/or testing to better characterize effects related to endocrine disruption.

e. Cumulative Risks

Risks summarized in this document are those that result only from the use of TCMTB. 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 TCMTB. 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 for residues in/on plant livestock commodities have been established under 40 CFR §180.288. The permanent tolerances for residues in/on plant commodities are established at the limit of quantitation (LOQ) of 0.1 ppm (N) and are expressed in term of residues of TCMTB *per se* [(2-benzothiazolylthio)methyl thiocyanate].

Confirmatory metabolism data conducted with wheat, cotton, and sugar beet are necessary to determine the nature of residues in plants. Depending on the results from the confirmatory metabolism studies, additional guideline requirements may be requested for: livestock metabolism; storage stability; and magnitude of the residue studies on livestock, processed crop commodities, and magnitude of residue studies for rotational crops. A summary of the TCMTB tolerance reassessment is presented below in Table 26.

a. Currently Established Tolerances Under 40 CFR 180.288 & Tolerance Reassessment of TCMTB

Tolerances for barley hay and cotton gin byproducts must be proposed. The "N" designation, denoting "negligible" residues, must be deleted from 40 CFR §180.288. Use of TCMTB on sorghum and corn are no longer supported and, therefore, must be revoked under 40 CFR §180.288.

Table 26. Established Tolerances and Tolerance Reassessment Summary Table for TCMTB

Commodity	Current Tolerance	Tolerance Reassessment	Comment/[Correct Commodity Definition]
Tolerances Established Under 40 CFR §180.288:			
Barley, grain	0.1 (N[1])	TBD[2]	
Barley, straw	0.1 (N)	TBD	
Beet, sugar, roots	0.1 (N)	TBD	
Beet, sugar, tops	0.1 (N)	TBD	
Corn, grain	0.1 (N)	Revoke	The registrants do not intend to support use of TCMTB on corn.
Corn, forage	0.1 (N)	Revoke	The registrants do not intend to support use of TCMTB on corn.
Corn, stover	0.1 (N)	Revoke	The registrants do not intend to support use of TCMTB on corn.
Cotton, forage	0.1 (N)	Revoke	No longer considered a significant livestock feed item.
Cotton, undelinted seed	0.1 (N)	TBD	
Oat, forage	0.1 (N)	TBD	
Oat, grain	0.1 (N)	TBD	
Oat, hay	0.1 (N)	TBD	
Oat, straw	0.1 (N)	TBD	
Rice, grain	0.1 (N)	TBD	
Rice, straw	0.1(N)	TBD	
Safflower, seed	0.1 (N)	TBD	
Sorghum, grain, forage	0.1 (N)	Revoke	The registrants do not intend to support use of TCMTB on sorghum.
Sorghum, grain, grain	0.1 (N)	Revoke	The registrants do not intend to support use of TCMTB on sorghum.
Sorghum, grain, stover	0.1 (N)	Revoke	The registrants do not intend to support use of TCMTB on sorghum.
Wheat, forage	0.1 (N)	TBD	
Wheat, grain	0.1 (N)	TBD	
Wheat, hay	0.1 (N)	TBD	
Wheat, straw	0.1 (N)	TBD	
Tolerances To Be Proposed Under 40 CFR §180.288:			
Barley, hay	None established	TBD	
Cotton, gin byproducts	None established	TBD	

1. N = Negligible. The "N" designation must be removed from all tolerances.
2. TBD = To be determined. Tolerances cannot be determined at this time because additional data are required.

b. Codex of Harmonization

There are no codex maximum residue limits (MRLs) for TCMTB; therefore, no questions of compatibility with U.S. tolerances exist.

D. Regulatory Rationale

The Agency has determined that TCMTB is eligible for reregistration provided that additional required data confirm this decision, 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 uses of TCMTB. 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

The acute and chronic dietary risks from TCMTB residues on food, estimated using conservative measures are below the Agency's level of concern for the seed treatment and antimicrobial uses. Therefore, no mitigation measures are necessary at this time. Additional confirmatory metabolism data are required to verify that 2-MBT and other TCMTB metabolites are not residues of concern in plant commodities.

b. Drinking Water Risk Mitigation

The Agency estimated drinking water exposure for the seed treatment use of TCMTB only, as no antimicrobial uses are expected to impact surface or groundwater resources. The drinking water concentrations did not result in risk of concern. Therefore, no mitigation measures are necessary at this time.

c. Residential Risk Mitigation

i. Handler Risk Mitigation

Residential handler risks were assessed for the application of TCMTB-preserved paint via airless sprayer and paint brush/roller (antimicrobial uses) to determine dermal and inhalation exposure. Short-term dermal risks of concern were identified for paint applicators using both airless sprayer and paint brush/roller scenarios (ST Dermal MOE of 10 for airless sprayer applications and ST Dermal MOE of 25 for paintbrush applications). The inhalation MOEs were above the target MOE of 300; however, the total dermal and inhalation MOEs for both application scenarios were under the target MOE of 100 and, thus, are risks of concern.

Because of remaining residential exposure concerns, the registrants for TCMTB have agreed to conduct a dermal exposure study for paint applicators that would allow the Agency to assess the risks associated with these uses. However, this study will not be completed in time for inclusion in this RED. Until acceptable exposure data are submitted, the Agency has determined that the residential use of TCMTB as a materials preservative in paints is ineligible for reregistration and this use must be deleted. The registrant has agreed that once the data has been determined to be acceptable, and if it is established that the risks are not of concern, the registrants can request that this use be reinstated.

ii. Post-Application Risk Mitigation

For the residential post-application assessment, high-end residential exposures were assessed for treated carpets (dermal and incidental oral exposure to children) and treated

clothing/leather products (dermal exposure to adults/children and incidental oral exposure to children). The short- and intermediate- term MOEs for dermal contact with treated clothing/leather products were of concern for both young children and adults (MOEs < 1 assuming 100% transfer factor; MOEs < 10 assuming 5% transfer factor). In addition, the short-term MOEs for dermal and incidental oral contact with treated carpet were less then the target of 100 for children (ST dermal MOE of 2, ST oral MOE of 4).

To address these risks all TCMTB textile preservative uses, with the exception of the leather preservative use, must be deleted. In addition, the registrant has agreed to conduct a study on TCMTB-treated leather products to determine how much TCMTB would transfer onto skin through normal wear. This study, which is confirmatory data, is expected to further refine the risk assessment for the leather preservative use.

As a result of the cancellation of the textile use, the Agency has determined that all dermal and oral risks of concern pertaining to children will be eliminated. The rationale for this decision is that children are not likely to come into oral contact through mouthing of treated leather products. In addition, children are not likely to wear TCMTB-treated leather products. Therefore, there are no remaining risks of concern for residential exposure of TCMTB-treated leather products to children.

Preliminary data was submitted by the technical registrant, Buckman Laboratories, to the Agency regarding leaching of TCMTB from treated leather. This data estimated the amount of TCMTB that would transfer to the skin during normal wear of leather products. A preliminary review of this data was used to characterize risks associated with wearing treated leather and suggests that dermal risks from wearing these products well exceeds the target MOE of 100 for adults and, thus, is not of concern. Confirmatory leather leaching data is required to support these findings.

d. Occupational Risk Mitigation

i. Handler Risk Mitigation

Seed Treatment Use

For commercial seed treatment, all dermal and inhalation MOEs met or exceeded the required uncertainty factor of 100 with baseline levels of PPE. Therefore, no mitigation is required.

Antimicrobial Use

Dermal risks of concern were identified for six individual use scenarios (paint preservation liquid pour, paint preservation liquid pump, textile preservation liquid pour, textile preservation liquid pump, cutting fluid preservation liquid pour, pulp and paper liquid pump) at the baseline level of evaluation (no PPE gloves). To mitigate the risks for occupational handlers of material preservation for adhesives, pulp and paper and metalworking, these workers must wear chemical resistant gloves while handling TCMTB products. The use of chemical resistant

gloves eliminates the dermal risks of concern (MOEs are well above 100 with the addition of gloves). Paint and textile uses, with the exception of leather, must be deleted based on residential risk concerns.

Short-term and intermediate-term dermal risks of concern were identified for occupational paint applicators with the use of an airless sprayer and paintbrush/roller. These risks remained a concern, even with addition of PPE (gloves). Because of remaining risk concerns associated with this use, the technical registrant for TCMTB has agreed to conduct a study that would allow the Agency to assess the risks associated with these uses. However, this study will not be completed in time for inclusion in this RED. Until acceptable exposure data are submitted, the Agency has determined that the occupational use of TCMTB in commercial and institutional premises for paint application is ineligible for reregistration and paint uses must be deleted. Once the data has been determined to be acceptable, and if it is established that the risks are not of concern, the registrants can request that this use be reinstated.

Dermal risks of concern were identified for occupational handlers of textiles and carpets being treated with TCMTB. To mitigate these risks all textile uses of TCMTB must be deleted, with the exception of leather. To mitigate the dermal risks for handlers during the manufacturing of leather products, pulp and paper products, and handling of metal cutting fluid, workers must wear gloves. The estimates for these risks are well over the target of 100 and are not of concern with the use of gloves.

The short-, intermediate- and long-term risks for occupational handlers who apply TCMTB to wood for non-pressure treatment were assessed. All of these risks were above the target MOEs of 100 (short- and intermediate-term) and 300 (long-term), and are not of concern.

ii. Post-Application Risk Mitigation

For the occupational post-application risk assessment of the seed treatment and antimicrobial uses of TCMTB, there are no risks of concern. Therefore, mitigation measures are not necessary at this time.

2. Environmental Risk Management

Seed Treatment Use

The Agency considers the seed treatment use of TCMTB assessed in this RED to be unlikely to result in any appreciable exposure to terrestrial or aquatic organisms. Therefore no environmental risk mitigation is required for the agricultural use of TCMTB at this time.

Antimicrobial Use

For the antisapstain use of TCMTB, the Agency used a Tier I screening model to estimate exposures that could result from this use. The worst case ecological concern for the TCMTB antisapstain use is for chronic risk to fish with RQs ranging from 25 – 39.
The estimated environmental concentrations (EECs) exceed chronic levels of concern (LOCs). It should be noted that this model has inherent assumptions and uncertainties that may result in over or under estimation of exposure levels. Additional information, including, specific leaching

data from TCMTB used as an antisapstain wood preservative would result in more accurate risk estimations. Therefore, the Agency is requesting an aerobic soil metabolism, anaerobic soil metabolism, and aerobic aquatic metabolism studies. Such data may remove uncertainties and may result in more accurate exposure estimations

In addition, the following language must be placed on all antisapstain products to decrease leaching risks:

> "Treated lumber must be stored under cover, indoors, or at least 100 feet from any pond, lake, stream, wetland, or river to prevent possible runoff of the product into the waterway. Treated lumber stored within 100 feet of a pond, lake, steam, or river must be either covered with plastic or surrounded by a berm to prevent surface water runoff into the nearby waterway. If a berm or curb is used around the site, it should consist of impermeable material (clay, asphalt, concrete) and be of sufficient height to prevent runoff during heavy rainfall events."

Registrants are responsible for amending all TCMTB wood preservative product labels to incorporate the required label language, which will help mitigate ecological risks of concern.

To address exposure to non-target insects, a special honeybee study is required for all wood preservative uses unless a statement prohibiting the use of treated wood in hive construction is added to the label such as, “Wood treated with TCMTB shall not be used in the construction of beehives.” This study is a combination of Guidelines 171-4 and 850.3030 (see information regarding residue data requirements for uses in beehives in the residue chemistry section of 40 CFR part 158). Numbers of bees used in this study and methods for collection/introduction of bees into hives, feeding, and observations for toxicity and mortality should be consistent with those described in OPPTS Guideline 850.3030, “Honey Bee Toxicity of Residues on Foliage.” The toxicity portion of this study is in lieu of the honeybee contact LD50 test.

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 TCMTB. For the specific labeling statements and a list of outstanding data, refer to Section V of this RED document.

4. Listed Species Considerations

a. The Endangered Species Act

Section 7 of the Endangered Species Act, 16 U.S.C. Section 1536(a)(2), requires all federal agencies to consult with the National Marine Fisheries Service (NMFS) for marine and anadromous listed species, or the United States Fish and Wildlife Services (FWS) for listed wildlife and freshwater organisms, if they are proposing an "action" that may affect listed species or their designated habitat. Each federal agency is required under the Act to insure that any

action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. To jeopardize the continued existence of a listed species means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species." 50 C.F.R. § 402.02.

To facilitate compliance with the requirements of the Endangered Species Act subsection (a)(2) the Environmental Protection Agency, Office of Pesticide Programs has established procedures to evaluate whether a proposed registration action may directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of any listed species (U.S. EPA 2004). After the Agency's screening-level risk assessment is performed, if any of the Agency's Listed Species LOC Criteria are exceeded for either direct or indirect effects, a determination is made to identify if any listed or candidate species may co-occur in the area of the proposed pesticide use. If determined that listed or candidate species may be present in the proposed use areas, further biological assessment is undertaken. The extent to which listed species may be at risk then determines the need for the development of a more comprehensive consultation package as required by the Endangered Species Act.

For certain use categories, the Agency assumes there will be minimal environmental exposure, and only a minimal toxicity data set is required (Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs U.S. Environmental Protection Agency - Endangered and Threatened Species Effects Determinations, 1/23/04, Appendix A, Section IIB, pg.81). Chemicals in these categories therefore do not undergo a full screening-level risk assessment, and are considered to fall under a no effect determination. The active ingredient uses of TCMTB, with the exception of the seed treatment and antisapstain wood preservation uses, fall into this category. Using Tier I screening modeling to assess potential exposure from seed treatment risks to Listed Species were not identified. Using Tier I screening modeling to assess potential exposure from antisapstain wood preservation uses of TCMTB, risks to Listed Species are indicated. Since the model is only intended as a screening-level model, and, as such, has inherent uncertainties and limitations which may result in inaccurate exposure estimations, further refinement of the model is recommended before any regulatory action is taken regarding the antisapstain uses of TCMTB. Additionally, impacts from the antisapstain use could potentially be mitigated with precautions to prevent leaching and runoff when wood is stored outdoors (see General Risk Mitigation, below). Due to these circumstances, the Agency defers making a determination for the antisapstain uses of TCMTB until additional data and modeling refinements are available. At that time, the environmental exposure assessment of the antisapstain use of TCMTB will be revised, and the risks to Listed Species will be reconsidered.

b. General Risk Mitigation

TCMTB end-use products (EPs) may also contain other registered pesticides. Although the Agency is not proposing any mitigation measures for products containing TCMTB specific to federally listed species, the Agency needs to address potential risks from other end-use products. Therefore, the Agency requires that users adopt all listed species risk mitigation measures for all active ingredients in the product. If a product contains multiple active ingredients with

conflicting listed species risk mitigation measures, the more stringent measure(s) should be adopted.

V. What Registrants Need to Do

The Agency has determined that TCMTB is eligible for reregistration provided that: (i) additional data that the Agency intends to require confirm this decision; (ii) the risk mitigation measure outlined in this document is adopted; and (iii) label amendments are made to reflect this measure. To implement the risk mitigation measure, the registrants must amend their product labeling to incorporate the label statement set forth in the Label Changes Summary Table in Section B below (Table 24). The additional data requirements that the Agency intends to obtain will include, among other things, submission of the following:

For TCMTB 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 K. Avivah Jakob at (703) 305-1328 with questions regarding generic reregistration.

By US mail:

Document Processing Desk
K. Avivah Jakob
Office of Pesticide Programs
(7510P)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

By express or courier service:

Document Processing Desk
K. Avivah Jakob
Office of Pesticide Programs
(7510P)
U.S. Environmental Protection Agency
One Potomac Yard, Room S-4900
2777 South Crystal Drive
Arlington, VA 22202

For end-use products containing the active ingredient TCMTB, 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 23 of this document;

4. A completed form certifying compliance with data compensation requirements (EPA Form 8570-34);

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 Marshall Swindell at (703) 308-6341 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
Marshal Swindell
Office of Pesticide Programs (7510P)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

By express or courier service:

Document Processing Desk
Marshal Swindell
Office of Pesticide Programs (7510P)
U.S. Environmental Protection Agency
Room S-4900, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202

A. Manufacturing Use Products

1. Additional Generic Data Requirements

The generic database supporting the reregistration of TCMTB has been reviewed and determined to be substantially complete. However, the following additional data requirements have been identified by the Agency as confirmatory data requirements and are included in the generic data call in (DCI) for this RED.

Data must be submitted indicating whether the use of TCMTB, as an antimicrobial materials preservative, in pulp and papermaking will result in residues of 2-MBT in paper. The registrant must also provide information regarding the level of 2-MBT that will occur in paper. Application rates (ranges) on all TCMTB paper coating use labels must be identified/clarified.

The risk assessment noted deficiencies in the surrogate inhalation exposure data available from the Chemical Manufacturers Association (CMA) data base. Therefore, the Agency is requiring confirmatory data to support the uses assessed with the CMA exposure data within this risk assessment. The risk assessment also noted that many of the use parameters (e.g., amount handled and duration of use) were base on professional judgments. Therefore, descriptions of human activities associated with the uses assessed are required as confirmatory.

The requested environmental fate and ecological studies outline in Table 24 are data gaps for the seed treatment and/or wood preservative uses of TCMTB.

Table 24. Data Requirements for TCMTB

Guideline Study Name	New OPPTS Guideline Number	Old Guideline Number
Anaerobic soil metabolism	835.4200	162-2
Terrestrial field dissipation	835.6100	164-1
Aquatic Field Study	835.6200	164-2
Aquatic Invertebrate Life-Cycle Study	850.1400	72-4b
Life Cycle Fish Study	850.1500	72-5
Terrestrial Plant Toxicity, Tier I (seedling emergence)	850.4100	122-1a
Seedling emergence, Tier II	850.4225	123-1
Vegetative vigor with Rice, Tier II	850.4250	123-1
Aquatic Plant Growth, Tier II	850.5400	123-2
Plant Metabolism	860.1300	171-4a
Residue Analytical Methods- Plant Commodities	860.1340	171-4c
Storage Stability Data-Plant Commodities	860.1380	171-4e
Processed Food/Feed- Barley	860.1520	171-4l
Processed Food/Feed- Beet, Sugar	860.1520	171-4l
Processed Food/Feed- Cotton	860.1520	171-4l
Processed Food/Feed- Oat	860.1520	171-4l

Processed Food/Feed- Rice	860.1520	171-4l
Processed Food/Feed-Safflower	860.1520	171-4l
Processed Food/Feed- Wheat	860.1520	171-4l
Proposed Tolerances	860.1550	171-6
Submittal of Analytical Reference Standards	860.1650	171-13
Dermal Indoor Exposure	875.1200	233
Inhalation Indoor Exposure	875.1400	234
Description of Human Activity	875.2800	133-1
Leather Leaching Data	Special Study	Special Study
Residues in honey/beeswax and toxicity of treated wood residues to bees	No Guideline	No Guideline
Reserved Confirmatory Data Requirements for Reregistration		
Terrestrial Plant Toxicity, Tier II (seedling emergence)	850.4225	123-1
Livestock Metabolism	860.1300	171-4b
Residue Analytical Methods- Livestock Commodities	860.1340	171-4d
Multi-residue Methods	860.1360	171-4m
Storage Stability Data-Processed Commodities	860.1380	171-4e
Storage Stability Data- Livestock Commodities	860.1380	171-4e
Meat, Milk, Poultry, and Eggs	860.1480	171-4i
Crop Field Trials-Beat, Sugar, Tops (Root and Tuber Vegetables Group)	860.1500	171-4k
Crop Field Trials-Beet, Sugar, Tops (Leaves of Root and Tuber Vegetables Group)	860.1500	171-4k
Crop Field Trials-Barley, Grain (Cereal Grains Group)	860.1500	171-4k
Crop Field Trials-Oat, Grain (Cereal Grains Group)	860.1500	171-4k
Crop Field Trials-Rice, Grain (Cereal Grains Group)	860.1500	171-4k
Crop Field Trials-Wheat, Grain and Aspirated Grain Fractions (Cereal Grains Group)	860.1500	171-4k
Crop Field Trials-Barley, Hay and Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	860.1500	171-4k
Crop Field Trials-Oat, Forage, Hay and Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	860.1500	171-4k
Crop Field Trials-Rice, Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	860.1500	171-4k

Crop Field Trials-Wheat, Forage, Hay, and Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	860.1500	171-4k
Crop Field Trials-Cotton, Undelinted Seed and Gin Byproducts (Miscellaneous Commodities)	860.1500	171-4k
Confined Rotational Crops	860.1850	165-1
Field Rotational Crops	860.1900	165-2

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 25, 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 will be issued at a later date.

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 25, Label Changes Summary Table.

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, all product labels must be amended to incorporate the risk mitigation measure outlined in Section IV of the TCMTB RED. The following table describes how language on the labels should be amended.

Table 25. Labeling Changes Summary Table

Description	Amended Labeling Language	Placement on Label
Environmental Hazards Statements Required by the RED and Agency Label Policies	"This product 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 Pollution 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."	Precautionary Statements
End Use Products Intended for Occupational Use		
PPE Requirements	"Wear chemical resistant gloves while handling concentrate."	Immediately following/below Precautionary Statements: Hazards to Humans and Domestic Animals
For all antisapstain end-use products	"Treated lumber must be stored under cover, indoors, or at least 100 feet from any pond, lake, stream, wetland, or river to prevent possible runoff of the product into the waterway. Treated lumber stored within 100 feet of a pond, lake, steam, or river must be either covered with plastic or surrounded by a berm to prevent surface water runoff into the nearby waterway. If a berm or curb is used around the site, it should consist of impermeable material (clay, asphalt, concrete) and be of sufficient height to prevent runoff during heavy rainfall events."	This language is to be included in the Environmental Hazards section of the label.
Directions For Use		
Use Cancellation	All TCMTB textile materials preservative/additive incorporation uses are cancelled and must be deleted from current product labels, with the exception use on leather. Examples of cancelled textiles are carpets, fibers and cordage.	
Use Cancellation	All TCMTB paint preservation/application uses are cancelled and must be deleted from all product labels.	

VI. APPENDICES

Appendix A. Table of Use Patterns for TCMTB

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Materials preservatives				
Leather	Soluble Concentrate 1448-55 1448-81 1448-377 1448-412	Add to pickling liquor or tanning liquor at the start of the tanning process or to the rinse water in a post tanning refloat	The dosage level used will depend on storage conditions and the length of protection required. A dosage rate of 0.025-0.3% (250-2,000 ppm) can be used. A satisfactory dilution of 1 part solution to 5 parts water can be prepared.	Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Leather	1448-386 1448-102 1448-100 1448-376 1448-408		1.5 to 12.0 lbs per 1,000 lbs of white weight stock.	Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Particle Board	Soluble concentrate 1448-55 1448-81 1448-99 1448-100 1448-377	Mix with resin or binding agent	0.1 to 3% based on the dry weight of the wood.	Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
	1448-386		0.6 to 6.0% based on the dry weight of the wood.	Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Coatings, caulking-sealants, & wall cover adhesives, pigment slurries, non food adhesives	Soluble concentrate 1448-45 1448-55 1448-81 1448-99 1448-100 1448-102 1448-376 1448-377 44392-11	Incorporation (mixing)	0.5 to 36% based on the total formulation weight. For solvent based formulations use combinations of aromatic and aliphatic solvents.	Per TCMTB RED mitigation, occupational handlers of TCMTB antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB paint preservation/application uses are cancelled and must be deleted from all product labels. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
Textiles	Soluble concentrate 1448-55	Impregnate	Apply solution to an emulsion of convenient concentration of 1-5% impregnate into the fabric using conventional padding or sizing equipment	Per TCMTB RED mitigation, all TCMTB textile materials preservative/additive incorporation uses are cancelled and must be deleted from current product labels, with the exception of use on leather. Examples of cancelled textiles are carpets, fibers and cordage.

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Crude and refined oils	Soluble concentrate 1448-81 1448-99 1448-100 1448-102 1448-147 1448-148 1448-171 1448-172 1448-376 1448-386 1448-377 44392-11	Incorporation	Chemical should be added to the oil as it is being transferred from the shipping container to the storage tank at a rate of 0.6 to 32 fl oz per 1,000 gal of oil.	Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
Hides and skins	Soluble concentrate 1448-55 1448-81 1448-99 1448-102 1448-376 1448-377 1448-408 1448-412	None stated	The solution should be used at a level of 0.003% to 0.02% (30 to 200ppm) based on the weight of the green fleshed hides or skins and saturated brine solution.	Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Fuels	Soluble concentrate 1448-102 1448-148 1448-147 1448-171 1448-172 44392-11	Incorporation	125 to 25 fl oz per 100 gallons of fuel. -or- 3.0 to 6.0 fl oz per 1,000 gal of fuel.	Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Bacteriostatic paper	Soluble concentrate 1448-81 1448-377	None stated	Dosage: 0. 5% to 9.0% weight/weight of product and added at the size press or similar application.	The bacteriostatic paper and paperboard applications are not to be used in the manufacture of food contact paper, paper coatings or paperboard. Per TCMTB RED mitigation, occupational handlers of antimicrobial materials preservative products must wear PPE chemical resistant gloves while handling concentrate. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Industrial processes and water systems				
Pulp mills	Soluble concentrate 1448-45 1448-55 1448-81 1448-99 1448-100 1448-102 1448-376 1448-383 1448-377 1448-386	Spray Applicator rolls	0.5 to 12.0 lb per ton of oven dry wood (50 to 400 ppm). It can be applied through a water shower located in the pneumatic conveyor carrying chips from the chipper to the storage pile. To control bacteria and fungal growth on paper and paper board machines add to the white water or stock 0.1 to 12.0 lb/ton of dry paper. To make mold resistant paper or paperboard use at 0.05 to 0.6lb/1000 sq ft. For coated paper or board, the solution is incorporated in the coating mix prior to application. For uncoated paper or board, the solution is dispersed in water, surface sizing solution, or other solvent and applied to the surface to be protected by means of applicator roller. For mulch paper 1.5 to 5lb/ton air dry paper.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Cooling Water	Soluble concentrate 1448-55 1448-81 1448-147 1448-148 1448-149 1448-150 1448-377	Fill, Flush	Initial dose: 0.6 to 3.7 fl oz per 1,000 gallons of water in the system. Subsequent dose: 0.2 to 1.2 fl oz per 1,000 gallons should be made every 1 to 5 days.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
	1448-100 1448-152 1448-153 1448-386 1448-408	Fill, Flush	3.6 to 22.2 fl oz. per 1,000 gallons of water.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Cooling Water	1448-99 1448-102 1448-151 1448-171 1448-172 1448-244 1448-376 1448-383 44392-11		1.3 to 14.8 fl oz per 1,000 gallons of water.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
Drilling Fluids	Soluble concentrate 1448-55 1448-81 1448-99 1448-100 1448-102 1448-147 1448-148 1448-149 1448-150 1448-151 1448-152 1448-153 1448-171 1448-172 1448-376 1448-383 1448-386 1448-377 1448-408 44392-11	Incorporation in the drilling fluid.	0.05% to 1.5 % based on the total wet weight of the fluid.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Petroleum Secondary Recovery	Soluble concentrate 1448-55 1448-81 1448-99 1448-100 1448-102 1448-147 1448-148 1448-149 1448-150 1448-151 1448-152 1448-153 1448-171 1448-172 1448-376 1448-383 1448-386 1448-377 1448-244 44392-11	Continuous feed method Intermittent feed Slug feed	0.2 to 6.3 fl oz per 100 gallons of Water. 0.65 to 10 fl oz per 1,000 gallons of water 4 to 8 hrs per day. 1.3 to 13.0 fl oz per 1,000 gallons of water every 1 to 7 days, 15.6 to 52.0 fl oz per 1000 gallons of water every 1 to 7 days.	

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Cutting fluids	Soluble concentrate 1448-55 1448-99 1448-100 1448-149 1448-150 1448-151 1448-152 1448-153 1448-386 1448-265 1448-244	Incorporation	Solution should be added to diluted cutting fluid at a rate that will provide 150 to 1,500 ppm. To prevent fungal growth, concentrations of 1,000 to 7,500ppm are necessary.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
Waste water treatment systems	Soluble concentrate 1448-55	None stated	The quantity of solution required varies with the degree of fouling. It should be added at a rate that will provide 10 to 30 ppm of the waste water.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Wood Preservatives				
Sapstain Control	1448-55 1448-81	Dipping/ Pressure Impregnation	0.5 to 8 gal of product (10% TCMB) per 100 gal of water.	Treatment should be made within 24 hrs of cutting or sawing. Per RED mitigation, the following language must appear on all products with an antisapstain use: "Treated lumber must be stored under cover, indoors, or at least 100 feet from any pond, lake, stream, wetland, or river to prevent possible runoff of the product into the waterway. Treated lumber stored within 100 feet of a pond, lake, steam, or river must be either covered with plastic or surrounded by a berm to prevent surface water runoff into the nearby waterway. If a berm or curb is used around the site, it should consist of impermeable material (clay, asphalt, concrete) and be of sufficient height to prevent runoff during heavy rainfall events." Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Sapstain Control	1448-102	Dipping/ Pressure Impregnation	5.6 kg to 44.0 kg of product (5% TCMB) per 100 liters of water.	Treatment should be made within 24 hrs of cutting or sawing. Per RED mitigation, the following language must appear on all products with an antisapstain use: "Treated lumber must be stored under cover, indoors, or at least 100 feet from any pond, lake, stream, wetland, or river to prevent possible runoff of the product into the waterway. Treated lumber stored within 100 feet of a pond, lake, steam, or river must be either covered with plastic or surrounded by a berm to prevent surface water runoff into the nearby waterway. If a berm or curb is used around the site, it should consist of impermeable material (clay, asphalt, concrete) and be of sufficient height to prevent runoff during heavy rainfall events." Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Sapstain Control	1448-100 1448-99	Dipping/ Pressure Impregnation	1.5 to 48 gal of product (5 to 10% TCMB) per 100 gal of water.	Treatment should be made within 24 hrs of cutting or sawing. Per RED mitigation, the following language must appear on all products with an antisapstain use: "Treated lumber must be stored under cover, indoors, or at least 100 feet from any pond, lake, stream, wetland, or river to prevent possible runoff of the product into the waterway. Treated lumber stored within 100 feet of a pond, lake, steam, or river must be either covered with plastic or surrounded by a berm to prevent surface water runoff into the nearby waterway. If a berm or curb is used around the site, it should consist of impermeable material (clay, asphalt, concrete) and be of sufficient height to prevent runoff during heavy rainfall events." Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Vertical Wood Surfaces, roofs and sidewalls	56156-1	Brush or low pressure sprayer	Sidewalls – first coat: 100 sq. ft. per gallon, second coat 200 sq ft. per gallon Roofs – 75 to 150 sq. ft. per gallon depending on porosity of surface. VOC Content limit: less than 500 grams per liter or 4.6 lbs. per gallon	Do not apply this product in a way that will contact workers or other persons. Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
Cooling Tower Wood	1448-55 1448-81	Brush or periodic shock dose	Brush: 0.5 to 0.7% of product in water onto surface. (provides 0.6 to 0.8 lbs per 1000 sq. ft. of wood surface) Shock Dose: 1.25 lb of product per 1000 gallons of water. Bleedoff should be stopped for 4 to 6 hrs after treatment. Repeat shock treatment every four months.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Cooling Tower Wood	1448-302	Brush or periodic shock dose	Brush: 2.0 to 2.8% of product in water onto surface. (provides 2.4 to 3.2 lbs per 1000 sq. ft. of wood surface) Shock Dose: 5.0 lb of product per 1000 gallons of water. Bleedoff should be stopped for 4 to 6 hrs after treatment. Repeat shock treatment every four months.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
	1488-100	Brush or periodic shock dose	Brush: 3.0 to 4.2% of product in water onto surface. (provides 3.6 to 4.8 lbs per 1000 sq. ft. of wood surface) Shock Dose: 7.5 lb of product per 1000 gallons of water. Bleedoff should be stopped for 4 to 6 hrs after treatment. Repeat shock treatment every four months.	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Seed Treatment				
Barley Seed, Oat Seed, Rice Seed, Wheat Seed	Liquid-Concentrate 2935-389	Commercial treater	Maximum application rate: 0.026 lbs ai/100 lbs of seed	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."
Cotton	Liquid-Concentrate 264-965 264-983 2935-413 2935-389	Commercial treater On-farm treater	Maximum application rate (commercial treater): 0.13 lbs ai/100 lbs of seed Maximum application rate (on-farm treater): 0.051 lbs ai/100 lbs of seed	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

Use Site	Formulation/ EPA No.	Method of Application	Application Rate/ No. of applications	Use Limitations
Safflower Seed, Sugar beet Seed	Liquid-Concentrate 2935-389	Commercial treater	Maximum application rate: 0.041 lbs ai/100 lbs of seed	Per TCMTB RED mitigation, all TCMTB labels must state the following: "This product 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 Pollution 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."

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 #2625(TCMTB) covered by this RED. It contains generic data requirements that apply to TCMTB 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 4). This column indicates the use patterns for which the data requirements apply. The following letter designations are used for the given use patterns.

(1) Agricultural premises and equipment
(2) Food handling/ storage establishments' premises and equipment
(3) Commercial, institutional and industrial premises and equipment
(4) Residential and public access premises
(5) Medical premises and equipment
(6) Human water systems
(7) Materials preservatives
(8) Industrial processes and water systems
(9) Antifouling coatings
(10) Wood preservatives
(11) Swimming pools
(12) Aquatic areas

3. Bibliographic Citation (Column 5). 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 (MRID) 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.

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
PRODUCT CHEMISTRY				
830.1550	61-1	Product Identity and Composition	1,3, 4, 7,8,10	41612001
830.1600 830.1620 830.1650	61-2a	Starting Materials and Manufacturing Process	1,3, 4, 7,8,10	41612001
830.1670	61-2b	Formation of Impurities	1,3, 4, 7,8,10	41612001
830.1700	62-1	Preliminary Analysis	1,3, 4, 7,8,10	41612002
830.1750	62-2	Certification of Limits	1,3, 4, 7,8,10	41612002
830.1800	62-3	Analytical Method	1,3, 4, 7,8,10	41612002
830.6302	63-2	Color	1,3, 4, 7,8,10	41612003
830.6303	63-3	Physical State	1,3, 4, 7,8,10	41612003
830.6304	63-4	Odor	1,3, 4, 7,8,10	41612003
830.7220	63-6	Boiling Point	1,3, 4, 7,8,10	41612003, 42407401
830.7300	63-7	Density	1,3, 4, 7,8,10	41612003
830.7840 830.7860	63-8	Solubility	1,3, 4, 7,8,10	42059701, 41612003
830.7950	63-9	Vapor Pressure	1,3, 4, 7,8,10	41612003, 42059701
830.7550 830.7560 830.7570	63-11	Partition Coefficient (Octanol/Water)	1,3, 4, 7,8,10	4232450,4205970, 41612003
830.7000	63-12	pH	1,3, 4, 7,8,10	41612003
830.6313	63-13	Stability	1,3, 4, 7,8,10	41612003
830.6314	63-14	Oxidizing/Reducing Action	1,3, 4, 7,8,10	41612003
830.6315	63-15	Flammability	1,3, 4, 7,8,10	41612003

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
830.6316	63-16	Explodability	1,3, 4, 7,8,10	41612003
830.6317	63-17	Storage Stability	1,3, 4, 7,8,10	41612003
830.7100	63-18	Viscosity	1,3, 4, 7,8,10	41612003
830.6319	63-19	Miscibility	1,3, 4, 7,8,10	41612003
830.6320	63-20	Corrosion Characteristics	1,3, 4, 7,8,10	41612003
830.6321	63-21	Dielectric breakdown voltage	1,3, 4, 7,8,10	41612003
ECOLOGICAL EFFECTS				
850.2100	71-1a	Avian Acute Oral Toxicity Test Quail/Duck	1,3, 4, 7,8,10	41780901
850.2100	71-1b	Avian Acute Oral Toxicity Test Quail/Duck TEP	1,3, 4, 7,8,10	41780901
850.2200	71-2a	Avian Acute Dietary Toxicity Quail	1,3, 4, 7,8,10	41595602, 42428501
850.2200	71-2b	Avian Dietary Toxicity Duck	1,3, 4, 7,8,10	41595601
850.1075	72-1a	Fish Acute Toxicity – Freshwater Bluegill	1,3, 4, 7,8,10	41804201
850.1075	72-1c	Fish Toxicity Rainbow Trout	1,3, 4, 7,8,10	41818101
850.1010	72-2a	Acute Aquatic Invertebrate Toxicity	1,3, 4, 7,8,10	41838201, 42226001
850.1075	72-3a	Acute Estuarine/Marine Toxicity - Fish	1,3, 4, 7,8,10	40363601
850.1025	72-3b	Acute Estuarine/Marine Toxicity - Invertebrate (Mollusk)	1,3, 4, 7,8,10	40363603
	72-3c	Estuarine/Marine Toxicity - Invertebrate (Shrimp)	1,3, 4, 7,8,10	40363602
850.1300	72-4a	Fish Early Life-Stage Testing	1,3, 4, 7,8,10	425929-01
850.1400	72-4b	Aquatic Invertebrate Life-Cycle	1,3, 4, 7,8,10	Data Gap
850.1500	72-5	Life Cycle Fish	1,3, 4, 7,8,10	Data Gap
850.1710	72-6	Aquatic Org. Accumulation	1,3, 4, 7,8,10	42418501, 46705201, 42453201

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
850.4100	122-1a	Terrestrial Plant Toxicity, Tier I (seeding emergence)	1,3, 4, 7,8,10	Data Gap
850.4400	123-2	Aquatic Vascular Plant Toxicity, Tier II	1,3, 4, 7,8,10	442009-01
850.5400	123-2	Aquatic Plant Growth, Tier II	1,3, 4, 7,8,10	Data Gap
850.4225	123-1	Seedling Emergence- Tier II	1,3, 4, 7,8,10	Data Gap
850.4250	123-1	Vegetative Vigor with Rice- Tier II	1,3, 4, 7,8,10	Data Gap
875.2100	132-1a	Foliar Residue Dissipation – not an eco requirement, check with fate/residue chem	1,3, 4, 7,8,10	Waived
None	None	Honey Bee Wood Preservative Residues Test	1,3, 4, 7,8,10	Data Gap (Unless label statement prohibiting use for beehive construction is added)
TOXICOLOGY				
870.1100	81-1	Acute Oral - Rat	1,3, 4, 7,8,10	41583801
870.1200	81-2	Acute Dermal - Rabbit	1,3, 4, 7,8,10	41515401
870.1300	81-3	Acute Inhalation - Rat	1,3, 4, 7,8,10	40419301, 41640601
870.2400	81-4	Primary Eye Irritation - Rabbit	1,3, 4, 7,8,10	Acc. No. 111991
870.2500	81-5	Primary Dermal Irritation - Rabbit	1,3, 4, 7,8,10	41583701
870.2600	81-6	Dermal Sensitization	1,3, 4, 7,8,10	42349201, Acc No. 259676
870.3100	82-1a	90-Day Feeding-Rodent	1,3, 4, 7,8,10	41342201
	82-1b	90-Day Feeding-Non-Rodent	1,3, 4, 7,8,10	41342201
870.3200	82-2	21/28-Day Dermal Toxicity – Rat/Rabbit	1,3, 4, 7,8,10	41655801
870.3465	82-4	90-Day Inhalation Toxicity	1,3, 4, 7,8,10	Reserved
870.3700	83-3	Developmental Toxicity	1,3, 4, 7,8,10	00154295, Accession no. 260491, 40075102

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
870.3800	83-4	Reproduction and Fertility Effects - 2 Generation Repro Rat	1,3, 4, 7,8,10	41471401
870.4100	83-1a	Chronic Feeding Toxicity - Rodent	1,3, 4, 7,8,10	41342201
	83-1b	Chronic Feeding Toxicity - Non-Rodent	1,3, 4, 7,8,10	41342201
870.4200	83-2a	Oncogenicity - Rat	1,3, 4, 7,8,10	42383001
	83-2b	Oncogenicity - Mouse	1,3, 4, 7,8,10	42383001
870.3700a	83-3a	Teratogenicity- Rat	1,3, 4, 7,8,10	00154295, accession no. 260491
870.3700b	83-3b	Teratogenicity-Rabbit	1,3, 4, 7,8,10	40075102
870.4300	83-5	Combined Chronic Toxicity/Carcinogenicity in Rats	1,3, 4, 7,8,10	42116301, 41529701, 41570301
870.5100	84-2	Mutagenicity study- Gene mutation	1,3, 4, 7,8,10	41386101
870.5395	84-2	Mutagenicity—Mammalian erythrocyte micronucleus	1,3, 4, 7,8,10	00165520
870.5550	84-4	Rat Primary Hepatocyte Unscheduled DNA Synthesis Assay	1,3, 4, 7,8,10	00165518
870.7485	85-1	General Metabolism	1,3, 4, 7,8,10	40884801 (upgradeable) The study does not fulfill the complete requirements for a metabolism study, as incomplete identification of metabolites and the purity of TCMTB was not reported. Only a single low does and a single high does were tested, a repeated does is required.
OCCUPATIONAL/RESIDENTIAL EXPOSURE				
875.2800	133-1	Description of Human Activity	1,3, 4, 7,8,10	Data Gap
875.2400 875.2900	133-3	Dermal Passive Dosimetry	1,3, 4, 7,8,10	Waived
875.1200 875.1600	233	Dermal Indoor Exposure	1,3, 4, 7,8,10	Data Gap

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
875.1400 875.1600	234	Inhalation Indoor Exposure	1,3, 4, 7,8,10	Data Gap
ENVIRONMENTAL FATE				
835.2120	161-1	Hydrolysis	1,3, 4, 7,8,10	Upgradeable 42386101, 43437601
835.2240	161-2	Photodegradation-water	1,3, 4, 7,8,10	42630901
835.2410	161-3	Photodegradation-soil	1,3, 4, 7,8,10	41515701
835.4100	162-1	Aerobic Soil Metabolism	1,3, 4, 7,8,10	Upgradeable 435322-01
835.4200	162-2	Anaerobic Soil Metabolism	1,3, 4, 7,8,10	Data Gap
835.4400	162-3	Anaerobic Aquatic Metabolism	1,3, 4, 7,8,10	428154-01
835.4300	162-4	Aerobic Aquatic Metabolism	1,3, 4, 7,8,10	Upgradeable 425086-01
835.1240	163-1	Leach/Adsorption/Desorption	1,3, 4, 7,8,10	426314-01
835.1240	163-1	Soil Column Leaching	1,3, 4, 7,8,10	Data Gap
835.6100	164-1	Terrestrial Field Dissipation	1,3, 4, 7,8,10	Data Gap
835.6200	164-2	Aquatic Field Study	1,3, 4, 7,8,10	Data Gap
850.1730	165-4	Accumulation Studies in Fish	1,3, 4, 7,8,10	424185-01, 424932-01, 467052-01
RESIDUE CHEMISTRY				
860.1100	171-2	Chemical Identity	1,3, 4, 7,8,10	41612001
860.1300	171-4	Plant Metabolism	1,3, 4, 7,8,10	Data Gap
860.1300	171-4	Livestock Metabolism	1,3, 4, 7,8,10	Reserved
860.1340	171-4	Residue Analytical Methods- Plant Commodities	1,3, 4, 7,8,10	Data Gap

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
860.1340	171-4	Residue Analytical Method- Livestock	1,3, 4, 7,8,10	Reserved
860.1360	171-4	Multi-residue Methods	1,3, 4, 7,8,10	Reserved
860.1380	171-4	Storage Stability Data-Plant Commodities	1,3, 4, 7,8,10	Data Gap
860.1380	171-4	Storage Stability Data- Processed Commodities	1,3, 4, 7,8,10	Reserved
860.1380	171-4	Storage Stability Data- Livestock Commodities	1,3, 4, 7,8,10	Reserved
860.1480	171-4i	Meat/Milk/Poultry/Egg	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Beat, Sugar, Tops (Root and Tuber Vegetables Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Beet, Sugar, Tops (Leaves of Root and Tuber Vegetables Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Barley, Grain (Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Oat, Grain (Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Rice, Grain (Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Wheat, Grain and Aspirated Grain Fractions (Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Barley, Hay and Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Oat, Forage, Hay and Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Rice, Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Wheat, Forage, Hay, and Straw (Fodder, Forage, Hay and Straw of Cereal Grains Group)	1,3, 4, 7,8,10	Reserved
860.1500	171-4k	Crop Field Trials-Cotton, Undelinted Seed and Gin Byproducts (Miscellaneous Commodities)	1,3, 4, 7,8,10	Reserved
860.1520	171-4l	Processed Food/Feed- Barley	1,3, 4, 7,8,10	Data Gap
860.1520	171-4l	Processed Food/Feed- Beet, Sugar	1,3, 4, 7,8,10	Data Gap
860.1520	171-4l	Processed Food/Feed- Cotton	1,3, 4, 7,8,10	Data Gap

DATA REQUIREMENT				CITATION(S)
New Guideline Number	**Old Guideline Number**	**Study Title**	**Use Pattern**	**MRID Number**
860.1520	171-4l	Processed Food/Feed- Oat	1,3, 4, 7,8,10	Data Gap
860.1520	171-4l	Processed Food/Feed- Rice	1,3, 4, 7,8,10	Data Gap
860.1520	171-4l	Processed Food/Feed-Safflower	1,3, 4, 7,8,10	Data Gap
860.1520	171-4l	Processed Food/Feed- Wheat	1,3, 4, 7,8,10	Data Gap
860.1550	171-6	Proposed Tolerances	1,3, 4, 7,8,10	Data Gap
860.1650	171-13	Submittal of Analytical Reference Standards	1,3, 4, 7,8,10	Data Gap
860.1850	165-1	Confined Rotational Crops	1,3, 4, 7,8,10	Reserved
860.1900	165-2	Field Rotational Crops	1,3, 4, 7,8,10	Reserved
OTHER DATA REQUIREMENTS				
Special Study	Special Study	Leather Leaching Study	1,3, 4, 7,8,10	Data Gap

Appendix C. Technical Support Documents

Additional documentation in support of this RED is maintained in the OPP docket, located in Room S-4400, One Potomac Yard, 2777 South Crystal Drive, Arlington, VA, and is open Monday through Friday, excluding legal holidays, from 8:30 am to 4 pm.

The docket initially contained the April 19, 2006 preliminary risk assessment and the related documents. EPA then considered comments on these risk assessments (which are posted to the e-docket) and revised the risk assessments. The revised risk assessments will be posted in the docket at the same time as the RED.

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://www.regulations.gov

These documents include:

- 2-(Thiocyanomethylthio) benzothiazole (TCMTB) Risk Assessment (Phase 3 of 4-Phase Process); Notice of Availability, 4/26/2006

Preliminary Risk Assessment and Supporting Science Documents:

- 2-(Thiocyanomethylthio)benzothiazole (TCMTB) Preliminary Risk Assessment for the Reregistration Eligibility Decision (RED) Document, 04/19/2006.
- TCMTB. Acute and Chronic Dietary Exposure Assessments for the Reregistration Eligibility Decision (RED) Document, 02/28/2006. Samuel Ary.
- TCMTB. Summary of Analytical Chemistry and Residue Data for the Reregistration Eligibility Decision (RED) Document, 2/28/2006. Samuel Ary.
- Incident Reports Associated with 2-(Thiocyanomethylthio)benzothiazole (TCMTB), 04/18/2006. Jonathan Chen.
- Environmental Fate Assessment of 2-(Thiocyanomethylthio)benzothiazole (TCMTB) for the Reregistration Eligibility Decision (RED) Document, 03/30/2006. Srinivas Gowda.
- Product Chemistry Science Chapter for 2-(Benzpthiazolylthio)methly thiocyanate, 03/31/2006. Chris Jiang.
- Drinking Water Assessment for the Use of the Fungicide of 2-(Thiocyanomethylthio)benzothiazole (TCMTB) as a Seed Treatment on Cotton, Wheat, Barley, Oats, Rice, Sugar Beets, and Safflower, 07/31/2006. James Lin.
- Aquatic Exposure Assessment for the Use of the Fungicide of 2-(Thiocyanomethylthio)benzothiazole (TCMTB) as a Seed Treatment on Cotton, Wheat, Barley, Oats, Rice, Sugar Beets, and Safflower, 02/16/2006. James Lin
- 2-(Thiocyanomethylthio)benzothiazole (TCMTB)- Report of the Antimicrobials Division Toxicity Endpoint Selection Committee (ADTC), 04/19/2006. Timothy F. McMahon.
- 2-(Thiocyanomethylthio) benzothiazole (TCMTB) Ecological Hazard and Environmental Risk Characterization and Environmental Modeling Chapters for the Reregistration Eligibility Decision (RED) Document (D322613), Edited per Phase I Error Correction

Comments and Revised ESA Language, 04/06/2006. Kathryn Montague.

- TCMTB [2-(Thiocyanomethylthio)benzothiazole]: First Revision of the Occupational and Residential Exposure Assessment for the Reregistration Eligibility Decision Document. 04/06/2006, Charles Smith.
- Toxicology Disciplinary Chapter for the Reregistration Eligibility Decision (RED) Risk Assessment, 04/04/2006. Deborah Smegal.
- Occupational and Residential Exposure Assessment for 2-(Thiocyanomethylthio)benzothiazole TCMTB, 04/18/2006. Siroos Mostaghimi.

Revised Risk Assessment and Supporting Science Documents (RED Supporting Documents):

- 2-(Thiocyanomethylthio) benzothiazole (TCMTB) Risk Assessment for the Reregistration Eligibility Decision (RED) Document, 08/01/2006.
- 2-(Thiocyanomethylthio) benzothiazole (TCMTB) Ecological Hazard and Environmental Risk Assessment Chapter-Revised, 08/01/2006. Kathryn Montague
- TCMTB [2-(Thiocyanomethylthio) benzothiazole]: Second Revision of the Occupational and Residential Exposure Assessment for the Reregistration Eligibility Decision Document, 07/27/2006. Charles Smith

Appendix D. Citations Considered to be Part of the Data Base Supporting the Reregistration Decision (Bibliography)

1. MRID Studies

MRID#	Citation
00004239	Wilbur-Ellis Company (1979) Residue Data Summary. Unpublished study including letter dated Oct 16, 1978 from J.H. Stoner to Dave T. Schulteis, received Feb 6, 1979 under 2935-413; pre-pared in cooperation with Stoner Laboratories; CDL:237334-A
00004241	Wilbur-Ellis Company (1979) Results of Tests on the Amount of Resi- due Remaining, Including a Description of the Analytical Method: Nu-Flow ND. Unpublished study received Feb 6, 1979 under 2935-413; CDL:237335-B.
00046073	Buckman Laboratories, Incorporated (1975) Analytical Procedures and Results of Residue Analyses: Busan 30. Undated method. Unpublished study received Nov 12, 1976 under 7F1885; CDL: 095601-D.
00078556	Buckman Laboratories, Incorporated (1972) Analytical Procedures and Results of Residue Analyses: Busan 30. Includes undated methods entitled: Analyses of 2-(thiocyanomethylthio)benzothiazole in soil; Regulatory method of analysis. Unpublished study re- ceived Mar 26, 1975 under 4F1613; CDL:095525-F.
00112618	Buckman Laboratories, Inc. (1970) Results of Tests on the Amount of Residue Remaining, Including a Description of the Analytical Method: 2-(Thiocyanomethylthio)benzothiazole. Compilation; unpublished study received on unknown date under 0F0954; CDL: 091624-K.
00117874	Buckman Laboratories, Inc. (1967) Study: TCMTB Residues in Selected Grains). (Compilation; unpublished study received Sep 28, 1972 under 2F1264; CDL:091795-A.
00124027	Buckman Laboratories, Inc. (19??) Analysis of Grains for Thioben- zothiazole-Containing Residues. Unpublished study received Oct 20, 1972 under 2F1264; CDL:094858-A.
00136342	Buckman Laboratories, Inc. (19??) Analysis of Grains for Thioben- zothiazole-Containing Residues. Unpublished study received on unknown date under 2F1264; CDL:097967-A.

MRID#	Citation
00138078	Buckman Laboratories, Inc. (1975) Residue Data: Busan 30: Sugar Cane. Unpublished study received Nov 12, 1976 under 7F1885; CDL:097566-B.
00154295	Goad P. T., et al. 1985. Teratogenicity study of TCMTB in rats. HED Doc no. 005769.
165518	Bonner, G. (1986) Evaluation of Other Genotoxic Effects TCMTB (EPA Reg. No.:1448-29): In the Rat Primary Hepatocyte Unscheduled DNA Synthesis Assay: HBC Project No. 20991. Unpublished study prepared by Hazleton Biotechnologies Company. 21 p.
165520	Bonner, G. (1986) Evaluation for Structural Chromosomal Aberration of TCMTB (EPA Reg. No.:1448-29): Clastogenic Evaluation in the in vivo Mouse Micronucleus Assay: HBC Project No. 20996. Unpublished study prepared by Hazleton Biotechnologies Co. 23 p.
009869	Booden, R.M. 1974. Avian Dietary LC50, Mallard Duck, Report #4043620. Unpublished data, conducted by Warf Institute for Buckman Laboratories, Memphis, TN.
091624	Knott, W.B., and G. Woodard. 1968a. Busan 72 – Safety Evaluation on Bobwhite Quail. Unpublished data, conducted by Woodard Research Corp., for Buckman Laboratories, Inc., Memphis, TN.
091624	Knott, W.B., and G. Woodard. 1968b. Busan 72 – Safety Evaluation on Bluegill Sunfish and Rainbow Trout. Unpublished data, conducted by Woodard Research Corp., for Buckman Laboratories, Inc., Memphis, TN
400751-01	Adam, C. P. 1986. TCMTB—A teratology study in rabbits.
400751-02	Adam, C. P. 1986. TCMTB—A teratology study in rabbits.
403636-01	Surprenant, D.C. 1986a. Acute Toxicity of TCMTB to the Sheepshead Minnow, *Cyprinodon variegatus*. Unpublished data, conducted by Springborn Bionomics, Inc., for Buckman Laboratories, Inc., Memphis, TN
403363-02	Surprenant, D.C. 1987. Acute Toxicity of TCMTB to Mysid Shrimp (*Mysidopsis bahia*). Unpublished data, conducted by Springborn Bionomics, Inc., for Buckman Laboratories, Inc., Memphis, TN.

MRID#	Citation
403636-03	Surprenant, D.C. 1986b. Acute Toxicity of TCMTB to Embryo-Larvae of the Quahog Clam (*Mercenaria mercenaria*). Unpublished data, conducted by Springborn Bionomics, Inc., for Buckman Laboratories, Inc., Memphis, TN.
404193-01	Buckman Laboratories, Inc. (1987) Submission of Toxicity Data on TCMTB in support of EPA Reg. No. 1448-29. Transmittal of 1 study.
408848-01	Cameron, B.D. Scott, G. 1987. The Metabolism of 2-(Thiocyanomethylthio)benzothiazole (TCMTB) in the rat. Buckman Laboratories, Inc., Memphis TN. Inveresk Research International Ltd., Scotland
413422-01	Goburdhun, R., and Greenough, R.J. 1989. 2-(Thiocyanomethylthio)benzothiazole (TCMTB): 52-Week dietary toxicity study in dogs.
413861-01	Lawlor, T.; Respess, C. (1990) Mutagenicity Test on TCMTB in the Salmonella/Mammalian-microsome Reverse Mutation Assay (Ames Test) with Confirmatory Assay: Final Report: Lab Project I.D.: 110277-0-401R. Unpublished study prepared by Hazleton Labora- tories America, Inc.32p.
414714-01	Hazelden, K., Pl. and Wilson, J.A. 1988. TCMTB-Two generation reproduction study in rats. HED Doc 010607
415154-01	Hazleton-Institut Francais de Toxicologie (1990) TCMTB Technical Grade: Acute Dermal Median Lethal Dose: Lab Project Number: 410211. 48 p.
415157-01	Saxena, A. (1987) Artificial Sunlight Photodegradation of TCMTB in a Buffered Aqueous Solution: Lab Project Number: HLA 6015-335. Unpublished study prepared by Hazleton Laboratories America, Inc. 86 p.
415297-01	Everett, D. J. et al. 1989. 104-Week dietary toxicity/carcinogenicity study n rats with 52-week interim kill.
415703-01	Everett, D. J. et al. 1989. 104-Week dietary toxicity/carcinogenicity study n rats with 52-week interim kill.
415837-01	Rush, R. (1990) Primary Skin Irritation Study in Rabbits with TCMTB -80 (...): Lab Project Number: 3138.61. Unpublished study pre- pared by Springborn Laboratories, Inc. 20 p.

MRID#	Citation
415838-01	Rush, R. (1990) Acute Oral Toxicity Study in Rats with TCMTB-80 (.. .): Lab Project Number: 3138.59. Unpublished study prepared by Springborn Laboratories, Inc. 63 p.
415956-01	Long, R.D., C.P. Driscoll, K.A. Hoxter, and G.J. Smith. 1990. TCMTB: A Dietary LC50 Study with the Mallard. Unpublished data, conducted by Wildlife International, Ltd., for Buckman Laboratories, Inc., Memphis, TN.
415956-02	Long, R.D., C.P. Driscoll, K.A. Hoxter, and G.J. Smith. 1990. TCMTB: A Dietary LC50 Study with the Northern Bobwhite. Unpublished data, conducted by Wildlife International, Ltd., for Buckman Laboratories, Inc., Memphis, TN.
416120-01	Fues, R.; Conaway, L.; Bowles, D. (1990) Product Chemistry for TCMTB: Product Identity; Manufacturing Process; Discussion of Impurities|. Unpublished study prepared by Buckman Laboratories International, Inc. 55 p.
416120-02	Fues, R.; Conaway, L.; Bowles, D. (1990) Product Chemistry for TCMTB: Preliminary Analysis; Certified Limits; Enforcement Ana- lytical Techniques|: Lab Project Number: 101-01. Unpublished study prepared by Buckman Laboratories International, Inc. 51 p.
416120-03	Bowles, D. (1990) Product Chemistry for TCMTB: (Physical/Chemical Properties). Unpublished study prepared by Buckman Laboratories International, Inc. 89 p.
416558-01	Siglin, J. (1990) 21-Day Dermal Toxicity Study in Rats with TCMTB- 80: Final Report: Lab Project Number: 3138.53. Unpublished stu- dy prepared by Springborn Laboratories, Inc. 274 p.
417809-01	Campbell, S. 1991. TCMTB: An Acute Oral Toxicity Study with the Northern Bobwhite." Unpublished data, conducted by Wildlife International, Ltd., for Buckman Laboratories, Memphis, TN
418042-01	Machado, M. W. 1991a. TCMTB – Acute Toxicity to Bluegill Sunfish (*Lepomis macrochirus*) under Flow-through Conditions. Unpublished data, conducted by Springborn Laboratories, Inc., for Buckman Laboratories, Inc., Memphis, TN.

MRID#	Citation
418181-01	Machado, M. W. 1991b. TCMTB – Acute Toxicity to Rainbow Trout (*Oncorhynchus mykiss*) Under Flow-Through Conditions. Unpublished data, conducted by Springborn Laboratories, Inc., for Buckman Laboratories, Inc., Memphis, TN
418382-01	McNamara, P.C. 1991. TCMTB – Acute Toxicity to Daphnids (*Daphnia magna*) Under Flow- Through Conditions. Unpublished data, conducted by Springborn Laboratories, Inc, for Buckman Laboratories, Inc., Memphis, TN.
420597-01	Watson, C. (1991) Product Chemistry for TCMTB. Unpublished study prepared by Buckman Labs International, Inc. 37 p.
4211653-01	Everett, D. J. et al. 1989. 104-Week dietary toxicity/carcinogenicity study n rats with 52-week interim kill.
422260-01	Collins, M.K. 1992b. 2-Mercaptobenzothiazole (ROKON) – Acute Toxicity to Daphnids (*Daphnia magna*) Under Static Conditions. Unpublished data, conducted by Springborn Laboratories, Inc., for R.T. Vanderbilt Ct., Inc., Norwalk, CT.
422322-01	Collins, M.K. 1992a. 2-Mercaptobenzothiazole (ROKON) – Acute Toxicity to Rainbow Trout (*Oncorhynchus mykiss*) Under Static Conditions. Unpublished data, conducted by Springborn Laboratories, Inc., for R.T. Vanderbilt Ct., Inc., Norwalk, CT
422671-01	Pedersen, C.A., and B.R. Helsten. 1992a. 2-Mercaptobenzothiazole (ROKON): 14-day Acute Oral LD50 Study in Bobwhite Quail. Unpublished data, conducted by Bio-Life Associates, Ltd., for R.T. Vanderbilt Co., Inc., Norwalk, CT.
423245-01	Whetzel, J. (1992) Determination of the Octanol/Water Partition Coefficient of TCMTB: Lab Project Number: 94/91-BUC.24. Un- published study prepared by Twin City Testing Corp. 30 p.
423492-01	Karcher, R.; Siglin, J.; Becci, P. (1986) Delayed Contact Hypersensitivity Study in Guinea Pigs with HPMTS: Lab Project Number: 3138.7. Unpublished study prepared by Springborn Institute for Bioresearch, Inc. 55 p.
423768-01	Raub, M.; Valle, H. (1992) Uptake and Translocation of carbon 14| Busan 30A Used in Seed Treatment: Combustion Analysis Phase: Lab Project Number: 39601. Unpublished study prepared by ABC Labs, Inc. 34 p.

MRID#	Citation
423833-01	Everett, D.J., et al. 1990. 2-(Thiocyanomethylthio)benzothiazole- 104-Week
423861-01	Fathulla, R.N. 1992. Hydrolysis of ^{14}C-TCMTB in Aqueous Buffer Solutions. Unpublished data. Conducted by Hazleton Wisconsin, Inc. for Buckman Laboratories International, Inc.
424074-01	Whetzel, J. (1992) Determination of the Boiling Point of TCMTB: Supp.|: Lab Project Number: 1002-001. Unpublished study prepared by Twin City Testing Corp. 19 p.
424185-01	Blasberg, J.W., S.L. Hicks and L.S. Stuerman. 1992. Uptake, Depuration, and Bioconcentration of ^{14}C-TCMTB by Bluegill Sunfish *Lepomis macrochirus*. Unpublished data. Conducted by ABC Laboratories, Inc. for Buckman Laboratories International, Inc.
424285-01	Pedersen, C.A., and B.R. Helsten. 1992b. 2-Mercaptobenziothiazol (ROKON): 8-Day Acute Dietary LC50 Study in Bobwhite Quail. Unpublished data, conducted by Bio-Life Associates, Ltd., for R.T. Vanderbilt Co., Norwalk, CT.
424932-01	Falb, L. And Stewart, R.C. 1992. Metabolism of [^{14}C]TCMTB in Water and Fish Tissue. Unpublished data. Conducted by ABC Laboratories, Inc. for Buckman Laboratories International, Inc.
425086-01	Fathulla, R.N. 1992. Aerobic Aquatic Metabolism of TCMTB. Unpublished data. Conducted by Hazleton Wisconsin, Inc. for Buckman Laboratories International, Inc.
425929-01	Rhodes, J.E. 1992. Early Life-Stage Toxicity of 2-(Thiocyanomethylthio)benzothiazole (TCMTB) to the Rainbow Trout Under Flow-Through Conditions. Unpublished data, conducted b ABC Laboratories, Inc., for Buckman Laboratories International, Inc., Memphis, TN.
426309-01	Fathulla, R.N. 1993. Artificial Sunlight Photodegradation of ^{14}C-TCMTB in an Aqueous Buffer Solution. Unpublished data. Conducted by Hazleton Wisconsin, Inc. for Buckman Laboratories International, Inc.
426314-01	Fathulla, R.N. 1992. The Adsorption and Desorption of ^{14}C-TCMTB on Representative Agricultural Soils. Unpublished data. Conducted by Hazleton Wisconsin, Inc. for Buckman Laboratories International, Inc.

MRID#	Citation
428154-01	Fathuella, R.N. 1993. Anaerobic Aquatic Metabolism of ^{14}C-TCMTB. Unpublished data. Conducted by Hazleton Wisconsin, Inc. for Buckman Laboratories International, Inc.
43112801	Atkinson, C., et al. 1987. 2-(Thiocyanomethylthio)benzothiazole (TCMTB). 13-Week dietary dose range finding study in rats.
431472-01	Raub, M. (1994) Uptake and Translocation of (carbon 14)-Busan 30A Used in Seed Treatment: Addendum Report: Lab Project Number: 39601A. Unpublished study prepared by ABC Labs., Inc. 13 p.
434376-01	Lowrie, C. 1994. Hydrolysis of (cyano-(^{14}C))-TCMTB in Aqueous Buffer Solution. Unpublished data. Conducted by Hazleton Wisconsin, Inc. for Buckman Laboratories International, Inc.
435322-01	Fathulla, R.N. 1994. Aerobic Soil Metabolism of ^{14}C-TCMTB. Unpublished data. Conducted by Hazleton Wisconsin, Inc. for Buckman Laboratories International, Inc.
441198-02	Duguet J.S. and V. Dartigues. 1988. Evaluating Possibilities of Leaching of Deltamethrin and TCMB (Insecticide and Fungicide for Protecting Wood) by Rain Water or by Soaking in Water. Unpublished data. Conducted by IRG Secretariat, Sweden for AgrEvo Environmental Health.
442009-01	Thompson, S.G., and J.P. Swigert. 1996. TCMTB: A 14-Day Static-Renewal Toxicity Test with Duckweed (*Lemna gibba*). Unpublished data, conducted by Wildlife International, Ltd., for Buckman Laboratories International, Inc., Memphis, TN.
445013-01	Singer, G. (1998) Nature of the Residue from (carbon 14)-TCMTB in/on Tomatoes after Soil-Drench Applications: Final Report: Lab Project Number: AA960317: XBL96101. Unpublished study prepared by American Agricultural Services, Inc. and XenoBiotic Labs. 26 p.
445013-02	Singer, G. (1998) Nature of the Residue from (carbon 14)-TCMTB in/on Melons after Soil-Drench Applications: Final Report: Lab Project Number: AA960318: XBL96101. Unpublished study prepared by American Agricultural Services, Inc. and XenoBiotic Labs. 26 p.

MRID#	Citation
446541-01	Singer, G. (1998) Nature of the Residue from (carbon-14)-TCMTB in/on Melons after Soil-Drench Applications: Final Report: Lab Project Number: AA960318: XBL96101: AA960318.NC. Unpublished study prepared by American Agricultural Services, Inc. and XenoBiotic Laboratories. 268 p.
446541-02	Singer, G. (1998) Nature of the Residue from (carbon-14)-TCMTB in/on Tomatoes after Soil-Drench Applications: Final Report: Lab Project Number: XBL96101: AA960317. Unpublished study prepared by American Agricultural Services, Inc. and XenoBiotic Laboratories. 257 p.
455243-04	Bestari KT, Macey K, Soloman KR, Tower N. 1999. Measurement and Assessment of Dermal and Inhalation Exposures to Didecyl Dimethyl Ammonium Chloride (DDAC) Used in the Protection of Cut Lumber (Phase III).
467052-01	Blasberg, J.W., S.L. Hicks and L.S. Stuerman. 1992. Uptake, Depuration, and Bioconcentration of ^{14}C-TCMTB by Bluegill Sunfish *Lepomis macrochirus*. Unpublished data. Conducted by ABC Laboratories, Inc. for Buckman Laboratories International, Inc. Supplemental Information in Response to Chris Jiang's DERs for Bioaccumulation Study of TCMTB MRID Nos. 424185-01 & 424932-01.
467110-01	Byrne, A. and D.R. Minchin. (1989) Leaching of TCMTB from Packaged Lumber. Prepared for Buckman Laboratories of Canada by Forintex Canada Corporation, Western Region, 6620 N.W. Marine Drive, Vancouver, B.C. V6T 1X2. Contract No. 17-86-K-409.
467111-01	Beck, Maureen; Hartmann, FE; May, JH; Reid, TC. 1996. Leachability Study…. (leaching of TCMTB from wood blocks). Buckman Laboratories, Inc., Memphis, TN. Control no. 452779.dietary carcinogenicity study in mice. HED Doc. 010332.
92179008	Goburdhun, R., and Greenough, R.J. 1989. 2-(Thiocyanomethylthio)benzothiazole (TCMTB): 52-Week dietary toxicity study in dogs.
92179009	Goad P. T., et al. 1985. Teratogenicity study of TCMTB in rats. HED Doc no. 005769.
92179011	Adam, C. P. 1986. TCMTB—A teratology study in rabbits.

MRID# **Citation**

92179011 Hazelden, K., Pl. and Wilson, J.A. 1988. TCMTB-Two generation reproduction study in rats. HED Doc 010607

92179026 Rao, G., No. 1980. 90-Day subchronic oral toxicity study of TCMTB in rats

2. Open Literature

Chew, G.L., G.M. Kruzynski, and I.K. Birtwell. *Behavioral assessment of exposure of juvenile Chinook salmon (Oncorhynchus tshawtscha) to sublethal doses of a toxicant.* In Proceedings of the Seventeenth Annual Aquatic Toxicity Workshop, Nov. 5-7, 1990, Vancouver, BC, Vol. 1. (edited by P. Chapman, F. Bishay, E. Power, K. Hall, L. Harding, D. Mcleay, M. Nassichuk and W. Knapp). Canadian Technical report of Fisheries and Aquatic Sciences, No. 1774 (vol 1).

Freeman, N , Jimenez M, Reed KJ,Gurunathan S, Edwards RD, Roy A, Adgate JL, Pellizzari ED, Quackenboss J, Sexton K, Lioy PJ, 2001. Quantitative analysis of chilren's microactivity patterns: The Minnesota Children's Pesticide Exposure Study. Journal of Exposure Analysis and Environmental Epidemiology. 11(6): 501-509.

HERA, 2005. Human and Environmental Risk Assessment, Guidance Document Methodology, February 2005 (http://www.heraproject.com).
The Multi-Chamber Concentration and Exposure Model (MCCEM) Model Version 1.2. Prepared for the US EPA Office of Pollution Prevention and Toxics. Prepared by Versar, Inc. and Wilkes Technologies, LLC.

Karickhoff SW, DS Brown, TA Scott, 1979. *Sorption of Hydrophobic Pollutants on Natural Sediments.* Water Resources. 13:241-248.

Krahn P and Strub R, 1990. *Standard Leaching Test for Antisapstain Chemicals: Regional Program Report 90-10*. Environment Canada, Conservation and Protection, Pacific and Yukon Region North Vancouver, BC.

Kruzynski, G.M., and I.K. Birtwell. 1990. *Some Respiratory Responses of Juvenile Pacific Salmon to the Antisapstain Chemical TCMTB*. Proceedings of the Seventeenth Annual Aquatic Toxicity Workshop, Nov. 5-7, 1990, Vancouver, BC, Vol. 1**.** (edited by P. Chapman, F. Bishay, E. Power, K. Hall, L. Harding, D. Mcleay, M. Nassichuk and W. Knapp). Canadian Technical report of Fisheries and Aquatic Sciences, No. 1774 (vol 1).

Kruzynski, G.M., I.K. Birtwell, G.L. Chew, G.E. Piercey,and S. Spohn. 1990. An approach to testing for ecological relevance using behavioral toxicology. Proceedings of the Seventeenth Annual Aquatic Toxicity Workshop, Nov. 5-7, 1990, Vancouver, BC, Vol. 1. (edited by P. Chapman, F. Bishay, E. Power, K. Hall, L. Harding, D. Mcleay, M.

Nassichuk and W. Knapp). Canadian Technical report of Fisheries and Aquatic Sciences, No. 1774 (vol 1).

Manninen, A., Auriola S, Vartiainen M., Leisivuori J., Turunen, T., Pasanen M. 1996. Determination of urinary 2-mercaptobenzothiazole (2-MBT), the main metabolite of 2-(thiocyanomethylthio)benzothiazole (TCMTB) in humans and rats.

Mineau, P., B.T. Collins, and A. Baril. 1996. On the Use of Scaling Factors to Improve Interspecies Extrapolation of Acute Toxicity in Birds. Regul Toxicol Pharmacol 24; 24-29.

USDA's Continuing Surveys of Food Intakes by Individuals (CSFII), 1994-1996 and 1998.

3. Website References

Aschacher G and Gruendlinger R, 2000. Methods to evaluate the ecotoxicological risks of anti-sapstain preservatives. Holzforschung, Austria Research and Development. www.holzforschung.at/english/img_eng/ascha200.pdf

Addinsoft, 2004. XLSTAT v7.5. http://www.xlstat.com

Do It Yourself, 2005. What You Need to Know When Carpet Shopping. http://doityourself.com/carpet/carpetshopping.htm. (September 2005).

FIRST (version 1.0; Aug. 1, 2001) Screening Model. http://www.epa.gov/oppefed1/models/water/

Terrestrial Residue Exposure Model (TREX). (http://www.epa.gov/oppefed1/models/terrestrial).

Tier 1 models: GENEEC (version 2.0; Aug. 1, 2001) and SCI-GROW (version 2.3; Nov. 4, 2003) screening models. http://www.epa.gov/oppefed1/models/water/.

USEPA. 2000. Information on Assessing Exposure from Pesticides, "A User's Guide." http://www.epa.gov/fedrgstr/EPA-PEST/2000/July/Day-12/6061.pdf

USEPA. 2004. PBT Profiler: Assessing Chemicals in the Absence of Data, v1.203. http://www.pbtprofiler.net/default.asp. (January 2006).

4. Internal Documents and Models

USEPA. 1979. TN 2432. Biological Report of Analysis, 90+ TCMTB, sample MB618. Unpublished data, performed by US EPA Terrestrial and Aquatic Biology Laboratory.

USEPA. 1979. TN 2427. Biological Report of Analysis, 90+ TCMTB, sample MB618.

Unpublished data, performed by US EPA Terrestrial and Aquatic Biology Laboratory.

USEPA. 1980. TN 2437. Biological Report of Analysis, 90+ TCMTB, sample MB618. Unpublished data, performed by US EPA Terrestrial and Aquatic Biology Laboratory.

USEPA. 1997. Exposure Factors Handbook. Volume I-II. Office of Research and Development. Washington, D.C. EPA/600/P-95/002Fa. August 1997.

USEPA. 1998. PHED Surrogate Exposure Guide. Estimates of Worker Exposure from the Pesticide Handler Exposure Database Version 1.1. Washington, DC: U.S. Environmental Protection Agency.

USEPA. 1999. Evaluation of Chemical Manufacturers Association Antimicrobial Exposure Assessment Study (Amended on 8 December 1992). Memorandum from Siroos Mostaghimi, PH.D., USEPA to Julie Fairfax, USEPA. Dated November, 4 1999. DP Barcode D247642.

USEPA. 2000. Residential SOPs. EPA Office of Pesticide Programs Human Health Effects Division. Dated April 5, 2000.

USEPA. 2000. Information on Assessing Exposure from Pesticides, "A User's Guide." http://www.epa.gov/fedrgstr/EPA-PEST/2000/July/Day-12/6061.pdf

USEPA. 2001. HED Science Advisory Council for Exposure. Policy Update, November 12. Recommended Revisions to the Standard Operating Procedures (SOPs) for Residential Exposure Assessment, February 22, 2001.

USEPA, March 2, 2004. Health Effects Division Science Advisory Committee on Exposure (HED ExpoSAC) SOP #15: "Amount of Seed Treated or Planted per Day."

USEPA. 2004. WLM recommendation regarding chemical generalization. Memorandum to Siroos Mostaghimi, from Lee R. December 15, 2004.

USEPA. 2004. Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs U.S. Environmental Protection Agency - Endangered and Threatened Species Effects Determinations, January 23, 2004.

USEPA, 2004. Wood Leaching Model: Chemical Concentration Screening Tool, v1.0. USEPA/OPPT/AD, developed by Versar, Inc.

USEPA. 2004. PBT Profiler: Assessing Chemicals in the Absence of Data, v1.203. http://www.pbtprofiler.net/default.asp. (January 2006).

USEPA. 2006. 2-(thiocyanomethylethylthio) benzothaizole (TCMTB)- report of the

Antimicrobials Division Toxicity Endpoint Selection Committee (ADTC). Memorandum from Timothy McMahon to Deborah Smegal. April 4, 2006.

USEPA. 2006. Office of Pesticide Programs internal memorandum, "Aquatic Exposure Assessment for the Use of the Fungicide of 2-(Thiocyanomethylthio)benzothiazole (TCMTB) as a Seed Treatment on Cotton, Wheat, Barley, Oats, Rice, Sugar Beets, and Safflower," February 16, 2006.

USEPA. 1/11/2006. Deschamp, P,"Report of the RARC."

Dietary Exposure Evaluation Model Software with the Food Commodity Intake Database (DEEM-FCID™, Version 2.03).

FDA Center for Food Safety & Applied Nutrition's (CFSAN), 4/2002. "Preparation of Food Contact Notifications and Food Additive Petitions for Food Contact Substances: Chemistry Recommendations."

FIRST (version 1.0; Aug. 1, 2001) Screening Model. http://www.epa.gov/oppefed1/models/water/ .

Terrestrial Residue Exposure Model (TREX) (http://www.epa.gov/oppefed1/models/terrestrial).

Tier 1 models: GENEEC (version 2.0; Aug. 1, 2001) and SCI-GROW (version 2.3; Nov. 4, 2003) screening models. http://www.epa.gov/oppefed1/models/water/.

Appendix E. Generic Data Call-In

The Agency intends to issue a Generic Data Call-In at a later date. See Chapter V of the TCMTB RED for a list of studies that the Agency plans to require.

Appendix F. Product Specific Data Call-In

The Agency intends to issue a Product Specific Data Call-In at a later date.

Appendix G. Batching of TCMTB Products for Meeting Acute Toxicity Data Requirements for Reregistration

The Agency will complete the batching for TCMTB at a later date.

Appendix H. List of All Registrants Sent the Data Call-In

A list of registrants sent the data call-in will be posted at a later date.

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/.

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.

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

8570-1	Application for Pesticide Registration/Amendment	http://www.epa.gov/opprd001/forms/8570-1.pdf
8570-4	Confidential Statement of Formula	http://www.epa.gov/opprd001/forms/8570-4.pdf
8570-5	Notice of Supplemental Registration of Distribution of a Registered Pesticide Product	http://www.epa.gov/opprd001/forms/8570-5.pdf
8570-17	Application for an Experimental Use Permit	http://www.epa.gov/opprd001/forms/8570-17.pdf
8570-25	Application for/Notification of State Registration of a Pesticide To Meet a Special Local Need	http://www.epa.gov/opprd001/forms/8570-25.pdf
8570-27	Formulator's Exemption Statement	http://www.epa.gov/opprd001/forms/8570-27.pdf
8570-28	Certification of Compliance with Data Gap Procedures	http://www.epa.gov/opprd001/forms/8570-28.pdf
8570-30	Pesticide Registration Maintenance Fee Filing	http://www.epa.gov/opprd001/forms/8570-30.pdf
8570-32	Certification of Attempt to Enter into an Agreement with other Registrants for Development of Data	http://www.epa.gov/opprd001/forms/8570-32.pdf
8570-34	Certification with Respect to Citations of Data (in PR Notice 98-5)	http://www.epa.gov/opppmsd1/PR_Notices/pr98-5.pdf
8570-35	Data Matrix (in PR Notice 98-5)	http://www.epa.gov/opppmsd1/PR_Notices/pr98-5.pdf
8570-36	Summary of the Physical/Chemical Properties (in PR Notice 98-1)	http://www.epa.gov/opppmsd1/PR_Notices/pr98-1.pdf
8570-37	Self-Certification Statement for the Physical/Chemical Properties (in PR Notice 98-1)	http://www.epa.gov/opppmsd1/PR_Notices/pr98-1.pdf

Pesticide Registration Kit
www.epa.gov/pesticides/registrationkit/.

Dear Registrant:

For your convenience, we have assembled an online registration kit that 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.

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

   b. Biopesticides and Pollution Prevention Division (BPPD) Contacts

   c. 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.

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.