Reregistration Eligibility Decision (RED) for Benzisothiazoline-3-one

September 29, 2005

United States
Environmental Protection
Agency

Office of Prevention, Pesticides
and Toxic Substances
(7510C)

739-R-05-007
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Reregistration Eligibility Decision for 1,2-Benzisothiazolin-3-one (BIT)

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 1,2-benzisothiazolin-3-one (hereafter referred to as BIT). The enclosed Reregistration Eligibility Decision (RED) document was approved on September 29, 2005. 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 BIT 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 BIT are available to the public in EPA's Pesticide Docket **OPP-2005-0200** at: http://www.epa.gov/edocket.

The BIT RED was developed through EPA's public participation process, published in the Federal Register on July 20, 2005, which provides opportunities for public involvement in the Agency's pesticide tolerance reassessment and reregistration programs. Developed with input from EPA's advisory committees and others, the public participation process encourages robust public involvement starting early and continuing throughout the pesticide risk assessment and risk mitigation decision making process. The public participation process encompasses full, modified, and streamlined versions that enable the Agency to tailor the level of review to the level of refinement of the risk assessments, as well as to the amount of use, risk, public concern, and complexity associated with each pesticide. Using the public participation process, EPA is attaining its strong commitment to both involve the public and meet statutory deadlines.

Please note that the BIT 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 BIT 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 BIT will be eligible for reregistration provided that all the conditions identified in this document are satisfied, including implementation of the risk mitigation measures outlined in Section IV of the document. Sections IV and V of this RED document describe labeling amendments for end-use products and data requirements necessary to implement these mitigation measures. Instructions for registrants on submitting the revised labeling can be found in the set of instructions for product-specific data that accompanies this document.

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

If you have questions on this document or the label changes necessary for reregistration, please contact the Chemical Review Manager, Rebecca M. Miller, at (703) 305-0012.

Sincerely,

Frank T. Sanders
Director, Antimicrobials Division

REREGISTRATION ELIGIBILITY
DECISION
for
1,2-Benzisothiazolin-3-one (BIT)
List C
CASE 3026

Approved By:

Frank T. Sanders
Director, Antimicrobials Division

Attachment

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GLOSSARY OF TERMS AND ABBREVIATIONS

a.i.	Active Ingredient
aPAD	Acute Population Adjusted Dose
APHIS	Animal and Plant Health Inspection Service
ARTF	Agricultural Re-entry Task Force
BCF	Bioconcentration Factor
CDC	Centers for Disease Control
CDPR	California Department of Pesticide Regulation
CFR	Code of Federal Regulations
ChEI	Cholinesterase Inhibition
CMBS	Carbamate Market Basket Survey
cPAD	Chronic Population Adjusted Dose
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	Protections 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

EXECUTIVE SUMMARY

The Environmental Protection Agency (hereafter referred to as EPA or the Agency) has completed its review of public comments on the human health and environmental risk assessments for 1,2-benzisothiazolin-3-one (hereafter referred to as BIT) and is issuing its risk management decision. The Agency has decided BIT is eligible for reregistration provided all measures outlined in this document are implemented. BIT is an antimicrobial that is used as an industrial preservative for the protection of water-based adhesives, caulks, sealants, grouts, spackling, ready-mixed cements, ready-mixed wallboard compounds, aqueous compositions such as emulsion paints, aqueous slurries, home cleaning and car care products, laundry detergents, fabric softeners, stain removers, inks, photographic processing solutions, paints and stains, titanium dioxide slurries, oil in water emulsions, latices, metalworking fluids, casein/rosin dispersions, textile spin-finish solutions, pesticide formulations, tape joint compound, leather processing solutions, preservation of fresh animal hides and skins, and for offshore and terrestrial gas/oil drilling muds and packer fluids preservation. 1,2-Benzisothiazolin-3-one is also used as an inert ingredient in a variety of products as a materials preservative. Exposures and risks from the use of products containing 1,2-benzisothiazolin-3-one as both the active and inert ingredients are assessed in this reregistration eligibility decision (RED). End-use products are formulated as either a soluble, ready-to-use, or flowable concentrates (all of which are considered to be liquids).

Overall Risk Summary

The Agency's human health risk assessment indicates few risks of concern. Acute and chronic dietary exposure is below the agency's level of concern for general U.S. populations and all population subgroups. Likewise, it was concluded that risk from exposure of BIT in drinking water would also not represent a risk of concern because it is not likely to be in drinking water sources at substantial concentrations. This is based on the fact that BIT readily biodegrades, is applied to crops via inert use in small amounts and is only likely to come into contact with soil/surface water via paint uses in small amounts. The acute and chronic aggregate dietary risk assessment estimates associated with the use of BIT as an inert or active ingredient are below the Agency's level of concern.

Short and intermediate term residential post-application and handler exposures (dermal, inhalation or incidental oral) from hard surface residues did not exceed the Agency's level of concern. For residential exposure and risk, the toddler post-application dermal exposure scenario from residues remaining on pets from the inert use, the margin of exposure (MOE) is below the targeted MOE, indicating that this scenario is a risk of concern.

For aggregate exposure, the risk estimates associated with BIT are below the Agency's level of concern. In cases where an aggregate risk index (ARI) was used to assess risk because of the different uncertainty factors for oral, dermal and inhalation exposure scenarios, the risk indices suggested that there is reasonable certainty of no harm from using products containing BIT. Based on the information provided, inhalation exposures were not considered to be of concern with regard to inhalation risk from occupational handler scenarios; however the dermal MOE indicated that the dermal risk for occupational handlers was below the target MOE for one

scenario, handlers of BIT-containing paint using an airless sprayer. While the inhalation risk may be an underestimation based on extrapolation from an oral study, the dermal risk is based on a number of conservative assumptions and are not of concern. Dermal and inhalation exposures to bystanders from the occupational use of BIT are also expected to be minimal.

The indoor uses of BIT make it unlikely that any appreciable exposure to terrestrial or aquatic organisms would occur. Facilities using BIT for indoor industrial applications are required to have NPDES permits before discharging effluents into receiving waters.

1,2-Benzisothiazolin-3-one's ready biodegradation in soil and small application amount greatly reduce the exposure potential for terrestrial and aquatic organisms. Run-off into surface water from pesticidal uses is likely to be low and it is not likely to be present in water sources at substantial concentrations. The ecological risks from the use of BIT suggest that because of the high toxicity of BIT to green algae and invertebrate species, adverse effects to the environment could result from contamination from BIT-treated oil recovery fluids.

Dietary Risk

The Agency has conducted a dietary exposure and risk assessment for use of 1,2-benzisothiazolin-3-one as a pulp and paper mill slimicide, and a preservative in paper coatings and paper adhesives, all of which may end in indirect food contact scenarios. For both the acute and chronic dietary exposure, the risk is highest for children (21.8% of the acute and chronic PAD). For an adult, the acute and chronic dietary exposure is 9.4% of the acute and chronic PAD. All dietary exposures calculated are below the Agency's level of concern (100% of aPAD or cPAD) for non-cancer risk. Furthermore, given the conservative nature of the assumptions used in the inert dietary exposure and risk assessment, risks of concern from food are not likely from the use of 1,2-benzisothiazolin-3-one as inert ingredients in pesticide products. A dietary cancer risk assessment could not be performed as there are no carcinogenicity data for 1,2-benzisothiazolin-3-one.

Drinking Water Risk

Based on environmental fate data, 1,2-benzisothiazolin-3-one binds moderately with soil and may potentially move with the soil during rainfall events and reach surface waters. Although, 1,2-benzisothiazolin-3-one has been shown to be hydrolytically stable with a half life of > 30 days, it breaks down fairly quickly in aerobic soils. Outdoor use patterns of 1,2-benzisothiazolin-3-one which may lead to contact with soil and/or surface water include: 1) the application of agricultural pesticides that contain 1,2-benzisothiazolin-3-one as an inert ingredient, and 2) the application of paints that contain 1,2-benzisothiazolin-3-one. Considering 1,2-benzisothiazolin-3-one readily biodegrades and the small amount (0.02 lbs. per acre) that may be applied to crops via the inert use and the small amount likely to come into contact with soils/surface waters via the paint use, 1,2-benzisothiazolin-3-one is not likely to be present in drinking water sources at substantial concentrations.

Residential Risk

To address residential exposure dermal, inhalation and incidental oral risks were assessed for the active and inert ingredient uses of BIT. The residential handler scenarios evaluated are considered to be representative of all possible exposure scenarios. None of the residential handler exposure scenarios or post-application exposure scenarios exceeded the Agency's level of concern.

For the inert uses of BIT, none of the residential handler exposure scenarios exceeded the Agency's level of concern. Although most of the post-application exposures did not exceed the Agency's level of concern, the toddler post-application dermal exposure scenario to residues remaining on pets resulted in a MOE of 33 which is lower than the target MOE of 100 resulting in risks of concern.

Aggregate Risk

The acute and chronic aggregate risk assessments generally include only dietary and drinking water exposures. Since drinking water exposure is not expected from any of the indoor or outdoor uses of 1,2-benzisothiazolin-3-one used as either an inert or active ingredient, the acute and chronic aggregate assessments only included dietary exposures from the active indirect food uses (i.e., use in food-contact packaging) and inert dietary exposures from agricultural pesticide uses. The acute and chronic aggregate risk estimates associated with 1,2-benzisothiazolin-3-one are well below the Agency's level of concern where, the adult's risks were 17.1% of the aPAD and 12.2% of the cPAD, and the children's risks were 44.1% of the aPAD and 31.8% of the cPAD.

The short- and intermediate-term aggregate assessments were conducted for adults and children. Since the toxicity endpoints for all of the routes of exposure (oral, dermal and inhalation) are based on the same study and same toxic effect, all routes are aggregated together. However, the aggregate risk index (ARI) method was utilized in the assessment. This method was used because the oral, dermal and inhalation endpoints have different uncertainty factors that need to be applied. For 1,2-benzisothiazolin-3-one, all endpoints for exposure were derived from a subchronic oral study in dogs however, the uncertainty factors (i.e., target MOEs) for oral, dermal and inhalation routes are 300, 100 and 100, respectively. A risk index 1 indicates no risk of concern. The short-term ARIs for adults and children were 6.8 and 1.9, respectively, while the intermediate-term ARIs for adults and children were 7.5 and 1.9, respectively. Therefore, short- and intermediate-term aggregate calculated risks are below the Agency's level of concern. Please note that the inert use in pet products is considered to result in intermittent exposures and, as such, were not included in the aggregate assessment.

Occupational Risk

To address occupational exposure, short-term inhalation, and intermediate-term combined dermal and inhalation risks were assessed. The inhalation exposures are not of concern for the any of the handler scenarios assessed (i.e., MOEs 1,000). However, for handlers using BIT-treated paint via an airless sprayer, the dermal MOE of 90 indicates a risk of concern (i.e., MOEs < 100).

Postapplication exposures may occur in industrial settings around the water systems via inhalation, and dermal exposures may occur while maintaining industrial equipment. However, occupational post-application dermal and inhalation exposures to 1,2-benzisothiazolin-3-one are likely to be minimal when compared to handler exposure because of dilution during processing or when compared to machinists using the metal working fluid. Inhalation exposures are expected to be minimal because aerosol generation is not expected and the vapor pressure of 1,2-benzisothiazolin-3-one is low.

Ecological Risk

Based on acute toxicity information, 1,2-benzisothiazolin-3-one displays low to moderate toxicity to birds and mammals. It is moderately toxic to freshwater fish and invertebrates, slightly toxic to marine/estuarine fish, and highly toxic to marine/estuarine invertebrates.

The indoor uses of BIT considered in this RED make it unlikely that any appreciable exposure to terrestrial or aquatic organisms would occur. Facilities using BIT for indoor industrial applications are required to have NPDES permits before discharging effluents into receiving waters. The potential exposure to terrestrial and aquatic species from the oil recovery uses of BIT cannot be estimated at this time, as there is currently no validated model available for such a purpose. The high toxicity of BIT to green algae and invertebrate species suggests that potential adverse acute effects could occur to some species if environmental contamination from BIT-treated oil recovery fluids occurs.

1,2-Benzisothiazolin-3-one is used as an inert ingredient in pesticide products but the allowable amount that can be applied is small (not more than 0.1% formulation and 0.02 lbs. per acre). Data indicate that 1,2-benzisothiazolin-3-one breaks down quickly in aerobic soils (half-life < 24 hours in sandy loam soil). 1,2-Benzisothiazolin-3-one's ready biodegradation in soil and small application amount greatly reduce the exposure potential for terrestrial and aquatic organisms. Run-off into surface water from pesticidal uses is likely to be low and it is not likely to be present in water sources at substantial concentrations. Therefore, risk to nontarget organisms is not anticipated from the inert uses of 1,2-benzisothiazolin-3-one.

Listed Species

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 1,2-benzisothiazolin-3-one fall into this category.

The inert uses of 1,2-benzisothiazolin-3-one are also considered to fall under a "no effect" determination, for the following reasons:

1. The allowable amount that can be applied is small (not more than 0.1% formulation and 0.02 lbs. per acre).
2. Data indicate that 1,2-benzisothiazolin-3-one breaks down quickly in aerobic soils (half-life < 24 hours in sandy loam soil).
3. 1,2-Benzisothiazolin-3-one s ready biodegradation in soil and small application result in minimal to no terrestrial or aquatic organism exposure.

Regulatory Decision

The Agency has completed its review and has determined that the data are sufficient to support reregistration of all supported products containing BIT. The Agency is issuing this RED for BIT, as announced in a Notice of Availability published in the *Federal Register*.

Summary of Mitigation Measures

The Agency has determined that BIT is eligible for reregistration provided the mitigation measures described in this document are implemented.

Residential Risk

The Agency has concluded that to have an acceptable MOE for toddler dermal post-application dermal scenarios, the maximum percent BIT as an inert in flea and tick pet products is 0.033%. The Agency target MOE for this exposure scenario is 100, while the Agency calculated toddler dermal post-application MOE is 33; a value that indicates a risk of concern. All pet products containing BIT as an inert ingredient must contain a maximum of 0.033% BIT in order mitigate the current risk that the flea and tick pet products pose.

Data Requirements

Additional confirmatory data is required to complete the reregistration of BIT. A complete list of data gaps is presented Section V and Appendix B (Table of Generic Data Requirements). In addition, product-specific data is required for all products containing BIT as described in Section V of 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 1,2-benzisothiazolin-3-one (BIT).

BIT is an antimicrobial that is used as an industrial preservative for the protection of water-based adhesives, caulks, sealants, grouts, spackling, ready-mixed cements, ready-mixed wallboard compounds, aqueous compositions such as emulsion paints, aqueous slurries, home cleaning and car care products, laundry detergents, fabric softeners, stain removers, inks, photographic processing solutions, paints and stains, titanium dioxide slurries, oil in water emulsions, latices, metalworking fluids, casein/rosin dispersions, textile spin-finish solutions, pesticide formulations, tape joint compound, leather processing solutions, preservation of fresh animal hides and skins, and for offshore and terrestrial gas/oil drilling muds and packer fluids preservation. The specific antimicrobial use categories include the following general use patterns: material preservatives (indoor food and indoor/outdoor non-food), industrial processes and water systems (indoor nonfood), and indoor and outdoor residential uses. 1,2-Benzisothiazolin-3-one is also used as an inert ingredient in a variety of products as a materials preservative. Exposures and risks from the use of products containing 1,2-benzisothiazolin-3-one as both the active and inert ingredients were assessed.

The Agency has concluded that the FQPA Safety Factor for 1,2-benzisothiazolin-3-one should be removed (equivalent to 1X) based on (1) the lack of evidence of increased susceptibility in the 2-generation reproduction toxicity study and the available developmental toxicity data; and (2) the risk assessment does not underestimate the potential risk for infants and children.

Risks summarized in this document are those that result only from the use of the active ingredient 1,2-benzisothiazolin-3-one. 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 1,2-benzisothiazolin-3-one and any other substances. 1,2-benzisothiazolin-3-one does not appear to produce a toxic metabolite produced by other substances. For the purposes of this action, therefore, EPA has not assumed that 1,2-benzisothiazolin-3-one 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 BIT. In an effort to simplify the RED, the information presented herein is summarized from more detailed information that can be found in the technical supporting documents for BIT 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.epa.gov/edocket.

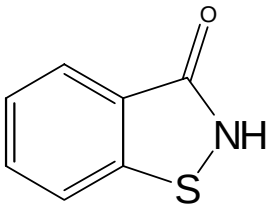
This document consists of six sections. Section I is the introduction. Section II provides a chemical overview, a profile of the use and usage of BIT, and its regulatory history. Section III, Summary of BIT Risk Assessment, gives an overview of the human health and environmental assessments, based on 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

There are 43 active products containing 1,2-benzisothiazolin-3-one as an active ingredient, 3 of which are technical products, registered under Section 3 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). There are hundreds of products that have inert uses for 1,2-benzisothiazolin-3-one. The first product containing 1,2-benzisothiazolin-3-one was registered on April 4, 1973.

B. Chemical Identification - Technical BIT



Common name: BIT

Chemical name: 1,2-Benzisothiazolin-3-one

Chemical Family: Isothiazolines

Empirical formula: C_7H_5NOS

CAS Registry No.: 2634-33-5

Case number: 3026

OPP Chemical Code: 098901

Molecular weight: 151.9

Trade name(s): IPX, Proxan, Proxel, Nipacide BIT, Mergal BIT

Basic manufacturer: PromChem, Arch Chemicals, ISP, Clariant Corp., and Troy Corp.

Technical BIT is in the form of a solid paste and is off-white to brown in color. BIT has a melting point of 159.5-160^{o}C. Three separate water solubilities were provided by different registrants: 1118 ppm at 20^{o}C, 1380 ppm at 24^{o}C, EPA database (EPI Suite) lists the solubility of

2.1 g/L at 25 ^{o} C. BIT has a vapor pressure of 4.4 x 10^{-7}mm Hg at 20^{o}C, 9.8 x 10^{-7}mm Hg at 25^{o}C, and 2.78 x 10^{-6} mm Hg at 25^{o}C

C. Use Profile

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

Type of Pesticide: Fungicide/Fungistat
Bacteriostat
Microbicide/Microbistat
Disinfectant (Bacteriocide/Germicide)

Summary of Use:

Food: BIT is used as an inert ingredient on many crops including Caneberries, Blackberries, Blueberries, Cranberries, Strawberries, Citrus, Almond, Apples, Pears, Apricots, Cherries, Nectarines, Peaches, Plums, Prunes, Cantaloupes, Casaba Melons, Crenshaw Melons, Honeydew Melons, Muskmelons, Watermelons, Tomatoes, Broccoli, Brussel Sprouts, Cabbage, Cauliflower, Collards, Kale, Endive, Spinach, Lettuce, Carrots, Onions, Radishes, Rutabagas, Guar, Ginseng, Beets, and Mustard.

Non-Food: BIT is also used as an inert ingredient on Conifer Plantings, Ornamental Flowering Plants, Ornamental Lawns, Ornamental Woody Shrubs, Roses, English Ivy, Ornamental Trees, Weeping Fig, Elm, Oak, Palm, Arizona Cypress, and Irish Moss.

Residential: BIT is used as an active ingredient for Nonagricultural Buildings, Perimeter Soil Treatment, Domestic Dwellings (Outdoor), and Hard Nonporous Surfaces.

Industrial: BIT is used as an active ingredient for Pulp and Paper Mill Systems, Secondary Oil Recovery Injection Water, and Heat Exchanger Water.

Materials Preservatives:
BIT is used as an active ingredient for Adhesives, Preservative Incorporation, Adhesives (Gums, Joint Cements, Latex, Tape Muds, Protein based, Starch based, Synthetic), Caulking Compounds, Grouts, Starch, Wallboard Joint Compounds, Mastics, Sealants, Coatings (Aqueous, Lacquer, Rosin, Wood, Protein and Starch based), Films, Coatings (Paper, Paper Products and Paperboard), Hides and Leather Products, Leather Processing Liquors (Preservative Incorporation), Metalworking Cutting Fluids (Preservative Incorporation), Oil Recovery Drill Muds and Packer Fluids (Preservative Incorporation), Paints (Acrylic, Emulsion and Latex), Synthetic Polymers, Latex and Latex Emulsions, Resin Emulsions, Cleansers, Photographic Solution, Polishes, Soap, Wax, Inks, Liquid Detergents, Dyes, Powdered Detergents, Floor Wax, Fabric Softeners, Tarnish Agents, Air Fresheners, Carpet Shampoos, Canvas, Cordage, rope, twine, Fabrics, Casein,

Clay Slurries, Starch Solutions, Printing Pastes, Stains (preservative incorporation), Water Based Paints, and Concrete Mixtures.

Target Pests: Staphylococcus aureus, pseudomonas aeruginosa, rhizopus stolonifer, aspergillus pencilloides, aspergillus niger, alternaria radicina, tricophyton mentagrophytes, salmonella typhosa, klebsiella pneumoniae, bacillus subtilis, bacillus megaterium, eschericha coli, proteus vulagris.

Formulation Types: Granular powder, flowable concentrate, soluble concentrate, ready to use solution.

Method and Rates of Application:

All products containing BIT as an active ingredient, including ready-to-use solutions, are used in manufacturing processes only. For laundry detergents, household cleaning products, and car care products, 0.10% to 0.30% of BIT is added by weight. When used as a materials preservative, 0.05% to 1% of BIT is added by weight. Please refer to Appendix A for more detailed application rates.

III. Summary of BIT 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 BIT. While the risk assessments and related addenda are not included in this document, they are available from the OPP Public Docket and may also be accessed on the Agency's website at http://epa.gov/docket. Hard copies of these documents may be found in the OPP public docket under docket number OPP-2004-0200. The OPP public docket is located in Room 119, Crystal Mall II, 1801 Bell Street, Arlington, VA, and is open Monday through Friday, excluding Federal holidays, from 8:30 a.m. to 4:00 p.m.

A. Human Health Risk Assessment

1. Toxicity of BIT

A brief overview of the toxicity studies used for determining endpoints in the human health dietary risk assessments are outlined in Table 2. Further details on the toxicity of BIT can be found in the documents "Human Exposure Assessment for a Reregistration Submission for 1,2-Benzisothiazolin-3-one (BIT)," dated July 11, 2005; "Dietary Risk Assessment of 1,2-Benzisothiazolin-3-one (BIT) for Reregistration Eligibility Decision (RED) Document," dated July 12, 2005; and "1,2-Benzisothizolin-3-one (BIT)-Revised Report of the Antimicrobials Division's Toxicology Endpoint Selection Committee (ADTC)," dated April 22, 2005. These documents are available on Agency's website in the EPA Docket at http://www/epa.gov/edocket.

The Agency has reviewed all toxicity studies submitted for BIT 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. Acute toxicity data show that 1,2-benzisothiazolin-3-one is moderately toxic by the oral and dermal routes (Toxicity Category III for both studies), but that this chemical is a severe eye irritant (Toxicity Category I). Irritation to the skin from acute data show only mild skin irritation (Toxicity Category IV), but repeated dermal application indicated a more significant skin irritation response.

Table 1. Acute Toxicity of 1,2-Benzisothiazolin-3-one Technical

Guideline No.	Study Type	MRID #(s)	Results	Toxicity Category
870.1100	Acute Oral	41022101; 42858101	LD_{50} = 670 mg/kg (M); 784 mg/kg (F)	III
870.1200	Acute Dermal	41022102; 42858102	LD_{50} > 2000 mg/kg	III
870.1300	Acute Inhalation	waiver granted		

Guideline No.	Study Type	MRID #(s)	Results	Toxicity Category
870.2400	Primary Eye Irritation	42905102	severe eye irritant	I
870.2500	Primary Skin Irritation	42905101	slight irritant	IV
870.2600	Dermal Sensitization	41750001; 42858103	moderate dermal sensitizer	Not Applicable

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

Table 2. Toxicological Endpoints for BIT (Dietary)

Exposure Scenario	Dose Used in Risk Assessment (mg/kg/day)	Target MOE, UF, Special FQPA SF, for Risk Assessment	Study and Toxicological Effects
Acute Dietary **General population**, including infants and children	NOAEL= 5 mg/kg/day	UF = 100 (10x inter-species extrapolation, 10x intra-species variation) FQPA SF= 1 DB UF = 3 **Acute RfD =0.017** mg/kg/day	Co-Critical studies: Subchronic toxicity, dog , NOAEL = 5 mg/kg/day based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day. **and** Subchronic toxicity, rats , NOAEL = 8.42 mg/kg/day based on macroscopic and microscopic lesions in the non-glandular and glandular regions of the stomach.
Chronic Dietary **All populations**	NOAEL= 5 mg/kg/day	UF = 100 (10x inter-species extrapolation, 10x intra-species variation) FQPA SF= 1 DB UF = 3 **Chronic RfD =0.017** mg/kg/day	Co-Critical studies: Subchronic toxicity, dog , NOAEL = 5 mg/kg/day based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day. **and** Subchronic toxicity, rats , NOAEL = 8.42 mg/kg/day based on macroscopic and microscopic lesions in the non-glandular and glandular regions of the stomach.
Cancer: No cancer data available for 1,2-benzisothiazolin-3-one			

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

Developmental toxicity studies were conducted in rats with maternal effects including decreased body weight gain, decreased food consumption, and clinical toxicity signs (audible breathing, haircoat staining of the anogenital region, dry brown material around the nasal area) as well as increased mortality. Developmental effects consisted of increases in skeletal abnormalities (extra sites of ossification of skull bones, unossified sternebra) but not external or visceral abnormalities.

In a two- generation reproduction study, parental toxicity was observed at 500 ppm and was characterized by lesions in the stomach. In pups, toxic effects were reported at 1000 ppm and consisted of preputial separation in males and impaired growth and survival in both sexes. The reproduction study did not show evidence of increased susceptibility of offspring.

General Toxicity Observations

Subchronic oral toxicity studies showed systemic effects after repeated oral administration including decreased body weight, increased incidence of forestomach hyperplasia, and non-glandular stomach lesions in rats. In dogs, the effects occurred at lower doses than in rats, and included alterations in blood chemistry (decreased plasma albumin, total protein, and alanine aminotransferase) and increased absolute liver weight.

The Agency has concluded that there is not a concern for neurotoxicity resulting from exposure to 1,2-benzisothiazolin-3-one. The neurotoxicity observed in the rat acute oral toxicity study (piloerection and upward curvature of the spine at 300 mg/kg and above; decreased activity, prostration, decreased abdominal muscle tone, reduced righting reflex, and decreased rate and depth of breathing at 900 mg/kg) and the acute dermal toxicity study (upward curvature of the spine was observed in increased incidence, but this was absent after day 5 post-dose at a dose of 2000 mg/kg) were felt to be at exposures in excess of those expected from the use pattern of this pesticide and that such effects would not be observed at estimated exposure doses.

Dietary: The acute and chronic RfDs are 0.017 mg/kg/day. These endpoints are based on a subchronic toxicity study in dogs with a reported NOAEL of 5 mg/kg/day and which indicated increased incidences of emesis and clinical chemistry alterations at the LOAEL of 20 mg/kg/day. An uncertainty factor of 300 (10x for interspecies extrapolation, 10x for intraspecies variability, and 3x for database uncertainty) was applied to the NOAEL to obtain the acute and chronic RfDs. The data base uncertainty factor of 3x is applied to account for oral data base concerns based on the lack of reliable developmental toxicity data with respect to maternal toxicity.

Incidental Oral: The short- and intermediate-term oral endpoint is 5 mg/kg/day and is based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day in a subchronic toxicity study in dogs. The target margin of exposure (MOE) is 300.

Dermal: The short-, intermediate-, and chronic-term dermal endpoint is 5 mg/kg/day and is based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day in a subchronic toxicity study in dogs. The target MOE is 100 for residential and occupational exposure.

Inhalation: The short-, intermediate-, and chronic-term inhalation endpoint is 5 mg/kg/day and is based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day in a subchronic toxicity study in dogs. The target MOE is 100 for occupational and residential exposure; however if the resulting MOE is not at least 1000, the Agency can request a repeat dose inhalation study of at least 28 days in duration. (The MOE of 1000 is based on the application of a 10X uncertainty factor for interspecies extrapolation, a 10X uncertainty for intraspecies variability and a 10X for the lack of an inhalation study).

Dermal Penetration: A dermal penetration study was conducted in rats in which a 10mg/kg dermal dose of 1,2-benzisothiazolin-3-one was applied to the skin for durations of 4, 8, 24, 48 or 72 hours. At 72 hours a maximum dermal penetration of 40.6% was achieved.

Mutagenicity: All acceptable mutagenicity studies showed a negative mutagenic response for this chemical.

Carcinogenicity: Carcinogenicity data are not available for 1,2-benzisothiazolin-3-one. These data are required to support the metalworking fluid use.

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. When the appropriate screening and/or testing protocols being considered under the Agency's Endocrine Disrupting Screening Program (EDSP) have been developed, 1,2-benzisothiazolin-3-one may be subjected to additional screening and/or testing to better characterize effects related to endocrine disruption.

2. 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 FQPA Safety Factor has been removed (i.e., reduced to 1X) for 1,2-benzisothiazolin-3-one based on (1) the lack of evidence of increased susceptibility in the 2-generation reproduction toxicity study and the available developmental toxicity data; and (2) the risk assessment does not underestimate the potential risk for infants and children. The FQPA Safety Factor assumes that the exposure databases (food, drinking water, and residential) are complete, the risk assessment for each potential exposure scenario includes all metabolites and/or degradates of concern, and does not underestimate the potential risk for infants and children. These criteria have been met for 1,2-benzisothiazolin-3-one. 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 postnatal toxicity.

3. 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.

a. Acute PAD

Acute dietary risk for BIT 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 (0.017 mg/kg/day) modified by the FQPA safety factor. The acute reference dose was derived from a subchronic toxicity study in dogs in which both the NOAEL (5.0 mg/kg/day) and the LOAEL (20.0 mg/kg/day) were determined based on the incidence of emesis and clinical chemistry alterations in both sexes. This study was further supported by a subchronic toxicity study in rats in which both the NOAEL (8.42 mg ai/kg/day) and the LOAEL (25.26 mg ai/kg/day) were determined based on the incidence of macroscopic and microscopic lesions in both sexes. The BIT aPAD is 0.017 mg/kg/day based on a reference dose of 0.017 mg/kg/day, and incorporating the FQPA safety factor of 1X for the overall U.S. population or any population subgroups.

b. Chronic PAD

Chronic dietary risk for BIT 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 (0.017 mg/kg/day) modified by the FQPA safety factor. The cPAD was derived from a subchronic toxicity study in dogs in which both the NOAEL (5.0 mg/kg/day) and the LOAEL (20.0 mg/kg/day) were determined based on the incidence of emesis and clinical chemistry alterations in both sexes. This study was further supported by a subchronic toxicity study in rats in which both the NOAEL (8.42 mg ai/kg/day) and the LOAEL (25.26 mg ai/kg/day) were determined based on the incidence of macroscopic and microscopic lesions in both sexes. The BIT cPAD is 0.017 mg/kg/day based on a reference dose of 0.017 mg/kg/day, which includes the incorporation of the FQPA safety factor (1X) for the overall U.S. population or any population subgroups.

4. Dietary Exposure Assumptions

Dietary exposure to BIT residues occurs primarily from the antimicrobial paper uses which include: slimicide use in paper/pulp manufacturing, paper coatings preservative, and paper adhesive preservatives. Acute and chronic dietary exposure assessments were conducted using FDA's Center for Food Safety & Applied Nutrition's (CFSAN) screening-level approach as presented in "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.

FDA's method utilizes a number of general assumptions for calculating the amount of BIT in food from contacting treated paper surfaces. These assumptions include the following: 1) the food contact can result from a one time use or a repeat use of the paper; 2) the consumption factor (CF or fraction of food that contacts the packaging surface) represents a ratio of the actual weight of food that comes into contact with the paper packaging to the total weight of the food packaged with the paper; 3) the CF varies based on type of packaging; and 4) 100% of the antimicrobial present in the packaging migrates into the food commodities.

5. Dietary (Food) Risk Assessment

a. Acute and Chronic Dietary Risk

Generally, a dietary risk estimate that is less than 100% of the acute or chronic PAD does not exceed the Agency's risk concerns. Since the PADs for acute and chronic exposures are identical, the dietary risk estimates are the same for both durations of exposure in this case. A summary of acute and chronic risk estimates are shown in Table 3.

Risk estimates are below the Agency's level of concern. For adults, the combined acute and chronic dietary risk estimate is 9.4% of the acute PAD and chronic PAD. For children, the most highly exposed population subgroup, the combined acute and chronic dietary risk estimate is 21.8% of the acute PAD and chronic PAD. Therefore, acute and chronic dietary risk estimates are below the Agency's level of concern for all population subgroups.

Table 3. Summary of Dietary Exposure and Risk for 1,2-Benzisothiazolin-3-one

Population Subgroup	EDI (g/person/day)	Acute and Chronic Dietary	
		Dietary Exposure[a] (mg/kg/day)	% aPAD and % cPAD [b]
Slimicide			
Adult	14.1	0.0002	1.2
Child	7.05	0.00047	2.8
Paper Adhesive Preservative			
Adult	21.0	0.0003	1.8
Child	10.5	0.0007	4.1
Paper Coating Preservative			
Adult	75.0	0.0011	6.5
Child	37.5	0.0025	14.7

Population Subgroup	EDI (g/person/day)	Acute and Chronic Dietary	
		Dietary Exposure[a] (mg/kg/day)	% aPAD and % cPAD [b]
Combined			
Adult	110.1	0.0016	9.4
Child	55.1	0.0037	21.8

a-- For adults, acute and chronic exposure analysis is based on a body weight of 70 kg. For children, exposure is based on a body weight of 15 kg.
b--%PAD = dietary exposure (mg/kg/day) * 100 / aPAD or cPAD, where aPAD and cPAD for adults and children = 0.017 mg/kg/day

b. Dietary Exposure for Inert Ingredient Uses

Included in this RED is the reassessment of 1,2-benzisothiazolin-3-one when used as an inert ingredient in pesticide products. 1,2-Benzisothiazolin-3-one is used as a preservative/stabilizer in a wide variety of residential use and agricultural pesticide products, including outdoor yard, garden, and turf products, and agricultural crop products.

Inert Dietary Exposure Assumptions

A dietary exposure analysis for the inert ingredient use of 1,2-benzisothiazolin-3-one was conducted using the generic screening model for estimating inert ingredient dietary exposure as a basis for estimating 1,2-benzisothiazolin-3-one dietary exposure. The generic model's output was adjusted to reflect the tolerance exemption limitation given in 40 CFR §180.920 which states that 1,2-benzisothiazolin-3-one cannot be applied at more than 0.02 lbs per acre. The generic screening model does not specifically include an application rate input, rather it is based on tolerances for pesticide active ingredients with application rates generally ranging from 1 to 5 lb ai/acre. Therefore, to more accurately estimate residues resulting from the lower application rate limitation of 0.02 lbs/acre of 1,2-benzisothiazolin-3-one, the results from the generic model were adjusted by a factor of 50 (using the ratio of 1 lb. per acre ÷ 0.02 lbs per acre) and 250 (using the ratio of 5 lbs. per acre ÷ 0.02 lbs/acre) to reflect residue levels resulting from the specified maximum application rate of 1,2-benzisothiazolin-3-one.

The dietary assessment is unrefined and extremely conservative in nature because the screening model assumes that the inert ingredient is used on all commodities, and that 100 percent of crops are treated with the inert ingredient. Further, the model assumes residues will be present for every consumed commodity (including meat, milk, poultry and eggs) that is included in the Dietary Exposure Evaluation Model (DEEM™). Additionally, in the case of 1,2-benzisothiazolin-3-one, the choice of an adjustment factor based on maximum application rate is conservative in nature, because the use of an adjustment factor based on concentration in formulation results in exposures less than half of the lowest values for the U.S. population and all population subgroups reported in Tables 8 and 9.

Inert Dietary Risk from Food

The tables below provide a summary of the results of the acute and chronic dietary risk estimates for 1,2-benzisothiazolin-3-one. Only one population subgroup had an estimated exposure over 100 % of either PADs at the 95th percentile of exposure – "Children (1-2 years)" had 112% of the aPAD but this was only at the high end of exposure. Considering the unrefined and extremely conservative nature of this screening level model (e.g., inclusion of all commodities; 100% of commodities are treated; adjustment factor for application rate), the results for all population subgroups are considered not to be of concern.

It should be noted that while the results from the screening level model do not raise a dietary concern, the modeling results would be even lower if an alternate adjustment factor had been used. As described in the "Exposure Assumptions" section above, 1,2-benzisothiazolin-3-one's maximum application rate of 0.02 lbs/acre was adjusted by 50 and 250 in the generic model. Instead of adjusting for application rate, the model could have been adjusted for the concentration of 1,2-benzisothiazolin-3-one in the pesticide formulation, which is limited to a maximum of 0.1% under 40 CFR §180.920 (the proposed tolerance exemption for use on animals under 180.930 has the same limitation). Adjusting the model for the concentration in the formulation would mean using a factor of 500.

The adjustment factor using formulation concentration is 500, which is calculated using 1,2-benzisothiazolin-3-one's maximum concentration (0.1%) and a value used in the screen level model of 50%, which represents a group of active ingredients that are typically found in agricultural food use products at concentrations >50%. Using the adjustment factor of 500 (50% ÷ 0.1%) to account for the effect of the limitation of 0.1% of 1,2-benzisothiazolin-3-one in pesticide formulations on residue levels would certainly lower the model results even further that what are presented in the Tables 4 and 5, below.

This dietary assessment includes the existing use of 1,2-benzisothiazolin-3-one as a pesticide inert ingredient used on growing crops under 40 CFR part 180.920. In addition, the Agency has received a petition to establish an exemption from the requirement for a tolerance for the use of 1,2-benzisothiazolin-3-one as an inert ingredient in pesticides applied to animals under 40 CFR part 180.930 with the same limitations as currently exist under 180.920. This dietary assessment also includes animals as a commodity. Therefore, the results of this assessment cover all existing and currently proposed inert ingredient uses of 1,2-benzisothiazolin-3-one. Dietary exposures of concern from food are not likely from the use of 1,2-benzisothiazolin-3-one as inert ingredients in pesticide products.

Table 4. Estimated Acute Dietary (Food) Risk Estimates for Inert Uses of BIT

Population Subgroup	*95th Percentile of Exposure*	
	BIT Estimated Exposure, mg/kg/day	**%aPAD[1/]**
U.S. Population (total)	0.0013 - 0.007	8% - 40%
All infants (< 1 year)	0.0028 - 0.014	17% - 84%
Children (1-2 years)	0.0038 - 0.019	22% - 112%
Children (3-5 years)	0.0027 - 0.014	16% - 82%
Children (6-12 years)	0.0016 - 0.008	9% - 47%
Youth (13-19 years)	0.0010 - 0.005	6% - 29%
Adults (20-49 years)	0.00080 - 0.004	5% - 24%
Adults (50+ years)	0.00076 - 0.004	5% - 23%
Females (13-49 years)	0.00079 - 0.004	5% - 24%

1/ aPAD=0.017 mg/kg/day

Table 5. Chronic Dietary (Food) Risk Estimates for Inert Uses of BIT

Population Subgroup	BIT Estimated Exposure, mg/kg/day	%cPAD[2/]
U.S. Population (total)	0.00048 - 0.0024	3% - 14%
All infants (< 1 year)	0.0010 - 0.0049	6% - 29%
Children (1-2 years)	0.0017 - 0.0084	10% - 51%
Children (3-5 years)	0.0012 - 0.0062	7% - 37%
Children (6-12 years)	0.00070 - 0.0035	4% - 21%
Youth (13-19 years)	0.00040 - 0.0020	2% - 12%
Adults (20-49 years)	0.00035 - 0.0017	2% - 10%

Population Subgroup	BIT Estimated Exposure, mg/kg/day	%cPAD[2/]
Adults (50+ years)	0.00034 - 0.0017	2% - 10%
Females (13-49 years)	0.00035 - 0.0017	2% - 10%

2/ cPAD=0.017 mg/kg/day

c. Dietary Risk from Drinking Water

Drinking water exposure to pesticides can occur through ground and surface water contamination. In assessing drinking water risks, EPA considers acute (one day), chronic (long-term) and, if applicable, cancer (overall) exposure, and uses either modeling or monitoring data, if available, to estimate those risks. To determine the maximum contribution from water allowed in the diet, EPA first looks at how much of the overall allowable risk is contributed by food and then calculates a "drinking water level of comparison" (DWLOC) to determine whether modeled or monitored exposure estimates exceed the allowable risk level. Estimated drinking water concentrations (EDWCs) that are above the corresponding DWLOC exceed the Agency's level of concern.

Based on environmental fate data, 1,2-benzisothiazolin-3-one binds moderately with soil and may potentially move with the soil during rainfall events and reach surface waters. Although, 1,2-benzisothiazolin-3-one has been shown to be hydrolytically stable with a half life of > 30 days, it breaks down fairly quickly in aerobic soils. Outdoor use patterns of 1,2-benzisothiazolin-3-one which may lead to contact with soil and/or surface water include: 1) the application of agricultural pesticides that contain 1,2-benzisothiazolin-3-one as an inert ingredient, and 2) the application of paints that contain 1,2-benzisothiazolin-3-one. Considering 1,2-benzisothiazolin-3-one's ready biodegradation and the small amount of (0.02 lbs. per acre) that may be applied to crops via the inert use and the small amount likely to come into contact with soils/surface waters via the paint use, 1,2-benzisothiazolin-3-one is not likely to be present in drinking water sources at substantial concentrations. Therefore a quantitative drinking water assessment was not conducted.

6. Residential Risk for Active Ingredient Uses

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; handling BIT-containing cleaning products through low-pressure spray, wiping, and mopping; and the washing of clothing/textiles with BIT-containing laundry detergents. 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) does. Based on the application methods, BIT has been assessed for the residential

mixing/loading/applicator (or "handler") exposure and for children's post-application exposure that may occur from clothing/textile and via floor-cleaning products.

a. Toxicity

The toxicological endpoints and associated uncertainty factors used for assessing the non-dietary risks for BIT 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, incidental oral and inhalation routes of exposure. The MOE of 100 includes 10x for interspecies extrapolation, 10x for intraspecies variation.

Table 6. Toxicity Endpoints Selected for Assessing Occupational and Residential Risk for BIT

Exposure Scenario	Dose Used in Risk Assessment (mg/kg/day)	Target MOE, UF, Special FQPA SF, for Risk Assessment	Study and Toxicological Effects
Incidental Oral (short and intermediate term	NOAEL= 5 mg/kg/day	MOE = 300 (10x interspecies extrapolation, 10x intraspecies variation) FQPA SF= 1 DB UF= 3	Co-Critical studies: Subchronic toxicity, dog, NOAEL = 5 mg/kg/day based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day. **and** Subchronic toxicity, rats, NOAEL = 8.42 mg/kg/day based on macroscopic and microscopic lesions in the non-glandular and glandular regions of the stomach.
Dermal All time periods (occupational and residential)	NOAEL= 5 mg/kg/day	MOE =100 (10x interspecies extrapolation, 10x intraspecies variation)	Co-Critical studies: Subchronic toxicity, dog, NOAEL = 5 mg/kg/day based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day. **and** Subchronic toxicity, rats, NOAEL = 8.42 mg/kg/day based on macroscopic and microscopic lesions in the non-glandular and glandular regions of the stomach.

Exposure Scenario	Dose Used in Risk Assessment (mg/kg/day)	Target MOE, UF, Special FQPA SF, for Risk Assessment	Study and Toxicological Effects
Inhalation All time periods (occupational and residential)	NOAEL= 5 mg/kg/day	MOE = 100 (10x inter-species extrapolation, 10x intra-species variation) An additional 10x route-to-route extrapolation is used to determine if an inhalation toxicity study is warranted.	Co-Critical studies: Subchronic toxicity, dog, NOAEL = 5 mg/kg/day based on increased incidence of emesis and clinical chemistry alterations at 20 mg/kg/day. **and** Subchronic toxicity, rats , NOAEL = 8.42 mg/kg/day based on macroscopic and microscopic lesions in the non-glandular and glandular regions of the stomach.
Cancer	No cancer data available for 1,2-benzisothiazolin-3-one		

Notes: UF = uncertainty factor, FQPA SF = FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, DB UF = data base uncertainty factor, LOC = level of concern, MOE = margin of exposure

b. Residential Handler Scenarios

i. Exposure Scenarios, Data and Assumptions

1,2-Benzisothiazolin-3-one may be added to residential-use products used to control bacteria and fungi, including as a preservative for paint (e.g., EPA Reg. No. 72674-15) and household cleaning products. The residential handler scenarios evaluated including handling BIT-containing paint through brush/roller and airless spray application methods and handling BIT-containing cleaning products through low-pressure spray, wiping, and mopping application methods. Where the data were available, residential assessment assumed that the handlers would be wearing short-pants and short-sleeved shirts

There are no chemical-specific exposure data to assess paint applications. Therefore, dermal and inhalation exposures were assessed for brush and airless sprayer applications using surrogate data. Specifically, *PHED Version 1.1* values found in the *Residential Exposure SOPs* (U.S. EPA, 1997a) were used (short pants, short-sleeved shirts). All homeowner painting scenarios are believed to be best represented by the short-term exposure duration.

The following two scenarios were considered for residential handlers of BIT-containing cleaning products:

- Use of cleaner as a wipe on hard non-porous surfaces, and
- Use of cleaner for mopping hard non-porous surfaces such as floors.

These potential exposures from a general purpose cleaner are expected to be best represented by the short-term duration. The short-term dermal and inhalation exposures were assessed for wipe and mopping application methods using surrogate data. Specifically, values from the Chemical Manufacturers Association (CMA) antimicrobial study (U.S. EPA, 1999) were used. The dermal and inhalation exposures from these techniques have been normalized by the amount of active ingredient handled and reported as unit exposures (UE) expressed as mg/lb ai handled. In addition, product label maximum application rates, related use information, and Agency standard values were used to assess residential handler exposures.

ii. Residential Handler Risk Estimates

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, incidental oral and inhalation routes of exposure. The MOE of 100 includes 10x for interspecies extrapolation, 10x for intraspecies variation.

A summary of the residential handler exposures and risk are presented on Table 7. The combined risks from dermal and inhalation exposures for all scenarios are below the Agency's level of concern.

Table 7. Estimates of Short-term Exposures and Risks to Residential Handlers

Product	Scenario	Absorbed Dermal Dose[a] (mg/kg/day)	Inhalation Dose[a] (mg/kg/day)	Dermal MOE[b] (Target MOE= 100)	Inhalation MOE[c] (Target MOE = 100)	Total MOE[d] (Target MOE = 100)
Paint	Paint brush/roller	0.013	4E-05	370	130,000	370
	Airless sprayer	0.035	0.00089	140	5,600	140
Cleaning	Wiping	0.00055	3.2E-05	9,000	160,000	8,500
	Mopping	0.00010	8.5E-06	48,000	590,000	44,000

c. Residential Post-Application Exposure

i. Exposure Scenarios, Data and Assumptions

Residential postapplication exposures result when bystanders (adults and children) come in contact with BIT in areas where pesticide end-use products have recently been applied (e.g., treated hard surfaces/floors), 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 exposure to residues from hard surfaces (i.e., floors) that have been mopped with a product containing 1,2-benzisothiazolin-3-one and the use of laundry detergents containing 1,2-benzisothiazolin-3-one where residues could remain on clothing articles after laundering.

There is the potential for dermal exposure to toddlers crawling on the floor. In addition to dermal exposure, infants crawling on treated floors will also be exposed to 1,2-benzisothiazolin-3-one via incidental oral exposure. To calculate incidental ingestion exposure to 1,2-benzisothiazolin-3-one due to hand-to-mouth transfer, the scenarios established in EPA's *Standard Operating Procedures (SOPs) for Residential Exposure Assessments* were used.

BIT labels also include a microbiocide use in laundry detergents, fabric softeners, and stain removers (EPA Reg. No. 67071-23). To determine dermal and incidental oral exposure to treated clothing, the guidance provided in the Human and Environmental Risk Assessment (HERA) Guidance Document (2003) was used for indirect skin contact from wearing clothes and oral exposure from mouthing or sucking on treated fabric.

ii. Residential Post-Application Risk Estimates

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 interspecies extrapolation and 10x for intraspecies variation.

A summary of the residential handler exposures and risk are presented on Table 8. The risks from dermal and incidental oral exposures for all scenarios are below the Agency's level of concern.

Table 8. Summary of Short- and Intermediate-Term Residential Postapplication Exposures and Risks for BIT

Scenario		Dose (mg/kg/day)	MOE (Target MOE>100 for dermal; >300 for oral)
Dermal Exposure			
Treated Floors	Residential Setting (Children)	0.00055	9,200
Treated clothing	Adults	0.00045	11,000
	Children	0.00070	7,200
Incidental Oral Exposure			
Treated Floors	Residential Setting (Children)	0.00016 (ST) 7.7E-5 (lT)	31,000 (ST) 65,000 (IT)
Treated clothing	Children	0.003	1,700

7. Residential Risk for Inert Ingredient Uses

1,2-Benzisothiazolin-3-one is an inert ingredient in over 900 different products and is used primarily as a materials preservative. The types of products that contain 1,2-benzisothiazolin-3-one as an inert ingredient include turf insecticides, fungicides and herbicides; garden and ornamental insecticides; flea and tick control products for pets; indoor crack and crevice insecticides; paints; and household cleaners. Since 1,2-benzisothiazolin-3-one is also used as an active ingredient in paints and household cleaners at a higher percent formulation than the inert, the inert exposure assessment did not include an analysis of the paint and cleaning products. The residential exposure assessment addresses these exposures and shows that the MOEs are above the Agency's level of concern. Furthermore, the inert assessment did not specifically evaluate indoor crack and crevice uses since it was anticipated the applicator exposures resulting from the outdoor lawn products (where 1,2-benzisothiazolin-3-one is an inert ingredient) would result in higher exposures based on the amount used per day. Additionally, it was anticipated the post-application exposures resulting from the use of indoor residential cleaners (where 1,2-benzisothiazolin-3-one is an active ingredient) would result in higher exposures when considering the fact that exposure to residues from a floor cleaner are much more accessible than residues applied in cracks/crevices and along baseboards. An inert exposure assessment was conducted for several representative residential products such as various formulations of turf and garden products as well as, flea and tick pet spray products.

All of the input parameters used in this assessment are defaults provided in the Agency's Residential SOPs (US EPA, 1997 and 2001). The percent formulation of 0.1% used in this assessment was based on the tolerance exemption limitation as specified in 40 CFR 180.920 and a review of several Confidential Statements of Formula (CSFs) for the various types of products.

Tables 9-11 provide the input parameters and resulting exposures and MOEs for the inert uses.

Table 9. Applicator Short-term Exposures and MOEs for 1,2-Benzisothiazolin-3-one used as an Inert Ingredient in Aerosol Pet Flea and Tick Products

Exposure = UE x AR x N / BW			
		Dermal	Inhalation
Unit Exposure (mg / lb ai)	UE	220	2.4
Application Rate (lb ai/can)	AR	0.0004	0.0004
Number of cans/day	N	0.5	0.5
Percent Absorption		41%	100%
Body weight (kg)	BW	70	70
Daily Dose (mg/kg/day)		2.52E-04	6.70E-06
Oral NOAEL (mg/kg/day)		5	5
Target MOE		100	100
MOE		20,000	750,000
Total MOE		19,000	

Table 10. Toddler Short-term Post-application Dermal Exposure and MOE for 1,2-Benzisothiazolin-3-one used as an Inert Ingredient in Aerosol Pet Flea and Tick Products

Exposure = AR x T x SA x DA / BW		
Application Rate (mg/cm^2 of animal)	AR	0.015
Transferable Fraction	T	20%
Surface area of a child hug (cm^2)	SA	1,875
Dermal Absorption	DA	41%
Body weight (kg)	BW	15
Daily Dose (mg/kg/day)		0.15
Oral NOAEL (mg/kg/day)		5
Target MOE		100
MOE		**33**

Table 11. Toddler Short-term Post-application Incidental Oral Exposure and MOE for 1,2-Benzisothiazolin-3-one used as an Inert Ingredient in Aerosol Flea and Tick Pet Products

Exposure = AR x T x SA x SE x FQ / BW		
Application Rate (mg/cm^2 of animal)	AR	0.015
Transferable Fraction	T	20%
Surface area of a child's hand (cm^2)	SA	20
Saliva Extraction	SE	50%
Frequency (events/day)	FQ	1
Body weight (kg)	BW	15

Daily Dose (mg/kg/day)		0.0020
Oral NOAEL (mg/kg/day)		5
Target MOE		300
MOE		2,500

Because the dermal and oral toxicological effects are the same but the target MOEs differ, it typically would be necessary to estimate an ARI for the total toddler exposure to the pet product residues. However, since the dermal MOE is less than the target MOE of 100, it was not necessary to estimate an ARI because it would result in a value less than 1. Therefore, the dermal risk and resulting total risk (ARI) for toddlers exposed to 1,2-benzisothiazolin-3-one residues in pet products are of concern. It should be noted that these exposures are based on very conservative models and default input parameters. The "transferable fraction" parameter is a value that could be further refined with chemical specific data. However at this time, the percent transfer factor from pet fur to skin is considered a data gap and is necessary to appropriately refine this dermal exposure.

The results from the exposure and risk assessment for 1,2-benzisothiazolin-3-one used as an inert ingredient in other residential products (i.e., turf, garden, indoor crack and crevice, paint, and cleaning products) show that all of the individual MOEs, total MOEs and ARIs are above the Agency's level of concern.

8. Aggregate Risk

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 will typically include exposures from food, drinking water, residential uses of a pesticide, and other non-occupational sources of exposure.

a. Acute and Chronic Aggregate Risks

The acute and chronic aggregate risk assessments generally include only dietary and drinking water exposures. Drinking water exposure is not expected from any of the indoor or outdoor uses of 1,2-benzisothiazolin-3-one used as either an inert or active ingredient. Table 12 presents a summary of these exposures, as well as the aggregate risks. The acute and chronic aggregate risk estimates associated with 1,2-benzisothiazolin-3-one are below the Agency's level of concern. It should be noted that the acute and chronic dietary exposures from the inert uses were selected from the low range values as presented in Tables 14 and 15. It is reasonable to use the low range values in the aggregate assessment given number of conservative assumptions that were the basis for the inert dietary assessment.

Table 12. Acute and Chronic Aggregate Dietary Exposures and Risks

	(mg/kg/day)			(mg/kg/day)		
	Active	**Inert**	**Aggregate**	**Active**	**Inert**	**Aggregate**
Adults	1.6E-03	1.3E-03	2.9E-03	1.6E-03	4.8E-04	2.1E-03
Children	3.7E-03	3.8E-03	7.5E-03	3.7E-03	1.7E-03	5.4E-03
Adults %a or cPAD	9.4%	7.6%	17.1%	9.4%	2.8%	12.2%
Children %a or cPAD	21.1%	22.4%	44.1%	21.8%	10.0%	31.8%

b. Short- and Intermediate-Term Aggregate Exposures and Risks

Short- and intermediate-term aggregate exposures and risks were assessed for adults and children that could be exposed to 1,2-benzisothiazolin-3-one residues from the use of products in non-occupational environments. This includes products that contain 1,2-benzisothiazolin-3-one as either the active or inert ingredient. The following list summarizes all of the potential sources of 1,2-benzisothiazolin-3-one exposures for adults and children:

Adult 1,2-benzisothiazolin-3-one exposure sources:

- Handling of paint containing BIT as an active or inert ingredient via brush
- Handling of paint containing BIT as an active or inert ingredient via sprayer
- Handling of cleaning products containing BIT as an active or inert ingredient during wiping activities
- Handling of cleaning products containing BIT as an active or inert ingredient during mopping activities
- Wearing BIT-treated clothing
- Eating food having BIT residues from indirect food contact via the active ingredient paper packaging use
- Eating food having BIT residues from the inert ingredient pesticide use
- Handling of EC, granular or RTU turf and garden products containing BIT as an inert ingredient
- Handling of pet flea control products containing BIT as an inert ingredient

Child 1,2-benzisothiazolin-3-one exposures sources:

- Post-application exposures to cleaning product residues containing BIT as an active or inert ingredient used on hard surfaces (i.e., floors)
- Wearing BIT-treated clothing
- Eating food having BIT residues from indirect food contact via the active ingredient paper packaging use
- Eating food having BIT residues from the inert ingredient pesticide use
- Post-application exposures to turf residues containing BIT as an active or inert ingredient
- Post-application exposures to pet flea control product residues containing BIT as an inert ingredient

The use patterns of the products and probability of co-occurrence must be considered when selecting scenarios for incorporation in the aggregate assessment. In the case of 1,2-

benzisothiazolin-3-one, homeowner painting activities occur only once or twice a year, while the use of turf/garden and pet products occurs on an intermittent basis. Therefore the probability of co-occurrence and the potential for exposure to residues from these products on the same day is highly unlikely. However, it is likely that someone could clean the kitchen (mopping and wiping activities) as well as, wear clothing treated with 1,2-benzisothiazolin-3-one during the same day. Table 13 summarizes the scenarios included in the short- and intermediate-term aggregate assessments.

Table 13. Exposure Scenarios Included in the Aggregate Assessments

	Short-term Aggregate	Intermediate-Term Aggregate
Adults	chronic dietary - inert chronic dietary - active handling cleaning products - wiping handling cleaning products - mopping treated clothing	chronic dietary - inert chronic dietary - active treated clothing
Children	chronic dietary - inert chronic dietary - active post-app to cleaning product - mopping treated clothing	chronic dietary - inert chronic dietary - active post-app to cleaning product - mopping treated clothing

The chronic dietary exposures were used in both the short- and intermediate-term aggregate assessment because chronic dietary exposures occur nearly every day (as opposed to acute dietary exposures occurring on a one-time basis). Therefore, short- or intermediate-term non-dietary exposures have a much higher probability to concur with the chronic dietary intake rather than the acute dietary intake.

Cleaning activities in a residential setting occur on a short-term basis. However, the BIT-containing cleaning products are also labeled for use in institutional settings such as day care facilities where cleaning activities can occur on an intermediate-term basis. Therefore, children could have exposure to cleaning product residues on a more continuous basis in a day care facility thus, these post-application scenarios were included in the intermediate-term aggregate assessment.

Since the toxicity endpoints for all of the routes of exposure (oral, dermal and inhalation) are based on the same study and same toxic effect, all routes are aggregated together. However, the aggregate risk index (ARI) method outlined in OPP guidance for aggregate risk assessment (September 1, 2000, Standard Operating Procedure (SOP) for Incorporating Screening Level Estimates of Drinking Water Exposure into Aggregate Risk Assessments) was utilized in the assessment. This method was used because the oral, dermal and inhalation endpoints have different uncertainty factors that need to be applied. A risk index 1 indicates a risk of no concern. The short-term ARIs for adults and children were 6.8 and 1.9, respectively, while the intermediate-term ARIs for adults and children were 7.5 and 1.9, respectively. Therefore short-term and intermediate-term aggregate risks are below the Agency's level of concern.

Tables 14 and 15 present the resulting ARIs for the short- and intermediate term aggregate assessments, respectively.

Table 14. Short-term Aggregate Risks

Exposure Routes	Dietary			Clothing	Hard Surface Cleaning				ARI
	Active	Inert	Total	Post-App	Applicator		Post-App	Total	
					Wipe	Mop			
Adults									
Oral Ingestion MOEs	3,100	10,000	2,400	NA	NA	NA	NA	NA	
Inhalation MOEs	NA	NA	NA	NA	160,000	590,00	NA	120,000	
Dermal MOEs	NA	NA	NA	11,000	9,100	50,000	NA	7,700	
Total MOE					8,600	46,000	NA	7,200	6.8
Toddlers									
Oral Ingestion MOEs	1,400	2,900	930	1,700	NA	NA	31,000	31,000	
Inhalation MOEs	NA	NA	NA	NA	NA	NA	NA	NA	
Dermal MOEs	NA	NA	NA	7,100	NA	NA	9,100	9,100	
ARI				5.2			48.5	48.5	1.9

Table 15. Intermediate-term Aggregate Risks

	Dietary			Clothing	Hard Surface leaning	
Exposure Routes	**Active**	**Inert**	**Total**	**Post-App**	**Post-App Mop**	**ARI**
Adults						
Oral Ingestion	3,100	10,000	2,400	NA	NA	
Inhalation MOEs	NA	NA	NA	NA	NA	
Dermal MOEs	NA	NA	NA	11,000	NA	
						7.5
Toddlers						
Oral Ingestion	1,400	2,900	930	1,700	31,000	
Inhalation MOEs	NA	NA	NA	NA	NA	
Dermal MOEs	NA	NA	NA	7,100	9,100	
ARI				5.2	48.5	1.9

Es

9. Occupational Risk

Workers can be exposed to a pesticide through mixing, loading, and/or applying a pesticide, or re-entering treated sites. Occupational handlers of BIT include formulated product handlers, material preservative handlers, and metal working fluids handlers. Occupational risk for all of these 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. In the case of BIT, MOEs greater than 100 are not of concern to the Agency. This MOE includes the standard safety factors of 10X for intraspecies variability (i.e., differences among humans) and 10X for interspecies variability (differences between humans and animals).

Occupational risk is assessed for exposure at the time of application (termed “handler” exposure) and is assessed for exposure following application, or post-application 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.

For more information on the assumptions and calculations of potential risk of BIT to workers, see the Occupational Exposure Assessment section in the “Human Health Risk Assessment (Revised),” dated July 11, 2005.

a. Occupational Toxicity

Please see Table 4 as it provides a listing of the toxicological endpoints used in the occupational risk assessment for BIT.

b. Occupational Handler Exposure

Formulated Product Handlers:

EPA has assessed the exposure to handlers mixing/loading/applying products containing the active ingredient. The following handler exposure scenarios which involve handling the formulated product were assessed for 1,2-benzisothiazolin-3-one to represent the high end of industrial uses of the formulated product.

Pouring the BIT-containing liquid biocide preservative into industrial process intermediate materials (dispersions, slurries, emulsions, solutions, etc.)
Pouring the BIT-containing liquid biocide preservative into industrial process water for leather and photo processing systems
Pouring the BIT-containing liquid biocide preservative into metalworking fluid
Pouring the BIT-containing liquid biocide preservative during oil field activities

There are no chemical-specific exposure data to assess primary handler applications. Therefore, dermal and inhalation exposures were assessed using CMA surrogate exposure data. Specifically, the liquid pour for preservative data from CMA were used as surrogate data for the scenarios involving the pouring of liquid preservatives into industrial process intermediate materials, leather and photo processing systems, and oil fields; the liquid pour for metal working fluid data from CMA were used as surrogate data for the liquid pouring of preservatives into metalworking fluid; the liquid pump for preservative data from CMA were used as surrogate data for the liquid pumping of preservatives into oil fields. In addition, product label maximum application rates, related use information, and Agency standard values were used to assess exposures.

Material Preservative Handlers:

EPA has assessed the exposure to handlers mixing/loading/applying products containing the active ingredient as a material preservative, not the formulated product (previously defined as "secondary" handlers). This includes those individuals exposed to the active ingredient as a direct result of its incorporation into an end use product (e.g., individuals using caulk or paint that in itself is not a registered product). The scenarios assessed have been selected to represent the high end of exposure to these types of products such as application of stains, water-based adhesives, caulks, sealants, grouts, spackling, ready-mixed cements, and ready-mixed wallboard compounds. Based on end-use product application methods, it is assumed that exposures while applying paints will be equal to or greater than exposures while applying building materials. (Note: metal working fluids for machinists are assessed separately below.) The following material uses were assessed to represent the high end of exposure to 1,2-benzisothiazolin-3-one:

Handling BIT-containing paint through brush/roller and airless sprayer application methods.
Handling BIT-containing cleaning products through wiping and mopping application methods.

These handler exposure scenarios were assessed using surrogate unit exposure data from *PHED Version 1.1* for the painting scenarios and using surrogate unit exposure from CMA for the cleaning product scenarios. For the painting scenarios, it was assumed that commercial painters apply 5 gallons (50 lbs) of paint through brush/roller application methods and 50 gallons (500 lbs) of paint through airless sprayer application methods. For the cleaning product scenarios, it was assumed that occupational handlers (i.e., janitors) use 1 liter for wiping and 2 gallons for mopping.

Metal Working Fluids Handlers:

The potential inhalation and dermal exposure may exist when using treated metal working fluid. A screening-level long-term inhalation exposure estimate for treated metal working fluids has been developed using the OSHA PEL for oil mist. The Agency conducted the screening level assessment for metal working fluids using the USEPA/OPPTS Chemical Engineering Branch (CEB) model (U.S. EPA, 1991). The CEB model uses measured and/or assumed airborne oil mist concentrations for metal working operations. Since no measured concentrations are available for 1,2-benzisothiazolin-3-one, the high-end oil mist concentration is based on the OSHA's Permissible Exposure Limit (PEL) of 5 mg/m^3 (NIOSH, 1998). EPA Reg. No. 72674-15 indicates that 0.25% (i.e., 0.0025) of the label product is added to metal working fluids and of that, only 19.3% is the active ingredient (1,2-benzisothiazolin-3-one). Therefore, the upper bound air concentration of 1,2-benzisothiazolin-3-one that a worker is exposed to is 5 mg/m^3 x 0.0025 x 0.09 or an air concentration of 0.0011 mg/m^3. Additionally, the following assumptions were made in the assessment: the inhalation rate for adults is 1.25 m^3 /hr; the exposure duration is 8 hours; and body weight is 70 kg.

A screening-level long-term dermal exposure estimate was derived from the 2-Hand Dermal Immersion in Liquid Model in ChemSTEER (EPA/OPPT). The weight fraction of 1,2-benzisothiazolin-3-one in metal working fluids is 0.00048 (0.0025 formulated product added to oil x 0.193 ai in formulated product = 0.00048), calculated from EPA Reg. No. 72674-15. Based on the model for emersion of hands in metal working fluids, the long-term absorbed dermal dose is estimated at 0.025 mg/kg/day.

c. Occupational Handler Risk Summary

The results of the MOE analysis are presented in Table 16. The calculated short- and intermediate-term dermal MOEs are greater than the target MOEs, and therefore, are not of concern with the exception of the dermal MOE for commercial painting with an airless sprayer which is 90. However, it is believed that the paint matrix has the potential to reduce the dermal exposure. Moreover, the dermal absorption factor of 41 percent was not adjusted to account for the potential reduction of the bioavailability of BIT in paint because of a lack of chemical-specific data. Therefore, the dermal MOE of 90 for the airless sprayer may be an overestimate of risk. In addition, the total MOEs (inhalation + dermal) have been presented. The total MOEs are all greater than 100, indicating no risks of concern, except for the commercial painting with an airless sprayer where the total MOE = 85. As mentioned above, the Agency believes that actual

dermal exposures resulting from this scenario are likely to result in risks that do not exceed the Agency's level of concern.

Table 16. Estimates of Short- and Intermediate-term Risks to Occupational Handlers of 1,2-Benzisothiazolin-3-one

Scenarios	Use Site Category	Inhalation MOE[b] (Target MOE =100)	Dermal MOE[c] (Target MOE =100)	Total MOE (Target = 100)
Occupational/Industrial Handler (Formulated Products)				
Mixing/loading/applying BIT-containing biocides using **liquid open pour** methods for preservation of **industrial process intermediate materials**. (Gloves)	Material Preservatives	20,000	1,300	1,200
Mixing/loading/applying BIT-containing biocides using **liquid open pour** methods for **industrial process and water system** use. (Gloves)	Industrial Processes and Water Systems	25,000	1,600	1,500
Mixing/loading/applying BIT-containing biocides using **liquid open pour** methods for preservation of **metalworking fluids** (Gloves)	Material Preservatives	51,000	5,700	5,100
Mixing/loading/applying BIT-containing biocides using **liquid open pour** methods for preservative products (Gloves)	Oil/gas Drilling fluids	7E+06	4.5E+05	4.2E+05
Mixing/loading/applying BIT-containing biocides using **liquid pump** methods for preservative products (Gloves)	Oil Secondary Recovery	830	130	110
Occupational Material Preservative Handlers (In-can Preservatives)				
Handling BIT-containing **cleaning solutions** through **wiping** application methods (No gloves)	Material Preservatives	79,000	4,500	4,300
Handling BIT-containing **cleaning solutions** through **mopping** application methods (No gloves)	Material Preservatives	290,000	24,000	22,000
Handling BIT-containing **paint** through **paint brush/roller** application methods (No gloves)	Material Preservatives	50,000	190	190
Handling BIT-containing **paint** through **airless sprayer** application methods (No gloves)	Material Preservatives	1,700	90	85

d. Occupational Post-Application Exposure

Postapplication exposures may occur in industrial settings around the water systems via inhalation, and dermal exposures may occur while maintaining industrial equipment. However, occupational post-application dermal and inhalation exposures to 1,2-benzisothiazolin-3-one are

likely to be minimal when compared to handler exposure because of dilution during processing or when compared to machinists using the metal working fluid. No postapplication exposure data have been submitted to the agency to determine the extent of postapplication exposures in the industrial settings. Inhalation exposures are expected to be minimal because aerosol generation is not expected and the vapor pressure of 1,2-benzisothiazolin-3-one is low.

B. Environmental Risk Assessment

A summary of the Agency's environmental risk assessment is presented below. The following risk characterization is intended to describe the magnitude of the estimated environmental risks for BIT use sites and any associated uncertainties.

For detailed discussions of all aspects of the environmental risk assessment, see the document "Environmental Risk Assessment and Characterization - 1,2-Benzisothiazolin-3-one (BIT)", dated July 7, 2005.

1. Environmental Fate and Transport

The environmental fate assessment for 1,2-benzisothiazolin-3-one was based on limited information; data were only available for hydrolysis, aerobic soil metabolism, and adsorption/desorption. These data indicate that 1,2-benzisothiazolin-3-one is hydrolytically stable (half-life > 30 days), but breaks down fairly quickly in aerobic soils (half-life < 24 hours in sandy loam soil). 1,2-Benzisothiazolin-3-one shows moderate to strong binding to soils, with adsorption K_d values estimated to be between 1.24 and 9.56. If used outdoors, 1,2-benzisothiazolin-3-one may possibly move with soil during rainfall events and potentially reach surface waters. However, it breaks down aerobically on the surface soils. Since it has a moderate binding potential to soils, it is not likely to migrate into the ground and there is low potential for ground water contamination. Furthermore, with a K_{ow} value of 20 at 25 ^{o}C, 1,2-benzisothiazolin-3-one is unlikely to bioaccumulate in aquatic organisms.

2. Ecological Risk

The available ecological effects data for 1,2-benzisothiazolin-3-one are somewhat limited. Based on acute toxicity information, 1,2-benzisothiazolin-3-one displays low to moderate toxicity to birds and mammals. It is moderately toxic to freshwater fish and invertebrates, slightly toxic to marine/estuarine fish, and highly toxic to marine/estuarine invertebrates. A submitted rat developmental study provided a NOAEL of 40 mg/kg/day. There was no aquatic organism chronic toxicity information available for 1,2-benzisothiazolin-3-one. Phytotoxicity data are limited, with one algae acute study found in published scientific literature, which indicates that 1,2-benzisothiazolin-3-one is highly toxic to green algae. Acute oral toxicity data for 1,2-benzisothiazolin-3-one are shown in Table 17, acute ecotoxicity data are shown in Table 18, and other ecotoxicity data (subacute dietary, dermal, and developmental) are shown in Table 19.

Table 17. Acute Oral Toxicity of 1,2-Benzisothiazolin-3-one

Species	LD50/LC50 (mg/kg)	NOAEL/NOAEC	Toxicity Category
Bird			
Bobwhite quail *(Colinus virginianus)*	453	NA	Moderately toxic
Mammal			
Rat	650 - males 784 - females	---	---

Table 18. Acute Ecotoxicity of 1,2-Benzisothiazolin-3-one

Species	LD50/LC50 (mg/kg)	NOAEL/NOAEC	Toxicity Category
Freshwater Fish			
Rainbow Trout *(Oncorhynchus mykiss)*	1.3	0.74	Moderately toxic
Rainbow Trout *(Oncorhynchus mykiss)*	1.6	---	Moderately toxic
Freshwater Invertebrate			
Waterflea *(Daphnia magna)*	1.5	0.7	Moderately toxic
Waterflea *(Daphnia magna)*	3.3	1.4	Moderately toxic
Estuarine/Marine Fish			
Sheepshead minnow *(Cyprinodon variegatus)*	12.2	3.3	Slightly toxic
Estuarine/Marine Invertebrates			
Mysid shrimp *(Mysidopsis bahia)*	0.99	0.25	Highly toxic
Pacific oyster (*Crassostrea gigas)*	0.047	0.024	Very highly toxic
Aquatic Algae			
Green algae, species not indicated	0.15 (72-hour EC_{50})	---	---

Table 19. Other Toxicity Studies of 1,2-Benzisothiazolin-3-one

Species	LD50/LC50 (mg/kg)	NOAEL/ NOAEC	LOAEL/ LOAEL	Toxicity Category
Subacute Dietary Toxicity of 1,2-Benzisothiazolin-3-one to Birds				
Bobwhite quail *(Colinus virginianus)*	> 5620	---	---	Practically non-toxic
Acute Dermal Toxicity of 1,2-Benzisothiazolin-3-one to Rats				
Rats	>2000	---	---	---
Developmental Toxicity of 1,2-Benzisothiazolin-3-one to Rats				
Rats	---	40	100	---

The indoor uses of BIT considered in this RED make it unlikely that any appreciable exposure to terrestrial or aquatic organisms would occur. Facilities using BIT for indoor industrial applications are required to have NPDES permits before discharging effluents into receiving waters. The potential exposure to terrestrial and aquatic species from the oil recovery uses of BIT cannot be estimated at this time, as there is currently no validated model available for such a purpose.

1,2-Benzisothiazolin-3-one is used as an inert ingredient in pesticide products but the allowable amount that can be applied is small (not more than 0.1% formulation and 0.02 lbs. per acre). Data indicate that 1,2-benzisothiazolin-3-one breaks down quickly in aerobic soils (half-life < 24 hours in sandy loam soil). 1,2-Benzisothiazolin-3-one's ready biodegradation in soil and small application amount greatly reduce the exposure potential for terrestrial and aquatic organisms. Run-off into surface water from pesticidal uses is likely to be low and it is not likely to be present in water sources at substantial concentrations. Therefore, risk to non-target organisms is not anticipated from the use of 1,2-benzisothiazolin-3-one.

3. Listed Species Consideration

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 1,2-benzisothiazolin-3-one fall into this category.

The inert uses of 1,2-benzisothiazolin-3-one are also considered to fall under a “no effect” determination, for the following reasons:

The allowable amount that can be applied is small (not more than 0.1% formulation and 0.02 lbs. per acre).
Data indicate that 1,2-benzisothiazolin-3-one breaks down quickly in aerobic soils (half-life < 24 hours in sandy loam soil).
1,2-Benzisothiazolin-3-one s ready biodegradation in soil and small application result in minimal to no terrestrial or aquatic organism exposure.

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 BIT 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 BIT.

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 BIT. The Agency has determined that BIT containing products are eligible for reregistration provided that: (i) current data gaps and confirmatory data needs are addressed; (ii) the risk mitigation measures outlined in this document are adopted; and (iii) label amendments are made to reflect these measures where necessary. Appendix A summarizes the uses of BIT 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 BIT 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 BIT, the Agency has determined that BIT products, unless formulated and used as specified in this document, would present risks inconsistent with FIFRA. Accordingly, should a registrant fail to implement any of the risk mitigation measures identified in this document, the Agency may take regulatory action to address the risk concerns from the use of BIT. If all changes outlined in this document are incorporated into the product formulations, then all current risks for BIT will be substantially mitigated for the purposes of this determination.

B. Public Comments and Responses

Through the Agency's public participation process, EPA worked with stakeholders and the public to reach the regulatory decisions for BIT. During the public comment period on the risk assessments, which closed on September 19, 2005, the Agency received comments from Acti-Chem Specialties, Inc.; Arch Chemicals, Inc., Clariant Corporation; International Specialty Products, Rohm & Haas Company, and Troy Corporation in response to EPA's draft risk assessment (RA) for BIT. The comments submitted by these registrants include areas of toxicology, exposure, and risks. The Agency's responses to these comments are incorporated into the risk assessment and revised chapters, which are available in the public docket at www.epa.gov/edocket, docket # OPP-2005-0200.

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 BIT. The Agency has concluded that the tolerance exemption for the use of BIT as an inert ingredient meets the FQPA safety standards and that the risk from dietary (food sources only) exposure is within the "risk cup." An aggregate assessment was conducted for exposures through food and residential exposure. The Agency has determined that the human health risks from these combined exposures are within acceptable levels. In reaching this determination, EPA has considered the available information on the special sensitivity of infants and children, as well as aggregate exposure from food and water.

b. Determination of Safety to U.S. Population

As part of the FQPA tolerance reassessment process, EPA assessed the risks associated with BIT. The Agency has determined that the established tolerance exemption for BIT meets 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 BIT. In reaching this conclusion, the Agency has considered all available information on the toxicity, use practices and exposure scenarios, and the environmental behavior of BIT.

The acute and chronic aggregate risk assessments generally include only dietary and drinking water exposures. Since drinking water exposure is not expected from any of the indoor or outdoor uses of 1,2-benzisothiazolin-3-one used as either an inert or active ingredient, the acute and chronic aggregate assessments only included dietary exposures from the active indirect food uses (i.e., use in food-contact packaging) and inert dietary exposures from agricultural pesticide uses. The acute and chronic aggregate risk estimates associated with 1,2-benzisothiazolin-3-one are well below the Agency's level of concern.

The short- and intermediate-term aggregate assessments were conducted for adults and children. Since the toxicity endpoints for all of the routes of exposure (oral, dermal and inhalation) are based on the same study and same toxic effect, all routes are aggregated together. The aggregate risk index (ARI) method was utilized in the assessment. Short- and intermediate-term aggregate calculated risks are below the Agency's level of concern.

c. Determination of Safety to Infants and Children

EPA has determined that the established tolerance exemption for 1,2-benzisothiazolin-3-one, with amendments and changes as specified in this document, meet the safety standards under the FQPA amendments to section 408(b)(2)(C) of the FFDCA, that there is a reasonable certainty of no harm for infants and children. The safety determination for infants and children considers factors of the toxicity, use practices, and environmental behavior noted above for the general population, but also takes into account the possibility of increased dietary exposure due

to the specific consumption patterns of infants and children, as well as the possibility of increased susceptibility to the toxic effects of BIT 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 BIT 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 BIT based on: (1) the lack of evidence of increased susceptibility in the 2-generation reproduction toxicity study and the available developmental toxicity data; and (2) the risk assessment does not underestimate the potential risk for infants and children.

d. Cumulative Risks

Risks summarized in this document are those that result only from the use of 1,2-benzisothiazolin-3-one. 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 1,2-benzisothiazolin-3-one. 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/.

e. 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 pesticides and inerts) "may have an effect in humans that is similar to an effect produced by a naturally occurring estrogen, or such other endocrine effect as the Administrator may designate." Following the 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 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 EDSP have been developed, 1,2-benzisothiazolin-3-one may be subjected to additional screening and/or testing to better characterize effects related to endocrine disruption.

2. Tolerance Summary

No pesticide tolerances have been established for BIT. BIT currently has one inert ingredient exemption from the requirement of a tolerance for residues as required under the Food Quality Protection Act (FQPA) section 408. The existing exemption is for use on growing crops under 40 CFR part 180.920 and is considered reassessed. In addition, the Agency has received a petition to establish an exemption from the requirement for a tolerance for the use of 1,2-benzisothiazolin-3-one as an inert ingredient in pesticides applied to animals under 40 CFR part 180.930. The risk assessments in this document took into consideration animals as a commodity. Therefore, the results of this assessment cover all existing and currently proposed inert ingredient uses of 1,2-benzisothiazolin-3-one. Dietary exposures of concern from food are not likely from the use of 1,2-benzisothiazolin-3-one as inert ingredients in pesticide products.

The existing exemption from the requirement of a tolerance, as well as the proposed exemption, are summarized in Table 20.

a. Tolerances Currently or Proposed To Be Listed Under 40 CFR §180.920

Table 20. Tolerance Reassessment Summary for BIT

Tolerance Exemption Expression	CAS Number	40 CFR §	Current Limits	Reassessed Limits	Use
1,2-benzisothiazolin-3-one (Also known as "BIT")	2634-33-5	180.920[1] 180.930[2]	Not more than 0.1% of formulation. Not more than 0.02 lbs. to be applied per acre.	Not more than 0.1% of formulation. Not more than 0.02 lbs. to be applied per acre.	preservative/ stabilizer

1. Residues listed in 40 CFR §180.920 are exempted from the requirement of a tolerance when used as inert ingredients in pesticide formulations when applied to growing crops only.

2. Residues listed in 40 CFR §180.930 are exempted from the requirement of a tolerance when used as inert ingredients in pesticide formulations when applied to animals only (pending).

b. Codex Harmonization

Currently there are no Codex MRLs established for BIT.

D. Regulatory Rationale

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

The following is a summary of the rationale for managing risks associated with the use of BIT. 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 exposure estimates for the active ingredient uses are below the Agency's level of concern. While the acute risk estimates for the inert uses exceed 100% of the aPAD for children, considering the unrefined and conservative nature of this screening level model (e.g., inclusion of all commodities; 100% of commodities are treated; adjustment factor for application rate), the results for all population subgroups are considered not to be of concern. Therefore, no risk mitigation measures are required to address exposure to BIT residues in food.

b. Drinking Water Risk Mitigation

Considering 1,2-benzisothiazolin-3-one's ready biodegradation and the small amount of (0.02 lbs. per acre) that may be applied to crops via the inert use and the small amount likely to come into contact with soils/surface waters via the paint use, 1,2-benzisothiazolin-3-one is not likely to be present in drinking water sources at substantial concentrations. Therefore a quantitative drinking water assessment was not conducted and no risk mitigation measures are required.

c. Residential Risk Mitigation

Residential risk estimates for the uses of BIT as an active ingredient are below the Agency's level of concern. Therefore, no risk mitigation measures are required to address exposure to BIT from these uses. However, residential risk estimates regarding the use of 1,2-benzisothiazolin-3-one as an inert ingredient in pet flea and tick products exceed the Agency's level of concern for children.

In evaluating the inert uses in pet products, the percent formulation of 0.1% was used in the assessment based on the tolerance exemption limitation as specified in 40 CFR 180.920 and a review of the formulations of various products. The Agency has determined that in a percent formulation of 0.033% BIT would result in the target MOE of 100 for the scenario of toddler post-application dermal exposure, which will adequately address the Agency's risk concerns. All pet products containing BIT as an inert ingredient must contain a maximum of 0.033% BIT in order to be eligible for reregistration.

d. Occupational Risk Mitigation

i. Handler Exposure

The calculated short- and intermediate-term dermal MOEs are greater than the target MOEs, and therefore, are not of concern with the exception of the dermal MOE for commercial painting with an airless sprayer which is 90. However, it is believed that the paint matrix has the potential to reduce the dermal exposure. Moreover, the dermal absorption factor of 41 percent was not adjusted to account for the potential reduction of the bioavailability of BIT in paint because of a lack of chemical-specific data. Therefore, the dermal MOE of 90 for the airless sprayer may be an overestimate of risk. In addition, the total MOEs (inhalation + dermal) have been presented. The total MOEs are all greater than 100, indicating no risks of concern, except for the commercial painting with an airless sprayer where the total MOE = 85. As mentioned above, the Agency believes that actual dermal exposures resulting from this scenario are likely to result in risks that do not exceed the Agency's level of concern.

ii. Post-Application Risk Mitigation

Postapplication exposures may occur in industrial settings around the water systems via inhalation, and dermal exposures may occur while maintaining industrial equipment. However, occupational postapplication dermal and inhalation exposures to 1,2-benzisothiazolin-3-one are likely to be minimal when compared to handler exposure because of dilution during processing or when compared to machinists using the metal working fluid. Inhalation exposures are expected to be minimal because aerosol generation is not expected and the vapor pressure of 1,2-benzisothiazolin-3-one is low, therefore no risk mitigation measures are required.

2. Environmental Risk Management

The indoor uses of BIT make it unlikely that any appreciable exposure to terrestrial or aquatic organisms would occur. Facilities using BIT for indoor industrial applications are required to have NPDES permits before discharging effluents into receiving waters. Therefore, no risk mitigation measures are required

When used as an inert ingredient in pesticide products the allowable amount that can be applied is small (not more than 0.1% formulation and 0.02 lbs. per acre). Data indicate that 1,2-benzisothiazolin-3-one breaks down quickly in aerobic soils (half-life < 24 hours in sandy loam soil). 1,2-Benzisothiazolin-3-one's ready biodegradation in soil and small application amount greatly reduce the exposure potential for terrestrial and aquatic organisms. Run-off into surface water from pesticidal uses is likely to be low and it is not likely to be present in water sources at substantial concentrations. Therefore, no risk mitigation measures are required.

3. Listed Species Considerations

a. The Endangered Species Program

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 1,2-benzisothiazolin-3-one fall into this category.

The inert uses of 1,2-benzisothiazolin-3-one are also considered to fall under a “no effect” determination, for the following reasons:

1. The allowable amount that can be applied is small (not more than 0.1% formulation and 0.02 lbs. per acre).
2. Data indicate that 1,2-benzisothiazolin-3-one breaks down quickly in aerobic soils (half-life < 24 hours in sandy loam soil).
3. 1,2-Benzisothiazolin-3-one s ready biodegradation in soil and small application result in minimal to no terrestrial or aquatic organism exposure.

b. General Risk Mitigation

BIT end-use products (EPs) may also contain other registered pesticides. Although the Agency is not proposing any mitigation measures for products containing BIT 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 BIT is eligible for reregistration provided that: (i) additional data that the Agency intends to require confirm this decision; and (ii) the risk mitigation measures outlined in this document are adopted, and (iii) label amendments are made to reflect these measures. The additional data requirements that the Agency intends to obtain will include, among other things, submission of the following:

For BIT 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 Rebecca M. Miller at (703) 305-0012 with questions regarding generic reregistration.

By US mail:
Document Processing Desk (DCI/AD)
Rebecca M. Miller
US EPA (7510C)
1200 Pennsylvania Ave., NW
Washington, DC 20460

By express or courier service:
Document Processing Desk (DCI/AD)
Rebecca M. Miller
Office of Pesticide Programs (7510C)
Room 266A, Crystal Mall 2
1801 S. Bell Street
Arlington, VA 22202

For end use products containing the active ingredient BIT, 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); and

5. if applicable, a completed form certifying compliance with cost share offer requirements (EPA Form 8570-32); and

6. the product-specific data responding to the PDCI.

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

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

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

A. Manufacturing Use Products

1. Additional Generic Data Requirements

The generic database supporting the reregistration of BIT 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. A generic data call-will be issued at a later date.

An acute inhalation study is required for the technical grade active ingredient based on new waiver criteria and advances in inhalation technology which nullified the previous waiver.

The chemical structure of BIT is not believed to be so closely related to CMIT/MIT that an argument can be made to bridge carcinogenicity data for CMIT/MIT to BIT. Therefore, EPA requires that the registrant submit carcinogenicity data for BIT to support the metal working fluid use. Conversely, the registrant may claim that a carcinogenicity study would not be required for the metalworking fluid use if the use is for "enclosed metalworking systems". Under this scenario, it has been determined that certain toxicology data requirements including carcinogenicity testing would be held in reserve pending review of worker exposure in such enclosed systems.

The Agency has established an interim two-tiered system for toxicology testing requirements. Tier I toxicology data requirements would apply to all indirect food additives that result in residue concentrations ranging from 0-200ppb which applied to BIT. The requirements would consist of an acute toxicity testing battery, subchronic toxicity study in the rodent, a developmental toxicity study in the rat, and a mutagenicity testing battery. Each of these data requirements has been fulfilled for BIT. The Agency also conducts a literature search and can also conduct a Structural Activity Review (SAR) if appropriate. The Agency also will hold in reserve a two-generation reproduction toxicity study in the rat and a subchronic toxicity studies in a non-rodent which would become data requirements if the Agency's evaluation of the Tier 1 data warranted. A 2-generation reproduction study is being held in reserve for BIT. A subchronic toxicity study in a non-rodent species is available for BIT.

Tier II studies would be triggered by the presence of significant (i.e. >200ppb) residues in food or evidence of significant toxicity from the Tier I data set, which may include developmental / reproductive, or other systemic toxicity such as presence of neoplastic growth or significant target organ toxicity. In such cases, chronic toxicity and carcinogenicity testing would be required.

The risk assessment noted deficiencies in the surrogate dermal and 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 based on professional judgments. Therefore, descriptions of human activities associated with the uses assessed are required as confirmatory.

To support the oil recovery uses of BIT, the following ecological effects data are needed:

850.1075 (Old 72-1) Freshwater fish acute toxicity test with a warmwater species, preferably Bluegill sunfish, using TGAI
850.1075 (old 72-3) Marine/estuarine fish acute toxicity test, preferably with Sheepshead minnow, using TGAI

Table 21. Confirmatory Data Requirements for Reregistration

Guideline Study Name	New OPPTS Guideline No.	Old Guideline No.
Acute Inhalation Toxicity, using TGAI	870.1300	81-3
Estuarine/Marine Fish Acute Toxicity, preferably with Sheepshead minnow, using TGAI	850.1075	72-3
Freshwater Fish Acute Toxicity with a warmwater species, preferably Bluegill sunfish, using TGAI	850.1075	72-1
Indoor Inhalation Exposure and Applicator Exposure Monitoring Data Reporting	875.1400 and 875.1600	234 and 236
Indoor Dermal Exposure and Applicator Exposure Monitoring Data Reporting	875.1200 and 875.1600	233 and 236
Descriptions of Human Activity	875.2800	133-1
Carcinogenicity	870.4200	83-2
Studies Held in Reserve		
2-Generation Reproduction	870.3800	83-4

2. Labeling for Technical and Manufacturing Use Products

To ensure compliance with FIFRA, technical and manufacturing use product (MP) labeling should be revised to comply with all current EPA regulations, PR Notices and applicable policies.

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

No specific labeling changes are necessary to implement measures outlined in Section IV above. However, to ensure compliance with FIFRA end use product (MP) labeling should be revised to comply with all current EPA regulations, PR Notices and applicable policies.