Proposed Re-evaluation Decision PRVD2020-07

Dazomet and Its Associated End-use Products, Used as a Preservative in Paints, Coatings and Related Uses

Consultation Document

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Proposed Re-evaluation Decision

Under the authority of the *Pest Control Products Act*, all registered pesticides must be regularly re-evaluated by Health Canada's Pest Management Regulatory Agency (PMRA) to ensure that they continue to meet current health and environmental safety standards and continue to have value. The re-evaluation considers data and information from pesticide manufacturers, published scientific reports, and other regulatory agencies. Health Canada applies internationally accepted risk assessment methods as well as current risk management approaches and policies.

This document forms part of a re-evaluation assessment of several active ingredients used as preservatives in paints, coatings and related uses. As per Re-evaluation Note REV2018-02, *Approach for the Re-Evaluation of Pesticides Used as Preservatives in Paints, Coatings and Related Uses*, the paint-related uses of sodium omadine, chlorothalonil, dazomet, folpet and ziram were evaluated separately from other uses and relied on data provided by the registrants and the Antimicrobial Exposure Assessment Task Force II (AEATF II). This approach was adopted in order to obtain and review paint-related studies, have risk assessments more reflective of current and realistic exposure scenarios and to allow for a consistent approach to the risk assessment and risk management for these uses.

This document presents the proposed regulatory decision for the re-evaluation of dazomet, used as a preservative in paints, coatings and related uses, including the proposed risk mitigation measures to further protect human health, as well as the science evaluation on which the proposed decision was based. All products registered in Canada containing dazomet for use as a preservative in paints, coatings and related uses are subject to this proposed re-evaluation decision. This document is subject to a 90-day public consultation period, during which the public including the pesticide manufacturers and stakeholders may submit written comments and additional information to Health Canada. The final re-evaluation decision will be published taking into consideration the comments and information received.

Dazomet is an "in-can" material preservative against bacterial and fungal contamination or spoilage of adhesives, adhesive coatings, latex paints, aqueous emulsions, coatings, slurries, paper, paper coatings, concrete admixtures and high viscosity suspensions. All other registered uses of dazomet (that is, as a non-selective pre-plant soil fumigant and a slimicide in industrial process fluids (for example, pulp and paper mills, recirculating water cooling towers, industrial air washers and oilfield industry)) were evaluated separately (Re-evaluation Decision RVD2018-34, *Dazomet and Its Associated End-use Products*).

Outcome of Science Evaluation

With respect to human health, risks of concern were identified for industrial manufacturers (primary handlers of dazomet as a material preservative and downstream postapplication workers) and for secondary handlers (professionals) applying dazomet-treated paint and building materials.

Therefore, mitigation measures for primary handlers (that is, closed transfer system for liquid formulations; additional personal protective equipment (PPE) for handling all solid formulations; a reduction in amount handled per person per day for soluble and wettable powders; and cancellation of the paper and paper coatings uses), and for secondary professional handlers (that is, reduction in the maximum rate of dazomet for all uses and additional PPE for professional painters using an airless sprayer) are proposed.

Proposed Regulatory Decision for Dazomet

Under the authority of the *Pest Control Products Act* and based on the evaluation of currently available scientific information, Health Canada is proposing that products containing dazomet for use as a material preservative are acceptable for continued registration in Canada, provided that the proposed risk mitigation measures are in place.

Human Health

To mitigate risks to primary (industrial manufacturing) and/or secondary (professional) handlers:

- Cancellation of the paper and paper coatings uses.
- Reduction of maximum label rates for all other uses to 0.53 g a.i./kg product.

To mitigate risks to primary handlers (mixers/loaders/applicators) in industrial manufacturing facilities, for all uses:

- For commercial-class solid products (wettable powder, soluble powder and granular):
    - Additional personal protective equipment (chemical-resistant coveralls over a long-sleeved shirt, long pants, chemical-resistant gloves, socks and chemical-resistant footwear, eye protection (goggles or a faceshield) and a respirator) when mixing/loading; and
    - Reduction in the amount of active ingredient handled per worker per day for wettable powder and soluble powder formulations to 3.36 kg a.i./person/day
- For commercial-class liquid products (solutions/suspensions/emulsifiable concentrates):
    - Closed transfer systems.

To mitigate risks to secondary (professional) handlers applying latex paints using an airless sprayer:

- Additional personal protective equipment (cotton coveralls over single-layer, chemical-resistant gloves, painter’s hat, respirator) coupled with an outreach/stewardship program.

International Context

Dazomet is currently acceptable for use in other Organisation for Economic Co-operation and Development (OECD) member countries, including the European Union, Australia, New Zealand, Mexico and the United States. No decision by an OECD-member country to prohibit all uses of dazomet for health or environmental reasons has been identified.

Next Steps

The public, including the registrants and stakeholders, are encouraged to submit additional information that could be used to refine risk assessments during the 90-day public consultation period[1] upon publication of this proposed re-evaluation decision.

All comments received during the 90-day public consultation period will be taken into consideration in preparation of the re-evaluation decision document[2], which could result in revised risk mitigation measures. The re-evaluation decision document will include the final re-evaluation decision, the reasons for it and a summary of comments received on the proposed re-evaluation decision with Health Canada's responses.

Additional Scientific Information

No additional scientific data are being requested. However, during the consultation period, the registrants and other stakeholders may consider submitting the following information that may address uncertainties in the available information database of dazomet and support refined risk assessment. In addition, stakeholders may consider providing information on risk management options for dazomet (for example, additional PPE, engineering controls).

The evaluation of any additional data would be based on the scientific merit and relevance to the risk assessment. While additional data may reduce uncertainty in the risk assessment, continued registration of any uses would be based on the acceptability of risk assessed using a science-based approach.

Additional detailed use description information and other data/information that may allow further refinement of the risk assessment:

- Refined daily amounts of paint manufactured and treated with preservatives in Canada
- Actual daily amounts of paint-related uses/building materials treated with preservatives and handled by professional secondary handlers
- Chemical-specific dermal absorption studies conducted with dazomet-treated paint formulations
- Chemical-specific air monitoring study measuring MITC air concentrations in paper mills using dazomet as a biocide in coating operations.

[1] "Consultation statement" as required by subsection 28(2) of the *Pest Control Products Act*.

[2] "Decision statement" as required by subsection 28(5) of the *Pest Control Products Act*.

Science Evaluation

1.0 Introduction

Dazomet is an “in-can” material preservative of adhesives, adhesive coatings, latex paints, aqueous emulsions, coatings, slurries, paper, paper coatings, concrete admixtures and high viscosity suspensions. All other registered uses of dazomet (that is, as a non-selective pre-plant soil fumigant and a slimicide in industrial process fluids (for example, pulp and paper mills, recirculating water cooling towers, industrial air washers and oilfield industry)) were evaluated separately (Proposed Re-evaluation Decision PRVD2018-09, *Dazomet and Its Associated End-use Products*; Re-evaluation Decision RVD2018-34, *Dazomet and Its Associated End-use Products*). Only human health (exposure) and value assessments related to the use of dazomet as a material preservative are presented herein. Environmental exposure from this use is expected to be minimal.

Appendix I lists all dazomet products that are registered for use as material preservatives under the authority of the *Pest Control Products Act*.

2.0 Human Health Assessment

Upon application, dazomet is broken down into several degradates, the primary being methyl isothiocyanate (MITC), which accounts for most of the pesticidal properties. Exposure to the parent, dazomet, or the degradate product (MITC), may occur to primary handlers working in industrial facilities (for example, while mixing, loading or treating products with dazomet), secondary handlers (downstream postapplication workers in industrial facilities, professional painters and residential painters) or to bystanders.

2.1 Toxicology Summary

See PRVD2018-09 and RVD2018-34.

2.2 Dietary Exposure and Risk Assessment

There are no food uses associated with the preservative uses of dazomet, therefore, no dietary exposure is anticipated.

2.3 Exposure from Drinking Water

Residues of dazomet in potential drinking water sources are not anticipated as a result of the preservative uses.

2.4 Residential and Occupational Exposure and Risk Assessment

Residential and occupational risk is estimated by comparing potential exposures with the most relevant endpoint from toxicology studies to calculate a margin of exposure (MOE). This is compared to a target MOE incorporating uncertainty factors protective of the most sensitive

subpopulation. If the calculated MOE is less than the target MOE, it does not necessarily mean that exposure will result in adverse effects, but mitigation measures to reduce risk would be required.

2.4.1 Toxicology Reference Values for Occupational and Residential Risk Assessment

Dermal Absorption

As per PRVD2018-09, a dermal absorption value of 13% for dazomet was determined to be acceptable for risk assessment purposes.

2.4.2 Residential Exposure and Risk Assessment

Residential risk assessment involves estimating risks to the general population, including youth and children, during or after pesticide application.

A residential applicator assessment for the dazomet preservative itself was not required since there are no registered domestic-class pesticide products for paint-related material preservatives. Residential handling of latex paint and building materials preserved with dazomet is considered a postapplication scenario.

The following postapplication scenarios were assessed:

- Individuals applying latex paints preserved with dazomet;
- Individuals applying building materials (adhesives, adhesive coatings, concrete admixtures, high viscosity suspensions, slurries) preserved with dazomet;
- Individuals who contact surfaces treated with paints and surfaces to which building materials preserved with dazomet have been applied; and

2.4.2.1 Residential Postapplication Exposure and Risk Assessment

Residential postapplication exposure occurs when an individual is exposed through dermal, inhalation and/or incidental oral (non-dietary ingestion) routes as a result of handling a product that has been treated with a pesticide, or being in a residential environment that has been previously treated with a pesticide.

There is potential for short-term exposure for residential handlers (≥ 16 years old) applying products preserved with dazomet. The following scenarios were assessed:

- Applying paints with paint brush and roller;
- Applying paints with an airless sprayer;
- Applying building materials; and
- Dermal contact with painted surfaces and surfaces to which building materials were applied

Paint Uses

Chemical-specific exposure data were not available for dazomet for the painting scenarios. However, a brush and roller study (PMRA# 2849401) and an airless sprayer study (PMRA# 3003682) were submitted by the Antimicrobial Exposure Assessment Task Force II (AEATF II).

The brush and roller study was designed to quantify dermal and inhalation exposures to both occupational and residential painters while applying paint, containing an antimicrobial, using a brush or roller. The study monitored 18 test subjects using a brush and/or roller in six identical rooms in a warehouse space. The surrogate non-volatile active ingredient used in this study was 1,2-benzisothiazolin-3-one (BIT). The total amount of paint handled (8.520 to 9.940 kg), the time spent while painting (48 to 172 min), and the surface area painted (25 to 82.5 m^2), were all measured. Dermal exposures were measured using inner and outer cotton whole body dosimeters, painter's hat, hand washes (all subjects did not wear gloves) and face and neck wipes. Inhalation exposures were measured using air sampling tubes. Separate dermal unit exposure values were generated for residential painters wearing a short-sleeved shirt and shorts and for occupational workers wearing a long-sleeved shirt, long pants and no gloves. The inhalation unit exposure values for both occupational and residential handlers were generated for each individual performing light activities. The total dermal and inhalation unit exposure values were presented as geometric means based on the arithmetic mean (AMu) of all test subjects.

The airless sprayer study was designed to quantify exposure to painters using airless sprayers. The study monitored 18 test subjects divided into 3 groups based on volume of paint sprayed (37.9 L, 56.8 L & 114 L). The surrogate active ingredient used in this study was propiconazole (PON). Within each group, subjects were subdivided into groups based on dose concentration (0.12% PON or 1.2% PON). All test subjects were occupational painters who had experience painting and handling airless sprayer equipment. The study was conducted in a warehouse facility constructed into three separate modules representing two residential spaces and one commercial office space. All subjects were required to open paint buckets, strain and pour the paint into the equipment and apply paint to the walls, ceiling and other surfaces of the modules. Test subjects wore a long-sleeved shirt and long pants over a 100% cotton dosimeter, as well as a half-face respirator, goggles, shoes and a painter's hat over a dosimeter placed on their head. The test subjects did not wear gloves. Dermal deposition was corrected to account for skin protected by a half-face respirator and goggles. Separate dermal unit exposure values were generated for residential painters wearing a short-sleeved shirt and shorts and for occupational workers wearing a long-sleeved shirt, long pants and no gloves. The inhalation unit exposure values for both occupational and residential handlers were generated for each individual performing light activities. The total dermal and inhalation unit exposure values were presented as the AMu of all test subjects. There were a number of limitations with the study; however, these did not preclude the use of this study to establish unit exposure values for painting with airless sprayers.

The unit exposure values from the brush and roller, and airless sprayer studies, were combined with the default amounts of paint handled per day from the USEPA 2012 Residential SOP (PMRA# 2409268), where a residential painter may apply up to two 1-gallon cans (7.58 L total) daily when using a brush and roller and approximately three 5-gallon cans (56.7 L total) when using an airless sprayer.

The dazomet risk assessments for residential handlers applying paint are summarized in Table 1 of Appendix II. Using the unit exposure values from these two studies, assuming the clothing scenario of a residential handler to be shorts and a short-sleeved shirt, together with the default amounts handled, calculated MOEs for dazomet for residential handlers applying latex paint met the target MOE and were therefore shown to be acceptable.

To determine the potential transfer of preservative residues from a painted surface, transferable residue studies (PMRA#s 2967976 and 2883917) were submitted by the AEATF II. The studies demonstrated that the transfer of residues onto the skin following contact with a painted surface is minimal. Hence exposure to dazomet is expected to be negligible. Based on the findings of these studies, a quantitative residential postapplication risk assessment for contact with a treated surface for dazomet used in paint was not required and the potential residential postapplication risk is considered to be acceptable.

Exposure to MITC (dazomet degradate):

Exposure to dazomet is expected to occur primarily through the dermal and inhalation route. Due to the volatile nature of MITC, the major route of residential exposure is expected to be by inhalation. No chemical-specific air monitoring data on MITC was available to assess the potential inhalation exposure to residential handlers applying paint treated with dazomet in an indoor setting. Using the inhalation unit exposure values from the AEATF II brush and roller or airless sprayer study is likely to underestimate the exposure to MITC based on its high vapour pressure (19 mm Hg at 25^{o}C). Therefore, the USEPA Wall Paint Exposure Model (WPEM) was used, where EPA-modelled concentrations (PMRA# 3087715) were proportionally extrapolated to the Canadian registered application rate. This estimates residential painter inhalation exposure to airborne concentrations of a chemical released from latex or alkyd primer/paint during the entire time of application. While the WPEM modelled airborne concentrations from painting in an indoor setting, MITC concentrations from painting outdoors are not expected to exceed those from painting indoors.

The MITC inhalation risk assessment demonstrated that the calculated MOE met the target MOE for MITC when residential handlers applied latex paint and coatings treated with dazomet, as summarized in Table 2 of Appendix II. In addition, based on the calculated MOEs for residential painters, risk from the MITC inhalation exposure to bystanders, including children, is not expected to be of concern.

Building Materials

In the case of building materials, no use description information was available. Therefore, the default amount of paint handled per day by a residential painter (7.58 L) was used as a surrogate for the amount of building materials handled. Likewise, in the absence of a scenario-specific exposure study, the total body unit exposure values from the brush and roller study were used as a surrogate for applying building materials.

The dazomet risk assessment for individuals applying treated building materials is summarized in Table 3 of Appendix II. Using the unit exposure values from the brush and roller study, assuming the clothing scenario to be shorts and a short-sleeved shirt, together with the default amounts handled, calculated MOEs for residential handlers applying all building materials met the target MOE at the maximum label rates and was therefore shown to be acceptable. Residues of MITC are not likely to become airborne when homeowners apply building materials, as they are likely to be bound to the matrix or to have dissipated between the time they were manufactured and when they were distributed in retail outlets. Therefore, inhalation exposure to MITC is expected to be limited when residential handlers apply building materials.

Dazomet preservatives are not expected to leach out of dried building materials, and MITC residues are not expected to become airborne once these building materials are applied and have dried. Therefore transfer of, and dermal postapplication exposure to, dazomet residues should be minimal. Likewise, postapplication inhalation exposure to MITC residues should be minimal.

Paper/paper coating

Residential postapplication exposure to dazomet can occur when adults, youth and children handle treated paper (arts and crafts, writing, reading, etc.). This use was not assessed, as potential risks of concern to downstream postapplication workers in manufacturing facilities were identified from the use of dazomet in paper and paper coatings (Refer to Section 2.4.3.2). Therefore, this use is proposed for cancellation.

Bystander Exposure

Bystander exposure is expected to be negligible for the preservative uses of dazomet.

2.4.3 Occupational Exposure and Risk Assessment

There is potential for exposure to dazomet and its degradate, MITC, in occupational scenarios when workers handle the pesticide during the mixing and loading process in industrial (manufacturing) settings, and for postapplication exposure to workers handling products treated with dazomet. Exposure to dazomet is expected to occur primarily through the dermal and inhalation route. Due to the volatile nature of MITC, the major route of occupational exposure is expected to be by inhalation.

2.4.3.1 Mixer, Loader and Applicator Exposure and Risk Assessment

For the commercial-class products used in paints (latex paints, aqueous emulsions, coatings), building materials (adhesives, adhesive coatings, slurries, concrete admixtures and high viscosity suspensions) and paper/paper coatings, there is potential for exposure to workers who handle dazomet during the manufacturing process.

Exposure to dazomet from its use in manufacturing facilities is expected to be long-term in duration (that is, >180 days), via the dermal and inhalation routes.

The commercial class products registered for use in the manufacturing of paints and building materials is formulated as liquids (solutions, suspensions and emulsifiable concentrates) and solids (wettable powder, soluble powder and granules). Therefore, the following scenarios were assessed:

- Mixing/transfer of liquids, open pour;
- Mixing/transfer of solids (powders and granules), open pour;

Chemical-specific exposure data were not available for dazomet for these scenarios. However, the liquid pour (PMRA#s 2296582 and 2296584) and solid pour (PMRA# 2834812) exposure studies were submitted by the AEATF II.

The liquid pour study was designed to determine the dermal and inhalation exposures to occupational workers during manual open pouring of a non-volatile liquid containing an antimicrobial product.

Three different liquid pouring scenarios were considered in the study: use of conventional containers with no design modifications, reduced-splash or "no-glug" containers and pouring into a trigger spray bottle. The trigger spray bottle scenario was not considered relevant to paint-related manufacturing. Two non-volatile active ingredients, formulated as soluble concentrates, didecyl dimethyl ammonium chloride (DDAC) and C^{14}-alkyl dimethyl benzyl ammonium chloride (C^{14}-ADBAC) were used. The conventional and reduced-splash container scenarios included pouring a range of various amounts of active ingredient handled at different heights using various sized pouring and receiving containers. In this study, 18 subjects that performed 36 monitoring events (MEs) using the two surrogate active ingredients were monitored for dermal and inhalation exposures. Eighteen MEs poured DDAC, and eighteen MEs poured C^{14}-ADBAC. Each subject performed two MEs, one for pouring from a conventional container and the second from a reduced-splash container. Container sizes were based on the typical product containers currently in the market. To account for different pouring heights the receiving containers were placed randomly either on a table or on the floor. The receiving container sizes were variable as well and ranged from 3.785 or 7.571 L buckets to 189 L low-walled plastic troughs.

Subjects wore inner and outer cotton dosimeters. An air sampling pump was attached to the belt of the subject, and an OVS air sampling tube was placed in the subject's breathing zone. The face and the neck were wiped with gauze. Exposure to the rest of the head was extrapolated based on the ratio of the surface area of the face/neck to that of the rest of the head (all subjects were provided with safety glasses). Hand washes were conducted following the removal of the gloves; residues on the chemical-resistant gloves were not quantified. Total dermal exposure was calculated by summing the residues on the inner and outer dosimeters (based on the clothing scenario), face/neck wipes and hand wash samples for each monitoring event (ME). Inhalation unit exposure values were generated for workers performing light activity, not wearing respiratory protection.

To assess occupational exposure for scenarios where individuals handled conventional and reduced-splash containers, dermal unit exposure values were generated based on a single layer (long-sleeved shirt and long pants) plus chemical-resistant gloves. However, unit exposure values

could not be generated for different levels of personal protective equipment, as exposure to the body was already minimal and below the level of quantification for most MEs. Therefore, adding additional protective equipment is not expected to significantly change exposure. The total dermal and inhalation unit exposure values for pouring from conventional containers and reduced-splash containers were presented as the AMu.

Similarly, the solid pour studies were designed to determine the dermal and inhalation exposures to occupational workers (primary handlers) when open pouring two different solid formulations (powder and granules) containing an antimicrobial.

Four different pouring scenarios were considered in this study. Two scenarios involved pouring powder and granular formulations in an occupational setting and the other two considered pouring powder and granular formulations in a residential setting. Study details are provided for the occupational scenarios only. The surrogate active ingredient used was cyanuric acid (1,3,5-triazine-2,4,6-triol, CAS number 108-80-5). Eighteen occupational workers poured the solid products into an indoor mix tank. Each subject was randomly assigned two monitoring numbers to account for two consecutive monitoring events, starting with the granules followed by the powder formulation to minimize the potential for cross contamination. All scenarios included manual pouring and/or scooping from different heights, using various sized containers.

Dermal exposure was measured using inner and outer cotton whole body dosimeters, hand washes, and face and neck wipes. All subjects were also given safety glasses and a dust mask. Subjects in the occupational scenario wore chemical-resistant gloves. Inhalation exposures were measured using IOM air sampling tubes (Institute of Occupational Medicine).

Separate dermal unit exposure values were generated for occupational workers wearing different levels of personal protective equipment. The inhalation unit exposure values for occupational handlers were generated for each individual performing light activities. The total dermal and inhalation unit exposure values were presented as the AMu of all test subjects.

The unit exposure values from the liquid and solid pour studies were combined with the default amounts of paint (used as a surrogate for building materials) treated per day by workers in manufacturing facilities to estimate exposures. The amounts of paint treated per day were based on the USEPA Antimicrobial Division Draft Summary of Amounts Handled or Treated for Occupational Handler Scenarios,[3] where it was assumed that facilities may treat up to 7571 L (9388 kg based on paint density of 1.24 kg/L) of paint per day.

The risk assessment for primary handlers (mixers/loaders) to dazomet is summarized in Table 1 of Appendix III. Calculated MOEs for mixing/transfer of liquids and solids did not reach the target MOE for dermal and inhalation exposure, and, therefore, risks were not shown to be acceptable. To mitigate this risk, the following mitigation measures are proposed:

[3] PMRA# 3084493. USEPA (2018). *Summary of Amounts Handled or Treated for Occupational Handler Scenarios*. EPA: Washington, DC.

- Require closed transfer systems for liquid formulations;
  Require a reduction in the maximum application rate to 0.53 g ai/kg product for all solid formulations;
- Require additional PPE (chemical-resistant coveralls over a long-sleeved shirt, long pants, chemical-resistant gloves, socks and chemical-resistant footwear, eye protection (goggles or a faceshield) and a respirator) for all solid formulations; and
- Require a reduction in the amount of dazomet handled to 3.36 kg ai/person/day for soluble and wettable powder formulations.

In addition to dazomet, mixer/loaders may also be exposed to MITC through the inhalation route. The risk from MITC to mixer/loaders is not expected to exceed that of dazomet, since the toxicological reference values for long-term inhalation exposure to dazomet and MITC are the same. As such, the risk mitigation measures required for dazomet are also adequate to mitigate the risk from MITC.

2.4.3.2 Postapplication Worker Exposure and Risk Assessment

Manufacturing facilities

Downstream postapplication workers in industrial settings are expected to be wearing PPE as required by law under occupational health and safety. The dazomet labels require that there be adequate ventilation in the manufacturing facilities. All these factors are expected to limit any potential exposure. Therefore, a quantitative dermal and inhalation risk assessment for dazomet and inhalation risk assessment for MITC for downstream workers in industrial facilities involved with the manufacturing of paints and building materials was not conducted.

However, the USEPA conducted a draft risk assessment (PMRA# 3087715) based on measured MITC air concentrations in paper mills using dazomet as a biocide for coating operations and stock preservation. Risks of concern were identified to downstream postapplication workers. While air monitoring information was not submitted to Health Canada, in the absence of this data and given the USEPA identified risk from MITC to downstream postapplication workers in paper mills, the paper and paper coatings uses are proposed for cancellation.

Secondary (Professional) Handlers

Exposure of workers (professional secondary handlers) to dazomet-treated paints (including coatings and aqueous emulsions), building materials (clay slurries, high viscosity suspensions and concrete admixtures) and paper/paper coatings were the postapplication occupational scenarios assessed in this review.

Paint Uses

There is potential exposure for professional painters applying latex paints preserved with dazomet.

Exposure to dazomet in paint is expected to be long-term in duration (that is >180 days), via the dermal and inhalation routes.

Based on the use pattern, the following major scenarios were identified for professional painters:

- Applying paints using paint brush and roller; and
- Applying paints using an airless sprayer.

The unit exposure values from the above brush and roller and airless sprayer exposure studies were combined with the default amounts of paint applied per day: 18.7 L per day (equivalent to 23.19 kg, based on paint density of 1.24 kg/L) using a brush and roller (2001 PMRA survey) and 120 L per day (equivalent to 232.5 kg, based on paint density of 1.24 kg/L) using an airless sprayer (PMRA# 2992785).

The dazomet risk assessment for professional painters is summarized in Table 2 of Appendix III. When applying paints, calculated MOEs did not meet the target MOEs when professional painters used a brush and roller or an airless sprayer. The risks to professional painters using brush and roller were shown to be acceptable when the maximum label rate was reduced to 0.53 g a.i./kg paint. When applying paint using an airless sprayer, risks were shown to be acceptable when the maximum label rate for paint was reduced to 0.53 g a.i./kg paint and professional painters wore additional PPE (cotton coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves, a painter's hat and respirator).

Based on the findings of the paint transferable residue studies, a quantitative occupational postapplication risk assessment for professional secondary handlers contacting a treated surface for dazomet used in paint was not required.

No chemical-specific air monitoring data on MITC was provided to assess the potential inhalation exposure to secondary (professional) handlers applying paints treated with dazomet in an indoor setting. Using the inhalation unit exposure values from the AEATF II brush and roller or airless sprayer studies is likely to underestimate the exposure to MITC based on its high vapour pressure. Therefore, the USEPA Wall Paint Exposure Model (WPEM) was used, where EPA-modelled concentrations (PMRA# 3087715) were proportionally extrapolated to the Canadian registered application rate. This estimates professional painter inhalation exposure to airborne concentrations of a chemical released from latex or alkyd primer/paint during the entire time of application. While the WPEM modelled airborne concentrations from painting in an indoor setting, MITC concentrations from painting outdoors are not expected to exceed those from painting indoors.

The MITC inhalation risk assessment demonstrated that the calculated MOE met the target MOE for MITC when professional secondary handlers (wearing additional PPE) applied latex paint and coatings treated with dazomet at 0.53 g a.i./kg paint, as summarized in Table 3 of Appendix III.

Building Materials

In the case of building materials, no use description information was provided. Therefore, the default amount of paint handled per day by a professional painter (18.7 L or 23.19 kg) was used as a surrogate for the amount of building materials handled. Likewise, in the absence of a scenario-specific exposure study, the total body unit exposure values from the brush and roller study were used as a surrogate for applying building materials.

The dazomet risk assessment for workers applying building materials is summarized in Table 4 of Appendix III. Using the unit exposure values from the brush and roller study, assuming the clothing scenario to be a long-sleeved shirt and long pants, together with the default amount handled, calculated MOEs for workers applying all building materials met the target MOE when reducing the maximum label rate to 0.53 g ai/kg of building material.

Residues of MITC are not likely to become airborne when professional handlers apply building materials as they are likely to be tightly bound to the matrix or would have dissipated from the time they were manufactured until they were distributed in retail outlets. Therefore, inhalation exposure to MITC is expected to be limited when professional handlers apply building materials.

Dazomet preservatives are not expected to leach out of dried adhesives, slurries and concrete admixtures, and MITC residues are not expected to become airborne once these building materials are applied and have dried. Therefore transfer of, and dermal postapplication exposure to, dazomet residues should be minimal. Likewise, inhalation postapplication exposure to MITC residues should be minimal.

Paper/paper coating

Occupational postapplication exposure to dazomet can occur for those industries where handlers work regularly with treated paper (packing, etc.). Since there are potential risks of concern associated with the use of dazomet in paper and paper coatings to downstream postapplication workers in manufacturing facilities and the paper and paper coatings use is proposed for cancellation, postapplication exposure to workers handling paper preserved/coated with dazomet was not assessed.

2.5 Aggregate Exposure and Risk Assessment

Aggregate exposure is the total exposure to a single pesticide that may occur from food, drinking water, residential and other non-occupational sources, and from all known or plausible exposure routes (oral, dermal and inhalation).

In an aggregate risk assessment, the combined potential risk associated with food, drinking water and various residential exposure pathways is assessed. A major consideration is the likelihood of co-occurrence of exposures. Additionally, only exposures from routes that share common toxicological endpoints can be aggregated.

The presence of dazomet or MITC in food or drinking water is expected to be minimal from soil fumigant uses. As paper and paper coatings uses are proposed for cancellation, none of the registered products will be used for food packaging materials. Therefore, an aggregate exposure and risk assessment is not required.

2.6 Cumulative Assessment

The *Pest Control Products Act* requires that the PMRA consider the cumulative exposure to pesticides with a common mechanism of toxicity. Metam sodium and metam potassium are non-selective pre-plant soil fumigants that break down to MITC, which is also a degradate of dazomet. The presence of MITC in food or drinking water is expected to be minimal from soil fumigant uses, and furthermore, the potential co-occurrence of exposure from applying treated paint and from dietary consumption on the same day is unlikely. Thus, there is no requirement for a cumulative risk assessment at this time.

2.7 Related Incident Reports

As of 20 December 2019, no human or domestic animal incidents involving dazomet as a material preservative were submitted to the PMRA.

3.0 Value Assessment

Dazomet is registered for a variety of uses as an “in-can” material preservative. It is incorporated into products during manufacturing, to provide protection from bacterial and fungal degradation.

This active ingredient is effective at controlling the various micro-organisms responsible for product degradation, when used as currently directed on the registered product labels.

Protection of these products is important to industry as degradation of the products can lead to a failure of the product to perform its intended purpose, discoloration, odour formation or other complications arising from bacterial or fungal growth.

4.0 Conclusion of Science Evaluation

4.1 Human Health

With respect to human health, the health risks associated with the use of dazomet and associated end-use products in the manufacturing of latex paints and building materials are shown to be acceptable with the proposed mitigation measures for these uses (see proposed revised label directions under Appendix IV). However, health risks associated with the use of dazomet and associated end-use products in the preservation of paper and paper coatings are of concern, and these uses are proposed for cancellation.

4.2 Value

Dazomet is used to control bacterial and fungal degradation in adhesives, adhesive coatings, latex paints, aqueous emulsions, coatings, slurries, paper, paper coatings, concrete admixtures and high viscosity suspensions, in order to prevent deleterious effects imposed on the product by the degrading organisms. Alternatives are available for industry to utilize.

List of Abbreviations

µg	microgram
AEATF II	Antimicrobial Exposure Assessment Taskforce II
ADBAC	alkyl dimethyl benzyl ammonium chloride
a.i.	active ingredient
AMu	geometric mean based on the arithmetic mean
BIT	1,2-benzisothiazolin-3-one
bw	body weight
CF	conversion factor
cm	centimeter(s)
DDAC	didecyl dimethyl ammonium chloride
g	gram(s)
kg	kilogram(s)
L	litre(s)
m	metre(s)
ME	monitoring event
mg	milligram(s)
min	minute(s)
mL	millilitre(s)
MOE	margin of exposure
NOAEL	no observed adverse effect level
PMRA	Pest Management Regulatory Agency
PON	propiconazole
PPE	personal protective equipment
PRVD	Proposed Re-evaluation Decision
REV	Re-evaluation Note
RVD	Re-evaluation Decision
USEPA	United States Environmental Protection Agency

Appendix I Products Used as Preservatives in Paints, Coatings and Related Uses

Table 1 Dazomet Products Used as Preservatives in Paints Coatings and Related Uses, as of 2 October 2019

Registrant	Registration Number	Product Name	Marketing Class
BASF Canada Inc.	19719	MYACIDE DZ	M
Buckman Laboratories of Canada Ltd.	25256	THION MICROBICIDE	T
	26404	BUSAN 1058 LIQUID MICROBICIDE	C
	27138	BUSAN 1124 MICROBICIDE	C
	27166	BUSAN 1059 WS	C
Dubois Chemicals Canada, Inc.	27830	B.I.O. BLAST 100S	C
Kemira Chemicals, Inc.	23295	AMA-35 D-C	T
	23954	AMA-35D-PC	C
	24065	AMA-20-C	C
	29739	AMA 424-C ANTIMICROBIAL AGENT	C
Lanxess Corporation	18873	N-521 BIOCIDE	T
	24755	N-521® PAC-24	C
	27171	N-521 DISPERSION	C
Nalco Canada ULC	14645	NALCON D3T-A	C
	14647	NALCON 7616	C
Solenis Canada ULC	27875	SPECTRUM RX3500	C

T = technical grade active ingredient; C = commercial; M = manufacturing concentrate;

Note: Discontinued products and products with submissions for discontinuation not included. Technical products where the registrant indicated that they did not support paint-related uses are not included.

Appendix II Non-Occupational (Residential) Risk Assessment

Table 1 Residential Painting Exposure and Risk Assessment (Short-Term)

Formulation Types	Scenario	Application rate (g a.i./kg paint)[a]	Amount handled per day (g a.i./day)[b]	Unit exposure value[c] (µg/kg a.i.)		Daily exposure[d] (mg/kg bw/day)			Margin of exposure (MOE)[e]		
				Dermal	Inhalation	Dermal	Inhalation	Combined	Dermal[f]	Inhalation[f]	Combined[g]
Shorts, short-sleeved shirt, no gloves											
All Formulations	Brush and roller	4.9	46	237445	17.30	0.018	0.00001	0.018	844	1506080	844
		0.53	5	237445	17.30	0.0019	0.000001	0.0019	7804	13924140	7799
	Airless sprayer	4.9	345	196244	2169	0.110	0.0093	0.119	137	1606	126
		0.53	37	196244	2169	0.012	0.0010	0.0129	1262	14847	1163

[a] Application rate = Maximum label rate for coatings (4.9 g a.i./kg) and the maximum rate at which occupational postapplication risks are acceptable (0.53 g a.i./kg; see Appendix III, Table 2).
[b] Amount handled per day for each use = Application rate × amount of paint handled/day (7.58 L for brush ad roller and 56.7 L for airless sprayer) × paint density (1.24 kg/L)
[c] Unit exposure values from AEATF II brush and roller and airless sprayer studies
[d] Daily exposure = [Amount handled per day × Unit exposure value × Absorption (13% for dermal or 100% for inhalation) × CF (1 mg/1000 µg) × CF (1 kg/1000 g)] /80 kg bw
[e] MOE = NOAEL/Daily exposure
[f] Dermal and inhalation NOAEL of 15 mg/kg bw/day from a rat oral toxicity study and target MOE of 100.
[g] Combined MOE = NOAEL/(dermal exposure + inhalation exposure) and target MOE of 100.

Table 2 Residential Painting Inhalation Exposure and Risk assessment to MITC (Short-term)

MITC application rate (ppm)[a]	Painted surface area (m^2)	Exposure period	EPA MITC air concentration (ppb)[b]	EPA MITC air concentration (mg/m^3)[c]	MITC air concentration (mg/m^3)[d]	Inhalation Rate[e] (m^3/hr)	Exposure time (hours)	Body Weight (kg)	Exposure[f] (mg/kg bw/day)	MOE
238	41.99	8-hour average	4.7	0.014	0.037	1	8	80	0.004	1450
238	41.99	24-hour average	2.4	0.007	0.019	1	24	80	0.006	947

[a] Conversion of 0.53 g dazomet/kg paint (530 ppm; the maximum rate at which occupational postapplication risks are acceptable) to MITC, based on the molecular weights, (i.e. 73.1 / 162.3 = 0.45)
[b] MITC air concentration modelled for dazomet application rate of 200 ppm (90 ppm MITC), from U.S. EPA (2018). Summary of Amounts Handled or Treated for Occupational Handler Scenarios (PMRA# 3084493).
[c] Concentration (mg/m^3) = Concentration (ppb)/(1000 ppb/ppm) × MW (73.1)/24.45
[d] MITC air concentration (mg/m^3) for 238 ppm MITC = EPA MITC air concentration (mg/m^3) × 238 ppm MITC/90 ppm MITC considering a linear relationship between dazomet application rate and MITC air concentration
[e] NAFTA, 1999
[f] Exposure = MITC air concentration (mg/m^3) × Inhalation rate (m^3/hr) × Exposure time (hr) / Body weight (kg)

[g] MOE = NOAEL / Exposure; where MITC NOAEL is 5.4 mg/kg bw/day from a rat inhalation study and target MOE of 100

Table 3 Residential Exposure and Risk Assessment from Handling Building Materials (Short-Term)

Scenario	Product Type	Application rate (g a.i./kg product)[a]	Amount handled per day (g a.i./day)[b]	Unit exposure value[c] (µg/kg a.i.)		Daily exposure[d] (mg/kg bw/day)			Margin of exposure (MOE)[e]		
				Dermal	Inhalation	Dermal	Inhalation	Combined	Dermal[f]	Inhalation[f]	Combined[g]
Shorts, short-sleeved shirt, no gloves											
Brush and roller	Adhesives, adhesive coatings, concrete admixtures, high viscosity suspensions, slurries	4.9	46	237445	17.30	0.018	0.00001	0.018	844	1506080	844
		0.53	4.98	237445	17.3	0.0019	0.000001	0.0019	7804	13924140	7799

[a] Application rate = Maximum label rate for adhesives (4.9 g a.i./kg) and the maximum rate at which occupational postapplication risks are acceptable (0.53 g a.i./kg; see Appendix III, Table 4).
[b] Amount handled per day = Application rate × amount of building material applied/day (7.58 L using brush and roller) × density (1.24 kg/L); both used as surrogate for building materials
[c] Unit exposure values from AEATF II brush and roller study
[d] Daily exposure = [Amount handled per day × Unit exposure value × Absorption (13% for dermal or 100% for inhalation) × CF (1 mg/1000 µg) × CF (1 kg/1000 g)]/80 kg bw
[e] MOE = NOAEL/Daily exposure
[f] Dermal and inhalation NOAEL of 15 mg/kg bw/day from a rat oral toxicity study and target MOE of 100.
[g] Combined MOE = NOAEL/(dermal exposure + inhalation exposure) and target MOE of 100.

Appendix III Occupational Risk Assessment

Table 1 Occupational Long-Term Exposure and Risk Assessment for Use of Dazomet in Manufacturing Facilities Using Liquid or Solid (Powder or Granules), Open Pour Scenario

Formulation Types	Application rate (g a.i./kg product)[a]	Amount handled per day (g a.i./day)[b]	Unit exposure value[c] (µg/kg a.i.)		Daily exposure[d] (mg/kg bw/day)			Margin of Exposure (MOE)[e]		
			Dermal	Inhalation	Dermal	Inhalation	Combined	Dermal[f]	Inhalation[f]	Combined[g]
Single layer, chemical-resistant gloves										
Solution	1.08	10139	1922	5.08	0.0317	0.0006	0.0323	11	543	11
	0.53	4976	1922	5.08	0.0155	0.0003	0.0159	23	1107	22
Granular	1.08	10120	134	199	0.0022	0.0252	0.0274	159	14	13
	0.53	4976	134	199	0.0011	0.0124	0.0135	322	28	26
Coveralls over single layer, gloves										
Soluble and Wettable Powder	4.9	46000	366	575.71	0.0274	0.3310	0.3584	13	1	1
	0.53	4976	366	575.71	0.0030	0.0358	0.0388	118	10	9
Chemical-resistant coveralls over single layer, chemical-resistant gloves, respirator										
Granular	1.08	10120	69	19.9	0.0011	0.0025	0.0037	308	139	96
	0.53	4976	69	19.9	0.0006	0.0012	0.0018	627	283	195
Soluble and Wettable Powder	4.9	46000	198	57.571	0.0148	0.0331	0.0479	24	11	7
	0.53	4976	198	57.571	0.0016	0.0036	0.0052	219	98	68
Soluble and Wettable Powder	n/a	3355	198	57.571	0.0011	0.0024	0.0035	324	145	100

Shaded cells indicate where the MOE is less than the target MOE (100)

[a] Application rate = Maximum label rate for each formulation type and the maximum rate at which occupational postapplication risks are acceptable (0.53 g a.i./kg; see Appendix III, Table 2).

[b] Amount handled per day for each use = Application rate × amount of paint or building material treated/day (7571 L) × paint density (1.24 kg/L; also used as surrogate for building materials)

[c] Unit exposure values from AEATF II liquid, solid (powder or granules) open pour study

[d] Daily exposure = [Amount handled per day × Unit exposure value × Absorption (13% for dermal or 100% for inhalation) × CF (1 mg/1000 µg) × CF (1 kg/1000 g)] /80 kg bw.

[e] MOE = NOAEL/Daily exposure

[f] Dermal and inhalation NOAEL of 0.35 mg/kg bw/day from a rat oral toxicity study and target MOE of 100.

[g] Combined MOE = NOAEL/(dermal exposure + inhalation exposure) and target MOE of 100.

Table 2 Professional Painter Long-Term Exposure and Risk Assessment to Dazomet

Formulation Types	Scenario	Application rate (g a.i./kg product)[a]	Amount handled per day (g a.i./day)[b]	Unit exposure value[c] (µg/kg a.i.)		Daily exposure[d] (mg/kg bw/day)			Margin of Exposure (MOE)[e]		
				Dermal	Inhalation	Dermal	Inhalation	Combined	Dermal[f]	Inhalation[f]	Combined[g]
All Formulations	Single layer, no gloves										
	Brush and roller	4.9	114	175871	17.3	0.0325	0.00002	0.0325	11	14245	11
		0.53	12	175871	17.3	0.0035	0.000003	0.0035	100	131696	100
	Airless sprayer	4.9	729	65937	2169	0.0781	0.0198	0.0979	4	18	4
		0.53	79	65937	2169	0.0085	0.0021	0.0106	41	164	33
	Cotton coveralls over single layer, chemical-resistant gloves, painter's hat, respirator										
	Airless sprayer	0.53	79	7402	217	0.0009	0.00021	0.0012	369	1637	301

Shaded cells indicate where the MOE is less than the target MOE (100)

[a] Application rate = Maximum label rate for coatings (4.9 g a.i./kg) and the maximum rate at which MOEs are acceptable (0.53 g a.i./kg).

[b] Amount handled per day for each use = Application rate × amount of paint applied/day (18.7 L using brush and roller and 120 L using airless sprayer) × paint density (1.24 kg/L)

[c] Unit exposure values from AEATF II brush and roller and airless sprayer studies

[d] Daily exposure = [Amount handled per day × Unit exposure value × Absorption (13% for dermal or 100% for inhalation) × CF (1 mg/1000 µg) × CF (1 kg/1000 g)] /80 kg bw.

[e] MOE = NOAEL/Daily exposure

[f] Dermal and inhalation NOAEL of 0.35 mg/kg bw/day from a rat oral toxicity study and target MOE of 100.

[g] Combined MOE = NOAEL/(dermal exposure + inhalation exposure) and target MOE of 100.

Table 3 Professional Painter Long-Term Exposure and Risk Assessment to MITC

MITC application rate (ppm)[a]	Painted surface area (m^2)	Exposure period	EPA MITC air concentration (ppb)[b]	EPA MITC air concentration (mg/m^3)[c]	MITC air concentration (mg/m^3)[d]	Inhalation Rate[e] (m^3/hr)	Exposure time (hours)	Body Weight (kg)	Exposure[f] (mg/kg bw/day)	MOE
238	197.97	8-hour average	10	0.030	0.079	1	8	80	0.008	44
Cotton coveralls over single-layer, chemical-resistant gloves, painter's hat, respirator										
238	197.97	8-hour average	10	0.030	0.079	1	8	80	0.0008	442

Shaded cells indicate where the MOE is less than the target MOE (100)

[a] Conversion of 0.53 g dazomet/kg paint (530 ppm; the maximum rate at which occupational postapplication risks are acceptable) to MITC, based on the molecular weights, (i.e. 73.1 / 162.3 = 0.45)

[b] MITC air concentration modelled for dazomet application rate of 200 ppm (90 ppm MITC), from U.S. EPA (2018). Summary of Amounts Handled or Treated for Occupational Handler Scenarios (PMRA# 3084493).

[c] Concentration (mg/m^3) = Concentration (ppb)/(1000 ppb/ppm) × MW (73.1)/24.45

[d] MITC air concentration (mg/m^3) for 238 ppm MITC = EPA MITC air concentration (mg/m^3) × 238 ppm MITC/90 ppm MITC considering a linear relationship between dazomet application rate and MITC air concentration

[e] NAFTA, 1999

[f] Exposure = MITC air concentration (mg/m^3) × Inhalation rate (m^3/hr) × Exposure time (hr) / Body weight (kg)

[g] MOE = NOAEL / Exposure; where MITC NOAEL is 0.35 mg/kg bw/day from a rat combined chronic toxicity/carcinogenicity study and target MOE of 100

Table 4 Professional Worker Long-Term Exposure and Risk Assessment from Handling Building Materials

Scenario	Product Type	Application rate (g a.i./kg product)[a]	Amount handled per day (g a.i./day)[b]	Unit exposure value[c] (µg/kg a.i.)		Daily exposure[d] (mg/kg bw/day)			Margin of exposure (MOE)[e]		
				Dermal	Inhalation	Dermal	Inhalation	Combined	Dermal[f]	Inhalation[f]	Combined[g]
Single layer, no gloves											
Brush and roller	Adhesives	4.9	114	175871	17.3	0.0325	0.00002	0.0325	11	14245	11
		0.53	12.3	175871	17.3	0.0035	0.000003	0.0035	100	131696	100

Shaded cells indicate where the MOE is less than the target MOE (100)

[a] Application rate = Maximum label rate for adhesives (4.9 g a.i./kg) and the maximum rate at which MOEs are acceptable (0.53 g a.i./kg).

[b] Amount handled per day for each use = Application rate × amount of building material applied/day (18.7 L) × density (1.24 kg/L); both used as surrogate for building materials

[c] Unit exposure values from AEATF II brush and roller study

[d] Daily exposure = [Amount handled per day × Unit exposure value × Absorption (13% for dermal or 100% for inhalation) × CF (1 mg/1000 µg) × CF (1 kg/1000 g)] /80 kg bw.

[e] MOE = NOAEL/Daily exposure

[f] Dermal and inhalation NOAEL of 0.35 mg/kg bw/day from a rat oral toxicity study and target MOE of 100.

[g] Combined MOE = NOAEL/(dermal exposure + inhalation exposure) and target MOE of 100.

Appendix IV Proposed Label Amendments for Products and New Labelling Required for Products Containing Dazomet

Information on labels of currently registered products should not be removed unless it contradicts the following label statements.

Cancellation of Uses

The uses of dazomet as a preservative in paper and paper coatings are proposed for cancellation. All references to these uses must be removed from end-use product labels.

PERSONAL PROTECTIVE EQUIPMENT

For All Commercial Class Liquid Products

Use a closed transfer system when mixing and loading.

For All Commercial Class Solid Products

Wear chemical-resistant coveralls over a long-sleeved shirt, long pants, chemical-resistant gloves, socks and chemical-resistant footwear, eye protection (goggles or a faceshield) and a respirator with a NIOSH-approved organic-vapour-removing cartridge with a prefilter approved for pesticides, or a NIOSH-approved canister approved for pesticides during mixing, loading, clean-up and repair.

For All Commercial Class Wettable Powder and Soluble Powder Formulations

Limit the amount of active ingredient handled to 3.36 kg per person per day. These restrictions are in place to minimize exposure to individual handlers. Application may need to be performed over multiple days or by using multiple handlers.

Manufactured paint products (EPs) containing the preservative dazomet must be labelled with the following information:

Professional painters USING AN AIRLESS SPRAYER must wear cotton coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves, a painter's hat, and a respirator with a NIOSH-approved organic-vapour-removing cartridge with a prefilter approved for pesticides, or a NIOSH-approved canister approved for pesticides during paint application.

DIRECTIONS FOR USE

For all registered uses:

The maximum application rate must not exceed 0.53 g a.i./kg product.

References

A. Information Considered for the Occupational and Residential Assessment

Published Information

PMRA Document Number	Reference
2409268	U.S. EPA (2012a). Standard Operating Procedures for Residential Pesticide Exposure Assessment. EPA: Washington, DC. Revised October 2012. Section 10.
3087715	USEPA (2018). Dazomet Registration Review Antimicrobial Occupational and Residential Exposure Draft Risk Assessment. September 27, 2018. Case 2135. Document ID: EPA-HQ-OPP-2013-0080-0024

AEATF II Studies:

PMRA Document Number	Reference
2834812	A Study for Measurement of Potential Dermal and Inhalation Exposure During Manual Pouring of Two Solid Formulations Containing an Antimicrobial. American Chemistry Council, Antimicrobial Exposure Assessment Task Force II, Washington, DC. (AEATF II) Project ID: AEA07.
2296582	A Study for Measurement of Potential Dermal and Inhalation Exposure during Manual Pouring of a Liquid Containing an Antimicrobial. American Chemistry Council, Antimicrobial Exposure Assessment Task Force II, Washington, DC. (AEATF II) Project ID: AEA05.
2849401	A Study for Measurement of Potential Dermal and Inhalation Exposure During Application of a Latex Paint Containing an Antimicrobial Pesticide Product Using a Brush and Roller for Indoor Surface Painting. Antimicrobial Exposure Assessment Task Force II (AEATF II), Washington, DC. January 31, 2018 (AEATF II) Project ID: AEA09.
3003682	A Study for Measurement of Potential Dermal and Inhalation Exposure During the Application of Paint Containing an Antimicrobial using an Airless Sprayer. American Chemistry Council, Antimicrobial Exposure Assessment Task Force II, Washington, DC. (AEATF II) Project ID: AEA10.
2967976	Analysis of Propiconazole Used as an In-Can Paint Preservative in Wall Wipe Samples Collected from Dried Paint During An Airless Paint Monitoring Study. American Chemistry Council, Antimicrobial Exposure Assessment Task Force II (AEATF II). (AEATF II) Project ID: AEA10.
2883917	Analysis of 1,2-Benzisothiazolin-3-one (BIT) in Background Wall Wipe Samples from Indoor Wall Surfaces Painted with Latex Paint Using a Brush and Roller (Non-GLP). Antimicrobial Exposure Assessment Taskforce II (AEATF II), Washington, DC. (AEATF II) Project ID: AEA19.

2296584	A Study for Measurement of Potential Dermal and Inhalation Exposure During Manual Pouring of a Liquid Containing an Antimicrobial. Supplemental Report – Supplement 1, Antimicrobial Exposure Assessment Task Force II, Washington, DC. (AEATF II) Project ID: AEA05.
2992785	2017, Study Design: A Study for Measurement of Potential Dermal and Inhalation Exposure During the Application of Paint Containing an Antimicrobial using an Airless Sprayer. American Chemistry Council, Antimicrobial Exposure Assessment Task Force II, Washington, DC. (AEATF II) Project ID: AEA10.