Re-evaluation Decision RVD2018-35

Cyfluthrin and Its Associated End-use Products

Final Decision

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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. The PMRA applies internationally accepted risk assessment methods as well as current risk management approaches and policies.

Cyfluthrin is a synthetic pyrethroid insecticide. There are two technical grade active ingredients, three commercial class and four domestic class end-use products registered. The commercial class cyfluthrin products, targeting flying and crawling insects, are applied by pest control applicators to residential and commercial sites using hand pressurized and power operated sprayers. They are also applied by farmers to livestock housing structures. The other commercial products are for use by the cattle industry as a pour-on to control horn fly and lice, or as an insecticide-impregnated ear tag for horn fly control. The domestic products are available as pressurized spray cans for use indoors to target household pests such as ants, earwigs, cockroaches and spiders. Currently registered products containing cyfluthrin are listed in Appendix I.

This document presents the final regulatory decision[1] for the re-evaluation of cyfluthrin, including the required risk mitigation measures to protect human health and the environment. All products containing cyfluthrin that are registered in Canada are subject to this re-evaluation decision. This re-evaluation decision has undergone a 90-day consultation period on the Proposed Re-evaluation Decision PRVD2016-17, *Cyfluthrin*[2] in which continued registration of cyfluthrin was proposed with requirements of new risk-reduction measures for the commercial-class end-use products registered in Canada. Based on potential risks of concern for residential exposure, all domestic-class products and certain residential uses of the commercial-class products were proposed for cancellation. The consultation period ended on 15 December 2016.

Health Canada received comments relating to the health risk and value assessments. These comments are summarized in Appendix II along with the responses by Health Canada. The comments and new information resulted in revisions to the risk assessments (see Science Evaluation Update section), and subsequently, in changes to the proposed regulatory decision as described in PRVD2016-17. A reference list of data used as the basis for the proposed re-evaluation decision is included in PRVD2016-17, and further data used in the re-evaluation decision is listed in Appendix XI of this RVD.

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

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

Regulatory Decision for Cyfluthrin

Health Canada has completed the re-evaluation of cyfluthrin. Under the authority of the *Pest Control Products Act*, Health Canada has determined that continued registration of products containing cyfluthrin is acceptable. An evaluation of available scientific information found that uses of cyfluthrin products meet current standards for protection of human health and the environment when used according to the conditions of registration, which include required amendments to label directions. Label amendments listed in Appendix III, are required for all technical and end-use products. No additional data are requested.

Risk Mitigation Measures

Registered pesticide product labels include specific instructions for use. Directions include risk reduction measures to protect human and environmental health. These directions must be followed by law. The key risk-reduction measures required, as a result of the re-evaluation of cyfluthrin, are summarized below.

Human Health

Commercial Class Product (Tempo 20 WP):

- To address the potential for respiratory effects identified in incident reports reviewed by Health Canada and to ensure consistency with the approach taken for the recently approved commercial-class products containing *beta*-cyfluthrin (Registration Decision RD2017-01):
    - The re-entry interval of 8 hours proposed in PRVD2016-17 will be reduced to 6 hours.
    - Commercial applicators will be required to ventilate after application.
    - Commercial applicators will be required to post or give an information sheet to occupants (informing them of the product that was applied, the re-entry interval, and potential adverse effects and what to do if they experience these effects).
- The label statements must be updated to include the potential adverse effects and what to do if occupants experience these effects.
- To clarify use directions, label statements for the agricultural use in livestock housing, for which broadcast application is permitted, must be separated from the label statements for all other indoor uses for which broadcast application is prohibited.
- A label statement must be added to clarify that broadcast application is not permitted for indoor uses, with the exception of livestock housing.
- A label statement must be added to clarify that application to furniture, mattresses, linens, pet bedding, toys or clothing is not permitted.

Domestic Class Products:

- To address the potential for respiratory effects identified in incident reports:
    - A label statement directing users to ventilate treated areas must be added.
    - The label statements must be updated to include the potential adverse effects and what to do if occupants experience these effects. This information is required because, unlike the commercial-class products that require the applicators to post or give an information sheet to occupants with the necessary information, the domestic-class products are applied by the occupants.
- Since only spot treatment is allowed, label statements prohibiting all other types of applications (general surface spray/broadcast, space spray, and perimeter) and defining spot application must be added.

Environment

Precautionary statements are required to inform users of potential toxic effects on aquatic organisms and mammals.

Next Steps

To comply with this decision, the required mitigation measures must be implemented on all product labels sold by registrants no later than 24 months after the publication date of this decision document. Appendix I lists the products containing cyfluthrin that are registered under the authority of the *Pest Control Products Act*.

Other Information

Any person may file a notice of objection[3] regarding this decision on cyfluthrin within 60 days from the date of publication of this Re-evaluation Decision. For more information regarding the basis for objecting (which must be based on scientific grounds), please refer to the Pesticides section of Canada.ca (Request a Reconsideration of Decision) or contact the PMRA's Pest Management Information Service.

[3] As per subsection 35(1) of the *Pest Control Products Act.*

Science Evaluation Update

1.0 Revised Health Risk Assessment

1.1 Toxicology Assessment for Cyfluthrin

The initial toxicological assessment for cyfluthrin was presented in the Proposed Re-evaluation Decision (PRVD2016-17). Comments were received from the technical product registrant regarding the value used as the point of departure for the acute and repeat oral/dietary risk assessments. Although Health Canada did not concur with all of the registrant comments, it did consider revising the point of departure for both the acute and repeat-dose scenarios to be scientifically valid; accordingly, the point of departure of 0.5 mg/kg bw(/day), as presented in PRVD2016-17, was modified to 1.4 mg/kg bw(/day) for the acute reference dose, acceptable daily intake, short-term non-dietary oral risk assessment and short- and intermediate-term aggregate assessments. The comments relating to the toxicology assessment are summarized in Appendix II with the associated response. Revised reference values are denoted with an asterisk in Appendix IV.

1.2 Dietary Exposure and Risk Assessment

The initial dietary risk assessment for cyfluthrin was presented in PRVD2016-17. Dietary risks of concern were identified from exposure to cyfluthrin; milk was the major risk driver for the most sensitive subpopulation (children 1–2 years old). To mitigate the potential dietary risks, Health Canada had proposed that the use of cyfluthrin on lactating dairy cattle be prohibited (both spot-on and ear tag products), and the Maximum Residue Limits (MRLs) for cyfluthrin in milk and milk fat be revoked.

In response to PRVD2016-17, comments were received from the registrant to consider further refinements (for example, percent livestock treated) for the dietary exposure assessment. These comments and Health Canada's responses are summarized in Appendix II.

The dietary risk assessment was revised to include the updated toxicological reference values (acute reference dose and acceptable daily intake) and updated percent livestock treated estimates. No dietary risks of concern were identified. Therefore, the use of cyfluthrin on lactating dairy cattle is acceptable. The detailed results of the updated dietary risk assessment are presented in Appendix V.

Maximum Residue Limits (MRLs)

Canadian MRLs are currently established for cyfluthrin residues in milk and animal commodities. In PRVD2016-07, MRLs for cyfluthrin in milk and milk fat were proposed to be revoked due to dietary risks of concern. Since the updated dietary risk assessment did not result in risks of concern, MRLs for cyfluthrin in milk and milk fat will be maintained.

1.3 Occupational and Residential Risk Assessment

In PRVD2016-17, risks of concern to children from incidental oral exposure were identified and the following risk mitigation measures were proposed:

- All domestic-class products to be cancelled.
- For the commercial-class product, Tempo, application in residential areas to be limited to crack & crevice/void only, and use for bedbug treatment to be cancelled.

Comments were received from the registrant and other stakeholders. These comments and Health Canada's responses are summarized in Appendix II. These comments did not directly impact the occupational and residential risk assessments. However, the occupational handler assessment was updated to include the new dermal unit exposure value derived from the passive dosimetry study submitted by the registrant (PMRA No. 2449137), and the residential incidental oral risk assessment was updated to include the new toxicological incidental oral point of departure and a refined hand-to-mouth equation. No risks of concern were identified (see Appendices VI–VIII). Therefore, cancellation of all domestic-class products is no longer required. Label statements to clarify the use as a spot treatment only are required, including the definition of spot treatment. For the commercial-class product, Tempo, perimeter applications are permitted. In addition, bedbug treatment can be retained, with a label statement clarifying that the product cannot be used on furniture and mattresses. A summary of specific label amendments required is provided in Appendix III.

1.4 Aggregate Exposure and Risk Assessment

The aggregate risk assessment in PRVD2016-17 was updated to include the residential uses which now have acceptable risk, that is, spot and perimeter application of the commercial-class product and spot treatment only of the domestic-class products. No risks of concern were identified (see Appendix IX).

2.0 Revised Environmental Risk Assessment

The registered uses of cyfluthrin (indoors as a domestic and commercial insecticide and outdoors as a commercial livestock pour-on and ear tag) are expected to result in minimal environmental exposure. As a result, when used according to the label, the environmental risks of this product are considered to be acceptable. Due to the inherent toxicity of cyfluthrin, label statements indicating toxicity to small mammals and aquatic organisms are required.

3.0 Incident Reports

Since the publication of PRVD2016-17, Health Canada has received 14 additional human incidents related to the active ingredient cyfluthrin or *beta*-cyfluthrin. Therefore, as of 22 May 2018, 49 human incidents had been submitted to Health Canada. Thirty-three of these incidents involving 64 individuals were considered to be associated with cyfluthrin or *beta*-cyfluthrin. Most of the incidents were minor or moderate in severity. Signs reported included coughing, wheezing, respiratory irritation, vomiting, nausea, and headache. More than half (37/64) of the

individuals reported respiratory effects. In two Canadian incidents classified as major, serious and/or long-lasting respiratory effects were reported. Incidents were reported with both commercial and domestic class products, and effects were observed both during application and when individuals re-entered a treated area up to 24 hours after the product was applied. Similar trends were observed in the United States, in which there was a high frequency of reports involving respiratory effects after individuals entered areas treated with cyfluthrin or *beta*-cyfluthrin.

To address the potential for respiratory effects identified in incident reports, the risk mitigation measures proposed in PRVD2016-17 for commercial class products are now required. The re-entry interval of 8 hours proposed in PRVD2016-17 will be reduced to 6 hours. The Agency has determined that this reduction is appropriate given the overall required risk mitigation, which includes ensuring adequate ventilation and the requirement for applicators to post or give to occupants an information sheet for each treated home/structure so that occupants are informed of the product that was applied, the re-entry interval, and potential adverse effects that may be experienced after exposure. Combined, these measures should address the potential for respiratory effects when the product is applied according to label directions. Furthermore, potential adverse effects will be listed on the commercial class product labels and the label will specify that an information sheet must be posted in each treated home/structure or provided to the occupant, so that all occupants are aware of re-entry intervals, the need to ventilate, and potential adverse effects that may be experienced from exposure to cyfluthrin (see Appendix X).

Since only spot treatment is allowed on the domestic-class products, label statements prohibiting all other types of applications (general surface spray/broadcast, space spray, and perimeter) will be added along with a definition of spot application (see Occupational and Residential Exposure section and Appendix III). Taking into account how domestic class products are used, while a specific time for re-entry and an information sheet are not required, the labels will continue to require the inclusion of the statement: “Do not allow adults, children or pets to enter the treated area until sprays have dried.” Additional label statements will also be added to domestic class product labels directing users to ventilate treated areas (as required for the commercial class products) and describing the potential adverse effects and what to do if users or occupants experience these effects. This information is required because, unlike the commercial-class products that require the applicators to post or give an information sheet to occupants with the necessary information, the domestic-class products are applied by the occupants.

See Appendix II for a summary of comments related to incident reports received during the consultation process, as well as Health Canada’s response to these comments.

3.1 Environmental Incident Reports

There have been no environmental incidents involving cyfluthrin reported to Health Canada.

List of Abbreviations

ADI	acceptable daily intake
a.i.	active ingredient
ARfD	acute reference dose
BMDL	benchmark dose lower confidence limit
bw	bodyweight
CAF	composite assessment factor
CPMA	Canadian Pest Management Association
DIR	regulatory directive
g	gram(s)
kg	kilogram(s)
L	litre(s)
LOAEL	lowest observed adverse effect level
m	metre(s)
mg	milligram(s)
mg/L	milligrams per litre
MOE	margin of exposure
MRL	maximum residue limit
NIOSH	National Institute for Occupational Safety and Health
NOAEC	no observed adverse effect concentration
NOAEL	no observed adverse effect level
PCPA	Pest Control Products Act
PHED	Pesticide Exposure Handlers Database
PMRA	Pest Management Regulatory Agency
PRD	proposed registration decision
PRVD	proposed re-evaluation decision
RD	registration decision
Reg. No.	PCPA registration number
SOP	standard operating procedure
USEPA	United States Environmental Protection Agency
µg	microgram

Appendix I Products Containing Cyfluthrin Registered in Canada as of 22 May 2018

Registration Number	Marketing Class	Registrant	Product Name	Formulation Type	ACTIVE INGREDIENT
23939	Technical	Bayer CropScience Inc.	Cyfluthrin Technical Insecticide	Not applicable	95.6% cyfluthrin
25672	Technical	Bayer CropScience Inc.	Cyfluthrin Technical	Not applicable	98.0% cyfluthrin
25673	Commercial	Bayer CropScience Inc.	Tempo 20 WP Insecticide	Wettable powder	20.0% cyfluthrin
25674	Commercial	Bayer Inc.	Cylence Pour-On Insecticide	Solution	1.0% cyfluthrin
26880	Commercial	Bayer Inc.	Cylent Gold Insecticide Cattle Ear Tag	Slow Release Generator	10.0% cyfluthrin
30355	Domestic	S.C. Johnson And Son Ltd	Raid® Ant Roach & Earwig Bug Killer 19	Pressurized product	0.05% cyfluthrin, 0.2% pyrethrins, 0.48% piperonyl butoxide
30356	Domestic	S.C. Johnson And Son Ltd	Raid® Spider Blaster Bug Killer 4	Pressurized product	0.05% cyfluthrin, 0.2% pyrethrins, 0.48% piperonyl butoxide
30357	Domestic	S.C Johnson And Son Ltd	Raid Max® Crawling Insect Bug Killer 3	Pressurized product	0.05% cyfluthrin, 0.2% pyrethrins, 0.48% piperonyl butoxide
30640	Domestic	S.C. Johnson And Son Ltd	Raid® Max Spider Blaster Bug Killer	Pressurized product	0.05% cyfluthrin, 0.2% pyrethrins, 0.48% piperonyl butoxide

Appendix II Comments and Responses

In response to the consultation for the cyfluthrin proposed re-evaluation decision (PRVD2016-17), the following comments were received:

1.0 Comments Related to the Health Risk Assessment

Health Canada received comments related to the health risk assessment primarily from the registrant of technical cyfluthrin (Bayer CropScience), the Canadian Pest Management Association (CPMA) and the Canadian Animal Health Institute. Comments related to the health risk assessment and Health Canada's responses are summarized in this appendix.

1.1 Toxicology

1.1.1 Selection of the NOAEL in the acute neurotoxicity study

A comment was received which expressed disagreement with the Health Canada's selection of the NOAEL of 0.5 mg/kg bw from the guideline oral gavage acute neurotoxicity study as the point of departure for the acute and repeat oral/dietary risk assessments. The commenter considered the findings cited by Health Canada at the LOAEL of 2 mg/kg bw in this study not toxicologically significant. In addition, they indicated that at a given level of exposure, bolus gavage dosing results in greater acute toxicity compared to human-relevant dietary or hand-to-mouth exposures. Finally, it was suggested that the vehicle (Cremophor EL) used in the acute neurotoxicity study exacerbates the acute toxicity of *beta*-cyfluthrin, compared to other vehicles or dietary exposure. For the above-noted reasons, the commenter considered the endpoint selected by Health Canada as overly conservative.

Health Canada Response:
In the guideline acute neurotoxicity study in rats conducted with *beta*-cyfluthrin the following effects were observed at the 2 mg/kg bw dose level: decreased motor and locomotor activity in a figure-eight maze in females (motor and locomotor activity were decreased by 32% and 36%, respectively, relative to controls), perianal staining (both sexes), and changes in FOB parameters (decreased approach response and oral stains in males and decreased activity in the open field in females). All of these effects were considered by the Health Canada to be treatment-related and adverse. As a point of note, the study authors also considered the decreased motor and locomotor activity in females at 2 mg/kg bw/day to be biologically significant.

Health Canada is of the opinion that the results obtained from studies using bolus gavage dosing are relevant for use in certain dietary and hand-to-mouth exposure scenarios. It is standard regulatory practice to consider these studies relevant for use in risk assessment.

Health Canada acknowledges the comment that the Cremophor EL vehicle enhanced absorption of *beta*-cyfluthrin, thus exacerbating toxicity. As noted in PRVD2016-17, *Cyfluthrin*, data were available which demonstrated that following oral gavage dosing, the rate and extent of absorption of cyfluthrin was increased when it was administered in Cremophor EL compared to polyethylene glycol. While it is not uncommon for vehicles to play a role in modulating pyrethroid toxicity, in the case of Cremophor EL, the enhancement of cyfluthrin toxicity was considerable.

The initial selection of the NOAEL of 0.5 mg/kg bw from the acute neurotoxicity study was supported by a $BMDL_{20}$ of 1.4 mg/kg bw generated from motor activity data in a published non-guideline acute neurotoxicity study (Wolansky *et al.*, 2006) which used corn oil as the vehicle. Given i) that the vehicle may have led to a conservative NOAEL for neurotoxicity and, ii) that the $BMDL_{20}$ falls between the NOAEL and LOAEL established by the PMRA for the guideline acute neurotoxicity study, Health Canada considers it scientifically valid to revise the point of departure selected for risk assessment. Accordingly, the $BMDL_{20}$ of 1.4 mg/kg bw from the Wolansky study is now selected by Health Canada as the point of departure for use in the risk assessments for both the acute and repeat-dose scenarios (acute reference dose, acceptable daily intake, short-term non-dietary oral risk assessment, short- and intermediate-term aggregate assessments).

1.1.2 The use of the NOAEL from an acute neurotoxicity study for use in the repeat-exposure oral/dietary risk assessments

A comment was received which expressed disagreement with the use of the results from an acute neurotoxicity study for repeat-exposure oral/dietary risk assessment. It was noted that the principal effect observed with *beta*-cyfluthrin is transient evidence of acute neurotoxicity, with limited or no evidence of cumulative toxicity. The commenter therefore felt that the use of a point of departure from an acute neurotoxicity study was overly conservative for a repeat-dose exposure scenario.

Health Canada Response:
Notwithstanding the issue of cumulative toxicity, it is necessary to protect for transient effects following either single or repeat exposures to a pesticide. The $BMDL_{20}$ of 1.4 mg/kg bw/day for motor activity from the acute oral neurotoxicity investigation by Wolansky *et al.* (2006) is the lowest point of departure in the *beta*-cyfluthrin/cyfluthrin database and is thus considered protective of all repeat-dose exposure scenarios. From a risk perspective, it would also not be appropriate to establish a higher point of departure for a repeat-dose scenario than for an acute scenario. For this reason, Health Canada considers the use of this point of departure appropriate for use in the repeat-exposure oral/dietary risk assessments.

1.1.3 Harmonization of endpoints with the USEPA

A comment was received requesting that Health Canada harmonize toxicology endpoints for risk assessment with those established by the USEPA. The USEPA selected the NOAELs of 2 mg/kg bw from the acute neurotoxicity study in rats and 2.36 mg/kg bw/day from the 90-day dietary study in dogs for the acute and repeat-exposure risk assessments, respectively.

Health Canada Response:
Health Canada takes into consideration points of departure established by other recognized pesticide regulatory authorities such as the USEPA during the evaluation process, but may not always concur on the selection of points of departure for risk assessment. Health Canada has revised the point of departure for the acute- and repeat-dose scenarios (acute reference dose, acceptable daily intake, short-term non-dietary oral risk assessment, short- and intermediate-term aggregate assessments), based on the scientific reasons discussed above. The revised Health Canada toxicology reference values are listed in Table 1of Appendix IV. Reference values that have been revised are marked with an asterisk (*).

1.2 Dietary Exposure

1.2.1 The use of cyfluthrin on lactating dairy cattle

Comments were received from the registrant indicating that this use does not present a dietary risk when further refinements, such as percent livestock treated, are considered.

Health Canada Response:
In PRVD2016-17, dietary risks of concern were identified from exposure to cyfluthrin; milk was the major risk driver for the most sensitive subpopulation (children 1–2 years old). To mitigate the potential dietary risks, Health Canada had proposed that the use of cyfluthrin on lactating dairy cattle be prohibited (both spot-on and ear tag products), and that MRLs for cyfluthrin in milk and milk fat be revoked. The dietary risk assessment was revised to include the updated toxicological reference values (acute reference dose and acceptable daily intake) and updated percent livestock treated estimates. Since no dietary risks of concern were identified, the use of cyfluthrin on lactating dairy cattle will continue to be permitted as per the current label directions, and MRLs for cyfluthrin in milk and milk fat will be maintained.

1.3 Occupational Exposure

1.3.1 Passive dosimetry study submitted by the registrant

A comment was received from the registrant stating that the handler risk assessment for pest control operators utilized the data from the Pesticide Exposure Handlers Database rather than the cyfluthrin pest control operator observational exposure study that was submitted by the registrant. In PRVD2016-17, Health Canada acknowledged receipt of the study (PMRA No. 2449137) after the completion of the assessment of cyfluthrin, and committed to review the study for relevance prior to issuing a final re-evaluation decision for cyfluthrin.

Health Canada Response:
This study, which monitored worker exposure during mixing, loading and applying liquid structural pest control products indoors using a manually pressurized hand wand was reviewed by Health Canada. The occupational handler assessment was revised to include the new dermal unit exposure value derived from the study. The risk conclusions did not change from PRVD2016-17, that is, no risks of concern were identified (see Appendix VIII).

1.4 Residential Exposure

1.4.1 Bedbug treatments in residential sites

The CPMA opposed the proposed cancellation of cyfluthrin bedbug treatment in residential sites and suggested instead that the use in residential and non-residential sites be restricted to crack and crevice/void applications only.

Health Canada Response:
In order to estimate exposure from bedbug application to specific sites, an application rate is required. The current label does not provide an application rate for bedbug treatment in terms of product applied per surface area. Therefore, default application rates derived from the USEPA

Residential SOPs (USEPA, 2012) for coarse and pin stream applications were used in PRVD2016-17. Risks were identified for children from hand-to-mouth exposure. The residential assessment has now been updated using the new toxicological point of departure (incidental oral) and the refined hand-to-mouth equation. No risks of concern were identified (see Appendix VII and Appendix IX). Therefore, bedbug treatment in residential areas is acceptable. However, a label statement will be added to clarify that application to mattresses and furniture is not permitted.

1.5 Incident Reports

1.5.1 Type of incident reports

Comments were received from the CPMA and Bayer CropScience regarding the types of incidents that were used in the review. In particular, the commenters questioned if the reported effects were consistent with exposure to cyfluthrin/*beta*-cyfluthrin, and if the exposure scenarios were consistent with the use patterns for applications in a residential setting.

Health Canada Response:
The use pattern of concern identified in the incident data was for indoor, structural application to cracks and crevices, as well as spot treatments. To support the risk assessment, only incidents where the product was applied in a manner similar to the current use pattern were considered. Three databases (PMRA, California Department of Pesticide Regulation, and National Institute of Occupational Health and Safety) were searched for incidents relevant to the current products. In all three databases, there was a high degree of repetition for respiratory effects following re-entry into structural areas that had been treated with cyfluthrin or *beta*-cyfluthrin.

In the PMRA database, 34 individuals were affected in 6 incidents when they were either present or re-entered a home or business treated with cyfluthrin. These incidents were found to be consistent with cyfluthrin exposure.

The California Department of Pesticide Regulation's database had 175 incidents and the National Institute of Occupational Health and Safety database had 97 incidents following the same exposure scenario (that is, after entering structural areas that had been treated with cyfluthin or *beta*-cyfluthrin). Respiratory effects were the most frequently reported symptoms in both American databases. All of the American incidents were considered to be consistent with exposure to cyfluthrin or *beta*-cyfluthrin. In addition, a search of the California Department of Pesticide Regulation website also identified a review of inhalation exposure of orange harvesters to cyfluthrin following re-entry into treated orchards 3–10 days after treatment (California Department of Pesticide Regulation, 1998). This review also highlighted the respiratory effects following re-entry, even in an outdoor application setting. It resulted in the initiation of a re-evaluation of cyfluthrin in California and generation of a respiratory irritation study, worker exposure study, and monitoring data for structural application by the registrant.

1.5.2 Rate of incidents reported

A comment was received from Bayer CropScience pointing out that the rate of incidents reported for cyfluthrin/*beta*-cyfluthrin, in both the PMRA database and the California database, were so low in comparison to product sales that they could not justify the risk mitigation being proposed.

Health Canada Response:
The proposed mitigation is based on the risk of respiratory effects that was identified in the PMRA database, and is supported by post-market data from two American databases.

A low number of reported incidents compared to product sales cannot be used to indicate a lack of risk. In addition, under-reporting of incidents has been documented for pharmaceuticals,[4] agricultural pesticides,[5] and veterinary drugs,[6] with estimates indicating that only 10% or less of adverse effects are reported. Hence, comparing the rate of these incidents to product sales could grossly underestimate the issue, which further supports Health Canada's consideration of information from the two American databases.

1.5.3 Re-entry into treated areas

Comments were received from the CPMA and Bayer CropScience that indicated the proposed re-entry of 8 hours was not necessary since the quantitative risk assessment showed no risk for post-application inhalation exposure and there were concerns regarding the use of incident reports to establish a proposed re-entry interval. In addition, the feasibility of applications that require an 8 hour re-entry interval was questioned, as it could displace occupants late into the evening or would restrict applicators to early morning applications only.

Health Canada Response:
Health Canada acknowledges that the quantitative risk assessment of cyfluthrin did not result in the identification of the human health risk concerns. The post-market surveillance of pesticides helps Health Canada to identify any potential risks to health or the environment from the use of pesticides not identified at the time of registration, and to take corrective actions as necessary. The review and consideration of scientific data that are assessed during the evaluation and in conjunction with incident reports from real-life circumstances is essential in determining whether there is reasonable certainty that no harm to human health will result from exposure to or use of the pesticide when used in accordance to the conditions of registration.
With respect to the feasibility of having an 8 hour re-entry interval, the PMRA has considered all available information, publicly available literature, as well as federal and provincial industry standards and practices. Cyfluthrin residue transfer data available in the public literature indicate that a lower percentage is transferred once residues have dried. Residue transfer was monitored at 3, 7, 12, 23, 47.5 and 407.5 hours after application and from 3 to 7 hours, residue transfer reduced from 8.5% to less than 2%, with minimal decreases thereafter. Current national best management practices following indoor commercial applications of pesticides recommend a re-entry of 2–6 hours. In Quebec, guidelines recommend a re-entry after 6 hours for cyfluthrin (Ville de Montreal, 2010). Pest control operators in the province indicated that, although restrictive, this re-entry was suitable for cyfluthrin.

[4] 2006. Lorna Hazzell and Saad A.W. Shakir. Under-reporting of adverse drug reactions. A systematic review. Drug Safety 2006: 29(5): 385-396.

[5] 2005. Bell, E.M., Sandler, D.P., and Alavanja, M.C. High pesticide exposure events among farmers and spouses enrolled in the agricultural health study. Journal of Agricultural Safety and Health. 12(2): 101-116.

[6] 2015. Fresnay E, Laurentie S, Orand JP. Étude de cas d'événements indésirables dus aux médicaments vétérinaires. Bulletin des GTV, 2015, n°80, p 95-102.http://www.sngtv.org/4DACTION/NS2013_INDEX/5

The incidents reviewed indicate that adverse health effects occurred when individuals were present during and up to 24 hours after application. Although a few incidents reportedly occurred 24 hours after application, it is unknown if the areas had been ventilated or if the product had been used according to label directions.

Based on the available information, scientific literature and the incident report data, the Agency has determined that reducing the re-entry interval to 6 hours is appropriate given the overall required risk mitigation, which also includes ensuring adequate ventilation and the requirement for applicators to post or give an information sheet to occupants (informing them of the product that was applied, the re-entry interval, and possible adverse effects and what to do if occupants experience these effects). Combined, these measures should address the potential for respiratory effects when the product is applied according to label directions.

1.5.4 Listing of adverse effects on product labels

Comments were received from Bayer CropScience indicating their agreement with listing potential adverse effects on product labels.

1.5.5 Requirement to leave an information sheet

Comments were received from the CPMA and Bayer CropScience indicating their support of providing an information sheet to the occupants; however, concerns were raised that adding potential adverse effects to this document could result in a placebo effect.

Health Canada Response:
The potential for placebo effects should be balanced with the fact that occupants need to be informed of health-risk related information in a clear and transparent manner so that they can take additional measures, if necessary, to further protect their health.

In the incident report data, there was evidence that occupants re-entering areas that had been treated with cyfluthrin or *beta*-cyfluthrin experienced respiratory effects such as coughing, sore throat, and shortness of breath, along with nausea, dizziness and eye irritation. The purpose of the information sheet is to provide the occupants with the necessary information so they will know what to do if they experience these effects. While the potential adverse health effects will be listed on the product label, as commercial class products are applied by professional applicators, the occupants do not see the product label. To that end, it is important for occupants to know what effects could occur following re-entry into a treated area and what they should do if they experience those effects.

Consumers currently have real-time access to this type of information for other products regulated by Health Canada, such as pharmaceuticals and veterinary drugs.

2.0 Comments Related to the Value Assessment

Stakeholder responses to PRVD2016-17 included the Canadian Animal Health Institute in support of the Dairy Farmers of Canada and the CPMA.

2.1 Comments from the Canadian Animal Health Institute

The Canadian Animal Health Institute opposed the discontinuation of the use of cyfluthrin on lactating dairy cattle to manage horn flies and lice because these pests have a negative impact animal welfare.

Health Canada Response: Health Canada acknowledges the importance of cyfluthrin to control horn flies and lice on lactating dairy cattle.

2.2 Comments from CPMA

The CPMA commented that prohibiting the use of cyfluthrin to control bedbugs in buildings and modes of transport would result in the removal of a valuable active ingredient to manage this pest in Canada. In order to maintain this use, they proposed restricting use of cyfluthrin for bedbugs to crack and a crevice treatment which is a similar mitigation measure found for other pests on the label.

Health Canada Response: Health Canada acknowledges the importance of cyfluthrin as a tool used by the structural pest management industry to manage bedbugs. Health Canada's response to the proposed measure is detailed above in comments related to the Health Risk Assessment.

Appendix III Label Amendments for Products Containing Cyfluthrin

The label amendments presented below do not include all label requirements for individual end-use products, such as first aid statements, disposal statements, precautionary statements and supplementary protective equipment. Information on labels of currently registered products should not be removed unless it contradicts the label statements provided below.

I) Label amendments for all cyfluthrin products

On the primary display panel of all cyfluthrin products, replace ‘guarantee’ with ‘active ingredient.’

II) Label amendments for the technical grade active ingredient products

Toxicological Information:

The following must be placed on the label under the section entitled Toxicological Information:

“Skin exposure may cause transient sensations (tingling, burning, itching, numbness). Other symptoms of exposure could include respiratory effects (such as cough, sore throat, or shortness of breath), nausea, dizziness. Treat symptomatically.”

Environmental Hazards:

Remove the entire section:

(Reg. No. 23939)

ENVIRONMENTAL HAZARDS

This pesticide is toxic to birds, fish, and aquatic invertebrates. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance contact the provincial regulatory agency or the manufacturer.

(Reg. No. 25672)

ENVIRONMENTAL HAZARDS

This pesticide is toxic to birds, fish, and aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public waters. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance contact the Provincial Regulatory Agency or the manufacturer.

Replace with:

ENVIRONMENTAL PRECAUTIONS

TOXIC to aquatic organisms

DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters.

Disposal:

Remove:

Canadian formulators should dispose of unwanted actives and containers in accordance with municipal or provincial regulations. For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.

Replace with:

Canadian manufacturers should dispose of unwanted active ingredients and containers in accordance with municipal or provincial regulations. For additional details and clean up of spills, contact the manufacturer or the provincial regulatory agency.

III) Label amendments for all commercial class products

Recommendations for the Resistance Management statement on labels:

The resistance management statement on each commercial class end use product label must reflect the latest wording described in the Regulatory Directive DIR2013-04, *Pesticide Resistance Management Labelling Based on Target Site/Mode of Action*.

Resistance management statements should be modified with terminology reflective of use sites in question. For example, within the context of structural and livestock uses, replace “field” with “location” and remove “crop advisors”.

IV) Label amendments for Tempo 20 WP Insecticide (Reg. No. 25673):

Primary Display Panel:

Replace “For control of crawling, flying, and wood destroying insect pests on indoor surfaces” with “FOR USE ON INDOOR SURFACES OF LISTED STRUCTURES.”

Precautions:

Remove: “Wear a NIOSH-approved respirator when mixing loading and applying Tempo 20 WP Insecticide.”

Replace with: “Wear a respirator with a NIOSH-approved organic-vapour-removing cartridge with a prefilter approved for pesticides OR a NIOSH-approved canister approved for pesticides when mixing loading and applying Tempo 20 WP Insecticide.”

Remove: “Wear long pants and chemical-resistant gloves when handling the product”.

Replace with: "Wear a long-sleeved shirt, long pants, chemical-resistant gloves, shoes and socks during mixing, loading, application, clean-up and repair."

Remove: "Ventilate treated areas."

Replace with: "Ventilate treated areas after application either by opening windows and doors or through use of air exchange/ventilation systems confirmed to be operational. Use fans where required to aid in the circulation of air."

Add: "DO NOT allow people or pets to enter treated areas until 6 hours after application."

"If you experience respiratory effects (such as cough, sore throat, or shortness of breath), nausea, dizziness, or eye irritation upon re-entering areas treated with any product containing cyfluthrin, ventilate the area more and vacate the premises."

"If you continue to experience effects after additional ventilation, contact your health care professional."

Toxicological Information:

The following must be placed on the label under the section entitled Toxicological Information:

"Skin exposure may cause transient sensations (tingling, burning, itching, numbness). Other symptoms of exposure could include respiratory effects (such as cough, sore throat, or shortness of breath), nausea, dizziness. Treat symptomatically."

Notice to User:

The following must be added on the label under the section entitled **"N**otice to User"**:**

"Following indoor applications to areas that people may re-enter, the user must complete the Information Sheet for Occupants and either post it at points of entry or provide directly to the occupant."

Directions for Use:

Under the statement "**DO NOT** formulate this product into other end-use products", add the following sections:

HOW TO APPLY:

Tempo 20 WP Insecticide may be applied using the following techniques:

- Indoor Perimeter Treatment: An indoor perimeter treatment is less than 30 cm wide along the edges of a room to baseboards, wall-floor and ceiling-wall joints, and around doorways or windows.

- Spot Treatment: Spot application is localized to a surface area not more than 0.2 m^2. Spots are not to be adjoining. The combined area of spots is not to exceed 10% of the total surface area of a room.

- Crack and Crevice Treatment: Crack and crevice is an application directly into narrow openings on the surface of the structure. It does not include the treatment of exposed surfaces. Narrow openings typically occur at expansion joints, utility entry points and along baseboards and mouldings.

- Void Treatment: Void application applies to inaccessible, enclosed empty spaces of a structure. For example, hollow walls and suspended ceilings.

- Indoor Broadcast Treatment (Permitted in Livestock Buildings Only): Broadcast application is to broad expanses of indoor structural surfaces.

DO NOT APPLY AS A SPACE SPRAY. A space spray is a suspension of fine droplets (0.1 to 100 micrometers) in the air within an indoor space.

DO NOT apply on the same day as other beta-cyfluthrin or cyfluthrin products.

DO NOT apply any product containing *beta*-cyfluthrin or cyfluthrin more than once every 10 days. Use the most restrictive retreatment interval of any product containing *beta*-cyfluthrin or cyfluthrin when reapplying.

DO NOT apply to furniture, mattresses, linens, pet bedding, toys or clothing.

As this product is not registered for the control of pests in aquatic systems, **DO NOT** use to control aquatic pests. **DO NOT** contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Replace the header ‘GENERAL INFORMATION’ with ‘PESTS CONTROLLED BY TEMPO 20 WP INSECTICIDE’.

Under ‘PESTS CONTROLLED BY TEMPO 20 WP INSECTICIDE’ replace ‘Tempo 20 WP Insecticide contains 20% active ingredient, which will provide effective knockdown and residual control of the pests listed on this label’ with ‘Tempo 20 WP Insecticide contains 20% active ingredient, which will provide effective knockdown and residual control of the following pests:’

Move the table entitled “PESTS CONTROLLED BY Tempo 20 WP Insecticide” to under this statement.

After the table listing the pests controlled by Tempo 20 WP add the following header: ‘GENERAL MIXING INSTRUCTIONS’ before the statement “One level Tempo scoop….”.

Under GENERAL MIXING INSTRUCTIONS, remove the following: ‘Tempo 20 WP Insecticide is intended for use as an indoor spot, or crack and crevice application in Dwellings, such as apartments, hospitals, hotels, houses and nursing homes; Institutions, such as factories, laboratories, mausoleums, non-commercial greenhouses, schools, stores and warehouses; Modes of transport, such as aircraft, buses, rail cars, ships and trucks; Food/feed establishments, such as

bakeries, bottling plants, canneries, dairies, frozen food plants, grain mills, kitchens, meat packing plants, poultry and egg processing plants and restaurants; and Pet kennels. Tempo 20 WP Insecticide also is intended for use as a general surface spray for control of flying and crawling insects in livestock housing structures, including poultry houses.'

Under GENERAL MIXING INSTRUCTIONS, replace 'Tempo 20 WP Insecticide is intended to be mixed with water and applied with hand pressurized or power operated sprayers' with 'Tempo 20 WP Insecticide is intended to be mixed with water and applied with hand pressurized or power operated sprayers having a pin-point or variable pattern nozzle.'

Move the statement 'Tempo 20 WP Insecticide will not stain or cause damage to any painted or varnished household surface, plastic, fabric or other surface where water applied alone causes no damage.;' to between the statement '**DO NOT** formulate this product into other end-use products' and the 'HOW TO APPLY' header.

And add: If you are unsure if this product will damage a substrate, it is recommended to check for potential staining and damage by spraying a small, inconspicuous area and examining the treated area after it has dried before treating an entire area.

Delete the 'SPOT, CRACK AND CREVICE APPLICATIONS' header.

Separate the application instructions for 'dwellings, institutions, modes of transportation and pet kennels' and application instruction for 'livestock buildings' into two separate text boxes.

In the text box for dwellings, institutions, modes of transportation and pet kennels' add the following text:

APPLICATION INSTRUCTIONS FOR DWELLINGS, INSTITUTIONS, MODES OF TRANSPORTATION AND PET KENNELS:

How to Apply:

Apply only as an indoor perimeter, spot, crack and crevice or void treatment. **DO NOT** APPLY AS A BROADCAST TREATMENT OR SPACE SPRAY.

Use Locations:

For Indoor Use Only. Permitted areas of use are the following structures and modes of transportation:

- Dwellings: apartments, hospitals, hotels, houses and nursing homes;
- Institutions: factories, laboratories, mausoleums, non-commercial greenhouses, schools, stores and warehouses;
- Modes of transportation: aircraft, buses, rail cars, ships and truck;
- Food/feed establishments: bakeries, bottling plants, canneries, dairies, frozen food plants, grain mills, kitchens, meat packing plants, poultry and egg processing plants and restaurants; and
- Pet kennels

> Apply to cracks and crevices in or behind baseboards, in floors, walls, expansion joints, areas around water and sewer pipes, wall voids, or voids in table legs and equipment where pests are seen or may be hiding. **DO NOT** apply where electrical short circuits could occur. Use a dust or dry bait in these areas.

Move statements from the 'Food/feed establishments' sub-section (i.e., from 'Food/feed establishments: Tempo 20 WP Insecticide applications are permitted….' to "clean food handling or processing equipment and thoroughly rinse with clean, fresh water.') to the 'Use Locations' section. Add 'feed' to statements where 'food' is only identified within the 'Food/feed establishments' sub-section.

After the statement 'Use a dust or dry bait in these areas', create a new section entitled '**Dilution Instructions:**' which includes the statements from 'Mix one level Tempo scoop….' to 'Under conditions of severe….to make a 0.1% active ingredient suspension.' In those statements, add the weight of one scoop (9.5 g) and two scoops (19 g) of Tempo 20 WP Insecticide in brackets.

After the 'Dilution Instructions' section, add the following sections:

> **Re-application Interval:** Tempo 20 WP Insecticide can be reapplied at 10-day intervals, if pests continue to be a problem.
>
> **Re-entry Interval: DO NOT** allow people or pets to enter treated areas until 6 hours after application.

Under 'Dilution Instructions', delete the following statements: 'Use a low pressure system with a pin-point or variable pattern nozzle to apply the suspension in specific areas such as cracks and crevices in or behind baseboards, in floors, walls, expansion joints, areas around water and sewer pipes, wall voids, or voids in table legs and equipment where pests can hide. Tempo 20 WP Insecticide can be reapplied at 10-day intervals, if necessary. **DO NOT** apply where electrical short circuits could occur. Use a dust or dry bait in these areas.' These have been moved to other sections on the label.

Move the statements related to spot treatments (i.e., from 'Spot treatment with a low pressure coarse spray…' to 'NOTE: CARE SHOULD BE TAKEN TO AVOID DEPOSITING THE PRODUCT ONTO SURFACES WHICH ARE EASILY ACCESSIBLE BY CHILDREN.') to the spot treatment information in the 'HOW TO APPLY' section.

Immediately above the statement 'For general household pests and occasional invaders…' add the following header "**Use Specific Instructions:**'

Specify the pests being targeted under the terms 'general household pests', 'occasional invaders', 'premises pest control' and 'aircraft pest control'.

Replace 'For general household pests and occasional invaders make applications in a manner as previously described under Spot, Crack and Crevice Application. Particular attention should be given to treating entry points and harbourage areas' with 'For (registrant to specify pests), apply where pests are seen, may hide or may enter."

Under general household pests and occasional invaders, move the statements ‘Remove or tightly cover fish tanks and disconnect aerators during application. Bystanders and animals must be excluded during applications of Tempo 20 WP Insecticide, and not allowed to re-enter treated areas until at least two hours afterwards’ to the PRECAUTIONS section.

Replace ‘For pantry pest control of exposed adult and immature stages of insects, make application to cupboards, shelving and storage areas.’ with ‘For control of listed pantry pests, apply to cupboards, shelving and storage areas.’

Replace ‘For stored product pest control of exposed adult and immature stages of insect pests, apply to cracks, crevices, and other surfaces where the pests have been seen or have harbourage.’ with ‘For control of listed stored product pests, apply where the pests are found or may hide.’

Replace ‘For premises pest control make spot application in closets and storage areas where these pests normally feed or hide. Follow all precautions listed above for general household pests’ with ‘For control of (registrant to specify pests), apply treatment in closets and storage areas where these pests are found or may hide.’

Replace ‘For control of carpet beetles, apply as a spot treatment along baseboards and edges of carpeting, under carpets and rugs, in closets and on shelving’ with ‘For control of carpet beetles, apply along baseboards and edges of carpeting, under carpets and rugs, in closets and on shelving where these pests are found or may hide.’

Replace ‘For control of flying insects indoors, apply as a spot treatment on window frames’ with ‘For control of listed flying insects indoors, apply around window frames.’

Replace ‘For control of carpenter ants in houses and other structures, use a 0.1% suspension and apply as a spot, crack and crevice or wall void application. Repeat treatments when necessary’ with ‘For control of carpenter ants in houses and other listed structures, use a 0.1% suspension, apply around doors and windows. Spray into cracks and crevices or through small drilled holes into voids where these ants or their nests are present. Do not exceed 30 mL of dilute suspension per m^2 of treated surface.’

Replace ‘For aircraft pest control apply to cracks, crevices and other surfaces where the pests have been seen or have harbourage. Applications should not be made when passengers or non-essential personnel are present in the immediate or treated area’ with ‘For control of (registrant to specify pests) in aircrafts, apply where the pests have been seen or may hide. **DO NOT** make applications when passengers or non-essential personnel are present in the immediate or treated area’.

Replace ‘Pet Kennels: For use in pet kennels to control flying and crawling insects: apply as a spot or crack and crevice spray.’ with ‘Pet Kennels: For use in pet kennels to control listed flying and crawling insects, apply as a spot or crack and crevice treatment.

Replace ‘General Surface Applications, Livestock housing (including poultry houses): and all the text up to the section Resistance Management Recommendations’, with the following text in a **text box** which clearly identifies the agricultural use:

AGRICULTURE USE - APPLICATION INSTRUCTIONS FOR LIVESTOCK HOUSING:

For indoor use only in livestock housing (including poultry houses).

INDOOR BROADCAST TREATMENTS ARE ONLY PERMITTED IN LIVESTOCK HOUSING.

For use by pest control operators and livestock producers in livestock housing structures (including poultry houses) to control listed crawling insects and flies.

Full protective clothing is recommended, including a hat (preferably safety helmet with visor), safety glasses, goggles or face shield, respirator, long-sleeved coveralls, unlined rubber gloves and rubber boots.

Restrictions:

- **DO NOT** apply Tempo 20 WP Insecticide when animals are present in area of facility to be treated. Apply only in well-ventilated areas.
- **DO NOT** allow cattle to re-enter facilities within 2 hours following application, and poultry within 24 hours following application.
- Cover water bowls in diary barns securely with a tight fitting, elastic banded plastic cover. Cover feeding troughs in dairy barns securely with heavy plastic (6 mil) with sufficient plastic to allow for a 15 cm (6”) overhang on the sides of the trough. Avoid direct spray application to the plastic used to cover bowls and troughs. Allow two hours after application before uncovering water bowls, feeding troughs or restocking the treated area of the facility with water and feed.
- **DO NOT** apply where electrical short circuits could occur.

Re-application Interval: Tempo 20 WP Insecticide can be reapplied at 10-day intervals, if pests continue to be a problem.

Re-entry Interval: DO NOT allow people or pets to enter treated areas until 6 hours after application.

Fly Control: For control of flies apply as an indoor broadcast treatment. Mix 1 or 2 level scoops (9.5–19 g) of Tempo 20 WP Insecticide per 100 m^2 in sufficient water to adequately cover the area being treated, but which will not allow dripping or runoff to occur. Use the higher rate when infestation is severe or when longer residual control is needed. Use a low pressure spray system with a fan-type nozzle to uniformly apply the suspension. Control will be enhanced if facilities are cleaned. Applications can be made to all fly resting surfaces including walls, ceilings, posts, rafters, windows, dividers, stanchions, gates, bunks or curtains.

Crawling Insects: For control of listed crawling insects (see 'Pests controlled by Tempo 20 WP Insecticide' table), apply as an indoor broadcast, (see all the above directions for fly control in livestock housing), spot, interior perimeter or a crack and crevice treatment (0.05–0.1% active ingredient suspension) to areas where the pests are found, may hide or may enter. For control of lesser mealworm (adults and larvae) in poultry houses, apply after clean-out and before fresh litter is put down. **DO NOT** add fresh litter until at least one day after spraying.

Update the personal protection equipment in the text box 'AGRICULTURE USE: For use in livestock housing (including poultry houses)' section based on cyfluthrin RVD.

Ensure that, throughout the label, all instances of directions for re-entry after "two hours" are replaced with re-entry after "6 hours".

Environmental Hazards:

Remove the entire section:

ENVIRONMENTAL HAZARDS

This pesticide is extremely toxic to fish and aquatic invertebrates. Remove from premises or tightly cover fish tanks and disconnect aerators when applying indoors where such containers are present. Do not contaminate water when disposing of equipment wash waters. Apply this product only as specified on this label.

Replace with:

ENVIRONMETNAL PRECAUTIONS

TOXIC to aquatic organisms and small wild mammals.

DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters.

Storage and Disposal:

Remove entire section:

STORAGE AND DISPOSAL

Not for storage in or around the house. Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, and feed. Store in original container and out of the reach of children. Do not contaminate water, food, or feed by storage or disposal.

Disposal of Container:
Do not reuse this container for any purpose. This is a recyclable container, and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site:

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
2. Make the empty, rinsed container unsuitable for further use. If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.
Replace with:

DISPOSAL

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.

2. Follow provincial instruction for any required additional cleaning of the container prior to its disposal.

3. Make the empty container unsuitable for further use.

4. Dispose of the container in accordance with provincial requirements.

5. For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.

V) Label amendments for CyLence (Reg. No. 25674):

Toxicological Information:

The following must be placed on the label under the section entitled Toxicological Information:

“Skin exposure may cause transient sensations (tingling, burning, itching, numbness).”

Directions for Use:

Replace: ‘Treatment for flies can be repeated as needed to a maximum of 3 applications per year, but not more than once every 3 weeks.’ with: ‘**DO NOT** apply more than once every 3 weeks. **DO NOT** apply more than 3 applications per year. ’

Delete: ‘Leave a minimum interval of 3 weeks between applications for fly control and for louse control.’

Add: As this product is not registered for the control of pests in aquatic systems, DO NOT use to control aquatic pests. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Environmental Hazards:

Remove the entire section:

ENVIRONMENTAL HAZARDS

This pesticide is extremely toxic to fish and aquatic invertebrates. Remove from premises or tightly cover fish tanks and disconnect aerators when applying indoors where such containers are present. Do not contaminate water when disposing of equipment wash waters. Apply this product only as specified on this label.

Replace the section with:

ENVIRONMENTAL PRECAUTIONS

TOXIC to aquatic organisms and small wild mammals.

Disposal of empty containers:

Remove the entire section:

DISPOSAL OF EMPTY CONTAINERS

1. Follow provincial instructions for any required cleaning of the container prior to its disposal or reconditioning. Do not re-use container.

2. Make the empty container unsuitable for further use.

3. Dispose of empty container in accordance with provincial requirements.

4. For information on disposal of unused, unwanted product, contact the Provincial Regulatory Agency or the manufacturer. Contact the Provincial Regulatory Agency and the manufacturer in case of a spill and for clean up of spills.

Replace with:

DISPOSAL

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
2. Follow provincial instruction for any required additional cleaning of the container prior to its disposal.
3. Make the empty container unsuitable for further use.
4. Dispose of the container in accordance with provincial requirements.
5. For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.

VI) Label amendments for Cylent Gold Insecticide Cattle Ear Tag (Reg. No. 26880)

Toxicological Information:

The following must be placed on the label under the section entitled Toxicological Information:

"Skin exposure may cause transient sensations (tingling, burning, itching, numbness)."

Disposal:

Remove:

Foil wrap/Used or recovered fallen tags: Remove the tag from the wrap. Dispose of the foil wrap and used or recovered tags in accordance with provincial requirements. For information on the disposal of unused, unwanted product, contact the provincial regulatory agency or the manufacturer.

Replace with:

Dispose of packaging and any used tags in accordance with provincial requirements.

VII) Label amendments for all domestic class products (Reg. No. 30355, 30356, 30357 and 30640):

Toxicological Information:

The following must be placed on the label under the section entitled Toxicological Information:

"Skin exposure may cause transient sensations (tingling, burning, itching, numbness). Other symptoms of exposure could include respiratory effects (such as cough, sore throat, or shortness of breath), nausea, dizziness. Treat symptomatically."

Directions for Use:

Remove 'Spray inside house as a spot treatment directly to pests or to areas where the listed pests may enter or hide, such as door sills, baseboards, window frames, cracks and crevices in floors and walls, surfaces around pipes, behind and beneath cabinets, refrigerators, sinks, stoves etc.'

Replace with: 'Spray inside house as a spot treatment directly to pests or to areas where the listed pests may enter or hide, including: door sills, baseboards, window frames, cracks and crevices in walls, surfaces around pipes, behind and beneath cabinets, refrigerators, sinks or stoves.'

The following must be added:

- "Apply ONLY as a spot treatment."
- "**Spot treatment:** Spot application is localized to a surface area not more than 0.2 m^2. Spots are not to be adjoining. The combined area of spots is not to exceed 10% of the total surface area of a room."

- "**DO NOT** apply as a broadcast treatment. **DO NOT** apply as a space spray. **DO NOT** apply as an indoor perimeter treatment"
- "**DO NOT** apply any product containing cyfluthrin more than once every 10 days."
- "**DO NOT** apply to surfaces that may come into contact with food/feed."
- "Ventilate treated areas after application by opening windows and doors. Use fans where required to aid in the circulation of air."
- "If you experience respiratory effects (such as cough, sore throat, or shortness of breath), nausea, dizziness, or eye irritation upon re-entering areas treated with any product containing cyfluthrin, ventilate the area more and vacate the premises."
- "If you continue to experience effects after additional ventilation, contact your health care professional."

Environmental Hazards:

Replace entire section:

ENVIRONMENTAL HAZARDS

Toxic to small wild mammals

Replace with:

ENVIRONMENTAL PRECAUTIONS

Toxic to aquatic organisms and small wild mammals.

Disposal:

Remove:

Pressurized products: When container is empty, press valve to release all remaining pressure. Dispose of empty container with household garbage.

Replace with:

DO NOT reuse the empty containers. Dispose in household garbage. Unused or partially used products should be disposed at provincially or municipally designated hazardous waste disposal sites.

Appendix IV Revised Toxicology Reference Values for Cyfluthrin Health Risk Assessment

Table 1 Revised Toxicology Reference Values for Cyfluthrin Health Risk Assessment

Exposure Scenario	Study	Point of Departure and Endpoint	CAF[1] or Target MOE
Acute dietary (All populations)*	Acute neurotoxicity study in rats	$BMDL_{20}$ of 1.4 mg/kg bw/day; based on decreased motor activity	300
	ARfD = 0.005 mg/kg bw		
Repeated dietary (All populations)*	Acute neurotoxicity study in rats	$BMDL_{20}$ of 1.4 mg/kg bw/day; based on decreased motor activity	300
	ADI = 0.005 mg/kg bw/day		
Short-, intermediate- and long-term dermal (All populations)	21-day dermal toxicity study in rats	NOAEL = 376 mg/kg bw/day; based on clinical signs of toxicity, decreased food consumption.	300
Short-term inhalation (All populations)	28-day inhalation toxicity study in rats	NOAEC = 0.0002 mg/L (0.07 mg/kg bw/day); based on decreased body weight and body weight gain.	300
Intermediate- and long-term inhalation (All populations)	90-day inhalation toxicity study in rats	NOAEC = 0.00009 mg/L (0.02 mg/kg bw/day); based on clinical signs of toxicity and decreased body weight.	300
Non-dietary incidental oral (short-term)*	Acute neurotoxicity study in rats	$BMDL_{20}$ of 1.4 mg/kg bw/day; based on decreased motor activity	300
Aggregate Exposure: Based on clinical signs of neurotoxicity			
All Durations Aggregate - Oral (All populations)*	Acute neurotoxicity study in rats	$BMDL_{20}$ of 1.4 mg/kg bw/day; based on decreased motor activity	300
Short-term Aggregate - Inhalation (All populations)	5-day inhalation toxicity study	NOAEC = 0.00025 mg/L (0.07 mg/kg bw/day)	300
Intermediate- and Long-term Aggregate - Inhalation	90-day inhalation toxicity study	NOAEC = 0.00009 mg/L (0.02 mg/kg bw/day)	300
Cancer	Equivocal increase in the incidence of urinary bladder tumours in females in the rat chronic toxicity/oncogenicity study with cyfluthrin. Endpoints selected for the non-cancer risk assessment are protective of these equivocal findings.		

[1]CAF (Composite assessment factor) refers to the total of uncertainty and pest control products act factors for dietary risk assessments. MOE refers to target MOE for occupational assessments
*denotes revised reference values

Appendix V Updated Dietary Exposure and Risk Estimates

Table 1 Summary of Dietary Acute and Chronic Exposure and Risk from Cyfluthrin

Subpopulations	Food only[1]			
	Acute (99.9th percentile)[2]		Chronic[3]	
	Exposure (mg/kg bw/day)	%ARfD	Exposure (mg/kg bw/day)	%ADI
General Population	0.001350	27	0.000059	1.2
All Infants (<1 year old)	0.002207	44	0.000115	2.3
Children 1–2 years old	0.002811	56	0.000227	4.5
Children 3–5 years old	0.001559	31	0.000158	3.2
Children 6–12 years old	0.000977	20	0.000097	1.9
Males 13–19 years old	0.000653	13	0.000056	1.1
Males 20–49 years old	0.000543	11	0.000044	0.9
Adults 50–99 years old	0.000528	11	0.000037	0.7
Females 13–49 years old	0.000589	12	0.000043	0.9

[1]Based on the registered uses for cyfluthrin and *beta*-cyfluthrin, residues in drinking water are not anticipated; therefore, risks from exposure to residues in food only were assessed.
[2]Acute Reference Dose (ARfD) of 0.005 mg/kg bw for all populations (including children).
[3]Acceptable Daily Intake (ADI) of 0.005 mg/kg bw/day for all populations (including children).

Appendix VI Updated Occupational and Residential Risk Assessments

Incidental Oral Risk Assessment

The incidental oral risk assessment was updated to include the revised incidental oral toxicological point of departure ($BMDL_{20}$ of 1.4 mg/kg bw/day) and the refined hand-to-mouth equation that was applied for *beta*-cyfluthrin (Registration Decision RD2017-01). The refined equation represents exposure after an hour of residue accumulation on a child's hands prior to the commencement of hand-to-mouth activity, rather than the existing assumption of an entire day of residue accumulation. Since the use of the refined equation resulted in reducing the incidental oral exposure through the hand-to-mouth route, it was no longer necessary to use the refined transfer values of 4% and 6% for soft and hard surfaces, respectively. As such, the standard transfer values of 6% for soft surfaces and 8% for hard surfaces, derived from the USEPA Residential SOPs (USEPA, 2012), were used in the updated incidental oral assessment.

Following revision of the hand-to-mouth equation, the hand-to-mouth exposure is no longer the incidental oral route with the highest source of exposure when compared to object-to-mouth exposure (see Appendix VII). In addition, although the long-term inhalation endpoint is lower than that for short-term, the refinement used in the long-term assessment resulted in exposure estimates similar to those obtained for the short-term. Therefore, only the results for the short-term post-application risk assessment are presented (see Appendix VII).

The margins of exposure (MOE) for the updated incidental oral assessment exceeded the target MOE of 300; therefore, risks are no longer considered to be of concern for children (see Appendix VII).

Occupational Handler Risk Assessment

In PRVD2016-17, data from the Pesticide Exposure Handlers Database were used to assess the exposure for commercial applicators; Health Canada, however, acknowledged receipt of a passive dosimetry study submitted by the registrant (PMRA No. 2449137) and committed to review the study for relevance prior to issuing a final re-evaluation decision for cyfluthrin. This study, which monitored worker exposure during mixing, loading and applying liquid structural pest control products indoors, using a manually pressurized hand wand, was reviewed by Health Canada, and the occupational handler assessment was revised to include the new dermal unit exposure value derived from the study. The risk conclusions did not change from PRVD2016-17, that is, no risks of concern were identified (see Appendix VIII).

Table 1 Summary of Revised Occupational and Residential Exposure Inputs

Updated Input	PRVD2016-17	Revised
Occupational Assessment		
Dermal Unit Exposure for Manually Pressurized Hand Wand	• Derived from PHED: 19745 µg/kg a.i. for a wettable powder formulation.	• Derived from a passive dosimetry study submitted by the registrant (PMRA No. 2449137): 85843 µg/kg a.i. for a liquid formulation.
Residential Assessment		
Toxicological Point of Departure (incidental oral)	• NOAEL = 0.5 mg/kg bw/day.	• $BMDL_{20}$ = 1.4 mg/kg bw/day.

Updated Input	PRVD2016-17	Revised
Hand-to-Mouth Equation	• Standard equation; derived from the USEPA Residential SOPs (USEPA, 2012).	• Refined equation; derived from the Registration Decision RD2017-01, *Beta-Cyfluthrin*.
Fraction Transferred	• 0.06 for hard surfaces (refined); derived from the Proposed Registration Decision PRD2016-21, *Beta-Cyfluthrin*. • 0.04 for carpet (refined); derived from the Proposed Registration Decision PRD2016-21, *Beta-Cyfluthrin*.	• 0.08 for hard surfaces derived from the USEPA Residential SOPs (USEPA, 2012). • 0.06 for carpet derived from the USEPA Residential SOPs (USEPA, 2012).
Chronic Dietary Exposure	• 0.000087 mg/kg bw/day for children (1<2 years old); all food uses included in the dietary assessment, except milk and dairy food forms.	• 0.000242 mg/kg bw/day for children (1< 2 years old); all food uses included in the dietary assessment.

NOAEL = No observed adverse effect level.
BMDL = Benchmark dose lower confidence limits.
PHED = Pesticide Exposure Handlers Database.

Appendix VII Updated Residential Risk Assessment

Table 1 Short- to Long-Term Post-application Incidental Oral Exposure to Children from Indoor Environments – Commercial-Class Product

Scenarios	Hard Surface MOE	
	Hand-to-Mouth	Object-to-Mouth
Perimeter/Spot/Bedbug (Coarse)	1267	595
Perimeter/Spot/Bedbug (Pin Stream)	5183	2434
Crack and crevice	19004	8926
Scenarios	**Soft Surface MOE**	
	Hand-to-Mouth	**Object-to-Mouth**
Perimeter/Spot/Bedbug (Coarse)	845	397
Perimeter/Spot/Bedbug (Pin Stream)	3455	1623
Crack and crevice	12669	5951

MOE = margin of exposure. Oral MOE = oral $BMDL_{20}$ ÷ Incidental Oral Exposure (mg/kg bw/day), based on an oral $BMDL_{20}$ of 1.4 mg/kg bw/day with a target MOE of 300.

Table 2 Short-Term Post-application Incidental Oral Exposure to Children from Indoor Environments – Domestic-Class Products

Scenario	Hard Surface MOE	
	Hand-to-Mouth	Object-to-Mouth
Spot	1267	595
	Soft Surface MOE	
	Hand-to-Mouth	**Object-to-Mouth**
	845	397

MOE = margin of exposure. Oral MOE = oral $BMDL_{20}$ ÷ Incidental Oral Exposure (mg/kg bw/day), based on an oral $BMDL_{20}$ of 1.4 mg/kg bw/day with a target MOE of 300.

Appendix VIII Updated Occupational Risk Assessment

Table 1 Short-Term Commercial Applicator Exposure and Risk Assessment

Scenarios	Application Types	Dermal Unit Exposure (µg/kg a.i. handled)	Dermal MOE (rounded)
Bedbug treatment	• Indoor Perimeter/Spot • Crack & Crevice	85843	57823
Residential and other indoor areas	• Indoor Perimeter/Spot • Crack & Crevice		34694
Commercial facilities	• Indoor Perimeter/Spot • Crack & Crevice		8673
Livestock housing	• Broadcast		5763

MOE = margin of exposure. Dermal MOE = Dermal NOAEL (mg/kg bw/day) ÷ Dermal Exposure (mg/kg bw/day), based on a dermal NOAEL of 376 mg/kg bw/day and a target MOE of 300.

Appendix IX Updated Aggregate Risk Assessment

Table 1 Short-Term Post-application Aggregate Object-to-Mouth, Inhalation and Chronic Food Exposure to Children – Commercial-Class Product

Scenarios	Object-to-Mouth Hard Surface MOE	Inhalation MOE	Dietary MOE	Aggregate MOE
Perimeter/Spot/Bedbug (Coarse)	595	1392	5785	389
Perimeter/Spot/Bedbug (Pin Stream)	2434	1392	5785	768
Crack and crevice	8926	1392	5785	997
Scenarios	**Object-to-Mouth Soft Surface MOE**	**Inhalation MOE**	**Dietary MOE**	**Aggregate MOE**
Perimeter/Spot/Bedbug (Coarse)	397	1392	5785	293
Perimeter/Spot/Bedbug (Pin Stream)	1623	1392	5785	663
Crack and crevice	5951	1392	5785	944

MOE = margin of exposure. Oral MOE = oral $BMDL_{20}$ ÷ Incidental Oral Exposure (mg/kg bw/day), based on an oral $BMDL_{20}$ of 1.4 mg/kg bw/day with a target MOE of 300. Inhalation MOE = Inhalation NOAEL÷ Inhalation Exposure (mg/kg bw/day), based on a inhalation NOAEL of 0.07 mg/kg bw/day with a target MOE of 300. Dietary MOE = oral $BMDL_{20}$ ÷ Chronic Dietary Exposure (mg/kg bw/day), based on an oral $BMDL_{20}$ of 1.4 mg/kg bw/day with a target MOE of 300.

The aggregate MOE was calculated by $= \frac{1}{[(1/MOE_{OtM\ Oral}) + (1/MOE_{Inhalation}) + (1/MOE_{Dietary})]}$

Table 2 Short-Term Post-application Aggregate Object-to-Mouth, Inhalation and Chronic Food Exposure to Children – Domestic-Class Products

Scenario	Object-to-Mouth Hard Surface MOE	Inhalation MOE	Dietary MOE	Aggregate MOE
Spot	595	21251	5785	526
	Object-to-Mouth Soft Surface MOE	**Inhalation MOE**	**Dietary MOE**	**Aggregate MOE**
	397	21251	5785	365

MOE = margin of exposure. Oral MOE = oral $BMDL_{20}$ ÷ Incidental Oral Exposure (mg/kg bw/day), based on an oral $BMDL_{20}$ of 1.4 mg/kg bw/day with a target MOE of 300. Inhalation MOE = Inhalation NOAEL÷ Inhalation Exposure (mg/kg bw/day), based on a inhalation NOAEL of 0.07 mg/kg bw/day with a target MOE of 300. Dietary MOE = oral $BMDL_{20}$ ÷ Chronic Dietary Exposure (mg/kg bw/day), based on an oral $BMDL_{20}$ of 1.4 mg/kg bw/day with a target MOE of 300.
The aggregate MOE was calculated by $= \frac{1}{[(1/MOE_{OtM\ Oral}) + (1/MOE_{Inhalation}) + (1/MOE_{Dietary})]}$

Table 3 Short-Term Aggregate Application and Post-application Inhalation, and Chronic Food Exposure to Handlers – Domestic-Class Products

Subpopulation	Inhalation MOEs		Dietary MOE	Aggregate MOE
	Handler	Post-Application		
Adults (>16 years old)	6778	91254	33333	5305

MOE = margin of exposure. Inhalation MOE = Inhalation NOAEL÷ Inhalation Exposure (mg/kg bw/day), based on an inhalation NOAEL of 0.07 mg/kg bw/day with a target MOE of 300. Dietary MOE = oral $BMDL_{20}$ ÷ Chronic Dietary Exposure (mg/kg bw/day), based on an oral $BMDL_{20}$ of 1.4 mg/kg bw/day with a target MOE of 300.
The aggregate MOE was calculated by $= \frac{1}{[(1/MOE_{Handler\ Inhalation}) + (1/MOE_{Post\text{-}application\ Inhalation}) + (1/MOE_{Dietary})]}$

Appendix X Required Information Sheet for Areas Treated with Tempo 20 WP Insecticide (Reg. No. 25673).

Information Sheet for Occupants of indoor areas treated with Tempo 20 WP Insecticide.

To be posted at points of entry or given to the occupant.

This area has been treated with Tempo 20 WP Insecticide (Reg. No. 25673), containing the active ingredient cyfluthrin.

DATE APPLIED:

TIME APPLIED:

- Bystanders and animals must not be present during application.
- Do not re-enter the treated area until at least 6 hours after the product has been applied.
- Ventilate treated area after application by opening windows and doors. Use fans where required to aid in the circulation of air.

The following adverse effects have been reported following re-entry into areas treated with products containing cyfluthrin:

- respiratory effects such as cough, sore throat, or shortness of breath
- nausea
- dizziness
- eye irritation

If you experience effects, leave the area and ventilate further. For medical information, call 1-800-334-7577. If you experience effects that do not resolve rapidly or become worrisome, contact your health care professional.

For more information pertaining to this application, contact the following pest control company which applied the product:

[Insert pest control company name and contact details]

For more information, contact:

BAYER CROPSCIENCE INC.
Suite 200, 160 Quarry Park Blvd. S.E.
Calgary, Alberta T2C 3G3
Telephone: 1-888-283-6847

Appendix XI

Additional References Considered Following Publication of PRVD2016-17

A. Information Considered in the Toxicological Assessment

Published Information

PMRA Document Number	Reference
	2006. Wolansky, M.J., Gennings, C, and Crofton, K.M. Relative potencies for acute effects of pyrethroids on motor function in rats. Toxicological Sciences 89(1): 271-277.

B. Additional Information Considered in the Dietary Assessment

Additional Studies/Information Submitted by Registrant

PMRA Document Number	Reference
2769757	2017. Estimate of the percent of dairy cattle in Canada treated with cyfluthrin when applied as a pour-on. Bayer CropScience. 02 June 2017.

C. Additional Information Considered in the Occupational and Residential Assessment

Additional Studies/Information Submitted by Registrant

PMRA Document Number	Reference
2449137	2014. Observational Study to Determine Dermal and Inhalation Exposure to Pest Control Operator (PCO) Workers Applying Deltamethrin and/or β-Cyfluthrin Using Hand-held Equipment in a Crack and Crevice Application, DACO: 5.4

Published Information

PMRA Document Number	Reference
2409268	2012. US EPA. Standard Operating Procedures for Residential Pesticide Exposure Assessment. EPA: Washington, DC. Revised October 2012.

D. Additional Information Considered in the Incident Reports Assessment

Published Information

1998. California Department of Pesticide Regulation, Health and safety report hs-1795. Inhalation exposure of orange harvesters to cyfluthrin residue. March 20, 1998. http://www.cdpr.ca.gov/docs/whs/pdf/hs1765.pdf

2003. Williams R.L., Bernard C.E., Krieger R.I. Human exposure to indoor residential cyfluthrin residues during a structured activity program. Journal of Exposure Analysis and Environmental Epidemiology, 13, p.112 – 119.

2010. Ville de Montreal. Bedbugs: Identifying and controlling bedbugs. Guide for building owners, administrators and managers. Ville de Montréal and Direction de santé publique de l'Agence de la santé et des services sociaux de Montréal, July 2010. ISBN – 978-2-7647-0899-6

2014. California Department of Pesticide Regulation, Semiannual report summarizing the reevaluation status of pesticide products during the period of July 1, 2013 through December 31, 2013.