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Proposed Registration Decision

Methoxyfenozone Technical Insecticide

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Publications
Pest Management Regulatory Agency
Health Canada
2720 Riverside Drive
A.L. 6605C
Ottawa, Ontario
K1A 0K9

Internet: pmra_publications@hc-sc.gc.ca
www.pmra-arla.gc.ca
Facsimile: 613-736-3758
Information Service:
1-800-267-6315 or 613-736-3799
pmra_infoserv@hc-sc.gc.ca

Canada 

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Overview

Proposed Registration Decision for Methoxyfenozide Technical Insecticide

Health Canada's Pest Management Regulatory Agency (PMRA), under the authority of the [Pest Control Products Act](#) and Regulations, is proposing conversion from conditional to full registration for the sale and use of Methoxyfenozide Technical Insecticide and Intrepid 240F Insecticide containing the technical grade active ingredient methoxyfenozide to control lepidopteran larvae in apples. The registration is for ground application only.

An evaluation of available scientific information found that, under the approved conditions of use, the product has value and does not present an unacceptable risk to human health or the environment.

This Overview describes the key points of the evaluation, while the Science Evaluation provides detailed technical information on the human health, environmental and value assessments of Methoxyfenozide Technical Insecticide and Intrepid 240F Insecticide.

What Does Health Canada Consider When Making a Registration Decision?

The key objective of the *Pest Control Products Act* is to prevent unacceptable risks to people and the environment from the use of pest control products. Health or environmental risk is considered acceptable¹ if there is reasonable certainty that no harm to human health, future generations or the environment will result from use or exposure to the product under its proposed conditions of registration. The Act also requires that products have value² when used according to the label directions. Conditions of registration may include special precautionary measures on the product label to further reduce risk.

To reach its decisions, the PMRA applies modern, rigorous risk-assessment methods and policies. These methods consider the unique characteristics of sensitive subpopulations in humans (e.g. children) as well as organisms in the environment (e.g. those most sensitive to environmental contaminants). These methods and policies also consider the nature of the effects observed and the uncertainties present when predicting the impact of pesticides. For more information on how the PMRA regulates pesticides, the assessment process and risk reduction programs, please visit the PMRA's website at www.pmra-arla.gc.ca.

¹ "Acceptable risks" as defined by subsection 2(2) of the *Pest Control Products Act*.

² "Value" as defined by Subsection 2(1) of the *Pest Control Products Act* "...the product's actual or potential contribution to pest management, taking into account its conditions or proposed conditions of registration, and includes the product's (a) efficacy; (b) effect on host organisms in connection with which it is intended to be used; and c) health, safety and environmental benefits and social and economic impact."

Before making a final registration decision on Methoxyfenozide Technical Insecticide, the PMRA will consider all comments received from the public in response to this consultation document.³ The PMRA will then publish a Registration Decision⁴ on Methoxyfenozide Technical Insecticide, which will include the decision, the reasons for it, a summary of comments received on the proposed final registration decision and the PMRA's response to these comments.

For more details on the information presented in this Overview, please refer to the Science Evaluation of this consultation document.

What Is Methoxyfenozide?

Methoxyfenozide is the active ingredient in Intrepid 240F Insecticide which is used to control lepidopteron larvae in apples. Methoxyfenozide belongs to the diacylhydrazine class of insecticides. This compound mimics the activity of the insect moulting hormone (ecdysone) of lepidopteron larvae. After ingestion, the larva is stimulated to moult, resulting in an incomplete and lethal moult. The larva stops feeding after ingestion of methoxyfenozide, and eventually dies.

Health Considerations

Can Approved Uses of Methoxyfenozide Affect Human Health?

Methoxyfenozide is unlikely to affect your health when used according to label directions.

Exposure to methoxyfenozide may occur through diet (food and water) or when handling and applying the product. When assessing health risks, two key factors are considered: the levels at which no health effects occur and the levels to which people may be exposed. The dose levels used to assess risks are established to protect the most sensitive human population (e.g. children and nursing mothers). Only uses for which the exposure is well below levels that cause no effects in animal testing are considered acceptable for registration.

Toxicology studies in laboratory animals describe potential health effects from varying levels of exposure to a chemical and identify the dose where no effects are observed. The health effects noted in animals occur at doses more than 100-times higher (and often much higher) than levels to which humans are normally exposed when using Methoxyfenozide Technical Insecticide products according to label directions.

³ "Consultation statement" as required by subsection 28(2) of the *Pest Control Products Act*.

⁴ "Decision statement" as required by subsection 28(5) of the *Pest Control Products Act*.

Methoxyfenozide Technical Insecticide and the end-use product Intrepid 240F Insecticide were of low toxicity to animals after a single dose administration, were not irritating to the skin or eyes, and did not cause skin sensitization. Methoxyfenozide Technical Insecticide did not cause cancer in animals and was not genotoxic. There was also no indication that Methoxyfenozide Technical Insecticide caused damage to the nervous system, and there were no effects on reproduction. The toxicological effects of Methoxyfenozide Technical Insecticide are observed only at relatively high doses when animals are given daily doses over longer periods of time. The effects observed included effects on blood parameters, the liver, thyroid and adrenal glands. The risk assessment protects against these effects by ensuring the level of human exposure is well below the lowest dose at which these effects occurred in animal tests.

When Methoxyfenozide Technical Insecticide was given to pregnant animals, no effects on the developing fetus were observed at doses that were toxic to the mother, indicating that the fetus was not more sensitive to Methoxyfenozide Technical Insecticide than the adult animal. Consequently, no extra protective measures were applied during the risk assessment.

Residues in Water and Food

The use of the end-use product Intrepid 240F, which contains the technical active ingredient methoxyfenozide, on apples is not expected to have an impact on dietary exposure nor pose an unacceptable risk to human health.

Dietary risks from food and water are not of concern

A dietary exposure assessment, which included pome fruits, was previously conducted for methoxyfenozide in August 2007. After refinement, the exposure of the general population was determined to be 19.8% of the acceptable daily intake (food only). Aggregate exposure from food and water ranged from 18.3% to 39.2% of the acceptable daily intake (ADI), with children aged 1 to 2 years being the most exposed subpopulation. Based on these estimates, the chronic dietary risk from Intrepid 240F Insecticide is not of concern for all population subgroups.

The *Food and Drugs Act* prohibits the sale of adulterated food, that is, food containing a pesticide residue that exceeds the established maximum residue limit (MRL). Pesticide MRLs are established for *Food and Drugs Act* purposes through the evaluation of scientific data under the *Pest Control Products Act*. Food containing a pesticide residue that does not exceed the established MRL does not pose an unacceptable health risk.

Residue trials conducted throughout Canada and the United States using methoxyfenozide on apples were acceptable. The MRLs for this active ingredient can be found in the Regulatory Note REG2004-08, *Methoxyfenozide*.

Risks in Residential and Other Non-Occupational Environments

There is a statement on the label of Intrepid 240F Insecticide to minimize the potential for drift to residential areas.

Occupational Risks From Handling Intrepid 240F Insecticide

Occupational risks are not of concern when Intrepid 240F Insecticide is used according to the proposed label directions, which include protective measures.

Farmers and custom applicators who mix, load or apply Intrepid 240F Insecticide as well as field workers re-entering freshly treated fields can come in direct contact with Intrepid 240F Insecticide residues on the skin. Therefore, the label specifies that anyone applying Intrepid 240F Insecticide must wear a long-sleeved shirt and long pants; as well, a long-sleeved shirt, long pants and chemical-resistant gloves must be worn during mixing, loading, clean-up and repair activities. The label also requires that workers do not enter treated fields for 12 hours.

For bystanders, exposure is expected to be much less than that for workers and is considered negligible. Therefore, health risks to bystanders are not of concern.

Environmental Considerations

What Happens When Methoxyfenozide Is Introduced Into the Environment?

Environmental risks to non-target organisms are not of concern when Intrepid 240F Insecticide is used according to label directions, which include precautionary label statements and buffer zones.

Methoxyfenozide is persistent in soil and it is expected that this compound will carry over to the next growing season. Based on the physical and chemical properties of methoxyfenozide, this compound has the potential to leach through the soil profile and enter groundwater. Methoxyfenozide is persistent in water and sediment. Residues of methoxyfenozide are not expected to be present in air due to its low volatility. Appropriate label statements are included on the label.

Methoxyfenozide, when used according to label directions, does not present a risk to earthworms, bees, beneficial arthropods and other insects, small mammals and birds. However, methoxyfenozide may pose a risk to some aquatic organisms. Precautionary label statements are thus included on the label and buffer zones up to 10 metres are required to mitigate exposure of sensitive aquatic habitats from spray drift.

Value Considerations

What Is the Value of Intrepid 240F Insecticide?

Intrepid 240F Insecticide is used on apples for control of codling moth, Oriental fruit moth, the overwintering generation of oblique-banded and three-lined leafrollers, and the first generation of western tentiform and spotted tentiform leafminers. Intrepid 240F also provides suppression of winter moth and the summer generation of oblique-banded and three-lined leafrollers on apples. Intrepid 240F Insecticide is potentially an alternative to older classes of insecticides (e.g. organophosphates) for use against the listed pests on apples.

A full value assessment of methoxyfenozide is presented in Regulatory Note REG2004-08, *Methoxyfenozide*.

Measures to Minimize Risk

Labels of registered pesticide products 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 being proposed on the label of Intrepid 240F Insecticide to address the potential risks identified in this assessment are as follows.

Key Risk-Reduction Measures

- **Human Health**

Because there is a concern that users might come into direct contact with Intrepid 240F Insecticide on the skin, anyone doing mixing, loading, cleaning-up and repair activities must wear a long-sleeved shirt, long pants and chemical-resistant gloves. Applicators must wear a long-sleeved shirt and long pants. A restricted-entry interval of 12 hours was added to the label. Label statements were added to the label to protect against drift during application and to minimize the potential for drift to residential areas, taking into consideration wind speed and direction, temperature inversions, application and sprayer settings when applying the product.

- **Environment**

Precautionary label statements are included on the label to identify persistence, leaching and runoff concerns.

To protect non-target aquatic organisms, precautionary label statements are included on the label and Intrepid 240F Insecticide cannot be sprayed up to 10 metres from sensitive aquatic habitats. The distance allowed depends on the timing of application.

Next Steps

Before making a final registration decision on methoxyfenozide, the PMRA will consider all comments received from the public in response to this consultation document. The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document. Please forward all comments to Publications (contact information on the cover page of this document). The PMRA will then publish a Registration Decision, which will include its decision, the reasons for it, a summary of comments received on the proposed final decision and the Agency's response to these comments.

Other Information

When the PMRA makes its registration decision, it will publish a Registration Decision on methoxyfenozide (based on the Science Evaluation of this consultation document). In addition, the test data referenced in this consultation document will be available for public inspection, upon application, in the PMRA's Reading Room (located in Ottawa).

Science Evaluation

1.0 The Active Ingredient, Its Properties and Uses

No chemistry data were required to convert methoxyfenozide to full registration. For a detailed assessment of the chemical properties, refer to Regulatory Note REG2004-08, *Methoxyfenozide*.

2.0 Methods of Analysis

Refer to REG004-08 for a detailed assessment of the methods of analysis for Methoxyfenozide.

3.0 Impact on Human and Animal Health

No toxicology, food residues, or occupational and residential data were required in support of the conversion from conditional to full registration. For details of the toxicology, dietary and the occupational and residential risk assessments, refer to REG2004-08, *Methoxyfenozide*.

4.0 Impact on the Environment

Refer to REG2004-08 for a detailed assessment of the environmental impacts of methoxyfenozide.

Information to address the outstanding requirements were submitted to the PMRA and were reviewed. These were found to adequately address outstanding environmental concerns related to the use of methoxyfenozide.

4.1 Fate and Behaviour in the Environment

The fate and behaviour of methoxyfenozide has previously been evaluated. For details, refer to REG2004-08. A summary of the physical and chemical properties relevant to the environment and the fate and behaviour of methoxyfenozide is presented in Appendix I, Tables 1 and 2, respectively.

Methoxyfenozide enters the terrestrial environment when it is used as an insecticide in apple orchards. Methoxyfenozide is persistent in soil. This product is stable to hydrolysis and undergoes limited phototransformation. Also, methoxyfenozide transforms slowly through microbial action. No major methoxyfenozide transformation products are formed in soil. In laboratory studies on mobility, methoxyfenozide has been shown to be moderately mobile in many types of soil. In field dissipation studies, methoxyfenozide was persistent and results indicate that methoxyfenozide accumulates in soil (50% carries over to next season, approximately 94% after 4 years of consecutive use). Because of its persistence and mobility, methoxyfenozide has the potential to leach through the soil profile and enter groundwater. Also, methoxyfenozide has been shown to leach through the soil profile under field conditions. While methoxyfenozide was found only in trace amounts below 30 cm in a study performed on

turf-covered plots in Canadian soils, this compound leached through the soil profile and reached the 30–90 cm soil layer in a study performed on bare plots in Washington state.

Methoxyfenozide may enter the aquatic environment through spray drift from orchard airblast applications and/or runoff via sorption to soil particles, leaching and movement through tile drainage systems. Methoxyfenozide is persistent in aquatic systems and stable to hydrolysis and phototransformation is not an important route of transformation of methoxyfenozide in water. Results from biotransformation studies in water/sediment systems showed that methoxyfenozide is persistent under both aerobic and anaerobic conditions and that this compound partitions to and accumulates in sediment. One major transformation product was found under aerobic conditions, RH-117236. This product is non persistent in aquatic systems.

The log K_{ow} for methoxyfenozide (3.72) suggests that this compound has the potential for bioaccumulation. However, results from bioaccumulation studies have indicated rapid elimination of methoxyfenozide from fish and clam tissue.

Based on the vapour pressure and Henry's law constant, methoxyfenozide has a low potential for volatilisation.

4.2 Effects on Non-Target Species

The environmental risk assessment integrates the environmental exposure and ecotoxicology information to estimate the potential for adverse effects on non-target species. This integration is achieved by comparing exposure concentrations with concentrations at which adverse effects occur. Estimated environmental concentrations (EECs) are concentrations of pesticide in various environmental media, such as food, water, soil and air. The EECs are estimated using standard models which take into consideration the application rate(s), chemical properties and environmental fate properties, including the dissipation of the pesticide between applications.

Ecotoxicology information includes acute and chronic toxicity data for various organisms or groups of organisms from both terrestrial and aquatic habitats including invertebrates, vertebrates, and plants. Toxicity endpoints used in risk assessments may be adjusted to account for potential differences in species sensitivity as well as varying protection goals (i.e., protection at the community, population, or individual level).

Initially, a screening level risk assessment is performed to identify pesticides and/or specific uses that do not pose a risk to non-target organisms, and to identify those groups of organisms for which there may be a potential risk. The screening level risk assessment uses simple methods, conservative exposure scenarios (e.g. direct application at a maximum cumulative application rate) and sensitive toxicity endpoints. A risk quotient is calculated by dividing the exposure estimate by an appropriate toxicity value (risk quotient = exposure/toxicity), and the risk quotient is then compared to the level of concern (LOC = 1).

If the screening level risk quotient is below the level of concern, the risk is considered negligible and no further risk characterization is necessary. If the screening level risk quotient is equal to or greater than the level of concern, then a refined risk assessment is performed to further

characterize the risk. A refined assessment takes into consideration more realistic exposure scenarios (such as drift to non-target habitats) and might consider different toxicity endpoints. Refinements may include further characterization of risk based on exposure modelling, monitoring data, results from field or mesocosm studies, and probabilistic risk assessment methods. Refinements to the risk assessment may continue until the risk is adequately characterized or no further refinements are possible.

4.2.1 Effects on Terrestrial Organisms

The toxicity of methoxyfenozide to many terrestrial organisms has previously been evaluated. For details, please refer to REG2004-08, *Methoxyfenozide*. All the data related to the toxicity of methoxyfenozide to terrestrial non-target organisms are presented in Appendix I, Table 3. Below is an overview of recent findings.

In studies with non-target arthropods, low mortality was observed following exposures to Intrepid 240F Insecticide. Also, this product did not affect the reproduction and or development of any of the tested species. Risk quotients calculated at the screening level did not exceed the level of concern (Appendix I, Table 4).

Results from a semi-field study (tunnel test with honeybee broods) showed that Intrepid 240F Insecticide does not affect the brood at the currently registered maximum seasonal rate of 480 g a.i./ha. Adverse effects on brood development were, however, observed at a higher rate. Based on these results, it is not expected that the use of Intrepid 240F Insecticide will pose an important risk to honeybee broods when used according to label directions.

There were no observable reproductive effects in bobwhite quail exposed to methoxyfenozide at concentrations up to 1000 mg a.i./kg diet (the highest test concentration). These results indicate that methoxyfenozide is less toxic to the bobwhite quail than to the mallard on a reproduction basis (NOEC of 562 mg a.i./kg in previously reviewed study with the mallard). Therefore, the reproductive risk assessment previously performed for the mallard is thought to be suitably conservative and a risk assessment using reproductive data for the bobwhite quail was not performed.

In the original risk assessment for methoxyfenozide, a dietary risk was identified for mammals. This assessment was performed using data from a two-year dietary study with rats, which was reported to be the most conservative. From an environmental point of view, however, it is more appropriate to use data from a 90-day dietary study. The dietary risk was therefore reassessed. Using data from a 90-day dietary study with rats and the same EEC as in the original assessment, it was found that the dietary risk for mammals is in fact below the level of concern (Appendix I, Table 4).

4.2.2 Effects on Aquatic Organisms

The toxicity of methoxyfenozide to many aquatic organisms has previously been evaluated. For details, please refer to REG2004-08, *Methoxyfenozide*.

The risk assessment for aquatic non-target organisms has been revisited to reflect recent changes to the risk assessment methods. For this assessment, both previously evaluated data and data recently submitted and reviewed to address outstanding requirements were considered (Appendix I, Table 3).

Aquatic invertebrates

Previously submitted data have shown that acute exposures to methoxyfenozide caused immobilization in daphnids. Chronic exposures of methoxyfenozide resulted in adverse effects in daphnids and in chironomids, with chironomids being the most sensitive organism tested. The chronic effects of the RH-117236 transformation product on chironomids were investigated in a limit test and there were no indications of adverse effects on chironomid development. In a recently submitted study on the chronic toxicity of methoxyfenozide to crayfish early life stages, no effect of on molting and growth were observed. For saltwater species, previously submitted data indicated that methoxyfenozide had an adverse effect on mysid shrimp on an acute and chronic basis and inhibited shell growth in Eastern oysters.

At the screening level, the risk quotients were calculated using the EEC in an 80-cm deep water body. Also, the acute toxicity value was divided by an uncertainty factor of two to reflect differences in species sensitivity as well as varying protection goals (e.g. community, population, individual). The risk quotients calculated at the screening level for aquatic invertebrates exceed the level of concern for the chironomid and mysid shrimp on a chronic basis (Appendix I, Table 4).

A refined assessment (Appendix I, Table 5) was conducted to characterize the risk from spray drift for the aquatic organisms for which risk quotients exceeded the level of concern at the screening level. For this assessment, the EEC was adjusted according to the projected percentage drift. For airblast applications with a fine spray quality (as would be the case for insecticide applications in orchards), the percent deposition at one metre is predicted to be 74% and 59% for airblast applications early in the season and late in the season, respectively. The refined assessment showed that the level of concern is still exceeded for chironomids suggesting a potential risk to aquatic invertebrates from spray drift.

Fish

Previously submitted data showed no mortality following acute exposures to methoxyfenozide in the rainbow trout, bluegill sunfish, and sheepshead minnow. In a full life cycle study with the fathead minnow, reproductive effects were observed.

Risk quotients calculated at the screening level for fish (using the EEC in an 80-cm deep water body and dividing the acute toxicity value by ten to account for differences in species sensitivity as well as varying protection goals) did not exceed the level of concern (Appendix I, Table 4).

Amphibians

To assess the risk to amphibians for an acute and a chronic exposure, the endpoint values for the most sensitive fish species were used as surrogate data along with the EEC in a 15-cm deep body of water (this water depth is representative of a seasonal water body used by amphibians to reproduce). The risk quotients calculated at the screening level did not exceed the level of concern for amphibians (Appendix I, Table 4).

4.2.3 Mitigation Measures

Methoxyfenozide is persistent and will carry over to the next growing season. It is recommended that the products containing methoxyfenozide not be used in areas treated with this product during the previous season. This recommendation is reflected in a precautionary label statement included on the product label.

Some characteristics of methoxyfenozide, including its persistence and mobility, suggest that this chemical has the potential to leach to groundwater. To identify this risk, a precautionary label statement is included on the product label, indicating that the use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable and or the water table is shallow.

Properties of methoxyfenozide indicate that this chemical has the potential for mobility and could lead to runoff. A precautionary label statement is included on the product label to reduce runoff from treated areas into aquatic habitats. Intrepid 240F Insecticide should not be applied to areas with a moderate to steep slope, compacted soil, or clay, and should not be applied when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Finally, the use of Intrepid 240F Insecticide may pose a risk to some aquatic non-target organisms and precautionary label statements are included on the product label to identify and mitigate this risk. Additionally, buffer zones up to 10 metres are required to protect sensitive aquatic habitats from spray drift.

5.0 Value

Intrepid 240F Insecticide is used on apples for control of codling moth, Oriental fruit moth, the overwintering generation of oblique-banded and three-lined leafrollers, and the first generation of western tentiform and spotted tentiform leafminers. Intrepid 240F Insecticide also provides suppression of winter moth and the summer generation of oblique-banded and three-lined leafrollers on apples. Intrepid 240F Insecticide is potentially an alternative to older classes of insecticides (e.g. organophosphates) for use against the listed pests on apples.

Refer to REG2004-08 for a detailed assessment of the value and efficacy of methoxyfenozide.

6.0 Toxic Substances Management Policy Considerations

6.1 Toxic Substances Management Policy Considerations

The management of toxic substances is guided by the federal government's Toxic Substances Management Policy, which puts forward a preventive and precautionary approach to deal with substances that enter the environment and could harm the environment or human health. The policy provides decision makers with direction and sets out a science-based management framework to ensure that federal programs are consistent with its objectives. One of the key management objectives is virtual elimination from the environment of toxic substances that result predominantly from human activity and that are persistent and bioaccumulative. These substances are referred to in the policy as Track 1 substances.

During the review process, methoxyfenozide was assessed in accordance with the PMRA Regulatory Directive [DIR99-03](#), *The Pest Management Regulatory Agency's Strategy for Implementing the Toxic Substances Management Policy*. Substances associated with the use of methoxyfenozide were also considered, including transformation products formed in the environment, and contaminants and formulants in the technical product and the end-use product. Methoxyfenozide and its transformation products were evaluated against the following Track 1 criteria: persistence in soil ≥ 182 days; persistence in water ≥ 182 days; persistence in sediment ≥ 365 days; persistence in air ≥ 2 days; bioaccumulation $\log K_{ow} \geq 5$ or bioconcentration factor ≥ 5000 (or bioaccumulation factor [BAF] ≥ 5000).

In order for methoxyfenozide or its transformation products to meet Track 1 criteria, the criteria for both bioaccumulation and persistence (in one media) must be met. The technical product and end-use-product, including formulants, were assessed against the contaminants identified in the *Canada Gazette*, Part II, Volume 139, Number 24, pages 2641–2643: *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern, Part 3 Contaminants of Health or Environmental Concern*. The PMRA has reached the following conclusions.

- Methoxyfenozide does meet the Track 1 criteria for persistence because the half-life values in a water/sediment system (387 to 963 days) and soil (239 to 433 days) exceed the Track 1 criteria for water, sediment and soil. However, methoxyfenozide does not meet the Track 1 criterion for bioaccumulation, as its *n*-octanol–water partition coefficient ($\log K_{ow}$ of 3.72) is below the Track 1 criterion. Further, studies in fish and clams have shown that the bioconcentration factor (BCF) for methoxyfenozide is 8.9 and 16, respectively. Although the Track 1 criterion is met for persistence, the Track 1 criterion for bioaccumulation is not met. Therefore, methoxyfenozide does not meet all Track 1 criteria, and is not considered a Track 1 substance.
- Methoxyfenozide does not form any transformation products that meet the Track 1 criteria. RH-117236, a major biotransformation product formed in a laboratory study on the aerobic biotransformation of methoxyfenozide in a water/sediment system, is not persistent.

- There are no Track 1 formulants in the technical product or the end-use product.
- There are no Track 1 contaminants in the technical product or the end-use product.

6.2 Formulants and Contaminants of Health or Environmental Concern

During the review process, formulants and contaminants in the technical and end-use products are assessed against the formulants and contaminants identified in the *Canada Gazette*, Part II, Volume 139, Number 24, pages 2641–2643: *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern*. This list of formulants and contaminants of health and environmental concern are identified using existing policies and regulations including: the federal Toxic Substances Management Policy; the Ozone-depleting Substance Regulations, 1998, of the *Canadian Environmental Protection Act* (substances designated under the Montreal Protocol); and the PMRA Formulants Policy as described in the PMRA Regulatory Directive DIR2006-02, *Formulants Policy and Implementation Guidance Document*. The *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern* is maintained and used as described in the PMRA Notice of Intent NOI2005-01, *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern under the New Pest Control Products Act*.

The *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern* consists of three parts:

- Part 1: Formulants of Health or Environmental Concern;
- Part 2: Formulants of Health or Environmental Concern that are Allergens Known to Cause Anaphylactic-Type Reactions; and
- Part 3: Contaminants of Health or Environmental Concern.

The contaminants to which Part 3 applies meet the federal Toxic Substances Management Policy criteria as Track 1 substances, and are considered in Section 6.1. The following assessment refers to the formulants and contaminants in Part 1 and Part 2 of the list.

Technical grade methoxyfenozide and the end-use product Intrepid 240F Insecticide do not contain any formulants or contaminants of health or environmental concern identified in the *Canada Gazette*, Part II, Volume 139, Number 24, pages 2641–2643: *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern*.

7.0 Summary

7.1 Human Health and Safety

Mixers, loaders and applicators handling Intrepid 240F Insecticide and workers re-entering treated fields are not expected to be exposed to levels of Intrepid 240F Insecticide that will result in an unacceptable risk when used according to label directions. The personal protective equipment specified on the product label is adequate to protect workers and bystanders.

7.2 Environmental Risk

Intrepid 240F Insecticide is persistent and has the potential to leach. Also, the use of Intrepid 240F Insecticide may pose a risk to some aquatic non-target invertebrates. Precautionary label statements are thus included on the product label to identify and mitigate such risks. Additionally, buffer zones up to 10 metres are required to protect sensitive aquatic habitats from spray drift.

7.3 Value

A new value assessment was not required because no efficacy issues were identified for the conversion to full registration. Refer to REG2004-08, *Methoxyfenozide*, for more details.

8.0 Proposed Regulatory Decision

Health Canada's PMRA, under the authority of the *Pest Control Products Act*, is proposing full registration for the sale and use of the technical grade active ingredient methoxyfenozide and the end-use product Intrepid 240F Insecticide to control lepidopteran larvae in apples.

An evaluation of available scientific information found that, under the approved conditions of use, the product has value and does not present an unacceptable risk to human health or the environment.

Health Canada's PMRA, under the authority of the *Pest Control Products Act* and Regulations, is proposing conversion from conditional to full registration for the sale and use of Methoxyfenozide Technical Insecticide and Intrepid 240F Insecticide, containing the technical grade active ingredient methoxyfenozide, to control *lepidopteran larvae* in apples for ground application.

An evaluation of available scientific information found that, under the approved conditions of use, the product has value and does not present an unacceptable risk to human health or the environment.

List of Abbreviations

µg	micrograms
a.i.	active ingredient
ADI	acceptable daily intake
atm	atmosphere
BAF	bioaccumulation factor
BCF	bioconcentration factor
bw	body weight
cm	centimetre
DT ₅₀	dissipation time 50% (the time required to observe a 50% decline in concentration)
dw	dry weight
EC ₅₀	effective concentration on 50% of the population
EEC	estimated environmental concentration
g	gram
ha	hectare
kg	kilogram
K _{oc}	organic-carbon partition coefficient
K _{ow}	<i>n</i> -octanol–water partition coefficient
L	litre
LC ₅₀	lethal concentration 50%
LD ₅₀	lethal dose 50%
LOC	level of concern
LOEC	lowest observed effect concentration
LR ₅₀	lethal rate 50%
m ³	cubic metre
mg	milligram
mol	mole
MRL	maximum residue limit
nm	nanometre
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
Pa	pascal
p <i>K</i> _a	dissociation constant
PMRA	Pest Management Regulatory Agency
RQ	risk quotient
t _{1/2}	half-life
torr	1/760 of one atmosphere
USEPA	United States Environmental Protection Agency
UV	ultraviolet

Appendix I Tables and Figures

Table 1 Physical and Chemical Properties Relevant to the Environment

Property	Value	Comments	Reference																		
Water solubility	3.3 mg/L	Low solubility.	REG2004-08																		
Vapour pressure	$<1.33 \times 10^{-5}$ Pa ($<1 \times 10^{-7}$ torr)	Non-volatile.	REG2004-08																		
Henry's law constant	1.935×10^{-7} atm·m ³ /mol 1.263×10^5 (1/H)	Non-volatile from moist soils or water.	REG2004-08																		
log K _{ow}	3.72 ± 0.04 at $24.7 \pm 1.4^\circ\text{C}$	There is potential for the active ingredient to bioconcentrate.	REG2004-08																		
pK _a	none	The active ingredient is not expected to dissociate in water.	REG2004-08																		
UV-visible absorption	<table border="1"> <thead> <tr> <th>medium</th> <th>λ_{max} (nm)</th> <th>ϵ</th> </tr> </thead> <tbody> <tr> <td rowspan="2">neutral:</td> <td>203</td> <td>55 313</td> </tr> <tr> <td>279</td> <td>2932</td> </tr> <tr> <td rowspan="2">acid:</td> <td>204</td> <td>51 183</td> </tr> <tr> <td>280</td> <td>2855</td> </tr> <tr> <td rowspan="2">alkaline:</td> <td>219</td> <td>21 317</td> </tr> <tr> <td>276</td> <td>3170</td> </tr> </tbody> </table>	medium	λ_{max} (nm)	ϵ	neutral:	203	55 313	279	2932	acid:	204	51 183	280	2855	alkaline:	219	21 317	276	3170	A UV absorption maximum for the active ingredient was found at 203 nm, however, the earth's ozone layer absorbs sunlight at wavelengths below 290 nm; therefore, the active ingredient has a low potential for ultraviolet light-induced phototransformation under normal environmental conditions. A visible light spectrum was not submitted, therefore, no prediction can be made on the potential for visible light-induced phototransformation.	REG2004-08
medium	λ_{max} (nm)	ϵ																			
neutral:	203	55 313																			
	279	2932																			
acid:	204	51 183																			
	280	2855																			
alkaline:	219	21 317																			
	276	3170																			

Table 2 Fate and Behaviour in the Environment

Property	Test Substance	Value	Comments	Reference
Terrestrial Environment				
Abiotic transformation				
Hydrolysis	Methoxyfenozide	pH 5: 587 d pH 7: 1572 d pH 9: 695 d	Not a route of transformation in the environment.	REG2004-08
Phototransformation on soil	Methoxyfenozide	173 d	Not a route of transformation in the environment.	REG2004-08
Biotransformation				
Biotransformation in aerobic soil	Methoxyfenozide	573 d (loam) 722 d (sandy clay loam) 336–1100 d (loamy sand)	A route of transformation in the environment. Methoxyfenozide is persistent in soil under aerobic conditions.	REG2004-08
Biotransformation in anaerobic soil	Methoxyfenozide	No data	–	–

Property	Test Substance	Value	Comments	Reference
Biotransformation in anaerobic water/sediment systems	Methoxyfenozide	DT ₅₀ : 654 d (whole system)	Not an important route of transformation in the environment.	REG2004-08
Bioconcentration	Methoxyfenozide	Fish: Depuration half-life: <1/2 day Bioconcentration factor: 8.9 Bivalve: Depuration half-life: <1/2 day Bioconcentration Factor: 16	Depurated quickly from fish and bivalve	REG2004-08 (fish); 1407459 (bivalve)

Table 3 Toxicity to Non-Target Species

Organism	Exposure	Test Substance	Endpoint Value	Degree of Toxicity ^a	Reference (PMRA#)
Terrestrial					
Invertebrates					
Earthworm (<i>Eisenia fetida</i>)	Acute	Methoxyfenozide	LC ₅₀ : >1213 mg a.i./kg dw substrate NOEC: 1213 mg a.i./kg dw substrate	non-toxic up to 1213 mg a.i./kg dw	REG2004-08
Bee (<i>Apis mellifera</i> L.)	Oral	Methoxyfenozide	LC ₅₀ : >100 µg a.i./bee	Practically non-toxic	REG2004-08
	Contact	Methoxyfenozide	LD ₅₀ : >100 µg a.i./bee	Practically non-toxic	REG2004-08
	Semi-field (tunnel test)	Intrepid 240F	No effect on bee survival and flight density up to 960 g a.i./ha. Adverse effects on brood development at 960 g a.i./ha. No effects at 480 g a.i./ha.	–	1407452
Predatory mite (<i>Typhlodromus pyri</i>)	Contact	Intrepid 240F	LR ₅₀ >960 g a.i./ha NOEC (mortality and reproduction): 960 g a.i./ha	–	1407456
Predatory beetle (<i>Stethorus punctillum</i>)	Contact	Intrepid 240F	LR ₅₀ >960 g a.i./ha NOEC (reproduction): 960 g a.i./ha.	–	1407454

Organism	Exposure	Test Substance	Endpoint Value	Degree of Toxicity ^a	Reference (PMRA#)
Carabid beetle (<i>Poecilius cupreus</i>)	Contact	Intrepid 240F	LC ₅₀ >1.28 mg a.i./kg soil NOEC (mortality and development): 1.28 mg a.i./kg soil	–	1407455
Collembola (<i>Folsomia candida</i>)	Contact	Intrepid 240F	LR ₅₀ >1.28 mg a.i./kg soil NOEC (mortality and fecundity): 1.28 mg a.i./kg soil	–	1407458
Birds					
Bobwhite quail (<i>Colinus virginianus</i>)	Acute	Methoxyfenozide	LC ₅₀ : >2250 mg a.i./kg bw NOEC: 2250 mg a.i./kg bw	Practically non-toxic	REG2004-08
	Acute dietary (5-d)	Methoxyfenozide	LC ₅₀ : >5620 mg a.i./kg diet NOEC: 5620 mg a.i./kg diet	Practically non-toxic	REG2004-08
	Reproduction	Methoxyfenozide	NOEC: 1000 mg a.i./kg dw diet	–	1407462
Mallard duck (<i>Anas platyrhynchos</i>)	Acute dietary (5-d)	Methoxyfenozide	LC ₅₀ : >5620 mg a.i./kg diet NOEC: 562 mg a.i./kg diet (reduction in feed consumption and body weight gain)	Practically non-toxic	REG2004-08
	Reproduction	Methoxyfenozide	LOEC: 1000 mg a.i./kg dw diet NOEC: 780 mg a.i./kg diet (adults: food consumption; reproduction: hatchling weight)	–	REG2004-08
Mammals					
Rat	Acute	Methoxyfenozide	Oral LD ₅₀ : >5000 mg a.i./kg bw Dermal LD ₅₀ : >2000 mg a.i./kg bw Inhalation LC ₅₀ : >4.3 mg/L	No treatment-related clinical signs of toxicity observed. Low oral, dermal, and inhalation toxicity	REG2004-08

Organism	Exposure	Test Substance	Endpoint Value	Degree of Toxicity ^a	Reference (PMRA#)
		Intrepid 240F	Oral LD ₅₀ : >5000 mg a.i./kg bw Dermal LD ₅₀ : >2000 mg a.i./kg bw Inhalation LC ₅₀ : >0.9 mg/L	No treatment-related clinical signs of toxicity observed. Low oral, dermal, and inhalation toxicity Inhalation toxicity considered low based on the low volatility of the active ingredient and the generation of large particles	REG2004-08
	Short-term (90-d dietary)	Methoxyfenozide	90-d dietary NOAEL: ♂: 1369 ♀: 1531 mg/kg bw/day	No adverse effects observed	REG2004-08
	Reproduction	Methoxyfenozide	Parental systemic NOAEL: ♂: 153 ♀: 181 mg/kg bw/day Reproductive NOAEL: ♂: 1552 ♀: 1821 mg/kg bw/day Offspring NOAEL: 1821 mg/kg bw/day	Some parental systemic effects; but no reproductive or offspring adverse effects	REG2004-08
Mouse	Acute	Methoxyfenozide	Oral LD ₅₀ : >5000 mg a.i./kg bw	No treatment-related signs of toxicity. Low oral toxicity	REG2004-08
		Intrepid 240F	Oral LD ₅₀ : >5000 mg a.i./kg bw	No treatment-related signs of toxicity. Low oral toxicity	REG2004-08
		RH-117236 (transformation product)	Oral LD ₅₀ : >5000 mg a.i./kg bw	No treatment-related signs of toxicity. Low oral toxicity	REG2004-08
	Short term (90-d dietary)	Methoxyfenozide	90-d dietary NOAEL: ♂: 1149 ♀: 1742 mg/kg bw/day	No adverse effects observed	REG2004-08

Organism	Exposure	Test Substance	Endpoint Value	Degree of Toxicity ^a	Reference (PMRA#)
Aquatic					
Freshwater Species					
<i>Daphnia magna</i>	Acute	Methoxyfenozide	48-h EC ₅₀ : >3.3 mg a.i./L NOEC: 1.7 mg a.i./L (immobilisation)	Moderately toxic	REG2004-08
	Chronic	Methoxyfenozide	21-d NOEC: 0.20 mg a.i./L (survival, reproduction, growth) LOEC: 0.39 mg a.i./L	–	REG2004-08
Chironomid (<i>Chironomus riparius</i>)	Chronic	Methoxyfenozide	EC ₅₀ for water: 0.014 mg a.i./L NOEC for water: 0.0065 mg a.i./L (emergence and development)	Very highly toxic	REG2004-08
	Chronic	RH-117236 (transformation product)	NOEC: >0.1 mg/L (emergence) LOEC: 0.1 mg/L	–	REG2004-08
Crayfish (<i>Procambarus clarkii</i>)	Chronic	Methoxyfenozide	NOEC: 0.19 mg a.i./L (survival, growth and molting)	–	1407460
Rainbow trout (<i>O. mykiss</i>)	Acute	Methoxyfenozide	96-h LC ₅₀ : >3.3 mg a.i./L NOEC: 3.3 mg a.i./L	Moderately toxic	REG2004-08
Bluegill sunfish (<i>Lepomis macrochirus</i>)	Acute	Methoxyfenozide	96-h LC ₅₀ : >3.3 mg a.i./L NOEC: 3.3 mg a.i./L	Moderately toxic	REG2004-08
Fathead minnow (<i>Pimephales promelas</i>)	Chronic	Methoxyfenozide	Whole life-cycle study (262 d) NOEC: 0.53 mg a.i./L (F1 survival) LOEC: 1.0 mg a.i./L	–	REG2004-08
Marine Species					
Crustacean – mysid shrimp (<i>Mysidopsis bahia</i>)	Acute	Methoxyfenozide	96-h LC ₅₀ : 1.3 mg a.i./L NOEC: 0.68 mg a.i./L (survival)	Moderately to highly toxic	REG2004-08
	Chronic	Methoxyfenozide	37-d NOEC: 51 µg a.i./L (growth) LOEC: 100 µg a.i./L	–	REG2004-08
Mollusc – Eastern oyster (<i>Crassostrea virginica</i>)	Acute	Methoxyfenozide	EC ₅₀ : 1.2 mg a.i./L NOEC: 0.4 mg a.i./L (shell deposition)	Moderately toxic	REG2004-08

Organism	Exposure	Test Substance	Endpoint Value	Degree of Toxicity ^a	Reference (PMRA#)
Sheepshead minnow (<i>Cyprinodon variegatus</i>)	Acute	Methoxyfenozide	LC ₅₀ : >2.8 mg a.i./L NOEC: 2.8 mg a.i./L	Moderately toxic	REG2004-08

^a Atkins et al. (1981) for bees and the USEPA classification for others, where applicable.
NOTE: 3.3 mg a.i./L is the limit of solubility

Table 4 Screening Level Risk Assessment on Non-Target Species

Organism	Type of Exposure	Test Substance	Toxicity	Exposure ^a	Units	RQ ^b
Terrestrial Invertebrates						
Earthworm	Acute	Methoxyfenozide	Refer to REG2004-08			
Bee	Oral	Methoxyfenozide	Refer to REG2004-08			
	Contact	Methoxyfenozide	Refer to REG2004-08			
Predatory mite (<i>T. pyri</i>)	Contact	Intrepid 240F	LR ₅₀ : >960	219	g a.i./ha	0.23
Lady bird beetle (<i>S. punctillum</i>)	Contact	Intrepid 240F	LR ₅₀ : >960	219	g a.i./ha	0.23
Carabid beetle (<i>P. cupreus</i>)	Contact	Intrepid 240F	LC ₅₀ : >1.28	0.21	mg a.i./kg soil	0.17
Collembola (<i>Folsomia candida</i>)	Contact	Intrepid 240F	LR ₅₀ : >1.28	0.21	mg a.i./kg soil	0.17
Birds						
Bobwhite quail	Acute	Methoxyfenozide	Refer to REG2004-08			
	Dietary	Methoxyfenozide	Refer to REG2004-08			
	Reproduction	Methoxyfenozide	RQ not calculated; RQ will be <LOC based on toxicity value			
Mallard duck	Acute	Methoxyfenozide	Refer to REG2004-08			
	Dietary	Methoxyfenozide	Refer to REG2004-08			
	Reproduction	Methoxyfenozide	Refer to REG2004-08			
Mammals						
Rat	Acute	Methoxyfenozide	Refer to REG2004-08			
	Dietary ^c	Methoxyfenozide	1369 ^c	242 ^c	mg a.i./kg dw	0.18
	Reproduction	Methoxyfenozide	Refer to REG2004-08			
Mouse	Acute	Methoxyfenozide	Refer to REG2004-08			
	Dietary	Methoxyfenozide	Refer to REG2004-08			

Organism	Type of Exposure	Test Substance	Toxicity	Exposure ^a	Units	RQ ^b
Freshwater Species						
<i>Daphnia magna</i>	Acute	Methoxyfenozide	EC ₅₀ ÷2: >1.65	0.06	mg a.i./L	<0.04
	Chronic	Methoxyfenozide	NOEC: 0.20	0.06	mg a.i./L	0.3
Chironomid	Chronic	Methoxyfenozide	NOEC: 0.0065	0.06	mg a.i./L	9.2
	Chronic	RH-117236	NOEC: 0.10	0.06	mg/L	0.6
Crayfish	Chronic	Methoxyfenozide	NOEC: 0.19	0.06	mg a.i./L	0.32
Rainbow trout	Acute	Methoxyfenozide	LC ₅₀ ÷10: >0.33	0.06	mg a.i./L	<0.18
Bluegill sunfish	Acute	Methoxyfenozide	LC ₅₀ ÷10: >0.33	0.06	mg a.i./L	<0.18
Fathead minnow	Chronic (full life cycle)	Methoxyfenozide	NOEC: 0.53	0.06	mg a.i./L	0.11
Amphibians						
Amphibians	Acute	Methoxyfenozide	Fish LC ₅₀ ÷10: >0.33	0.32	mg a.i./L	<0.97
	Chronic	Methoxyfenozide	Fish NOEC: 0.53	0.32	mg a.i./L	0.6
Marine Species						
Crustacean (mysid shrimp)	Acute	Methoxyfenozide	LC ₅₀ ÷2: 0.65	0.06	mg a.i./L	0.09
	Chronic	Methoxyfenozide	NOEC: 0.051	0.06	mg a.i./L	1.2
Mollusc (Eastern oyster)	Acute	Methoxyfenozide	EC ₅₀ ÷2: 0.60	0.06	mg a.i./L	0.1
Sheepshead minnow	Acute	Methoxyfenozide	LC ₅₀ ÷10: >0.28	0.06	mg a.i./L	0.21

^a For soil dwelling arthropods, the soil EEC is calculated using a maximum seasonal cumulative rate of 478 g a.i./ha (based on half-life of 1100 from aerobic biotransformation study on soil), assuming soil bulk density of 1.5 g/cm³ and that compound is evenly distributed in the 0–15 cm soil layer. For other arthropods, the EEC is the maximum cumulative seasonal rate on vegetation (437 g a.i./ha, based on a default foliar half-life of 35 days) multiplied by a factor of 0.5 to take into consideration leaf canopy interception in orchard crops. For aquatic organisms, water EEC was calculated using a maximum cumulative rate of 478 g a.i./ha (based on half-life of 963 days in aerobic aquatic system) and represents the exposure to a directly oversprayed water body (80-cm depth, except for amphibians where a 15-cm depth is used).

^b Risk quotient = exposure/toxicity. Shaded cells indicate that the screening level risk quotient exceeds the level of concern (LOC = 1).

^c While the dietary risk for mammals was assessed previously (risk quotient based an EEC of 242 mg a.i./kg dw and on a toxicity value of 200 mg a.i./kg dw drawn from a 2-yr dietary study with rats; refer to REG2004-08), this risk was reassessed using the toxicity value drawn from a 90-day dietary study with rats, which is considered to be more appropriate from an environmental point of view.

Table 5 Refined Risk Assessment on Non-Target Aquatic Species

Organism	Type of Exposure	Test Substance	Toxicity	Exposure from Drift ^a	RQ ^b
Chironomid	Chronic	Methoxyfenozide	NOEC: 0.0065 mg a.i./L	with 74% drift deposition: 0.044 mg a.i./L	6.8
				with 59% drift deposition: 0.035 mg a.i./L	5.4
Mysid shrimp	Chronic	Methoxyfenozide	NOEC: 0.051 mg a.i./L	with 74% drift deposition: 0.044 mg a.i./L	0.9
				with 59% drift deposition: 0.035 mg a.i./L	0.7

^a 74% spray deposition: early season spray drift at one metre downwind resulting from airblast applications

59% spray deposition: late season spray drift at one metre downwind resulting from airblast applications

^b Risk quotient = exposure/toxicity. Shaded cells indicate that the screening level risk quotient exceeds the level of concern (LOC = 1).

References

A. LIST OF STUDIES/INFORMATION SUBMITTED BY REGISTRANT

Impact on the Environment

PMRA No.	Title
1432130	2007, Surface Water Monitoring with Sediment Testing and Prospective Groundwater Study (Waiver), Dow AgroSciences Canada Inc., DACO: 8.3.4
1407452	2006, Study on the Effect of Intrepid 2F on Honey Bee Brood (<i>Apis mellifera</i> L.) under Semi-Field Conditions - Tunnel Test, Institut fur Biologische Analytik, Laboratory Report No. 24521031, DACO: 9.2.4.3
1407453	1993, RH-2485 Technical: An Acute Contact Toxicity Study with the Honey Bee, Wildlife International Ltd., Laboratory Report No. 129-149, DACO: 9.2.4.3
1407454	2007, Intrepid 2F: Persistence Toxicity Test on Field-Applied Apple Trees Exposing <i>Stethorus punctillum</i> (Weise) (Coleoptera: Coccinellidae) Under Laboratory Conditions, Springborn Smithers Laboratories (Europe), Laboratory Report No. 1072.009.695, DACO: 9.2.5, 9.2.6
1407455	2006, Effects of Methoxyfenozide (active ingredient) and the Formulated Product Intrepid 2F on Larvae of the Carabid Beetle <i>Poecilus cupreus</i> L., Extended Laboratory Study - Multiple Rate Test, Institut fur Biologische Analytik, Laboratory Report No. 24523008, DACO: 9.2.5, 9.2.6
1407456	2005, An aged-residue extended laboratory test to determine the effects of Intrepid 2F, containing 240 g/L methoxyfenozide, on the predatory mite <i>Typhlodromus pyri</i> (Acari: Phytoseiidae), Mambo-Tox Ltd., Laboratory Report No. DOW-05-8, DACO: 9.2.5, 9.2.6
1407457	2005, Rate-Response Extended Laboratory Tests to Determine the Effects of Mimic 2F (240 g/L Tebufenozide) and Intrepid 2F (240 g/L Methoxyfenozide) on Second-instar Larvae of the Speckled Wood Butterfly, <i>Pararge aegeria</i> (Lepidoptera, Satyridae), Mambo-Tox Ltd., Laboratory Report No. DOW-04-LEP1, DACO: 9.2.7
1407458	2005, Methoxyfenozide TGAI and Intrepid 2F, RH-2485 Effects on the <i>Collembola Folsomia candida</i> , CEM Analytical Services Limited (CEMAS), Laboratory Report No. CEMS-2648, DACO: 9.2.7
1407459	2002, RH-112,485 Technical-Flow-Through Bioconcentration Study with Asian Clams (<i>Corbicula fluminea</i>), Springborn Smithers Laboratories, Laboratory Report No. 86.6242, DACO: 9.3.4

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- 1407460 2002, Methoxyfenozide (RH-2485) Technical: Effects on Early Life-Stage Molting and Growth in Red Swamp Crayfish (*Procambarus clarkii*), Springborn Smithers Laboratories, Laboratory Report No. 12550.6188, DACO: 9.3.4
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- 1432129 2007, Frog Embryo Tertogenesis waiver, Dow AgroSciences Canada Inc., DACO: 9.3.4
- 1521381 1999, Response and Recovery of Aquatic Communities Exposed to RH-2485 240 SC in Indoor Microcosms Representing Shallow Freshwater Lentic Ecosystems, Springborn Laboratories, Inc., Laboratory Report No. 99RC-0052, DACO: 9.3.4 PMRA

B. ADDITIONAL INFORMATION CONSIDERED

Published Information

2004, PMRA Regulatory Note, REG2004-08, *Methoxyfenozide*. November 19, 2004.