Hazardous Substances Consideration Committee

TOPIC: Consideration of Application for the Modified Reassessment of DuPont Altacor Insecticide

Introduction

1 DuPont (New Zealand) Limited is seeking the modified reassessment of the substance identified as DuPont Altacor Insecticide. The substance was approved by the Authority on 26 September 2008 via Part 5 of the Hazardous Substances and New Organisms Act 1996 ("the Act") and has the HSNO Approval Number of HSR007968.

2 One of the controls of the approval states that:

"*The maximum application rate for DuPont Altacor Insecticide shall be 0.063 kg ai/ha and 2 times per season (minimum application interval: 14 days).*"

3 The applicant intends to market the substance for use on avocados at an application rate that exceeds the maximum application rate allowed under the existing approval.

4 The proposed modification, therefore, relates to an increase in the maximum application rate to allow the substance to be used on avocados at the application rate proposed by the applicant.

Legislative Criteria for the Application

5 Unless otherwise stated, references to section numbers in this report refer to sections of the Act and clauses to clauses of the Hazardous Substances and New Organisms (Methodology) Order 1998 ("the Methodology").

6 In its decision dated 21 June 2010 (Application Number: ERMA200454), the Authority determined that the proposed use of the substance at a rate that exceeds the specified maximum application rate is a significant change of use and therefore constitutes grounds for its reassessment (section 62(2)(c)). Consequently, the applicant is able to make an application for the modified reassessment of the substance.

7 The application was received on 28 June 2010 in accordance with section 63A on the basis that─

(a) a reassessment of the hazardous substance under section 63 is not appropriate because the reassessment will involve only a specific aspect of the approval (i.e. a change in the maximum application rate of the substance); and

(b) the amendment is not a minor or technical amendment to which section 67A applies (i.e. a change is use is not considered a minor or technical amendment).

8 The Authority may approve or decline an application for reassessment under this section, as it considers appropriate, after taking into account (see section 63A(6)):

a) all the effects associated with the reassessment; and

b) the best international practices and standards for the safe management of hazardous substances.

9 When making their decision, the Authority must follow the decision path outlined in Appendix 1.

Notification and Consultation

10 The Minister for the Environment was advised of the application[1] and given the opportunity to "call-in" the application[2]. This action was not initiated.

11 The Department of Labour (Workplace Group), the New Zealand Food Safety Authority (Agricultural Compounds and Veterinary Medicines (ACVM) Group) and the Department of Conservation were identified as having a specific interest in the application and were provided with a copy of the application (excluding the confidential information, but with the opportunity to access this if necessary).

11.1. No comments or submissions were received.

12 Other Government departments, Crown agencies and other interested parties, as listed in Appendix 4, were provided with a copy of the application summary and given the opportunity to comment or to make a submission.

12.1. No comments or submissions were received.

13 The application was publicly notified on the ERMA New Zealand website on 7 July 2010 and advertised in The Dominion Post, the New Zealand Herald, the Christchurch Press and the Otago Daily Times[3].

13.1. No comments or submissions were received.

AGENCY EVALUATION

14 To enable the Agency to consider all the effects associated with the proposed reassessment, the Agency has undertaken an assessment of the change in the risks, costs and benefits associated with the proposed modification to the approval of the substance.

Risk Assessment

15 A "cost" is defined in Regulation 2 of the Methodology as "the value of a particular adverse effect expressed in monetary or non-monetary terms". Thus, these have been assessed in an integrated fashion together with the risks of the adverse effects in the following assessment.

16 As the proposed modification relates to a change in use of the substance, the Agency has confined its risk assessment to the use phase of the substance's lifecycle.

[1] section 53(4)(a)
[2] section 68
[3] section 53

17 In accordance with sections 5 and 6 of the Act and clauses 9 and 12 of the methodology, the Agency has assessed the potentially non-negligible risks of the change in use of this substance in terms of risks to the environment, to human health and safety, to the relationship of Māori to the environment, to society and the community, to the market economy, and to New Zealand's international obligations.

Assessment of the risks to the environment

18 The Agency has classified DuPont Altacor Insecticide as being very toxic to the aquatic environment (9.1A). Thus, organisms in the aquatic environment may be adversely affected if exposed to the substance.

19 The Agency has undertaken quantitative modelling of the risks to the environment when used at the proposed application rate and compared this to the risks associated with the use of the substance at the current maximum application rate.

20 The results of the risk assessments are summarised in Table 1 and discussed in more detail in Appendix 2.

Table 1: Risks to the environment from the use of DuPont Altacor Insecticide

Potential Adverse Effect	Proposed Application Rate	Current Maximum Application Rate	Change in risk
Death or adverse effects to aquatic organisms in the environment.	High acute risk to crustacea and a high chronic risk to crustacea and aquatic insects.	High acute risk to crustacea and a high chronic risk to crustacea and aquatic insects.	No significant increase in risk.
Death or adverse effects to soil organisms in the environment.	Risk to springtails via in field exposure.	No risks to soil organisms via either in field or off field exposure	Significant increase in risk.
Death or adverse effects to birds.	No acute or chronic risks to birds	No acute or chronic risks to birds	No significant increase in risk.
Death or adverse effects to bees.	Low risk to bees	Low risk to bees	No significant increase in risk.
Death or adverse effects to non-target invertebrates in the environment.	High risk via either in field or off field exposure	High risk via either in field or off field exposure	No significant increase in risk.
Adverse effects to ground water.	High risk of leaching into ground water	High risk of leaching into ground water	No significant increase in risk.

21 The Agency notes the results of the quantitative modelling and considers that the following existing controls on the substance will reduce the level of risk to the environment at either application rate:

- the approved handler controls (triggered by the 9.1A classification);
- prohibiting the application of the substance into or onto water;
- restricting the method of application of the substance to ground-based methods only;
- The labels for the substance shall state the following:
  - *"The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in the substance leaching into ground-water"*
  - *"Harmful to some beneficial insects – particularly some foliage dwelling predators that may be used in Integrated Pest Management"*
  - *"Due to the persistent nature of chlorantraniliprole in soil, this product is expected to accumulate over successive seasons following repeated use."*
- DuPont (New Zealand) Limited shall make available to ERMA New Zealand the results of any soil accumulation trials for chlorantraniliprole upon their completion.

22 The Agency notes that the risk assessment indicates that the revised application rate used in the modelling should be set as the maximum application rate for use of the substance on avocados. Therefore, the following revised maximum application rate is proposed:

- The maximum application rate for the substance shall be 0.095 kg ai/ha twice per year with a minimum application interval of 14 days.

Assessment of the risks to human health and safety

23 The Agency has not classified DuPont Altacor Insecticide as being hazardous to human health or safety. Therefore, no assessment of the risks of the substance to human health and safety has been conducted.

Relationship of Māori to the Environment

24 The Agency notes that DuPont Altacor insecticide triggers a hazardous property giving rise to the potential for cultural risk including the deterioration of the mauri of taonga flora and fauna species and the environment (i.e. this substance has the potential to leach into ground water, thereby disrupting the mauri of the water).

25 In addition, the introduction and use of this substance has the potential to inhibit the ability of iwi/Māori to fulfill their role as kaitiaki, particularly in relation to the guardianship of waterways given the highly ecotoxic nature of the substance to aquatic species.

26 On considering the information outlined here and elsewhere in this report, the Agency considers a ***minimal*** impact from DuPont Altacor insecticide on the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, valued flora and fauna and other taonga to be ***highly improbable***. In addition there is no evidence to suggest that the controlled use of DuPont Altacor insecticide will breach the principles of the Treaty of Waitangi.

27 The overall level of risk is therefore considered to be ***negligible*** assuming that the substance will be handled, stored, transported, used, and disposed of, in accordance with the explicitly stated default and additional controls proposed in this report, and any other controls required by other legislation. It is considered that the increase in the application rate will not affect this assessment.

28 However, the Agency notes that should inappropriate use, or accident, result in the contamination of waterways or the environment generally, that users notify the appropriate authorities including the relevant iwi authorities in that region. This action should include advising them of the contamination and the measures taken to contain and remediate.

Assessment of the risks to society and the community

29 There are not expected to be any significant adverse impacts on the social environment with the controlled use of the substance as a pesticide, apart from the environmental effects already discussed. Consequently, the Agency considers that this aspect of potential risk need not be considered further.

Assessment of the risks to the market economy

30 Taking into account the level of risk to the environment and to human welfare, no sources of additional risk have been identified that could result in an adverse economic impact on a community.

31 The Agency notes that direct economic costs will be borne by the applicant and users of the substance. The HSNO default controls intentionally do not manage direct economic effects. These are for suppliers and users of the substance to address.

New Zealand's international obligations

32 The Agency does not anticipate that the use of the substance at the increased application rate will pose any risks to New Zealand's international obligations.

Assessment of Beneficial Effects

33 A "benefit" is defined in Regulation 2 of the Methodology as "the value of a particular positive effect expressed in monetary or non-monetary terms". Benefits that may arise from any of the matters set out in clauses 9 and 11 were considered in terms of clause 13.

34 The applicant claims that the proposed modification of the approval of the substance will provide the following benefits:

- The use of DuPont Altacor Insecticide at the increased application rate will provide avocado growers with an insecticide option which is IPM compatible, virtually harmless to the applicator, safe to bees, earthworms and beneficials, whilst offering a new mode of action to assist with insect resistance management.

- Increased profits and employment opportunities within DuPont (New Zealand) Limited and those involved in the distribution of the substance within New Zealand.

35 The Agency considers the economic and related benefits to be derived from the use of the substance on turf at the increased application rates are potentially significant.

Controls

36 As a result of the proposed modification to the approval of this substance, no variations to the existing controls on the substance are necessary, with the exception of the revision of the maximum application rate.

37 The Agency has considered the controls imposed by the Authority in approvals given to other pesticides under Part 5 of the Act as well as those transferred to the Act under the *Hazardous Substances (Pesticides) Transfer Notice 2004 (as amended)* and considers that the controls listed in Appendix 3 should apply to the substance.

Overall evaluation of risks, costs and benefits

38 The Agency notes that there is a significant increase in the risks to the environment as a result of the increase in the maximum application rate. However, the Agency considers the increased risks of the substance to the environment will be managed by the existing controls on the substance. Therefore, the Agency considers the risks of the substance to the environment and human health, with the existing controls in place, to be negligible.

39 The Agency does not consider there to be significant risks to Māori cultural wellbeing, society and the community, the market economy, or to New Zealand's international obligations associated with the modified reassessment.

40 The Agency has taken the type and severity of the risks, and the characteristics of such risks into account, and considers that the overall level of risk posed by the substance is negligible.

41 The Agency considers that there are benefits associated with the modified reassessment of this substance.

42 Thus, the Agency considers that the benefits of the modified reassessment outweigh the costs.

Best international practices and standards for the safe management of hazardous substances

43 The requirement to consider best international practices and standards for the safe management of hazardous substances is demonstrated by assessing the proposed modified reassessment against:

- the Globally Harmonised System of Classification and Labelling of Chemicals;
- international codes of practice and standards;
- overseas legislative requirements.

Globally Harmonised System

44 The controls applied to the substance as a result of the modified reassessment are based on the HSNO Regulations. These regulations specify a number of controls aimed at managing the risk posed by hazardous substances throughout their lifecycle, such as the requirement for protective clothing and provision of appropriate information, disposal and emergency management requirements. These regulations have previously met the requirements of section 141(1)(b) on best international practices and standards for the safe management of hazardous substances. In particular, the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), published by the United Nations, forms the basis of the HSNO hazard classification system and the requirements for the provision of information on hazards.

International Codes of Practice and Standards

45 The transportation controls on the substance requiring the segregation of incompatible substances are cross-references to the requirements of the Land Transport Rule, the Maritime Rule and the Civil Aviation Rule, which are themselves based on the International UN Transport of Dangerous Goods Model Regulations, the International Maritime Dangerous Goods Code and the International Civil Aviation Organization Regulations.

Overseas Legislative Requirements

46 The Agency notes that the substance is approved for use as a pesticide by a number of overseas regulators. The controls proposed by the Agency are consistent with those imposed by the overseas regulators.

Conclusions

47 DuPont (New Zealand) Limited is seeking the modified reassessment of the substance identified as DuPont Altacor Insecticide to allow its use on avocados at application rates that exceed the existing maximum application rate.

48 The Agency considers that there are negligible risks to the environment and human health, with the existing controls in place, and benefits associated with the modified reassessment of the substance.

49 The Agency considers that the modified reassessment meets the requirements of best international practices and standards for the safe management of hazardous substances.

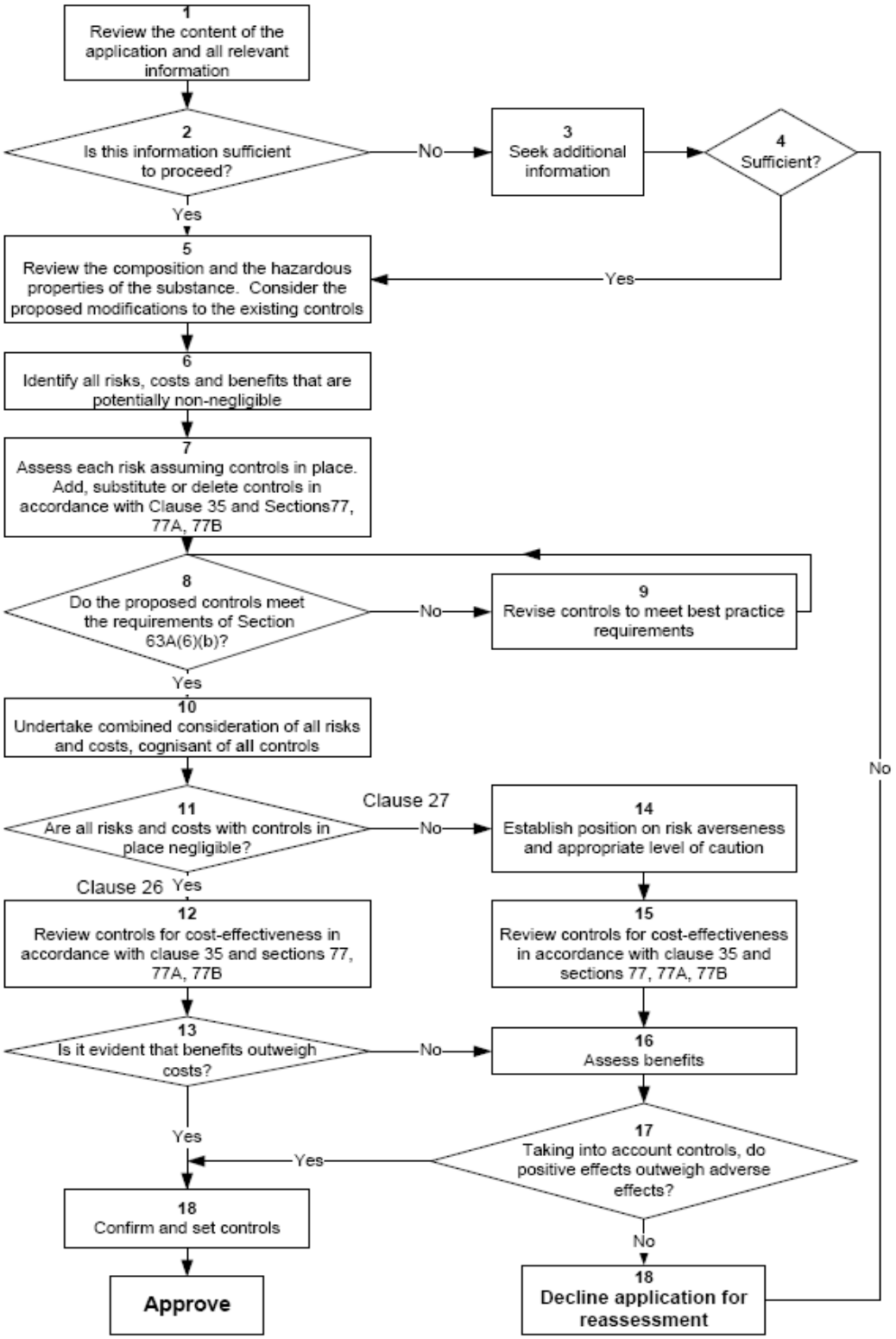
50 The Agency considers that the application for the modified reassessment meets the requirements of section 63A(6) and, therefore, may be approved in accordance with clause 26.

51 The Agency considers that the controls listed in Appendix 3 should apply to DuPont Altacor Insecticide.

APPENDIX 1 DECISION PATH

Decision path for modified reassessment for amendments to hazardous substance approvals: application made and determined under section 63A.

For proper interpretation of the decision path it is important to work through the flowchart conjunction with the explanatory notes



APPENDIX 2 RISK ASSESSMENT

Environmental exposure and risk assessment

For Class 9 substances, irrespective of the intrinsic hazard classification, the ecological risk can be assessed for a substance by calculating a risk quotient based on an estimated exposure concentration. Such calculations incorporate toxicity values, exposure scenarios (including spray drift, application rates and frequencies), and the half lives of the component(s) in soil and water. The calculations provide an Estimated Environmental Concentration (EEC) which, when divided by the LC_{50} or EC_{50}, gives a risk quotient (RQ).

$$\text{Acute RQ} = \frac{EEC_{\text{short term}}}{LC_{50} \text{ or } EC_{50}} \qquad \text{Chronic RQ} = \frac{EEC_{\text{long term}}}{NOEC}$$

Levels of concern (LOC) developed by the US EPA (Urban and Cook 1986) and adopted by the Agency, to determine whether a substance poses an environmental risk are provided in Table A2.1.

Table A2.1: Levels of concern as adopted by the Agency.

Endpoint	LOC	Presumption
Aquatic (fish, invertebrates)		
Acute RQ≥	0.5	High acute risk
Acute RQ	0.1-0.5	Risk can be mitigated through restricted use
Acute RQ<	0.1	Low risk
Chronic RQ≥	1	High chronic risk
Plants (aquatic and terrestrial)		
Acute RQ≥	1	High acute risk

For terrestrial organisms toxicity-exposure ratios (TER) are used for terrestrial vertebrates and earthworms and hazard quotient (HQ) values for terrestrial invertebrates. This convention results in concern arising if a risk quotient is less than the trigger value for birds and earthworms and more than a trigger value for terrestrial invertebrates. The levels of concerns are shown in Table A2.2.

$TER = LD_{50}$ / estimated environmental concentration

HQ_{bees} = application rate/ LD_{50}

$HQ_{invertebrates}$ = exposure/ LR_{50}

Table A2.2: Levels of concern in environmental risk assessment for terrestrial organisms

	Level of Concern (LOC)	Presumption
Bird/ earthworm		
Acute TER	<10	High risk
Chronic TER	<5	High risk

	Level of Concern (LOC)	Presumption
Bees		
HQ	< 50	Low risk
HQ	>50	Higher tier testing required
Terrestrial invertebrates		
HQ	< 2	Low risk
HQ	≥2	Higher tier testing required

If the risk exceeds a predefined level of concern, this suggests that it may be appropriate to refine the assessment or to apply the approved handler (E7) control and/or other controls to ensure that appropriate matters are taken into account to minimize off-site movement of the substance. Conversely, if a worst-case scenario is used, and the level of concern is not exceeded, then in terms of the environment, there is a presumption of low risk which is able to be adequately managed by such things as label statements (warnings, disposal). The E7 control can then be removed on a selective basis.

AQUATIC RISK

PROPOSED APPLICATION RATE

Assessment of Expected Environmental Concentration

The Agency has used the Generic Estimated Environmental Concentration Model v2 (GENEEC2) surface water exposure model (USEPA 2001) to estimate the EEC of chlorantraniliprole in surface water which may potentially arise as a result of spray drift and surface runoff from the applicant's proposed New Zealand use pattern.

The parameters used in the GENEEC2 modeling are listed in Table A2.3 and represent the recommended use on avocado.

Table A2.3: Input parameters for GENEEC2 analysis.

	Dupont Altacor Insecticde	Reference
Application rate	0.095 kg ai/ha	applicant
Application frequency	Twice per year	
Application interval	14 days	
*K_d	0.7 Sandy Loam (pH 7.7, OC 1.0%)	Mattson (2006)
**Aerobic soil DT_{50}	593.2	McCorquodale & Addison (2005) McCorquodale & Mackie (2005)

		Koch Singles & Berg (2006) Berg & Koch Singles (2006)
Pesticide wetted in?	No	
Methods of application	Airblast Spray Orchard	Product Label
'No spray' zone	0	
Water solubility	1.023 mg/L	Craig & Ramsay (2004)
***Aerobic aquatic DT_{50}	231 days	Lynn & McCorquodale (2005).
Aqueous photolysis DT_{50}	0.6 days	MacDonald et al. 2005

*The lowest of the K_d value measured in a non-sand textured soil (i.e. not sand, coarse sand, fine sand, loamy sand) (USEPA, 2001).

**The soil DT_{50} value of 593.2 for Chlorantraniliprole follows the GENEEC2 calculation of the upper 90% confidence limit on the mean value ($n \geq 2$) of the nine aerobic laboratory values measured at 25°C (USEPA, 2001).

Output from the GENEEC2 model.

RUN No. 1 FOR chlorantraniprol ON avocado * INPUT VALUES *

RATE (lb/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	NO-SPRAY ZONE(FT)	INCORP (IN)
.085(.168)	2 14	.7	1.0	ORCHAR(9.7)	.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
593.20	2	N/A	.60- 74.40	231.00	56.28

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

PEAK GEEC	MAX 4 DAY AVG GEEC	MAX 21 DAY AVG GEEC	MAX 60 DAY AVG GEEC	MAX 90 DAY AVG GEEC
9.27	9.18	8.66	7.60	6.90

The Estimated Environmental Concentration (EEC) for chlorantraniliprole as estimated by GENEEC2 are:

Peak EEC 0.00927 mg/L
Chronic EEC (21 days) 0.00866 mg/L,
(60 days) 0.00760 mg/L,
(90 days) 0.00690 mg/L

Assessment of acute risk

Table A2.4: Aquatic Ecotoxicity endpoints for DuPont Altacor Insecticide to be used in risk assessment.

Acute	Formulation LC_{50} or EC_{50} (mg /L) (Values given in ai)	Active Ingredient LC_{50} or EC_{50} (mg ai/L)
Fish	>1.09	
Crustacea	0.011	
Algae	>1.78	
Chronic		LC50 or EC50 (mg/L)
Fish (90 days)		0.11
Crustacea (21 days)		0.00447
Aquatic Insects (28 days)		0.0025

Table A2.5: Acute risk quotients derived from the GENEEC2 model and toxicity data.

	Peak EEC from GENEEC2 (mg/L)	LC_{50} or EC_{50} (mg/L)	RQ (Acute) EEC/ LC_{50} or EC_{50} One appl.	Two appl.
Fish	0.00927	>1.09	0.0085	Fish
Crustacea		0.011	0.843	Crustacea
Algae		>1.78	0.0052	Algae

When compared against the relevant acute levels of concern (Table A2.1), the acute RQs derived from the GENEEC2 modeling for chlorantraniliprole indicate the following:

For fish: the acute risk is low
For crustacean: the acute risk is high
For algae: the acute risk is low

Assessment of chronic risk

Table A2.6: Chronic risk quotients derived from the GENEEC2 model and chronic aquatic toxicity data.

	EEC from GENEEC2 (mg/L)	NOEC (mg/L)	RQ (Chronic) EEC/ NOEC
Fish	0.00690	0.11	0.063
Crustacea	0.00866	0.00447	1.94
Aquatic insects	0.00866	0.0025	3.46

When compared against the relevant chronic levels of concern (Table A2.1), the chronic RQs derived from the GENEEC2 modeling for chlorantraniliprole indicate the following:

For fish the chronic risk is low
For crustacean: the chronic risk is high
For aquatic insects the chronic risk is high
For algae: the levels of concern to estimate chronic risks to algae are not currently defined

CURRENT MAXIMUM APPLICATION RATE

The parameters used in the GENEEC2 modeling are listed in Table A2.7 and represent the recommended use on pome fruit (highest rate) as a conservative estimate.

Table A2.7: Input parameters for GENEEC2 analysis.

	DuPont Altacor insecticide	**Reference**
Application rate	0.063 kg ai/ha	
Application frequency	2 per season	
Application interval	14 days	
*K_d	0.7 Sandy Loam (pH 7.7, OC 1.0%)	Mattson (2006)
**Aerobic soil DT_{50}	593.2	McCorquodale & Addison (2005) McCorquodale & Mackie (2005) Koch Singles & Berg (2006) Berg & Koch Singles (2006)
Pesticide wetted in?	No	
Methods of application	Airblast Spray Orchard	Product Label
'No spray' zone	-	
Water solubility	1.023 mg/L	Craig & Ramsay (2004)
***Aerobic aquatic DT_{50}	231 days	Lynn & McCorquodale (2005).
Aqueous photolysis DT_{50}	0.6 days	MacDonald et al. 2005

*The lowest of the K_d value measured in a non-sand textured soil (i.e. not sand, coarse sand, fine sand, loamy sand) (USEPA, 2001).

**The soil DT_{50} value of 593.2 for Chlorantraniliprole follows the GENEEC2 calculation of the upper 90% confidence limit on the mean value ($n \geq 2$) of the nine aerobic laboratory values measured at 25°C (USEPA, 2001).
***Longest value taken in accordance with GENEEC2 guidance document (USEPA, 2001).

Output from the GENEEC2 model.

```
RUN No.   1 FOR Chlorantranilipr ON   Pome Fruit    * INPUT VALUES *
   ---------------------------------------------------------------------
   RATE (#/AC)   No.APPS &   SOIL  SOLUBIL   APPL TYPE  NO-SPRAY INCORP
    ONE(MULT)    INTERVAL     Kd   (PPM )    (%DRIFT)   ZONE(FT)  (IN)
   ---------------------------------------------------------------------
   .056(   .111)   2  14        .7    1.0   ORCHAR(  9.7)    .0    .0


   FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)
   ---------------------------------------------------------------------
   METABOLIC  DAYS UNTIL  HYDROLYSIS   PHOTOLYSIS   METABOLIC  COMBINED
    (FIELD)   RAIN/RUNOFF   (POND)     (POND-EFF)    (POND)     (POND)
   ---------------------------------------------------------------------
    593.20        2          N/A       .60-   74.40   231.00     56.28


   GENERIC EECs (IN MICROGRAMS/LITER (PPB))     Version 2.0 Aug 1, 2001
   ---------------------------------------------------------------------
       PEAK      MAX 4 DAY     MAX 21 DAY    MAX 60 DAY    MAX 90 DAY
       GEEC      AVG GEEC       AVG GEEC      AVG GEEC      AVG GEEC
   ---------------------------------------------------------------------
        6.15        6.09          5.74          5.04          4.58
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The Estimated Environmental Concentration (EEC) for chlorantraniliprole as estimated by GENEEC2 are:

Pome Fruit Orchard Spray
Peak EEC 6.15 µg/L = 0.00615 mg/L
Chronic EEC (21 days) 5.74 µg/L = 0.00574 mg/L
Chronic EEC (60 days) 5.04 µg/L = 0.00504 mg/L
Chronic EEC (90 days) 4.58 µg/L = 0.00458 mg/L

Assessment of acute risk

Table A2.8: Aquatic Ecotoxicity endpoints for DuPont Altacor insecticide to be used in risk assessment.

Acute	Formulation LC_{50} or EC_{50} (mg/L)	Active Ingredient LC_{50} or EC_{50} (mg ai/L)
Fish	> 1.09	
Crustacea	0.0011	
Algae	> 1.78	
Chronic		LC50 or EC50 (mg/L)
Fish		0.110
Crustacea		0.00447
Aquatic Insects		0.0025

The Estimated Environmental Concentration (EEC) for chlorantraniliprole as estimated by GENEEC2 are shown in Table 2.9, along with the aquatic data for chlorantraniliprole for the most sensitive species tested.

Table A2.9: Acute risk quotients derived from the GENEEC2 model and toxicity data.

Airblast Spray Orchard	Peak EEC from GENEEC2 (mg/L)	LC_{50} or EC_{50} (mg/L)	RQ (Acute) EEC/ LC_{50} or EC_{50}
Fish	0.00615	> 1.09	<0.1
Crustacea		0.011	0.56
Algae		> 1.78	<0.1

When compared against the relevant acute risk quotients (Table A2.1), the acute RQs derived from the GENEEC2 modeling for chlorantraniliprole indicate the following:

Fish: the acute risk is low
Crustacea: the acute risk is high
Algae: the acute risk is low

Assessment of chronic risk

Table A2.10: Chronic risk quotients derived from the GENEEC2 model and chronic aquatic toxicity data.

Airblast Spray Orchard	EEC from GENEEC2 (mg/L)	NOEC (mg/L)	RQ (Chronic) EEC/ NOEC
Fish	90 day 0.00458	0.110 (90 day)	< 0.1
Crustacea	21 day	0.00447 (21 day)	1.28
Aquatic Insects	0.00574	0.0025 (28 day)	2.30

When compared against the relevant chronic risk quotients (Table A2.1), the chronic RQs derived from the GENEEC2 modeling for chlorantraniliprole indicate the following:

Fish: the chronic risk is low
Crustacean: the chronic risk is high
Aquatic Insect: the chronic risk is high
For algae: the levels of concern to estimate chronic risks to algae are not currently defined

Overall Summary of Aquatic Risk Assessment

The quantitative assessment of the risks to the aquatic environment at the proposed rate shows that the use of the substance at this rate presents a high acute risk to crustacea and a high chronic risk to crustacea and aquatic insects. This compares the results using the current maximum application rate, which also identified a high acute risk to crustacea and a high chronic risk to crustacea and aquatic insects. There is, therefore, no significant increase in the risks to organisms in the aquatic environment at the proposed application rate.

SOIL ORGANISMS, EXPOSURE AND RISK ASSESSMENT

PROPOSED APPLICATION RATE

The soil invertebrate toxicity assessment was performed according to "Guidance document on terrestrial ecotoxicology under Council Directive 91/414/EEC, October 2002". The risk assessment is based on a TER (toxicity-exposure ratio) approach. If the acute TER = <10 further testing and assessment is required.

The maximum application rate of DuPont Altacor Insecticide is 0.095 kg ai/ha per ha.

This value is used to calculate concentrations in soil adjacent to an application area. It was assumed that drift from a 1 ha treated area was evenly distributed over a 1 ha non-target area.

It is assumed that 9.7% of the chlorantraniliprole will drift outside the target area by (assumption based on GENEEC2 modelling).

For the off field deposition of DuPont Altacor Insecticide see Table A2.11. For the in-field situation the drift percentage is not taken into account.

Table A2.11: Deposition DuPont Altacor Insecticide off-field

Application scenario	Application rate (kg ai/ha)	% of application drifting	Deposition in drift (kg/ha)	Deposition (mg/m^2)
Airblast sprayer	0.095	9.7	0.0092	0.92

Soil concentrations of the active ingredient are calculated by assuming the deposition would mix into the top 5 cm of soil, and this soil would have a bulk density of 1500 kg/m^3, ie the deposition expressed in mg/m^2 would mix into 75 kg of soil.

Deposition after 2 applications was calculated according to European guidance (EU, 2000):

$$PEC_{multiple\ applications} = PEC_{one\ application} \times (1- e^{-nki}) / (1-e^{-ki})$$

Where

- PEC = predicted environmental concentration
- n = number of applications
- $k= \ln 2/ DT_{50}$ (in days)
- i= interval between two consecutive applications in days, 7 days
- DT_{50} = half life soil in days = 491 days [mean DT_{50} source internal database]
- e = constant= 2.718

The estimated soil concentrations of DuPont Altacor Insecticide are shown in Table A2.12.

Table A2.12: Soil concentration of DuPont Altacor Insecticide

Application scenario	Soil concentration off field (mg/kg)		Soil concentration in field (mg/kg)	
	1 application	2 applications		1 application
Airblast sprayer	0.012	0.024	Airblast sprayer	0.012

The estimated concentrations and the toxicity-exposure ratios are shown in Table A2.13 and A2.14.

Table A2.13: Soil invertebrates –TER off-field

Application scenario	EC_{50} / LC_{50}	Soil concentration off-field (mg/kg)		TER off-field	
		1 application	2 applications		
Earthworm acute toxicity 14 day LC_{50} (mg/kg)					
Airblast sprayer	>1000	0.012	0.024	Airblast sprayer	>1000
Springtail chronic toxicity 28 day EC_{50} (mg/kg)					
Airblast sprayer	0.39	0.012	0.024	Airblast sprayer	0.39

Table A2.14: Soil invertebrates –TER in-field

Application scenario	EC_{50} / LC_{50}	Soil concentration in-field (mg/kg)		TER in-field	
		1 application	2 applications		
Earthworm acute toxicity 14 day LC_{50} (mg/kg)					
Airblast sprayer	>1000	0.13	0.26	Airblast sprayer	>1000
Springtail chronic toxicity 28 day EC_{50} (mg/kg)					
Airblast sprayer	0.39	0.13	0.26	Airblast sprayer	0.39

Non-target plants risk assessment

No data on non-target plants is provided. Given the nature of the product, an insecticide, and the fact that another (liquid) formulation with the same active ingredient did not cause adverse effect up to an application rate of 0.3 kg ai/ha the Agency considers the risk to non-target plants low. Generally the chance on phytotoxicity on plants is greater with liquid formulations compared with granule formulations.

Conclusion soil organisms

The toxicity-exposure ratios for acute toxicity of earthworm are many fold above the trigger value so the acute risk to earthworm is low. However, for springtail there is a risk for the in-field situation even after one application.

CURRENT MAXIMUM APPLICATION RATE

Soil-based exposure
Springtail
Folsomia candida
28 day Chronic test (Mortality and Reproduction)
Reproduction NOEC
0.39 mg as/kg dry weight soil
Guideline: ISO 11267 (1999)
GLP
Klimisch score: 1
Reference: Luhrs (2006)

The Australian assessment estimated that for a 444 day half-life, accumulation would reach a plateau with peak residues approximately 2.4 times higher than from a single season after approximately 4 years. From the Australian estimation, the Agency can estimate that the plateau PEC (ppb) for DuPont Altacor insecticide and DuPont Altacor insecticide are as follows:

Worst case PECs in soil derived from Australian assessment for New Zealand use patterns of DuPont Altacor insecticide.

Product	Maximum seasonal application rate	Seasonal PEC (ppb)	Plateau PEC (ppb)
DuPont Altacor insecticide	126	105	252

In field
Application rate: 63 g ai/ha x 2 (14 day minimum interval)

Chlorantraniliprole generates a NOEC (reproduction) value of 0.39 mg/kg for collembolans. Consequently, chlorantraniliprole (scenario: airblast spray orchard) results in a risk quotient of 0.252/0.39 = 0.646 (EEC/NOEC = RQ).

Off field
Application rate: 63 g ai/ha x 2 (14 day minimum interval)

If it is assumed that 9.7% (scenario: airblast spray orchard) of the chlorantraniliprole will reach directly outside the target area (an assumption based on GENEEC2 modeling), then the concentration of chlorantraniliprole adjacent to a sprayed field would be 0.252 x 0.097 = 0.024 mg/kg soil.

Chlorantraniliprole generates a NOEC (reproduction) value of 0.39 mg/kg for collembolans. Consequently, chlorantraniliprole (scenario: airblast spray orchard) results in a risk quotient of 0.024/0.39 = 0.063 (EEC/NOEC = RQ).

Non-target invertebrates (soil): The risk is low

Soil Microbes – Nitrogen turnover
Rate:
171.4 g DPX-E2Y45 35WG/ha (0.23 mg DPX-E2Y45 35WG /kg soil dry weight)
1714 g DPX-E2Y45 35WG/ha (2.3 mg DPX-E2Y45 35WG /kg soil dry weight).

Toxicity Endpoint: *Deviation from controls*
Nitrogen turnover
≥ 25% (171.4 g DPX-E2Y45 35WG/ha soil dry weight after 28 days)

Results
The difference between test and control nitrogen turnover was ≥ 25% after 28 days but < 25% after 42 days.
Reference:
Reis 2006

In field
Application rate: 180 g DPX-E2Y45 35WG/ha (63 g ai/ha) x 2
(14 day minimum interval)

If it assumed that the DuPont Altacor insecticide is dispersed to a depth of 0.05 m and the density of soil is 1500 kg/m^3, then the 36* mg a.i./m^2 DuPont Altacor insecticide will be dispersed within 75 kg of soil/m^2 giving 36/75 = 0.48 mg/kg.

DuPont Altacor insecticide generates an EC_{25} value of 0.23 mg/kg for nitrogen turnover. Consequently, DuPont Altacor insecticide (scenario: airblast spray orchard) results in a risk quotient of 0.48/0.23 = 2.1 (EEC/EC_{25} = RQ).

*****Given the mean aerobic soil DT_{50} of 491.38 (n=8), it is unlikely to be major degradation over the minimum interval, therefore it is relevant to include both applications as the in-field rate.

Off field
Application rate: 180 g DPX-E2Y45 35WG/ha (63 g ai/ha) x 2
(14 day minimum interval)

If it assumed that the DuPont Altacor insecticide is dispersed to a depth of 0.05 m and the density of soil is 1500 kg/m^3, then the 36* mg a.i./m^2 DuPont Altacor insecticide will be dispersed within 75 kg of soil/m^2 giving 36/75 = 0.48 mg/kg.

If it is assumed that 9.7% (scenario: airblast spray orchard) of the DuPont Altacor insecticide will reach directly outside the target area (an assumption based on GENEEC2 modeling), then the concentration of DuPont Altacor insecticide adjacent to a sprayed field would be 0.48 x 0.097 = 0.04656 mg/kg soil.

DuPont Altacor insecticide generates an EC_{25} value of 0.23 mg/kg for nitrogen turnover. Consequently, DuPont Altacor insecticide (scenario: airblast spray orchard) results in a risk quotient of 0.04656/0.23 = 0.202 (EEC/EC_{25} = RQ).

*****Given the mean aerobic soil DT_{50} of 491.38 (n=8), it is unlikely to be major degradation over the minimum interval, therefore it is relevant to include both applications as the in-field rate.

The seasonal use rate for pome fruits appears to be of high (in field) risk to the microbes essential for nitrogen turnover. In addition, chlorantraniliprole is expected to accumulate in soils. However, because there was recovery of nitrogen turnover after 42 days and were no effects to nitrogen turnover at the high rate (10 x) tested, there are not expected to be long term effects.

Soil microbes: The risk is low

Overall Summary of Soil and Non-Target Plant Risk Assessment

The quantitative assessment of the risks to soil organisms at the proposed rate shows that the use of the substance at this rate presents a risk to springtails via in field exposure. This compares the results using the current maximum application rate, which identified there were no risks to soil organisms via either in field or off field exposure. Overall, therefore, there is a significant increase in the risks to soil organisms at the proposed application rate.

AVIAN RISK ASSESSMENT

PROPOSED MAXIMUM APPLICATION RATE

The avian toxicity assessment was performed according to "Risk Assessment to Birds and Mammals (EFSA 2008)". Full details of the methodology can be found in EFSA (2008).

The methodology calculates Toxicity Exposure Ratios (TER) where exposure is calculated as the dose that a bird will receive when feeding in crops that have been sprayed. To avoid doing detailed evaluations for low risk scenarios, assessments are performed in tiers of increasing complexity. The steps for the acute assessment are:

- Screening step
- Tier I
- Higher tier

The steps for the reproductive assessment are:

- Screening step
- Phase-specific approach
- Higher tier

Progression to the next tier is only made if the threshold for concern is exceeded at the previous tier.

Exposure

Principles

The principles underlying the exposure assessment are the same for all assessments other than higher tier assessments in which more specific field exposure data may be used. The dose that a bird receives (the DDD, Daily Dietary Dose) is calculated from the application rate and a so-called 'Shortcut value' for the RUD, Residue Unit Dose, reflecting the concentration on the bird's food and the quantity of food consumed. Quantities consumed are based on a

bird's energy requirements, its energy assimilation, and the energy content of its food (dry weight). Birds' energy requirements are based on an algorithm based on bodyweight and bird type (e.g. passerine/non-passerine). The parameters used to calculate a bird's exposure are summarized in Table A2.15.

Table A2.15 Parameters used for estimating bird Daily Dietary Dose

<table>
<tr><td rowspan="2">Application rate$_{multiple\text{-}applications}$</td><td colspan="3">Application rate$_{single\text{-}application}$</td></tr>
<tr><td colspan="3">Multiple Application Factor (MAF)
(90th percentile residue based on DT$_{50(foliage)}$ = 10 days)</td></tr>
<tr><td rowspan="6">Shortcut value for Residue Unit Dose, (RUD)</td><td rowspan="5">Food intake rate</td><td rowspan="2">Daily energy expenditure</td><td>Body weight</td></tr>
<tr><td>Bird type</td></tr>
<tr><td colspan="2">Energy in food</td></tr>
<tr><td colspan="2">Energy assimilation efficiency</td></tr>
<tr><td colspan="2">Moisture content of food</td></tr>
<tr><td colspan="3">Concentration in/on fresh diet</td></tr>
</table>

Screening step exposure

Both screening step assessments (acute and reproduction) select from 6 'indicator species' each applicable to a particular type of crop. They are not real species, but, by virtue of their size and feeding habits, their exposure is considered worst-case for birds in a particular crop type. For example, the representative species for orchards is described as a 'small insectivorous bird'. It is assumed that the relevant indicator species feeds only on contaminated food and the concentration of pesticide on the food is not affected by the growth stage of the crop. Thus, the exposure assessment is expressed as:

$$DDD_{multiple\text{-}applications} = \text{Application rate} \times MAF \times \text{shortcut value}$$

Where:

- MAF is chosen from a table based on number of applications and interval between applications. For an acute screening assessment, the MAF_{90} is used, for a reproductive assessment the MAF_{mean} is used;
- Shortcut value is chosen from a table containing 6 crop types with a shortcut value (90th percentile and mean) for each.

Exposure in Tier I acute and Phase-specific reproduction assessments

In the Tier I acute and Phase-specific reproduction assessments exposure is calculated for generic focal species', applicable to particular crops. Such assessments refine the screening step assessments in that:

- there are more bird 'species' (19) and crop options (21);
- the growth stage of the crop is taken into account, affecting the residues on the feed;
- more than one bird species may be considered for any one crop;
- a bird's diet can be calculated to include more than one food item.

The larger number of bird species, crop types and growth stages of the crops leads to a total of 138 RUD shortcut options, each with a mean and 90th percentile value.

The exposure assessment of the Phase-specific reproduction assessment uses time-weighted average (TWA) exposure estimates over 1, 2, 3 or 21 days for different phases of the assessment. To estimate these average concentrations, the initial exposure estimates (DDD) are multiplied by TWA factors of:

Exposure	TWA factor
1 day	1.0
2 days	0.93
3 days	0.9
21 days	0.53

Higher tier

In higher tier assessments, both acute and reproduction, additional factors affecting exposure may be taken into account. These include the proportion of a bird's diet obtained in treated areas and measured residue levels. These higher tier refinements will be substance specific and are not discussed further here.

Risk Assessment

Acute assessments

In both the screening and Tier I assessments, exposure estimates are compared to the LD_{50} from an oral toxicity study[4]:

$$TER = LD_{50}/DDD$$

Interpretation of the TER is based on thresholds for concern:

$TER \geq 10$	no refinement required
$TER < 10$	proceed to next tier assessment

Reproduction

In the screening assessment, exposure estimates are compared to the lowest NOAEL from an avian reproduction study. Normally the NOAEL has to be converted from units of ppm (mg/kg diet) to mg/kg bw/d. In the first instance a factor of 0.1 is used for such conversion. If specific information is available from the test reports, this is preferable. The TER is:

$$TER = NOAEL/DDD$$

And the thresholds for concern are:

$TER \geq 5$	no refinement required
$TER < 5$	proceed to phase-specific assessment

In the phase-specific assessment, risk estimates are made for all phases of reproduction using the measures of toxicity and exposure shown in Table A2.16 and TER are evaluated as shown in Table A2.17.

[4] If data are only available from a dietary study these can be used with appropriate conversion to dose/unit bodyweight.

Table A2.16 Measures of exposure and toxicity used in the reproduction assessment

Breeding phase	**Test endpoint used as surrogate**	**Short-term exposure**	**Long-term exposure**
Pair formation/ breeding site selection	0.1 x LD_{50}[5]	1 day DDD	21 day TWA DDD
Copulation and egg laying (5 days pre-laying through end of laying	NOAEL for the number of eggs laid per hen	1 day DDD	21 day TWA DDD
	NOAEL for mean eggshell thickness	1 day DDD	21 day TWA DDD
Incubation and hatching	0.1 x LD_{50}	1 day DDD	21 day TWA DDD
	NOAEL for proportion of viable eggs/eggs set/hen	1 day DDD	21 day TWA DDD
	NOAEL for proportion of hatchlings/viable eggs/hen	3 day TWA DDD	21 day TWA DDD
Juvenile growth and survival until fledging	0.1 x LD_{50} (extrinsic adult)	2 day TWA DDD	21 day TWA DDD
	0.1 x LD_{50} (extrinsic juvenile)	1 day DDD based on chick shortcut values of 3.8 and 22.7[6]	21 day TWA DDD based on chick shortcut value of 3.8 and 22.7[2]
	NOAEL for proportion of 14 day old juveniles/number of hatchlings/hen	3 day TWA DDD	21 day TWA DDD
Post-fledging survival	0.1 x LD_{50}	1 day DDD based on chick shortcut values of 3.8 and 22.7[2]	21 day TWA DDD based on chick shortcut value of 3.8 and 22.7[2]
	NOAEL for 14 day old juvenile weights/hen	3 day TWA DDD	21 day TWA DDD

Table A2.17. Interpretation of TER in reproduction phase-specific assessment

Assessment outcome		Next Steps
Short-term exposure (1-3 day)	Long-term exposure (21 day)	
TER ≥ 5	TER ≥ 5	No refinement required
TER<5	TER ≥ 5	Further refinement is required. One possibility is to determine if the effects are the result of short-term exposure
TER<5	TER<5	Further refinement is required. Refinement should focus on refining exposure and the consequences of effects. Little will be gained from additional effects data.

[5] From acute study

[6] The two values are to account for ground and foliar dwelling arthropods with mean residue unit doses of 3.5 and 21 respectively. Assessments are made with both values. If TER are exceeded with either value, then an assessment based on the actual composition of the diet of relevant species.

DuPont Altacor Insecticide assessment

Exposure

The exposure of birds to DuPont Altacor Insecticide is shown in Tables A2.18 & A2.19.

Table A2.18 Exposure of birds for acute assessment

Assessment	Crop & BBCH class (where appropriate)[1]	Indicator/generic Species[2]	90th percentile short-cut value[3]	Application rate (kg ai/ha)	MAF (90th %)[4]	$DDD_{multiple\ applications}$
screening	avocado	Small insectivorous bird	46.8	0.095	1.2	5.34

[1] Crop type (EFSA, 2008, Table I.1 & I.3)
[2] Indicator species (EFSA, 2008, Table I.1 & I.3)
[3] Short-cut value(EFSA, 2008, Table I.1 & I.3)
[4] Multiple application factor (90th percentile) (EFSA, 2008, Table 11)

Table A2.19. Exposure of birds for reproduction assessment

Assess-ment	Crop + BBCH code where appropriate[1]	Generic focal species[2]	Mean short-cut value[3]	Appli-cation rate (kg ai/ha)	MAF mean[4]	TWA $DDD_{multiple\ applications}$			
						1 day	2 days	3 days	21 days
Screening	avocado	Small insectivorous bird	18.2	0.095	1.4	2.42	2.25	2.18	1.28
Tier 1 phased approach	Avocado BBCH 10-19	Thrush	2.1	0.095	1.4	0.28	0.26	0.25	0.15
		finch	10.1	0.095	1.4	1.34	1.25	1.21	0.71
	Avocado BBCH 20-39	thrush	1.6	0.095	1.4	0.21	0.20	0.19	0.11
		finch	7.6	0.095	1.4	1.01	0.94	0.91	0.54
	Avocado BBCH >40	thrush	0.8	0.095	1.4	0.11	0.10	0.10	0.06
		finch	3.8	0.095	1.4	0.51	0.47	0.46	0.27

[1] Crop type (EFSA, 2008, Tables I.1 & I.3)
[2] Generic focal species (EFSA, 2008, Tables I.1 & I.3)
[3] Short-cut value(EFSA, 2008, Tables I.1 & I.3)
[4] Multiple application factor (mean) (EFSA, 2008, Table 14)

Toxicity

The toxicity values used in the risk assessment of DuPont Altacor Insecticide are shown in Table A2.20.

Table A2.20. Toxicity values used in risk assessment

Endpoint	Value (mg ai/kg bw/d)	Study	Reference
LD_{50}	>2250	Acute oral	Gallagher S, Beavers J (2004) study no DuPont 14378
$NOAEL_{lowest}$	10.1	Reproduction study	Temple D, Beavers J, Fray L, Jaber M (2006) study no Dupont 14384
$NOAEL_{number\ of\ eggs\ laid/hen}$	100		
$NOAEL_{mean\ egg\ shell\ thickness}$	10.1		
$NOAEL_{proportion\ of\ viable\ eggs\ set/hen}$	100		
NOAEL proportion of hatchling per viable eggs/hen	100		
NOAEL proportion of 14 day old juveniles per number of hatchlings/hen	100		
$NOAEL_{14\ day\ juvenile\ weights/hen}$	100		

Risk Assessment

The results of the risk assessment are shown in Table A2.21 (acute risk) and Table A2.22 (risks to reproduction).

It is concluded that:

The acute and chronic risks to birds are low.

Table A2.21. Acute risks to birds from exposure to DuPont Altacor Insecticide

Crop[1]	Indicator Species[2]	Assessment	TER[3]		Conclusion
avocado	Small insectivorous bird	Screening	LD_{50}/DDD_{ma}	421	The toxicity exposure ratio is above the trigger value. Refinement of the acute risk assessment is not required.

[1] Crop type Table I.1 (Annex 1) and Appendix 10
[2] Species type Table I.1 (Annex 1) and Appendix 10
[3] Toxicity-exposure ratio = LD_{50} / Estimated environmental concentration

Table A2.22 Risks to bird reproduction from exposure to DuPont Altacor Insecticide

Breeding phase	Test endpoint used as surrogate	Crop	Generic focal species	TER		Conclusion
				Short-term exposure	Long-term exposure	
Reproduction, screening Large herbivorous bird	Lowest NOAEL from reproduction study		Small insectivorous bird	4.17		Tier 1 Phase-specific assessment triggered
Pair formation/ breeding site selection	0.1 x LD_{50}[7]	Avocado BBCH 10-19	Thrush	804	1500	Risk is low
			finch	168	317	
		Avocado BBCH 20-39	Thrush	1071	2045	
			finch	223	417	
		Avocado BBCH >40	Thrush	2045	3750	
			finch	441	833	
Copulation and egg laying (5 days pre-laying through end of laying)	NOAEL for the number of eggs laid per hen	Avocado BBCH 10-19	Thrush	357	667	Risk is low
			finch	75	141	
		Avocado BBCH 20-39	Thrush	476	909	
			finch	99	185	
		Avocado BBCH >40	Thrush	909	1667	
			finch	196	370	

[7] From acute study

	NOAEL for mean eggshell thickness	Avocado BBCH 10-19	Thrush	36	67	Risk is low
			finch	75	14	
		Avocado BBCH 20-39	Thrush	48	92	
			finch	10	19	
		Avocado BBCH >40	Thrush	92	168	
			finch	19	37	
Incubation and hatching	0.1 x LD_{50}	Avocado BBCH 10-19	Thrush	804	1500	Risk is low
			finch	168	317	
		Avocado BBCH 20-39	Thrush	1071	2045	
			finch	223	417	
		Avocado BBCH >40	Thrush	2045	3750	
			finch	441	833	
	NOAEL for proportion of viable eggs/eggs set/hen	Avocado BBCH 10-19	Thrush	357	667	Risk is low
			finch	75	141	
		Avocado BBCH 20-39	Thrush	476	909	
			finch	99	185	
		Avocado BBCH >40	Thrush	909	1667	
			finch	196	370	
	NOAEL for proportion of hatchlings/viable eggs/hen	Avocado BBCH 10-19	Thrush	400	667	Risk is low
			finch	83	141	
		Avocado BBCH 20-39	Thrush	526	909	
			finch	110	185	
		Avocado BBCH >40	Thrush	1000	1667	
			finch	217	370	
Juvenile growth and survival until fledging	0.1 x LD_{50} (extrinsic adult)	Avocado BBCH 10-19	Thrush	865	1500	Risk is low
			finch	180	317	
		Avocado BBCH 20-39	Thrush	1125	2045	
			finch	239	417	
		Avocado BBCH >40	Thrush	2250	3750	
			finch	479	833	

	0.1 x LD_{50} (extrinsic juvenile)	Avocado BBCH 10-19	Thrush	Ground dwelling insects 445 Foliar dwelling insects 75	Ground dwelling insects 840 Foliar dwelling insects 141	Risk is low
			finch			
		Avocado BBCH 20-39	Thrush			
			finch			
		Avocado BBCH >40	Thrush			
			finch			
	NOAEL for proportion of 14 day old juveniles/number of hatchlings/hen	Avocado BBCH 10-19	Thrush	400	667	Risk is low
			finch	83	141	
		Avocado BBCH 20-39	Thrush	526	909	
			finch	110	185	
		Avocado BBCH >40	Thrush	1000	1667	
			finch	217	370	
Post-fledging survival	0.1 x LD_{50}	Avocado BBCH 10-19	Thrush	Ground dwelling insects 445 Foliar dwelling insects 75	Ground dwelling insects 840 Foliar dwelling insects 141	Risk is low
			finch			
		Avocado BBCH 20-39	Thrush			
			finch			
		Avocado BBCH >40	Thrush			
			finch			
	NOAEL for 14 day old juvenile weights/hen	Avocado BBCH 10-19	Thrush	400	667	Risk is low
			finch	83	141	
		Avocado BBCH 20-39	Thrush	526	909	
			finch	110	185	
		Avocado BBCH >40	Thrush	1000	1667	
			finch	217	370	

CURRENT MAXIMUM APPLICATION RATE

The risk assessment was performed according to the Guidance Document on Risk Assessment for Birds and Mammals; SANCO/4145/2000 for birds. This model assumes birds are exposed to Altacor 35 WG following orchard spray. For tier 1 assessments it is assumed that the contaminated diet is not avoided, the animals satisfy their entire food demand in the treated area, the animals feed on a single food type and the concentration in the diet is comparable to the maximum application rate.

Calculations were made for the range of bird types specified in the guidance document and expressed in terms of bird size and diet.

The estimate of chlorantraniliprole toxicity to exposure ratio is dependent on factors such as bird type and body weight, daily food intake, the concentration of chlorantraniliprole in food and feeding behaviour. These factors are considered in the following equation:

Equation 1. Estimated Theoretical Exposure
The estimated daily uptake of a compound is calculated according to the following equation:

ETE = (DFI / bw) x C x AV x PT x PD (mg/kg bw/d)

Where:
ETE = Estimated Theoretical Exposure;

DFI = Daily Food Intake rate of indicator species (gram fresh weight per day);

bw = Body weight (g);

C = Concentration of compound in fresh diet (mg/kg);

AV = Avoidance factor (1 = no avoidance, 0 = complete avoidance);

PT = Fraction of diet obtained in treated area (number between 0 and 1);

PD = Fraction of food type in diet (number between 0 and 1; one type or more types).

In the first tier it is assumed that:

- the contaminated diet is not avoided;
- animals satisfy their entire food demand in the treated area;
- animals feed on a single food type.

Thus the factors AV, PT and PD become 1 and can be omitted.

Daily Food Intake (DFI in Equation 1)
The Daily Food Intake (DFI) is derived from the Daily Energy Expenditure (DEE) as calculated in Equation 2:

Equation 2
Estimation of Daily Energy Expenditure (DEE)
Log (DEE) = Log a + b x (log bodyweight)

Factors “a” and “b” are specific to bird type as stipulated in Crocker et al. (2002).

Small insectivorous birds (passerine) bodyweight = 10 g
Log (DEE) = 1.0017 + (0.7034 x (log 10)) = 1.7051 kJ/day
DEE = Anti-log 1.7051 kJ/day = 50.71 kJ/day

The Daily Food Intake is derived from the Daily Energy Expenditure divided by factors specific to the food source (i.e., small insects) as calculated in Equation 3:

Equation 3
Estimation of Daily Food Intake (DFI)

Daily Food Intake (wet g) =

$$\frac{\text{Daily Energy Expenditure (kJ)}}{\text{Energy in Food (kJ/g dry) x (1 - Moisture in Food) x Assimilation Efficiency}}$$

where moisture and assimilation efficiency are proportions between 0 and 1.

Example
Daily Energy Expenditure = 50.71
Energy in Food = 21.9
Moisture = 70.5% (proportion = 0.705)
Assimilation Efficiency = 76% (proportion = 0.76)

Daily Food Intake =

$$\frac{50.71}{21.9 \times (1-0.705) \times 0.76}.$$

= 10.33 g/day fresh weight

Concentration of Compound in Fresh Diet (C in Equation 1)
The estimated theoretical exposure is also dependent on the concentration of compound in the fresh diet (mg/kg). This was calculated according to the DuPont Altacor insecticide use pattern as stipulated by Du Pont.

Pome Fruit: 63 g ai/ha x 2 applications (14 day minimum interval)

From these values, the Estimated Theoretical Exposure (Equation 1) can be calculated as below.

Calculation of Estimated Theoretical Exposure
ETE = (DFI / bw) x C x AV x PT x PD (mg/kg bw/d)

Where (from the example):

DFI = 10.33 g/day fresh weight (Equation 3)
bw = 10 g

C = Concentration
Concentration is dependent on factors such as the "Application Rate", "Residue Unit dose (RUD)" and "Multiple Application Factor (MAF)".

In this example:
Application Rate = 0.063 kg ai/ha
RUD = converted to 1 kg ai/ha

- For Acute Assessment (90^{th} percentile RUD) = 52
- For Short-term and Long-term Assessments (Mean RUD) = 29

MAF = Multiple application factor (concentration immediately after the last application compared to a single application)

It is expected that repeated applications do not cause appreciable accumulation of residues at least in foliage dwellers because in addition to other factors replacement of individuals due to migration and reproduction will contribute to the residue decline in the population. Therefore no MAF is applied for residues in insects.

Spray application: Multiply relative daily intake by RUD and application rate (kg/ha) (when applicable multiply also by MAF and F_{twa}).

F_{twa} = Time Weighted Average

With regard to residues on vegetation a simple $_{twa}$factor is used in the first tier which is based on the following default values:

- time window (averaging time) = 3 weeks
- DT_{50} = 10 days

With these assumptions f_{twa} is 0.53; it means that over a period of 3 weeks the average concentration is about half the initial concentration.

In the case of insects no default $_{twa}$-factor is employed in the first tier as the time course of residue level is unknown.

AV, PT and PD = 1 (Tier 1 assessment)

ETE_{acute} = (10.33/10) x 0.063 x 52

ETE_{acute} = 3.38 mg/kg bw/d

$ETE_{short\text{-}term}$ = (10.33/10) x 0.063 x 29

$ETE_{short\text{-}term}$ = 1.887 mg/kg bw/d

$ETE_{long\text{-}term}$ = (10.33/10) x 0.063 x 29

$ETE_{long\text{-}term}$ = 1.887 mg/kg bw/d

Toxicity
Toxicity data for Chlorantraniliprole show:
Acute LD50 = > 2250 mg ai/kg bw;
5 day dietary study LD50 = > 1729 mg ai/kg bw;
Bird reproduction NOEC = 10.1 mg ai/kg bw.

Toxicity Exposure Ratio
The toxicity exposure ratio is calculated by comparing the ETE to toxicity as follows:

Equation 4. Toxicity Exposure Ratio = Toxicity / ETE

Acute Toxicity Exposure Ratio
$TER_a = LD_{50}$ / ETE ($RQ = ETE / LD_{50}$)

LD_{50} = > 2550 mg a.i./kg body weight

ETE = 3.38 mg/kg bw/d

TER_a = > 665.7, the risk does not exceed the acute TER limit of concern (i.e. is > 10).
(RQ = 0.002, RQ is < 0.5 for acute exposure)

Short-term Toxicity Exposure Ratio
$TER_{st} = LD_{50}$ / ETE

LD_{50} = > 1729 mg a.s./kg body weight

ETE = 1.887 mg/kg bw/d

TER_{st} = 916.3, the risk does not exceed the short-term TER limit of concern (i.e. is > 10).
(RQ = 0.001, RQ is < 0.5 for acute exposure)

Long-term Toxicity Exposure Ratio
$TER_{lt} = NOEL_{lt}$ / ETE

$NOEL_{lt}$ = 10.1 mg a.s./kg body weight

ETE = 1.887 mg/kg bw/d

TER_{lt} = 5.35, the risk does not exceed the long term TER limit of concern (i.e. is > 5).
(RQ = 0.19, RQ is < 1 for chronic exposure)

Summary of the Tier 1 Risk Assessment for Birds (Altacor 35 WG)
The unrefined tier 1 risk assessment showed that pome fruit treated with DuPont Altacor insecticide according to the label instructions poses a low risk to small insectivorous birds with regard to acute, short-term and long-term toxicity.

Overall Summary of Avian Risk Assessments

The quantitative assessment of the risks to birds at the proposed rate identified there were no acute or chronic risks to birds. This compares the results using the current maximum application rate, which also identified there were no acute or chronic risks to birds. Overall, therefore, there is no significant increase in the risks to birds at the proposed application rate.

TERRESTRIAL INVERTEBRATES (BEES) RISK

PROPOSED APPLICATION RATE

The terrestrial invertebrate risk assessment for agricultural pesticides determines whether or not the proposed application poses an unacceptable risk to terrestrial invertebrates (bees).

The following European model has been adopted by ERMA New Zealand to assess the risk to bees [Guidance Document on terrestrial ecotoxicology under Council Directive 91/414/EEC, SANCO/ 10329/2002 rev. 2 final, 17 October 2002].

Hazard Quotient (HQ) = Application Rate / LD_{50}

Application rate: the maximum single application rate (g active ingredient/ha).

LD_{50}: µg active ingredient/bee.

The maximum application rate of DuPont Altacor Insecticide is 95 g ai/ha.

The contact toxicity value LD_{50} > 100 µg ai/bee is the most relevant parameter for the risk assessment.
HQ= 95/ 100 = 0.95
The critical HQ is 50 which was validated against incidents (EPPO 2002).

Given those HQ's the Agency considers there is a low risk for bees when DuPont Altacor Insecticide is applied according to the label and good agricultural practice.

CURRENT MAXIMUM APPLICATION RATE

The terrestrial invertebrate risk assessment for agricultural pesticides determines whether or not the proposed application poses an unacceptable risk to terrestrial invertebrates (bees).

The following European model has been adopted by ERMA New Zealand to assess the risk to bees [Guidance Document on terrestrial ecotoxicology under Council Directive 91/414/EEC, SANCO/ 10329/2002 rev. 2 final, 17 October 2002].

Hazard Quotient (HQ) = 63 / > 340.5 (oral) = < 0.185
Hazard Quotient (HQ) = 63 / > 285.7 (contact) = < 0.221

Application rate: the maximum single application rate (g active ingredient/ha).

LD_{50}: µg active ingredient/bee.

If the oral and contact HQ < 50, low risk to bees is concluded.
Additional semi-field studies conducted have shown low level effects to bee colonies.

Overall Summary of Terrestrial Invertebrate (Bees) Risk Assessments

The quantitative assessment of the risks to bees at the proposed rate shows that the use of the substance at this rate presents a low risk to bees. This compares the results using the current maximum application rate, which identified there was a low risk to bees. Overall, therefore, there is no significant increase in the risks to bees at the proposed application rate.

TERRESTRIAL INVERTEBRATES (EXCL-BEES) RISK

PROPOSED APPLICATION RATE

The invertebrate toxicity assessment was performed according to EU (2002).
Exposure
In-field exposure is estimated using the formula:

In-field exposure = application rate x MAF

Where:

- MAF is a multiple application factor listed in the guidance document. In accordance with the guidance the MAF is not applied for bees, only for other non-target invertebrates.
- Table D9: Terrestrial invertebrates- in-field exposure

Crop	Application rate (g ai/ ha)	Application frequency	MAF[1]	In-field exposure (g ai/ha)
avocado	95	1	1	95
	95	2	1.7	161.5

1: MAF= multiple application factor. In the absence of field data, default values are used.

For the off-field exposure ERMA New Zealand used the formula:

Off field exposure = application rate x MAF x (drift factor/ vegetation distribution factor)
Where

- MAF is a multiple application factor
- The drift factors used in the model differ from the drift factors in GENEEC2 modelling. The values used were recommended for use with this model (Rautmann et al, 2001).
- The vegetation distribution factor estimates the interception of drift by vegetation. For a generic assessment a value of 1 was used corresponding to the worst case assessment of no interception.

The estimated off field concentrations are shown in Table D10.

Table D10: Terrestrial invertebrates- off field exposure

Crop	Application rate (g ai/ ha)	Application frequency	MAF[1]	Drift factor (= % drift/ 100)	Vegetation distribution factor	Off field exposure (g ai/ha)
avocado	95	1	1	Early season 0.2553	1	24.25
				Late season 0.1213		11.52
	95	2	1.7	Early season 0.2553	1	41.23
				Late season 0.1213		19.59

1: MAF= multiple application factor. In the absence of field data, default values are used.

Risk assessment

Table F9: Terrestrial invertebrates - in-field

Crop	In field exposure (g ai/ha)	LR_{50} (g ai/ha)	Hazard quotient
		Episyrphus balteatus	*Episyrphus balteatus*
avocado	1 appl.: 95 2 appl.: 161.5	4.64	1 appl.: 20.47 2 appl.: 34.81

Off-field risk quotients were estimated as:

HQ off field = (off-field exposure/ LR_{50}) * correction factor

Where

- Off-field exposure is estimated in Appendix D (Table D10)
- The default for the correction factor is 10. The correction factor accounts for the extrapolation from the two test species to all off-field non-target arthropods.

The derived hazard quotients for the off-field situation are shown in Table F10.

Table F10: Terrestrial invertebrates – off-field

Crop	Off- field exposure (g ai/ha)	LR_{50} (g ai/ha)	Hazard quotient Off-field
		Episyrphus balteatus	*Episyrphus balteatus*
One application			
avocado	Early season: 24.25 late season: 11.52	4.64	Early season: 5.23 late season:2.48
Two applications			
avocado	Early season: 41.23 late season: 19.59	4.64	Early season: 8.89 late season:4.22

For both in-field and off-field exposure the risk quotients are greater than the cut-off of 2, regardless the application frequency. Therefore higher tier testing and assessment are desirable. The applicant provided test data with aged residues for the previous application for the non-target species hoverfly (*Episyrphus balteatus*)and ladybird (*Coccinella septempunctata*). It was noted that the effect of foliar residues took some time to decline and this may need to be taken into consideration against the biology, ecology and behaviour of non-target species.

Overall, the Agency considers there is a risk for non-target species.

To reduce the risk to non-target species the application frequency may be restricted.

CURRENT MAXIMUM APPLICATION RATE

Chlorantraniliprole is sprayed at a maximum application rate of 63 g a.i./ha x 2 applications (minimum interval 14 days).

For an individual application (63 g a.i./ha x 1):
The LR_{50} for the hoverfly (*Episyrphus balteatus*) is 4.64 g ai/ha.

Consequently, DuPont Altacor insecticide (scenario: airblast spray orchard) results in a risk quotient of 63/4.64 = 13.58 for the LR_{50}.

Based on the mortality data, a conservative NOER for the hoverfly (*Episyrphus balteatus*) was set at < 0.5 g ai/ha.

Consequently, DuPont Altacor insecticide (scenario: airblast spray orchard) results in a risk quotient of 63/<0.5 = >126 for the NOER.

Non-target invertebrates (in field): The risk is high

Spray Drift Modelling – Non-target invertebrates (off field effects)
Chlorantraniliprole is sprayed at a maximum application rate of 63 g a.i./ha x 2 applications (minimum interval 14 days).

For an individual application (63 g a.i./ha x 1):
If it is assumed that 9.7% (scenario: airblast spray orchard) of the chlorantraniliprole will reach directly outside the target area (an assumption based on GENEEC2 modeling), then the concentration of chlorantraniliprole (EEC) adjacent to a sprayed field would be 63 g ai/ha x 0.097 = 6.111 g ai/ha.

The LR_{50} for the hoverfly (*Episyrphus balteatus*) is 4.64 g ai/ha.

Consequently, DuPont Altacor insecticide (scenario: airblast spray orchard) results in a risk quotient of 6.111/4.64 = 1.32 for the LR_{50}.

Based on the mortality data, a conservative NOER for the hoverfly (*Episyrphus balteatus*) was set at < 0.5 g ai/ha.

Consequently, DuPont Altacor insecticide (scenario: airblast spray orchard) results in a risk quotient of 6.111/<0.5 = >12.222 for the NOER.

It should also be noted that the product is to be applied twice with a minimum interval of 14 days. In addition, the results from these tests (LR_{50} and NOER) did not examine the effects of feeding on exposed prey.

It is also noted that the effect of foliar residues took some time to decline and this may need to be taken into consideration against the biology, ecology and behaviour (inc. recovery potential) of non-target species.

For the hoverfly (*Episyrphus balteatus*), statistically significant mortality was observed following exposure to aged residues (2 x 60 g ai/ha) 42 days after the 2nd application. However, a repeat test showed no significant mortality.

For the ladybird beetle (*Coccinella septempunctata*), negative reproductive effects were observed following exposure to aged residues (2 x 60 g ai/ha) 28 days after the 2nd application.

Non-target invertebrates (off field):
The risk is high and may adversely affect re-colonisation of the treated field.

Overall Summary of Terrestrial Invertebrate (Excl-Bees) Risk Assessments

The quantitative assessment of the risks to other non-target invertebrates at the proposed rate shows that the use of the substance at this rate presents a high risk via either in field or off field exposure. This compares the results using the current maximum application rate, which identified there was a high risk to non-target invertebrates (excluding bees). Overall, therefore, there is no significant increase in the risks to non-target invertebrates at the proposed application rate.

GROUND WATER RISK ASSESSMENT

In the original assessment of the active ingredient the Agency identified a risk to groundwater. The Agency concluded that chlorantraniliprole has the potential to leach into groundwater. This risk remains valid at the revised application rate.

To limit the potential for groundwater contamination the Agency considers that the application rate, proposed by the applicant and modeled for the aquatic and terrestrial risk assessments, be set as the maximum application rate when the substance is applied to avocados.

Appendix 3: List of Controls for DuPont Altacor Insecticide

Table A3.1: Revised controls for DuPont Altacor Insecticide – codes, regulations and variations.

Control Code[8]	Regulation[9]	Topic	Variations
Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations 2001			
E1	32-45	Limiting exposure to ecotoxic substances	No EEL values are set at this time and the default EELs are deleted.
E2	46-48	Restrictions on use within application area	As no EELs have been set, no application rate is required to be set under this control at this time. However, an application rate is set as an additional control under Section 77A.
E5	5(2), 6	Requirements for keeping records of use	
E6	7	Requirements for equipment used to handle hazardous substances	
E7	9	Approved handler requirements	The following control is **substituted** for Regulation 9(1) of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations 2001: (1). The substance must be under the personal control of an approved handler when the substance is - (a) applied in a wide dispersive manner; or (b) used by a commercial contractor.
Hazardous Substances (Identification) Regulations 2001			
I1	6, 7, 32-35, 36 (1)-(7)	General identification requirements Regulation 6 – Identification duties of suppliers Regulation 7 – Identification duties of persons in charge Regulations 32 and 33 – Accessibility of information Regulations 34, 35, 36(1)-(7) –	

[8] Note: The numbering system used in this column relates to the coding system used in the ERMA New Zealand Controls Matrix. This links the hazard classification categories to the regulatory controls triggered by each category. It is available from the ERMA New Zealand website www.ermanz.govt.nz/resources and is also contained in the ERMA New Zealand User Guide to the HSNO Control Regulations.

[9] These Regulations form the controls applicable to this substance. Refer to the cited Regulations for the formal specification, and for definitions and exemptions.

Control Code[8]	Regulation[9]	Topic	Variations
		Comprehensibility, Clarity and Durability of information	
I3	9	Priority identifiers for ecotoxic substances	
I9	18	Secondary identifiers for all hazardous substances	
I11	20	Secondary identifiers for ecotoxic substances	
I19	29-31	Alternative information in certain cases Regulation 29 – Substances in fixed bulk containers or bulk transport containers Regulation 30 – Substances in multiple packaging Regulation 31 – Alternative information when substances are imported	
I21	37-39, 47-50	Documentation required in places of work Regulation 37 – Documentation duties of suppliers Regulation 38 – Documentation duties of persons in charge of places of work Regulation 39 – General content requirements for documentation Regulation 47 – Information not included in approval Regulation 48 – Location and presentation requirements for documentation Regulation 49 – Documentation requirements for vehicles Regulation 50 – Documentation to be supplied on request	
I23	41	Specific documentation requirements for ecotoxic substances	
I29	51-52	Duties of persons in charge of places with respect to signage	

Control Code[8]	Regulation[9]	Topic	Variations
Hazardous Substances (Packaging) Regulations 2001			
P1	5, 6, 7 (1), 8	General packaging requirements Regulation 5 – Ability to retain contents Regulation 6 – Packaging markings Regulation 7(1) – Requirements when packing hazardous substance Regulation 8 – Compatibility Regulation 9A and 9B – Large Packaging	
P3	9	Packaging requirements for substances packed in limited quantities	
P15	21	Packaging requirements for ecotoxic substances	
PG3	Schedule 3	The tests in Schedule 3 correlate to the packaging requirements of UN Packing Group III (UN PGIII).	
Hazardous Substances (Disposal) Regulations 2001			
D5	9	Disposal requirements for ecotoxic substances	
D6	10	Disposal requirements for packages	
D7	11, 12	Disposal information requirements	
D8	13, 14	Disposal documentation requirements	
Hazardous Substances (Emergency Management) Regulations 2001			
EM1	6, 7, 9-11	Level 1 emergency management information: General requirements	
EM7	8(f)	Information requirements for ecotoxic substances	
EM8	12-16, 18-20	Level 2 emergency management documentation requirements	
EM11	25-34	Level 3 emergency management requirements – emergency response plans	
EM13	42	Level 3 emergency management requirements – signage	
Hazardous Substances (Personnel Qualification) Regulations 2001			
AH1	4-6	Approved Handler requirements	See E7.
Hazardous Substances (Tank Wagons and Transportable Containers) Regulations 2004			
Regulations 4 to 43 where applicable		The Hazardous Substances (Tank Wagons and Transportable Containers) Regulations 2004 prescribe a number of controls relating to tank wagons and	

Control Code[8]	Regulation[9]	Topic	Variations
		transportable containers and must be complied with as relevant.	
Section 77A Additional Controls			
ADE (chlorantraniliprole) = 1.58 mg/kg bw/day PDE_{food} (chlorantraniliprole) = 1.58 mg/kg bw/day			
The maximum application rate for DuPont Altacor insecticide shall be shall be 0.095 kg ai/ha and 2 times per season (minimum application interval: 14 days).			
DuPont Altacor insecticide shall not be applied onto or into water.			
The method of application of DuPont Altacor insecticide shall be limited to ground based application only.			
The label for DuPont Altacor insecticide shall state the following: "The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in the substance leaching into ground water." "Harmful to some beneficial insects – particularly some foliage dwelling predators that may be used in Integrated Pest Management" "Due to the persistent nature of chlorantraniliprole in soil, this product is expected to accumulate over successive seasons following repeated use."			
DuPont (New Zealand) Limited shall make available to ERMA New Zealand the results of any soil accumulation trials for chlorantraniliprole upon their completion.			

APPENDIX 4: GOVERNMENT DEPARTMENTS, CROWN ENTITIES AND INTERESTED PARTIES NOTIFIED

Aakland Chemicals (1997) Limited
AgBio Research Limited
Agcarm Incorporated
AgResearch Limited
Agronica New Zealand Limited
AR and JA Drysdale Limited
ARPPA
Baldwins Intellectual Property
BASF New Zealand Limited
Bayer New Zealand Limited
BOC Limited
Chancery Green
Chemagro New Zealand Limited
Chemsafety Limited
Comunity and Public Health
Dow AgroSciences Australia Limited
DuPont (New Zealand) Limited
Environment Bay of Plenty
Far North District Council
Farmoz Pty Ltd
Federated Farmers of New Zealand (Incorporated)
Fish and Game Eastern Region
Fruitfed Supplies Limited (PGG Wrightson Ltd)
Grayson Wagner Company Ltd
Greater Wellington - The Regional Council
Green Party of Aotearoa New Zealand
Hawkes Bay Regional Council
IMCD New Zealand Limited
Kaipara District Council
Kawerau District Council
Landcorp Farming Limited
Lowndes Associates
Ministry of Agriculture and Fisheries (MAF) Biosecurity New Zealand
Ministry of Research Science and Technology (MoRST)
Napier Health Centre - Public Health Unit
National Beekeepers Association
New Zealand Bee Industry Group - Federated Farmers
New Zealand Chemical Industry Council Inc
New Zealand Customs Service
New Zealand Meatworkers Union
New Zealand Press Association
New Zealand Society of Gunsmiths Inc

Ngāti Kahungunu Iwi Incorporated
Northland District Health Board
Northland Regional Council
Nufarm Ltd
Pacific Growers Supplies Limited
Pesticide Action Network Aotearoa New Zealand
PharmVet Solutions
Physicians and Scientists for Global Responsibility (PSGR)
Rangitikei District Council
Reckitt Benckiser
Schering Plough Animal Health Limited
Sigma Aldrich
South Taranaki District Council
Sustainability Council of New Zealand
Syngenta Crop Protection Limited
Taranaki Regional Council
Tasman District Council
Taupo District Council
Technical Compliance Consultants Ltd
Television New Zealand
The Eden Park Trust
The National Beekeepers Association of New Zealand
The New Zealand Institute for Plant and Food Research Limited (Auckland)
The New Zealand Institute for Plant and Food Research Limited (Motueka)
The New Zealand Society for Risk Management Inc
TMP Consultancy
Zelam Limited
7 private individuals