

# EVALUATION SHEET

## CANDIDATES FOR REASSESSMENT PRIORITY LISTING

Name of Substance: **Carbaryl**

CAS No. 63-25-2

Listing Proposed by: ERMA New Zealand

### Brief Description of Substance and Background Context:

Carbaryl is a broad-spectrum carbamate insecticide which is used in New Zealand to control insects on fruit trees, vegetables, ornamentals, lawns and to control wasp nests. It is also used as a veterinary medicine in combination with other actives.

A reassessment of carbaryl would cover the following HSNO approvals:

- Carbaryl (HSR002822)
- Dust containing 50 g/kg carbaryl (HSR000672)
- Dustable powder containing 2 g/kg carbaryl, 20 g/kg maldison and 5 g/kg rotenone (HSR000185)
- Suspension concentrate containing 100 g/litre carbaryl (HSR000441)
- Suspension concentrate containing 500 g/litre carbaryl (Substance A) (HSR000450)
- Suspension concentrate containing 500 g/litre carbaryl (Substance B) (HSR000681)
- Suspension concentrate containing 500 g/litre carbaryl (Substance C) (HSR000680)
- Wettable powder containing 115 g/kg carbaryl, 250 g/kg copper as copper oxychloride and 284 g/kg sulphur (HSR000594)
- Wettable powder containing 800 g/kg carbaryl (HSR000819)
- Aerosol containing 0.3 - 0.7% carbaryl and 0.4 - 0.8% piperonyl butoxide (HSR001811)
- Liquid containing 1.4 - 2.6% 2-hydroxybenzoic acid, 0.7 - 1.3% carbaryl and 0.11 - 0.29% chlorocresol (HSR001825)
- Other substances for which approval is sought prior to the start of reassessment

Formulations containing carbaryl have been registered for use in New Zealand since 1963. There are seven products containing carbaryl that are currently registered for agricultural or veterinary medicine use in New Zealand. These are Carbaryl 50F, Carbaryl 80, Fido's Ear Drops, Flea-Di Aerosol Spray, Sevin Flo, Tomato Spray, and Yates Carbaryl Liquid. There are also products containing carbaryl that are available to the general public to control wasps, such as No Wasps Insecticidal Dust.

### Application of Criteria:

<i>Specific Criteria</i>	<i>Assessment</i>
(1) The inherent risks of the substance given current and projected patterns of use. This should include consideration of: <ul style="list-style-type: none"><li>• Hazardous properties;</li><li>• Exposure pathways;</li><li>• Quantity and patterns of use;</li></ul>	<b><i>Hazardous Properties</i></b> The Agency has classified carbaryl as: 6.1C acute oral toxicant 6.1D acute dermal toxicant 6.7B suspected carcinogen 6.9B suspected target organ systemic toxicant 9.1A very ecotoxic in the aquatic environment 9.2B ecotoxic in the soil environment 9.3B ecotoxic to terrestrial vertebrates 9.4A very ecotoxic to terrestrial invertebrates

- And, thus risks to people, communities and the environment.

The Agency has insufficient data to classify carbaryl with respect to acute inhalation toxicity and respiratory sensitisation.

The exact hazards of the formulations used in commercial applications differ, as they are also affected by excipients, but retain at least the following hazards as triggered by the carbaryl component: 6.7B, 9.1B.

The controls applicable to individual formulations can be located on the [ERMA New Zealand register](#).

Carbaryl causes neurotoxic effects at low concentrations following both acute and chronic exposure. It affects the nervous system by inhibiting acetylcholinesterase, an enzyme essential for normal nerve impulse transmission. Acetylcholinesterase inhibition causes acute effects in humans and other mammals. The symptoms in humans may include: headache, exhaustion and mental confusion together with blurred vision, sweating, salivation, chest tightness, muscle twitching and abdominal cramps. The more severe effects can include muscle paralysis leading to severe difficulty in breathing, so requiring respiratory support. Convulsions and unconsciousness can occur. Carbaryl is also suspected of being carcinogenic. The World Health Organisation (WHO) has set an Acceptable Daily Intake (ADI) value for carbaryl of 0.008 mg/kg bodyweight.

Carbaryl is very ecotoxic to the aquatic environment with an LC<sub>50</sub> of 0.0072 mg/L in crustacea and 0.69 mg/L in fish. It also very ecotoxic to honeybees with an LD<sub>50</sub> of 1.02 µg/honeybee. It is also ecotoxic to terrestrial vertebrates.

Carbaryl is readily degradable. It dissipates in the environment by abiotic and microbially mediated degradation. The major metabolite for carbaryl is 1-naphthol, which further degrades to CO<sub>2</sub>. Under acidic conditions, carbaryl is stable to hydrolysis, but it hydrolyses in neutral (pH 7 half-life=12 days) and alkaline environments (pH 9 half-life=3.2 hours). 1-naphthol, is less persistent and less mobile than carbaryl, and is categorised as moderately to very toxic to aquatic organisms on an acute exposure basis.

Carbaryl has a low potential for bioaccumulation with reported bioconcentration factors ranging between 9 and 34. The substance also has a low octanol water partition coefficient (logKow = -2.36).

### ***Use & Exposure***

Carbaryl is a wide-spectrum carbamate insecticide. In New Zealand, it is used to control insects on fruit trees, vegetables, ornamentals, lawns and to control wasp nests. It is also used as a veterinary medicine in combination with other actives. Wasp control products and home garden products containing carbaryl are available to the general public.

The application rate and method of application varies greatly among products. Individual labels should be referred to for this information - these can be obtained through the [ACVM Register](#).

A report produced by HortResearch for the Ministry for the Environment, *Trends in Pesticide Use in New Zealand: 2004*, estimated the usage of carbaryl to be 16.4 tonnes of active ingredient annually and that this represents 0.38% of total active ingredient use.

Workers may be exposed to carbaryl during mixing, application, cleaning-up of equipment or disposal of containers. Other people may be exposed by re-entry into areas where insecticides containing carbaryl have recently been applied. Members of the public may be exposed to carbaryl through spray drift or residues in food previously treated with insecticides containing carbaryl. Public exposure to veterinary medicines containing carbaryl could occur with the handling of veterinary medicines or treated pets.

At this stage the Agency has collected no information on concentrations of carbaryl in the environment or to which people are exposed as a result of use of products containing this active ingredient. Maximum residue limits in food are set by New Zealand Food Safety Authority (NZFSA) under the Food Act and monitoring of actual residue levels are

	conducted against these.
<p>(2) The extent to which the existing management regime (including controls) is achieving effective management of risks.</p>	<p><b><i>Incident Reports</i></b></p> <p>The Agency has not collected incident data relating to carbaryl in New Zealand at this stage in the process of screening substances for reassessment.</p> <p>Incident data from the United States is informative:</p> <ul style="list-style-type: none"> <li>• The Incident Data System (IDS) indicates that the majority of incidents associated with carbaryl exposure involved dermal reactions. A number of other cases involved asthmatics and people who experienced hives and other allergic type reactions.</li> <li>• Incident data from the Poison Control Centre indicates that non-occupational adult or older children exposure to carbaryl is almost twice as likely to require serious health care (hospitalisation or treatment in a critical care unit) and is two and a half times more likely to result in a major medical outcome (life-threatening effects or significant residual disability) than other pesticides. This pattern of increased risk was not seen among occupational reports or in young children, which may mean that careless handling by non-professionals is a particular hazard. In addition, five case report studies suggested that carbaryl may be a cause of chronic neurological or psychological problems.</li> <li>• The EPA's Ecological Incident Information Systems has reported relatively few reports of ecological incidents involving birds, small mammals and fish. Five of these incidents relate to bees including a mortality incident associated with 0.08 ppm carbaryl residues in North Carolina.</li> </ul>
<p>(3) The extent to which new and relevant information is both required and is available, or will shortly become available particularly if under review overseas, for the reassessment process.</p>	<p><b><i>New Information</i></b></p> <p>Many overseas regulatory jurisdictions are currently in the process of reviewing carbaryl, including the US Environment Protection Agency (EPA), the Canadian Pest Management Regulatory Agency (PMRA) the European Union and the Australian Pesticides and Veterinary Medicines Authority (APVMA). Subsequently, much relevant new information has, and will continue to, become available that will assist with the reassessment of carbaryl in New Zealand.</p> <p>The EU released a <a href="#">Draft Assessment Report</a> for carbaryl in July 2005. However, the proposed decision in this document has not been made publicly available.</p> <p>The US EPA released a revised <a href="#">Interim Reregistration Eligibility Decision (IRED)</a> document for carbaryl in October 2004. A <a href="#">Fact Sheet</a> for carbaryl has also been released, which summarises this information.</p> <p>The Canadian PMRA released a <a href="#">Re-evaluation Note</a> for non-turf uses of carbaryl in August 2003.</p> <p>The APVMA released a <a href="#">Carbaryl Review</a> in July 2006.</p> <p>The UK PSD released <a href="#">MAFF Approved Uses of Carbaryl</a> and <a href="#">Carbaryl Review of its Uses in Public Hygiene and Amateur Insecticides</a> documents in September 1996.</p>
<p>(4) Regulatory action taken overseas</p>	<p><b><i>Overseas Regulatory Action</i></b></p> <p><b>United States</b></p> <p>The US EPA has reassessed carbaryl and has come to the interim decision that the residential, occupational and ecological risks associated with products containing carbaryl in the US are acceptable with the following new risk mitigation measures:</p> <p>Residential risk mitigation:</p> <ul style="list-style-type: none"> <li>- Residential lawn care liquid broadcast applications will be voluntarily cancelled</li> </ul>

pending EPA review of pharmacokinetic data to refine post-application risk estimates.

- Home garden/ornamental dust products must be packaged in ready-to-use shaker can containers, with no more than 0.05 lbs. active ingredient per container.
- Certain uses and application methods will be cancelled:
  - All pet uses (dusts and liquids) except collars;
  - Aerosol products for various uses;
  - Belly grinder applications of granular and bait products for lawns;
  - Hand applications of granular and bait products for ornamentals and gardens.

#### Occupational risk mitigation:

- Certain uses and application methods will be cancelled:
  - Wheat use;
  - Pet uses (except pet collars);
  - Applications by hand, spoon, and bellygrinder;
- Maximum application rates are reduced for mosquito control, citrus, and asparagus.
- Aerial applications are prohibited for:
  - Wettable powder formulations;
  - Granular and bait formulations applied to corn (field, pop, and sweet), grain sorghum, alfalfa, rice, and sunflowers.
- Additional personal protective equipment (PPE) and engineering controls are to be used for aerial/chemigation and ground airblast applications, and for use of granular and bait, liquid, and wettable powder formulations.
- Current 12-hour restricted entry interval (REI) for carbaryl is being extended for most crop uses;
- Maximum application rates are reduced for citrus, asparagus, field corn, and stone fruit;
- For brassica crops, leafy vegetables, and table beets and turnips when harvested for greens, use is restricted for applications only within 30 days of crop emergence/transplanting.

#### Ecological risk mitigation:

- Mandatory bee precaution statement
- Several mitigation measures required to address residential and occupational risks, described above, will also address risks to terrestrial and aquatic organisms, including: reducing maximum application rates, cancelling use on wheat; prohibiting certain aerial applications; and cancelling liquid broadcast applications to home lawns.

#### **Australia**

The APVMA has reassessed carbaryl and has come to the decision that the risks associated with products containing carbaryl in Australia are acceptable with the following new risk mitigation measures:

- Delete instructions of use for berry fruits (except raspberries), fruit in general, citrus (except oranges and lemons), cherries, kiwi fruit, grapes (except butt treatment), sunflower and linseed crops and vegetable crops (except, potatoes, sugarbeets, beetroot and turnip (swede), and limited uses on cucurbits).
- Limit the uses for avocados, cucurbits, feijoa, guavas, grapes, jaboticaba, jackfruit, loquats, lychees, mangoes and rambutans to non-flowering/non-fruiting trees/plants.
- Retain uses for macadamias, pecans, pome fruit (apples & pears) stone fruit (except cherries), citrus (oranges & lemons), potatoes, raspberries, beetroot, turnips (swede), sugarbeet, cereal crops & storage, cotton, dubosia, kenaf, lucerne, maize, pastures, pasture seed crops, rice, rosella, sorghum, elm trees, ornamentals, roses, commercial, industrial and domestic areas, tobacco storage sheds and rights of way, in non-crop areas in general, horses, ponies and dogs.
- Delete use of WP formulations by handheld application to garden beds, compost heaps and treatment around buildings.
- Change the delivery method for WP formulations.

	<ul style="list-style-type: none"> <li>- Delete use by hand-held spray equipment for pest control activities in domestic, commercial and industrial settings, except for the eradication of insect nests.</li> <li>- Operators applying carbaryl by orchard airblast must be protected by appropriate engineering controls.</li> <li>- Use of enclosed transfer/mixing systems for preparation of carbaryl SC products is required to reduce the exposure of operators mixing and loading for aerial, boomspray and orchard airblast application to acceptable levels.</li> <li>- Withholding periods are to be amended.</li> <li>- Re-entry periods to be established.</li> <li>- Directions table for use on pigs to be changed.</li> <li>- Warning Statements and Safety Directions are to be updated.</li> </ul> <p><b>Canada</b></p> <p>In Canada, Bayer CropScience, the registrant and manufacturer of carbaryl, has proposed several risk mitigation measures for carbaryl, including:</p> <ul style="list-style-type: none"> <li>- voluntary discontinuation of the broadcast application of liquid formulations to residential lawns (excluding golf courses and sod farms) pending the outcome of pharmacokinetics data which Bayer CropScience is generating. The use of liquid formulations on residential lawns would be limited to spot treatments only (defined as an area 100 m<sup>2</sup> or less);</li> <li>- limitations on packaging of dusts products (e.g., shaker can only; restrictions on amount of active ingredient per container);</li> <li>- discontinuation of pet care use products (dusts and sprays);</li> <li>- various mitigation measures for ornamental uses.</li> </ul> <p><b>United Kingdom</b></p> <p>Carbaryl is no longer approved:</p> <ul style="list-style-type: none"> <li>- for non-professional uses (ie home garden) because control measures to minimise exposure from such use are not possible.</li> <li>- to treat poultry houses (animal husbandry)</li> </ul> <p>For other uses such as use on apples as a thinning agent and insecticide, the following restrictions must be imposed to reduce operator and consumer exposure:</p> <ul style="list-style-type: none"> <li>- applications must only be made using vehicles with a closed cab—open vehicles are no longer permitted;</li> <li>- a low level induction bowl or closed systems must be used for transferring the product to the spray tank;</li> <li>- coverall, apron and gloves must be worn when handling the concentrate—previous approvals also require a face shield to be worn;</li> <li>- coverall must be worn during application;</li> <li>- coverall and gloves must be worn when handling contaminated surfaces;</li> <li>- the latest time of treatment to top fruit is three weeks before harvest—this period was previously seven days.</li> </ul> <p>Carbaryl is also used in veterinary medicine on products such as pet flea collars. The Veterinary Products Committee is considering restricting these uses.</p> <p><b>European Union</b></p> <p>The European Union is currently reviewing carbaryl. It is noted the EU is only reviewing carbaryl that is used for apple thinning after flowering.</p>
<p>(5) The level of public interest or concern, measured amongst other things by the results of periodic consultation on the reassessment</p>	<p><b>Public Concern</b></p> <p>There is general public concern about the use of pesticides, due to their association with adverse health effects in humans and the environment.</p> <p>Carbaryl was listed as a Priority 1 Pesticide for Reassessment in <a href="#">Petition 1999/227</a> of Kees</p>

programme.

Bon, presented to the Local Government and Environment Select Committee, September 2006. This petition was signed by 147 people.

#### **OVERALL EVALUATION**

Carbaryl is a broad-spectrum carbamate insecticide which is used on fruit trees, vegetables, ornamentals, lawns and the control of wasp nests. It is also used as a veterinary medicine on pets. There are currently seven products containing carbaryl that are registered for agricultural and veterinary medicine use in New Zealand. Carbaryl has the potential to cause adverse effects to the nervous system in humans at low concentrations. It is also suspected of being carcinogenic. It is also very ecotoxic to fish and honeybees. Many overseas regulators have reviewed, or are in the process of reviewing, carbaryl. The US, UK and Australia have imposed new and more stringent measures to mitigate the risks associated with products containing carbaryl in their respective countries. New measures have been proposed in Canada.

#### **RECOMMENDATION**

It is considered appropriate that ERMA New Zealand should review the grounds for reassessment of the approvals containing carbaryl, given the potential for adverse effects in humans and concerns of overseas regulators.

**Proposed by Reassessments Manager: Robin Toy**

**Agreed by Chief Executive: Rob Forlong**