Australian Government

Australian Pesticides and Veterinary Medicines Authority

PUBLIC RELEASE SUMMARY

on the Evaluation of Metaflumizone in the Product SIESTA GRANULAR ANT BAIT

APVMA Product Number 67126

DECEMBER 2015

ISBN: 978-1-925390-09-4

Ownership of intellectual property rights in this publication

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Australian Pesticides and Veterinary Medicines Authority (APVMA).

Creative Commons licence

With the exception of the Coat of Arms and other elements specifically identified, this publication is licensed under a Creative Commons Attribution 3.0 Australia Licence. This is a standard form agreement that allows you to copy, distribute, transmit and adapt this publication provided that you attribute the work.

A summary of the licence terms is available from www.creativecommons.org/licenses/by/3.0/au/deed.en. The full licence terms are available from www.creativecommons.org/licenses/by/3.0/au/legalcode.

The APVMA's preference is that you attribute this publication (and any approved material sourced from it) using the following wording:

Source: Licensed from the Australian Pesticides and Veterinary Medicines Authority (APVMA) under a Creative Commons Attribution 3.0 Australia Licence.

In referencing this document the Australian Pesticides and Veterinary Medicines Authority should be cited as the author, publisher and copyright owner.

Use of the Coat of Arms

The terms under which the Coat of Arms can be used are set out on the Department of the Prime Minister and Cabinet website (see www.dpmc.gov.au/pmc/publication/commonwealth-coat-arms-information-and-guidelines).

Disclaimer

The material in or linking from this report may contain the views or recommendations of third parties. Third party material does not necessarily reflect the views of the APVMA, or indicate a commitment to a particular course of action.
There may be links in this document that will transfer you to external websites. The APVMA does not have responsibility for these websites, nor does linking to or from this document constitute any form of endorsement.
The APVMA is not responsible for any errors, omissions or matters of interpretation in any third-party information contained within this document.

Comments and enquiries regarding copyright:

Director Public Affairs and Communication
Australian Pesticides and Veterinary Medicines Authority
PO Box 6182
KINGSTON ACT 2604 Australia

Telephone: +61 2 6210 4701

Email: communications@apvma.gov.au

CONTENTS

PREFACE IV
About this document iv
Making a submission iv
Further information v
1 INTRODUCTION 1
2 CHEMISTRY AND MANUFACTURE 2
2.1 Active constituent 2
2.2 Formulated product 3
3 TOXICOLOGICAL ASSESSMENT 5
3.1 Chemical class 5
3.2 Toxicokinetics and metabolism 5
3.3 Public health standards 8
4 RESIDUES ASSESSMENT 10
5 ASSESSMENT OF OVERSEAS TRADE ASPECTS OF RESIDUES IN FOOD 11
6 OCCUPATIONAL HEALTH AND SAFETY ASSESSMENT 12
6.1 Health hazards 12
6.2 Formulation, packaging, transport, storage and retailing 12
6.3 Use pattern 12
6.4 Conclusion 13
7 ENVIRONMENTAL ASSESSMENT 14
7.1 Environmental fate 14
7.2 Environmental effects 18
7.3 Risk assessment 20
8 EFFICACY AND SAFETY ASSESSMENT 21
9 LABELLING REQUIREMENTS 23
ABBREVIATIONS 28
GLOSSARY 31
REFERENCES 32

PREFACE

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is the Australian Government regulator with responsibility for assessing and approving agricultural and veterinary chemical products prior to their sale and use in Australia.

In undertaking this task, the APVMA works in close cooperation with advisory agencies, including the Department of Health, Office of Chemical Safety (OCS), Department of Environment (DE), and State Departments of Primary Industries.

The APVMA has a policy of encouraging openness and transparency in its activities and of seeking community involvement in decision making. Part of that process is the publication of Public Release Summaries for products containing new active constituents.

The information and technical data required by the APVMA to assess the safety of new chemical products, and the methods of assessment, must be consistent with accepted scientific principles and processes.

This Public Release Summary is intended as a brief overview of the assessment that has been conducted by the APVMA and of the specialist advice received from its advisory agencies. It has been deliberately presented in a manner that is likely to be informative to the widest possible audience thereby encouraging public comment.

About this document

This is a Public Release Summary.

It indicates that the Australian Pesticides and Veterinary Medicines Authority (APVMA) is considering an application for registration of an agricultural or veterinary chemical. It provides a summary of the APVMA's assessment, which may include details of:

- the toxicology of both the active constituent and product
- the residues and trade assessment
- occupational exposure aspects
- environmental fate, toxicity, potential exposure and hazard
- efficacy and target crop or animal safety.

Comment is sought from interested stakeholders on the information contained within this document.

Making a submission

In accordance with sections 12 and 13 of the Agvet Code, the APVMA invites any person to submit a relevant written submission as to whether the application for registration of SIESTA GRANULAR ANT BAIT should be granted. Submissions should relate only to matters that the APVMA is required, by legislation, to take into account in deciding whether to grant the application. These matters include aspects of public

health, occupational health and safety, chemistry and manufacture, residues in food, environmental safety, trade, and efficacy and target crop or animal safety. Submissions should state the grounds on which they are based. Comments received that address issues outside the relevant matters cannot be considered by the APVMA.

Submissions must be received by the APVMA by close of business on Friday 15 January 2016 and be directed to the contact listed below. All submissions to the APVMA will be acknowledged in writing via email or by post.

Relevant comments will be taken into account by the APVMA in deciding whether the product should be registered and in determining appropriate conditions of registration and product labelling.

When making a submission please include:

- contact name
- company or group name (if relevant)
- email or postal address (if available)
- the date you made the submission.

All personal information, and confidential information judged by the APVMA to be *confidential commercial information (CCI)*[1] contained in submissions will be treated confidentially.

Written submissions on the APVMA's proposal to grant the application for registration that relate to the grounds for registration should be addressed in writing to:

Case Management and Administration Unit
Australian Pesticides and Veterinary Medicines Authority
PO Box 6182
Kingston ACT 2604

Phone: +61 2 6210 4701
Fax: +61 2 6210 4721
Email: enquiries@apvma.gov.au

Further information

Further information can be obtained via the contact details provided above.

[1] A full definition of 'confidential commercial information' is contained in the Agvet Code.

Further information on public release summaries can be found on the APVMA website: www.apvma.gov.au

1 INTRODUCTION

This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of SIESTA GRANULAR ANT BAIT, and approval of the new active constituent, Metaflumizone.

It is proposed to register SIESTA GRANULAR ANT BAIT containing 0.63 g/kg Metaflumizone as a bait intended for use in the control of nuisance ant species such as coastal brown ant (*Pheidole megacephala*), black ant (*ridomyrmex sp*) and red imported fire ant (*Solenopsis invicta*).

The product will generally be used by professional pest control operators in and around gardens, golf courses, industrial areas, lawns, parks, turf, sports grounds and other non-crop land and non-food bearing nursery stock.

SIESTA GRANULAR ANT BAIT, with the active ingredient Metaflumizone, claims to deliver fast and long-lasting control of native and imported fire ants. Metaflumizone is formulated on corn grit, along with soybean oil, a proven attractant bait for native and imported fire ants. Metaflumizone belongs to a new IRAC (Insecticide Resistance Action Committee) Mode of Action (MoA) Chemical Group, 22B. Metaflumizone is claimed to be the only sodium channel blocker insecticide (SCBI) that does not require metabolism for bioactivation. The direct effects are that SIESTA GRANULAR ANT BAIT causes the cessation of feeding, increasing levels of immobility, and ultimately ant death.

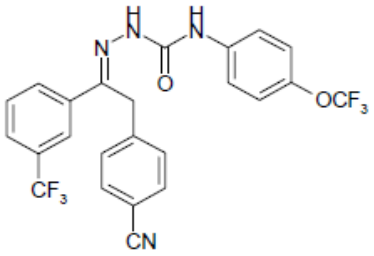
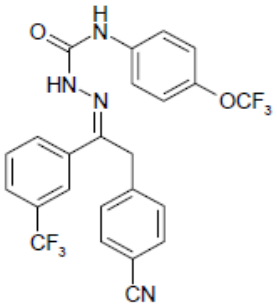
Metaflumizone has been registered for the control of ants in North America since 2007 as the product Siesta™ Insecticide Fire Ant Bait for use in and around golf courses, residential turfgrass and ornamental landscapes, production field and container nurseries (around greenhouses), sod farms, commercial and industrial areas, recreational areas and school grounds, athletic fields, cemeteries, airports, roadsides, noncrop/nongrazed areas, perimeters of hospitals, nursing homes, and warehouses. A similar product with the active metaflumizone, Altrevin™ Fire Ant Bait, was registered in North America in 2012 for use in citrus orchards, tree nut orchards and grape vineyards.

Red imported fire ant has only been detected in some states and territories, with the most widespread outbreak occurring in Queensland. However, as there are no specific market access concerns for red imported fire ant (RIFA) it is proposed that the use will be approved in all states to prepare for any potential future outbreaks. More information on red imported fire ant outbreak can be found on the Department of Agriculture website (www.outbreak.gov.au/national-eradication-programs/red-imported-fire-ants).

2 CHEMISTRY AND MANUFACTURE

2.1 Active constituent

Metaflumizone has the following properties:

COMMON NAME (ISO):	Metaflumizone
IUPAC NAME:	a mixture of 90–100% (E)-2′-[2-(4-cyanophenyl)-1-(α,α,α-trifluoro-m-tolyl)ethylidene]-4-(trifluoromethoxy)carbanilohydrazide and 10–0% (Z)-2′-[2-(4-cyanophenyl)-1-(α,α,α-trifluoro-m-tolyl)ethylidene]-4-(trifluoromethoxy)carbanilohydrazide
CHEMICAL ABSTRACTS NAME:	2-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]-N-[4-(trifluoromethoxy)phenyl]hydrazinecarboxamide
CAS REGISTRY NUMBER:	139968-49-3
EMPIRICAL FORMULA:	$C_{24}H_{16}F_6N_4O_2$
MOLECULAR WEIGHT:	506.41
STRUCTURE:	 BAS 320 I (*E*-isomer)  BAS 320 I (*Z*-isomer)

TECHNICAL GRADE METAFLUMIZONE HAS THE FOLLOWING PHYSICAL AND CHEMICAL PROPERTIES:

PHYSICAL FORM:	Solid
COLOUR:	White
MELTING POINT:	187–190°C
DENSITY:	1.43 g/cm^3
OCTANOL/WATER PARTITION COEFFICIENT (LOG KOW):	5.1
SOLUBILITY IN WATER:	1.79 ppb
SOLUBILITY IN ORGANIC SOLVENTS:	Methanol: 1.4 g/100 mL Dichloromethane: 9.88 g/100 mL n-Hexane: 0.0085 g/100 mL
SELF-HEATING/IGNITION	Not self-heating

The APVMA has evaluated the chemistry aspects of metaflumizone active constituent (manufacturing process, quality control procedures, batch analysis results and analytical methods) and found them to be acceptable.

APVMA active constituent standard

On the basis of the data provided, and the toxicological assessment, it is proposed that the following APVMA Active Constituent Standard be established for metaflumizone active constituent:

CONSTITUENT	SPECIFICATION	LEVEL
metaflumizone	metaflumizone	950 g/kg (E-isomer 90% (w/w) minimum and Z-isomer 10% (w/w) maximum)

Based on a review of the data provided by the applicant, the APVMA proposes to be satisfied that the chemistry and manufacturing details of metaflumizone are acceptable.

2.2 Formulated product

The chemistry aspects of the product, SIESTA GRANULAR ANT BAIT (physico-chemical properties, formulation process, quality control procedures, batch analysis results, stability, analytical methods and packaging) have been evaluated by the APVMA.

SIESTA GRANULAR ANT BAIT HAS THE FOLLOWING PROPERTIES:

FORMULATION TYPE	Bait
APPEARANCE	Yellow granular solid
ACTIVE CONSTITUENT CONCENTRATION	Metaflumizone 0.63 g/kg
PACKED BULK DENSITY	0.32 kg/L
PH (1% W/V AQUEOUS SOLUTION 25 ˚C)	6.23
PARTICLE SIZE	no particles less than 120 mesh (or 125 microns) in size.
SAFETY PROPERTIES	does not react with iron, a reducing agent. It reacts very weakly with oxidizing agents or water, and it is non-hazardous when in contact with monoammonium phosphate (MAP), a fire-extinguishing agent

The product will be formulated at a number of locations using metaflumizone manufactured in the USA. The manufacturing and quality control procedures, including compliance with the release specifications, are acceptable.

The applicant provided the results of stability testing conducted using samples stored in high density polyethylene containers. Testing of all of the important parameters for this bait formulation was conducted. The results indicate that the formulated product is expected to be stable for at least two years when stored under normal conditions in the proposed commercial packaging.

Based on a review of the data provided by the applicant, the APVMA proposes to be satisfied that the chemistry and manufacturing details of SIESTA GRANULAR ANT BAIT product are acceptable.

3 TOXICOLOGICAL ASSESSMENT

The toxicological database for metaflumizone is considered to be complete and adequate. The majority of the studies submitted complied with Good Laboratory Practice (GLP), and were undertaken according to contemporary test guidelines. The OCS notes that a few of the reports alluded to initial dose-range finding studies with the provision of limited reference details, and some studies were provided as summaries without adequate details. However, the data were considered relevant and applicable for the purposes of this application.

In interpreting the data, it should be noted that toxicity tests generally use doses that are high compared with likely human exposures. The use of high doses increases the likelihood that potentially significant toxic effects will be identified. Findings of adverse effects in any one species do not necessarily indicate such effects might be generated in humans. From a conservative risk assessment perspective however, adverse findings in animal species are assumed to represent potential effects in humans, unless convincing evidence of species specificity is available. Where possible, considerations of the species specific mechanisms of adverse reactions weigh heavily in the extrapolation of animal data to likely human hazard. Equally, consideration of the risks to human health must take into account the likely human exposure levels compared with those, usually many times higher, which produce effects in laboratory animal studies. Toxicity tests should also indicate dose levels at which the specific toxic effects are unlikely to occur.

3.1 Chemical class

Metaflumizone is a semicarbazone insecticide. Metaflumizone belongs to a new IRAC (Insecticide Resistance Action Committee) Mode of Action (MoA) Chemical Group, 22B. The direct effects are that SIESTA GRANULAR ANT BAIT causes the cessation of feeding, increasing levels of immobility, and ultimately ant death.

3.2 Toxicokinetics and metabolism

Following a single oral dose of metaflumizone, <10% of the administered low dose (30 mg/kg bw) and high dose (1000 mg/kg bw) was absorbed over a 72 h test period (2.7–7.2% for low dose and 0.7–1.9% for the high dose). Peak plasma concentration (blood Tmax) was not reached until 10–23 h post-dosing, dependent on dose, sex and moiety radiolabel. A slow elimination phase from the plasma was indicated with plasma half-lives (T1/2) of 38–402 h, dependent on the dose, sex and moiety radiolabel. Total radioactive residues in muscle, liver, kidney and plasma reached maximal levels at or near the blood Tmax in both sexes irrespective of dose rate. At or near the blood Tmax, radioactivity concentration was the highest in liver (<0.6% of administered dose) and fat (<0.2% of administered dose) followed by kidney, blood, plasma, muscle and others.

There was evidence of metaflumizone accumulation in tissues, particularly in the fat. After 14 days of daily dosing at 30 mg/kg bw/d, metaflumizone concentrations were up to 43 times higher in the fat than following a single dose. Other tissues showing elevated metaflumizone concentrations after repeat dosing included muscle and plasma (26 times higher than after a single dose) and liver and kidney (13 times higher than after a single dose). Most significantly, an elevated plasma to tissue ratio of 1:250 was apparent for metaflumizone in the fat after 14 days of repeated dosing. Based on an analysis of adipose tissue in rats, a

steady state for metaflumizone was approached after approximately 3–4 weeks of daily oral dosing at 30 mg/kg bw. Further kinetic analysis of study data during a 35 day post-dosing period indicated that the level of metaflumizone in adipose tissue declined in a biphasic manner with initial half-life of 2–5 days and a terminal half-life of 14–17 days.

Absorbed metaflumizone was metabolised by the rat via hydroxylation of the aniline or benzonitrile ring and hydrolysis of the central hydrazine carboxamide group to yield aniline derivatives and phenacylbenzoylnitrile derivatives. The trifluoromethoxyaniline metabolite moiety was shown to conjugate with malonic acid and oxalic acids. The ring hydroxylated derivatives were readily conjugated with sulphate or glucuronic acid. Glycine conjugation occurred at the carboxyl group of the cyanobenzoic acid moiety, whereas glutathione conjugation occurred by displacement of one of the fluorine atoms of the trifluoromethyl or trifluoromethoxy group to form S-(N-(N-γ-glutamyl))-cysteinyl-, glycyl-conjugate.

Between 32–86 % of the administered low and high doses of metaflumizone were excreted in the faeces during the first 24 h. At 168 h post-dosing in both sexes, 90–100% of both low and high metaflumizone doses were excreted in the faeces; biliary excretion accounted for less than 5% (0.9–4.7%) of the low dose and less than 2% (0.2–1.3%) of the high dose, while urinary excretion was low, at <0.5% of the administered low and high doses.

Additional absorption studies with different preparations of metaflumizone indicated an oral absorption of 17–33% after a 6 mg/kg bw dose, while bioavailability studies identified that the bioavailability of metaflumizone was different when orally administered in feed (23%) or by gavage (10.8%).

Samples taken from animals on a range-finding developmental neurotoxicity study indicated that the test material was readily detectable in maternal milk, and passed onto nursing pups during the pre-weaning phase as evidenced in the presence of test material in pup plasma. Test material residues continued to be identified in both maternal milk and pup plasma samples up to 11 days after cessation of dosing. In maternal animals dosed throughout the in-life phase, a constant maternal milk residue level was achieved during the latter phase of the pre-weaning period (up to post-dosing day 21).

Percutaneous absorption

No dermal absorption studies on SIESTA GRANULAR ANT BAIT were provided. Dermal absorption studies with other product formulations containing metaflumizone indicate that the dermal absorption of metaflumizone is largely affected by the formulation type, the solvent, the concentration of the dilution and the excipients.

Acute toxicity

Metaflumizone displayed low acute oral (LD50 >5000 mg/kg bw in rats and mice), dermal (LD50 >2000 mg/kg bw in rats) and inhalational toxicity (LC50 >5200 mg/m3, 4-h head and nose exposure in rats). Metaflumizone was a non-irritant to the skin and a slight irritant to the eyes of rabbits, but not a skin sensitiser in guinea pigs.

SIESTA GRANULAR ANT BAIT containing 0.063% metaflumizone, is of low acute oral (LD50 > 2000 mg/kg bw) and dermal toxicity (LD50 > 2000 mg/kg bw) in rats. The acute inhalational toxicity

is likely to be low based on product formulation and use pattern, although an acute inhalation study is not available. It is a slight dermal irritant, but not an eye irritant. However, it showed the potential for skin sensitisation in guinea pigs by a modified Buehler test. The OCS notes that the skin irritancy and sensitisation effects can likely be attributed to one or more excipients, since the active constituent is neither a skin irritant nor a skin sensitiser.

Systemic toxicity

Toxicity in rats and dogs was characterised by general non-specific signs of toxicity including reduced food consumption, reduced bodyweight gain, poor general state, ataxia, salivation and lateral position after repeated dosing. Mice were considered to be the least sensitive species for metaflumizone and did not exhibit any of these signs of toxicity up to a dose of 1000 mg/kg bw/d inclusive during a lifetime study. The lowest dose for metaflumizone effects was 30 mg/kg bw/d in dogs (the LOEL in a 3–month and 1–year oral study; the NOEL was identified at 12 mg/kg bw/d). General signs of toxicity were also observed in a 2–generation rat reproduction study at a maternotoxic LOEL of 50 mg/kg bw/d (NOEL identified at 20 mg/kg bw/d), in a rat developmental study at a maternotoxic LOEL of 120 mg/kg bw/d (NOEL identified at 40 mg/kg bw/d) and in a 3–month rat neurotoxicity study at a LOEL of 150 mg/kg bw/d (NOEL identified at 36 mg/kg bw/d).

Genotoxicity and carcinogenicity

There was no evidence of increased cancer incidence rates in metaflumizone treated-animals when compared to concurrent study controls in lifetime oral exposure studies of rats and mice.

While two tests in an in vitro chromosomal aberration assay performed in a rodent cell line were positive for genotoxicity, in vivo micronucleus and unscheduled DNA synthesis tests were negative. The weight of evidence from genotoxicity testing in vitro and in vivo suggested that metaflumizone is not likely to be a genotoxic compound, noting that, clastogenic effects observed in vitro did not translate into any predisposition for neoplastic lesion(s) or tumour development in vivo as no carcinogenic effects were observed in long-term rodent bioassays.

Reproductive and developmental toxicity

Metaflumizone was not demonstrated to be toxic to reproduction when administered continuously to rats over two successive generations up to the highest doses tested of 50 mg/kg bw/d. On the basis of this evidence, metaflumizone was not considered likely to be a reproductive toxicant in humans.

There were no foetal findings in a rat developmental study of metaflumizone when tested up to doses of 120 mg/kg bw/d. General signs of toxicity in the rat dams at 120 mg/kg bw/d were consistent with the effects observed with metaflumizone in other repeat-dose studies and occurred at similar dosages (decreased food consumption and decreased body weight gain).

Test-substance related foetal findings (runting) were noted in a rabbit developmental study but occurred only at a dose level of 300 mg/kg bw/d that produced maternal toxicity.

Considered together, the rat and rabbit developmental study data indicated that pregnant animals are not more sensitive than non-pregnant animals to metaflumizone administration. As no structural abnormalities or malformations were noted in rat or rabbit foetuses, metaflumizone was not considered to be a teratogenic agent. Additionally, the foetus was not considered likely to be more sensitive to metaflumizone than maternal animals, as foetal effects occurred at dose levels which were either identical to or above those where maternal effects were observed in both rat and rabbit developmental studies.

Neurotoxicity

Clinical symptoms observed in repeat-dose studies suggested some possible effects of metaflumizone on the neurological system. Ataxia was a common clinical symptom associated with metaflumizone administration in rats, dogs and rabbits in both acute and repeat-dose studies from the lowest dose of 30 mg/kg bw/d. Decreased motor activity was associated with administration of the Z-isomer in rats, but was not apparent when a mixture of the Z- and E- isomer (metaflumizone technical) was tested in the same species. The underlying causes of ataxia and decreased motor activity following metaflumizone administration were not established.

Functional observational battery and motor activity testing in rats did not reveal any evidence of neurotoxicity potential following repeat-dose administration of metaflumizone up to the highest doses tested (150 mg/kg bw/d (females) and 300 mg/kg bw/d (males)) in a subchronic neurotoxicity study.

Overall, metaflumizone is not considered likely to be a neurotoxicant in humans. No evidence of developmental neurotoxicity was noted in the range-finding developmental neurotoxicity study.

Immunotoxicity

Metaflumizone at up to 75 mg/kg bw/d in rats did not show a potential of immune system damage / depression based on the lack of treatment related effects on sheep red blood cells IgM antibody titers in one study, and the splenic natural killer cell activity in another study.

Toxicity of metabolites

A series of studies (acute, repeat dose and/or genotoxicity) indicated that the toxicity of various impurities and metabolites of metaflumizone were not higher than metaflumizone active constituent itself.

3.3 Public health standards

Poisons scheduling

On 27 March 2015, the Delegate to the Secretary of the Department of Health published a final scheduling decision to confirm the current Schedule 5 entry for metaflumizone in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) with no exemption cut-off.

ADI/ARfD

The acceptable daily intake (ADI) for humans is the level of intake of an agricultural or veterinary chemical which can be ingested daily over an entire lifetime without appreciable risk to health. It is calculated by dividing the overall NOEL for the most sensitive toxicological endpoint from a suitable study (typically an animal study) by an appropriate safety factor. The magnitude of the safety factor is selected to account for uncertainties in extrapolation of animal data to humans, intra-species variation, and the completeness of the toxicological database and the nature of the potential toxicologically significant effects.

The acute reference dose (ARfD) is the estimate of the amount of a substance in food or drinking water, expressed on a milligram per kilogram body weight basis, that can be ingested over a short period of time, usually in one meal or during one day, without appreciable health risk to the consumer on the basis of all known facts at the time of the evaluation.

No ADI or ARfD has been established for metaflumizone since the proposed product use pattern for SIESTA GRANULAR ANT BAIT is not associated with food-producing uses.

4 RESIDUES ASSESSMENT

The product will generally be used by professional pest control operators in and around Gardens, Golf courses, Industrial areas, Lawns, Parks, Turf, Sports grounds and other non-crop land and non-food bearing nursery stock.

An assessment of residues in food has not been undertaken as part of this assessment as this application does not include uses on food producing crops.

5 ASSESSMENT OF OVERSEAS TRADE ASPECTS OF RESIDUES IN FOOD

The product will generally be used by professional pest control operators in and around gardens, golf courses, industrial areas, lawns, parks, turf, sports grounds and other non-crop land and non-food bearing nursery stock.

An assessment of overseas trade aspects of residues in food was not undertaken as part of this application as the product is not proposed to be used on food bearing crops and is unlikely to enter the food chain for export commodities of animal origin.

6 OCCUPATIONAL HEALTH AND SAFETY ASSESSMENT

6.1 Health hazards

Metaflumizone (CAS: 139968-49-3) is not listed on the Safe Work Australia (SWA) Hazardous Substances Information System (HSIS) Database (SWA, 2015). Based on the toxicological information presented in this submission and NOHSC's Approved Criteria for Classifying Hazardous Substances (2004), no HSIS listing or risk phrases have been proposed for metaflumizone.

Based on the toxicological information on SIESTA GRANULAR ANT BAIT containing 0.063% metaflumizone presented in this submission and NOHSC's Approved Criteria for Classifying Hazardous Substances (2004), the following risk phrases have been proposed for SIESTA GRANULAR ANT BAIT.

R43	May cause sensitisation by skin contact

6.2 Formulation, packaging, transport, storage and retailing

Both the active constituent metaflumizone and the associated product SIESTA GRANULAR ANT BAIT are manufactured and formulated overseas, and will be imported to Australia. SIESTA GRANULAR ANT BAIT is intended to be available in 170 g, 450 g and 11.34 kg packages, packed in a high-density polyethylene container with twist cap and a self-adhesive label.

6.3 Use pattern

SIESTA GRANULAR ANT BAIT is a ready-to-use granulated bait (oil bait) containing 0.63 g/kg metaflumizone. The product is proposed to be used to control nuisance ant species (such as coastal brown ant, black ant and red imported fire ant) on gardens, golf courses, industrial areas, lawns, parks, turf, sports grounds and other non-crop land and non-food bearing nursery stock. The use rate is 3–5 g of the formulated product per 20 m2, equivalent to 0.950 to 1.583 g metaflumizone/ha. A maximum of 2.5 kg product per ha is not exceeded if individual mounds are treated.

According to the label instructions, the product granules should be evenly distributed over infested areas using a hand held rotary granule spreader or equivalent spinning disk type applicator which ensures uniform distribution. For small areas, granules may be uniformly sprinkled by gloved hand. Application should be conducted in early morning or late afternoon when ants are most active to achieve good results, and the areas be re-treated when ant activity becomes troublesome again.

Additional instructions indicated that the product should not be used in conjunction with contact insecticide aerosol sprays or any other ant remedy, and a minimum of 7 days is allowed between bait application and use of a contact insecticide on the bait treated area. In addition, mixture with any other product (e.g. granular fertilisers) is not suggested, as this can cause uneven distribution and variable ant control.

Exposure during use

For professional use, pest control workers will be the main users of the product, and will apply the product to golf courses, recreational or residential turf, and other areas. Contract workers are expected to have frequent exposure to the chemical during the year.

Workers may be exposed to the product when opening the packages and loading the product, and during application when using a hand held rotary granule spreader or equivalent spinning disk type applicator, or dispersing the product by hand. Exposure is considered to be medium to long-term in duration. The main route of exposure to the product granules will be dermal contact, as well as inhalation of the granule dust, or accidental ocular exposure.

In the absence of exposure data for the proposed mode of application, the Pesticide Handler Exposure Database (PHED) Surrogate Exposure Guide (1998) was used to estimate exposure.

The toxic endpoint of concern and identified NOEL for risk assessment is derived from a repeat dose study in animals, and in this instance a margin of exposure (MOE) of 100 or above is considered acceptable. The MOE takes into account both potential inter-species extrapolation and intra-species variability. Based on the risk assessment, the proposed use of the product is acceptable when the appropriate personal protective equipment (chemical-resistant gloves) are used.

Exposure during re-entry

Due to the low concentration of metaflumizone in the product, low use rate of the product and the specific formulation and use pattern, the acute and/or chronic risks for workers exposed to product residues in treated areas upon conducting re-entry activities are generally considered to be low, and not require specific re-entry statements for risk management.

Recommendations for safe use

Based on the risk assessment, the product is appropriate for professional use; users should follow the First Aid Instructions, Safety Directions and Re-entry statements on the product label.

6.4 Conclusion

The registration of SIESTA GRANULAR ANT BAIT, containing 0.63 g/kg of metaflumizone, for professional use is supported. SIESTA GRANULAR ANT BAIT can be used safely if handled in accordance with the instructions on the product label and any other control measures described above. Additional information is available on the product Safety Data Sheet.

7 ENVIRONMENTAL ASSESSMENT

The end use product SIESTA GRANULAR ANT BAIT is a 0.63 g/kg granular formulation. Registration is sought for control of nuisance ant species such as coastal brown ant, black ant and red imported fire ant. It is proposed for use on gardens, golf courses, industrial areas, lawns, parks, turf, sports grounds and other non-crop land and non-food bearing nursery stock. The product will be applied at 3–5 g/20 m2, which on a per hectare rate, equates to a maximum 1.58 g ac/ha. Up to 6 applications per annum may be made with a minimum 30 days between applications.

Metaflumizone is stable to hydrolysis under neutral and basic conditions but may undergo photolytic degradation under acidic conditions. It is only slowly degraded by biotic processes in soil and sediment under both aerobic and anaerobic laboratory conditions. The chemical quickly dissipates from the water column where it associates with the sediment. Dissipation was more rapid in the field than in the laboratory studies carried out in the dark. Photolysis on the soil surface is likely to have contributed to field dissipation in the bare soil plots, which were kept free of vegetation by herbicides. Metaflumizone is not expected to be mobile in soils. Metaflumizone was shown to bioconcentrate in aquatic organisms, however, further studies indicated that it does not bioaccumulate in fish, earthworms or mammals or biomagnify in the aquatic food chain. A study indicated biomagnification in aquatic snails.

Metaflumizone is practically non-toxic to birds based on acute exposure, and moderately toxic to birds from dietary exposure. While the substance did show effects on reproduction, additional tests demonstrated a clear preference for birds to consume normal food rather than the granules. Testing with fish, algae and aquatic plants generally showed no effects up to the levels tested. However, it was chronically highly toxic to aquatic invertebrates.

The substance showed delayed toxicity to bees in standard adult acute oral and contact toxicity tests and is considered moderately toxic to bees. It was not acutely toxic to beneficial insects at the maximum single application rate currently proposed for use in Australia. Metaflumizone generally did not exhibit toxicity towards terrestrial invertebrates, soil microorganisms or non-target terrestrial plants.

The risk assessment determined that the chemical is unlikely to pose an environmental risk under the proposed use pattern.

To support the application, a full suite of environmental fate and toxicity data were provided for the new active constituent. Several tests for environmental fate and ecotoxicity provided were undertaken using rates and formulations not registered in Australia, or where registration is sought in Australia. These tests have been accepted as providing additional information on the fate and toxicity of the active constituent. One ecotoxicity study was provided for the end-use product itself.

7.1 Environmental fate

Hydrolysis

At low pH, metaflumizone is hydrolysed to M320I04 and M320I08, with DT50's (SFO kinetics) of 5.4–6.0 d at pH 4 and 27.2–27.5 d at pH 5. However, the substance is stable to hydrolysis at pH 7 and 9.

Photolysis

Aqueous photolysis

With exposure to continuous irradiation from a filtered Xenon light source in an aqueous photolysis study, metaflumizone degraded with DT50 and DT90 values of 2.4–4.1 d and 19.0–28.4 d, respectively. There was conversion of the E-isomer of metaflumizone to the Z-isomer, altering the initial ratio of E:Z = 90:10 to 35:65 under the test conditions. The major metabolites produced were the organic volatile metabolites M320I05 and M320I06, with smaller amounts of M320I04, M320I08, M320I09 and 14CO2, and numerous other minor, unidentified products.

Soil photolysis

Soil photolysis was tested in two soils. Half-lives in continuously irradiated samples were ~20 days compared to >60 days in dark samples.

Biodegradation

Aerobic soil metabolism

Aerobic soil degradation in the laboratory was studied in eight different soils (three studies). Two of these studies indicated metaflumizone was persistent with half-lives of 202–419 days. A third study (4 soils) showed much faster degradation (DT50's 46.1–74.6 d), but test conditions included a temperature of 27°C, which was much higher than other results (20°C).

In soil, metaflumizone can be oxidized at the benzyl group between the trifluoromethylphenyl ring and the benzonitrile ring (M320I07), which further leads to the cyclic product (M320I23). Metaflumizone can also split into two moieties, one representing the trifluoromethoxyphenyl ring (M320I08 or M320I05), and the other still consisting of benzonitrile + trifluoromethylphenyl ring (M320I09 or M320I04). Under irradiated conditions (as well as under dark conditions but to a smaller extent), the two aromatic rings in metabolites M320I09 and M320I04 can be split forming the single ring structures M320I29 (trifluoromethyl benzoic acid) and M320I06 (cyano benzoic acid). All intermediates are further degradable to finally form CO2 and bound residues.

Anaerobic soil metabolism

In anaerobic soils, the anaerobic phase half-lives were determined to be >400 days.

Aerobic aqueous metabolism

Metaflumizone is not readily biodegradable, with minimal degradation observed over 29 days. In aquatic metabolism (water/sediment) studies conducted in the dark, metaflumizone initially dissipated rapidly to sediment (DT50 <1 d), but the rate of dissipation then slowed (DT50/DT90 = 0.56 d/86.5 d, 0.73 d/70.6 d, and 0.30 d/5.3 d in 3 different systems). Dissipation in the sediment and whole system was slow in the dark, with only minor levels of M320I04, M320I23 and 14CO2, and some formation of bound residues in sediment.

In a study where water/sediment systems were also exposed to 12 h light:12 h dark cycles from a filtered Xenon light source, the rate of dissipation from water was again <1 d (DT50/DT90 = 0.22 d/4.65 d), with

levels in sediment peaking the first day after treatment and then declining. The DT50 and DT90 calculated for the whole system were 6.2 d and 114 d. Isomerisation of metaflumizone was again evident. Major metabolites formed included 14CO2, M320I05, M320I06 and M320I29, and minor metabolites identified were M320I08 and M320I09. A major proportion remained as bound residues in sediment.

Anaerobic aqueous metabolism

In an anaerobic aquatic metabolism study, rapid dissipation from the water to sediment again occurred (DT50 <1 d), but metaflumizone was very slow to dissipate from the sediment and whole system. Minor metabolites observed were M372I04, M372I05, M372I08, M372I09, and M372I23, with small amounts of 14CO2 and 14CH4 and some formation of bound residues in sediment.

Field dissipation

Similar field dissipation rates for the DT50 values were found at four US sites on bare soil (DT50's 9.2–41.9 d, DT90's 30.6–>450 d, FOMC and SFO kinetics) to the eight sites in Europe, which were all conducted on bare soil (DT50's 3.0–15.8 d, DT90's 9.9–177 d, FOMC kinetics). However, the DT90's at two of the US bare soil sites were longer, and overall dissipation was much slower on the cropped sites.

Dissipation was more rapid in the field than in the laboratory studies carried out in the dark. Photolysis on the soil surface is likely to have contributed to field dissipation in the bare soil plots, which were kept free of vegetation by herbicides. However, this is not the full explanation for more rapid dissipation in the field than in laboratory studies conducted in the dark, as the rate of dissipation in the field was also faster than that in the laboratory soil photolysis studies (DT50 = ~20 d continuous irradiation from a filtered Xenon light source). Where field dissipation was studied on cropped plots, the DT50 was considerably higher (>140 d, three sites).

At all sites, minimal movement of metaflumizone below the surface layer (10 cm in Europe, 7.6 cm in the US) occurred, consistent with its strong sorption to soil. The soil metabolites M320I04, M320I06 and M320I23 which were investigated were generally only found sporadically and in very low amounts, with minimal downward movement.

Aquatic dissipation

In an outdoor microcosm study, rapid isomerization of applied metaflumizone occurred and residues declined within 7 days to about 10% of the day zero values. The metabolites M320I04 and M320I23 occurred only in minor amounts in water and not in sediment. Residues in water declined to very low levels at 70 d from the last application. In sediment samples, maximum residues degraded gradually from peak levels 4–14 d after the last application.

Mobility

In batch equilibrium studies with 7 soils and organic carbon ranging from 0.8–3.7%, Kd values ranged from 350–1030 L/kg (Koc >15000 L/kg) and metaflumizone is considered immobile in soils. The main soil metabolite, M320I23, is also considered immobile in soil.

Fate and behaviour in air

Predicted concentrations of metaflumizone in air are negligible: based on the vapour pressure (1.24 × 10–8 Pa at 20ºC for total metaflumizone) and Henry's Law constant (1.05 × 10–6 atm m3/mol for the Z-isomer and 7.70 × 10–9 atm m3/mol for the E-isomer) values, it is classified as only very slightly volatile with little potential for volatilisation from soil, plant or water surfaces. Low volatilisation from soil and plant surfaces was confirmed in the above study to German guidelines showing a loss of ~3% of applied from each of these surfaces over 24 h.

Estimation of the photochemical and oxidative decomposition rate in air by the Atkinson method indicated a first order half-life of 3.25 h (12 h irradiation day). Therefore, if metaflumizone were volatilised it would not be expected to be subject to long distance transport. The estimated photochemical and oxidative decomposition rate in air of the volatile metaflumizone metabolite M320I05 was 1.38 h (12 h days), indicating short persistence in the upper atmosphere. Therefore, even if significant amounts of this metabolite were formed and volatilised, long range transport would not be expected.

Bioaccumulation

Based on the n-octanol/water partition coefficient for metaflumizone (log Pow = 4.2 for the Z isomer and 4.9 for the E isomer, pH 7 and 20º C), metaflumizone has potential to bioaccumulate. Several studies were conducted to address this. These confirmed that metaflumizone bioconcentrates in aquatic organisms and indicated that it does not bioaccumulate in earthworms, fish or mammals but it can in aquatic snails.

Fish bioconcentration studies to standard guidelines were conducted with bluegill sunfish and carp. These indicated Bioconcentration Factors (BCF) of 7800–8100 and 1986–2117, respectively. The depuration half-lives were 14–17 d in both studies. Based on the BCF values, metaflumizone is classified as having potential for bioconcentration (BCF ≥ 500) and highly bioconcentrating (BCF > 1000) in fish.

In the bioconcentration studies, fish were exposed to the test substance through the surrounding water. In a dietary bioaccumulation study, where the fish were exposed to treated food, the concentration of metaflumizone reached in the fish remained below that in the diet. The calculated Biomagnification Factor (BMF, corrected for growth of the fish) was 0.554, with a depuration half-life of 12 d. Therefore no accumulation of the test substance is expected in the aquatic food chain.

The Bioaccumulation Factor (BAF) refers to accumulation of the test item within the organism through uptake from the surrounding medium and also from contaminated food items, and thus includes both biomagnification and bioconcentration. In an outdoor microcosm study, organisms were mainly exposed to metaflumizone applied to the water on 2 or 4 occasions at 7 d intervals, but also potentially through residues resulting in diet. Residues in the water declined within 7 days of each application to about 10% of the day zero values while residues in sediment peaked ~4–14 d after the last application and then declined gradually. The highest BAF in fish based on the nominal initial concentration of metaflumizone in water was 1071. Higher BAF values (1102–6359) were found with snails, whereas similar to lower values were found with mussels (filter feeders), and the lowest values were found with sowbugs (detritus feeders), periphyton and aquatic plants.

In a bioaccumulation study with earthworms (Eisenia foetida), the worms were exposed to soil treated with metaflumizone. No bioaccumulation was observed during the uptake phase, with concentrations in the worms always below those initially in the soil. Thus, despite a log Pow value indicating potential for bioaccumulation, and high BCF found in fish studies, this study showed metaflumizone did not bioaccumulate in earthworms exposed in soil.

The whole body bioaccumulation factor [BAF (whole body)] for metaflumizone in rats was estimated by comparing the residue of metaflumizone in the whole body of rats to the theoretical residue of metaflumizone in feed. The resulting BAF (whole body) value in the whole body of rats was 0.12 (0.69 in fat), where a BAF (whole body) value < 1 indicates that biomagnification in mammals is not expected to be a concern.

High levels of metaflumizone in aquatic snails in a bioaccumulative study were found. The bioaccumulation in aquatic snail-eating birds is not known.

7.2 Environmental effects

Birds

Metaflumizone is considered practically non-toxic to birds based on acute oral toxicity. In acute dietary toxicity tests, the result of LC50 = 997 mg/kg diet to bobwhite quail indicates moderate toxicity while the result for mallard duck indicates slight toxicity. Two types of studies were provided to assess reproductive effects. In sub-acute dietary exposure, birds were exposed to metaflumizone in the diet for 7 weeks (42 days), and the resultant NOECs of 60–120 mg ac/kg diet were based on effects on egg production and both parental and offspring survival. When exposure was extended to 21 weeks in the chronic reproduction tests, effects were seen at much lower concentrations. Parental effects on mortality were not observed, but treatment levels were lower than those used in the sub-acute tests. However, treatment related effects were apparent again with offspring survival being the most sensitive end-point for both bobwhite quail and mallard duck. The NOEC for bobwhite quail was 7.5 mg ac/kg diet. Two studies were undertaken for mallard duck because the first test was not performed with sufficiently low concentrations to derive a study NOEC. The second study allowed for a NOEC of 15 mg ac/kg diet to be determined. When tested in a choice/no choice test with the end-use product, birds showed a clear preference to consume normal food rather than the granular product.

Aquatic organisms

Effects on fish

Acute toxicity tests with five different fish species were provided. Three of these were ‘traditional’ water only tests where insufficient mortality was found at the highest test concentrations to enable calculation of an LC50. The rainbow trout study had 40% mortality at the highest test concentration while there was 25% or less mortality at the highest concentrations for bluegill sunfish and sheepshead minnow. At worst, metaflumizone can be considered highly toxic to fish (LC50 0.1–1.0 mg/L).

Early life stage toxicity testing with rainbow trout and sheepshead minnow did not show any effects up to the highest tested measured concentrations of 1.47 µg/L and 1.15 µg/L respectively. Given these were the

highest tested levels, no further analysis is possible. In a complex study with zebrafish where the full lifecycle was considered through exposure of three separate life stages of the fish to a range of concentrations with the inclusion of sediment in the test system, a study NOEC of 15 µg/L was determined, which was again the highest test concentration.

Effects on aquatic invertebrates

Results with the active constituent tested to aquatic invertebrates, which is dominated by the E-isomer, showed <50% mortality or effects at the maximum tested rates. In one of the Daphnia magna studies, between 30–35% inhibition was found at measured concentrations of 80.2–331 µg/L while in the second Daphnia magna study, mortality was 45% at 173 µg/L. The Z-isomer appeared quite a bit less toxic and the EC50 for this substance was calculated at 4,640 µg/L (moderately toxic). While no mortality at all but the lowest test concentration was found in the mysid shrimp study, there did appear to be a dose response to shell growth inhibition in the eastern oyster study. At the highest rate tested, shell growth was reduced by 43% compared to the controls. It can be estimated then that metaflumizone is possibly highly toxic to aquatic invertebrates with EC/LC50's between 0.1–1.0 mg/L considered likely.

Mysid shrimp was the most sensitive aquatic invertebrate tested chronically with a NOEC of 0.271 µg/L, based on reproductive effects. Metaflumizone can be considered highly toxic to aquatic invertebrates based on this chronic result.

Effects on algae and aquatic plants

Metaflumizone did not exhibit any adverse effects on cell density, biomass or growth rate for any of the four algal species tested up to the maximum exposure levels (313–529 µg/L), and did not exhibit any adverse effects on frond number or growth rate of the aquatic macrophyte, Lemna gibba up to the maximum tested rate (649 µg/L).

Effects on sediment dwelling organisms

Chronic (28 d) testing with the sediment dwelling midge through spiked water resulted in a NOEC of 2.56 µg/L, and when tested as the Z-isomer alone, the result was essentially the same indicating that any conversion from the E- to the Z- isomer in the environment is not expected to alter toxicity. Midge were less sensitive when exposed through spiked sediment than through water. In the 28 d spiked sediment study, there were no effects on emergence or development rate at the highest 1.62 mg/kg treatment level. In the spiked water test, application at 1000 µg/L resulted in sediment concentrations of around this level.

Terrestrial organisms

Effects on bees

Mortality effects on adult bees appeared to be delayed. In the 48 h study, there was essentially no treatment related mortality after this time period. When the tested period was extended to 96 h, there was again very little mortality observed after 48 h, but significant mortality found over the next 24 h period. The 96 h contact and oral LD50's were 1.65 and 2.43 µg ac/bee, respectively.

Effects on non-target terrestrial arthropods

The most sensitive non-target arthropod in extended laboratory testing was the parasitic wasp with a LR50 of 17.8 g ac/ha.

Effects on earthworms and other soil-dwelling arthropods

With the exception of M320I29 and M320123, metaflumizone or its metabolites did not exhibit toxicity to earthworms in either acute or chronic exposure studies. Based on the Department ecotoxicity classification system, M320I29 is considered moderately toxic to earthworms based on acute exposure (LC50 10–100 mg/kg soil). Metaflumizone and M320123 did not exhibit toxicity at the proposed use rate in Australia. The most sensitive species was the predatory mite with a NOEC of 55 mg ac/kg soil.

Soil Micro-organisms

Metaflumizone and its metabolites were tested for impacts on soil microbial functions with maximum levels tested equating to 3X international field rates, taking into account transformation levels for the metabolites. These levels are significantly higher than the proposed ant bait use rate in Australia, and did not demonstrate any adverse effects (≤25% of control values) up to 28 days after treatment.

Effects on terrestrial plants

Terrestrial plant toxicity tests were performed at the Tier I level within the US EPA framework. At this tier, substances that do not result in 25% or more adverse impact compared to control plants do not require testing at a higher tier. In the tests for both seedling emergence and vegetative vigour using 4 standard monocotyledon and 6 standard dicotyledon test species, no mortality was observed up to 694–856 g ac/ha, which is >400 times higher than the proposed rate for SIESTA GRANULAR ANT BAIT. There were no effects on emergence, shoot length or biomass (plant weight) at 25% or higher than control plants for any species, so no further plant toxicity testing was considered necessary.

Effects on biological methods of sewage treatment

One activated sludge respiration inhibition test was provided. Metaflumizone did not inhibit microbial respiration of an activated sludge inoculum in a synthetic sewage suspension at concentrations up to 10 µg/L.

7.3 Risk assessment

To support the application a comprehensive data package for metaflumizone has been assessed. Due to the low single and cumulative application rate, and considering the suite of toxicity data available for the end use product, the proposed use of this product is considered to be unlikely to have an unintended effect that is harmful to animals, plants or things or the environment.

8 EFFICACY AND SAFETY ASSESSMENT

It is proposed to register SIESTA GRANULAR ANT BAIT Against Nuisance Ants containing 0.63 g/kg Metaflumizone as a bait intended for use in the control of nuisance ant species such as coastal brown ant (Pheidole megacephala), black ant (ridomyrmex sp) and red imported fire ant (Solenopsis invicta).

The product will generally be used by professional pest control operators in and around gardens, golf courses, industrial areas, lawns, parks, turf, sports grounds and other non-crop land and non-food bearing nursery stock.

SIESTA GRANULAR ANT BAIT, with the active ingredient Metaflumizone, claims to deliver fast and long-lasting control of nuisance ants and imported fire ants. Metaflumizone is formulated on corn grit, along with soybean oil, a proven attractant bait for native and imported fire ants. Metaflumizone belongs to a new IRAC (Insecticide Resistance Action Committee) Mode of Action Chemical Group, 22B. Metaflumizone is claimed to be the only sodium channel blocker insecticide (SCBI) that does not require metabolism for bioactivation. The direct effects are that SIESTA GRANULAR ANT BAIT causes the cessation of feeding, increasing levels of immobility, and ultimately ant death.

The DIRECTIONS FOR USE in the label specify even distribution of granules over the infested area or individual mound treatment where nest entrances or foraging trails are easily identified. The rate for broadcast treatment is 3–5 g/20m2, with a maximum of 2.5 kg/ha specified for mound treatment.

The Applicant submitted data from 4 trials to support the claim for control of red imported fire ants Solenopsis invicta (RIFA) through the use of broadcast application. The trials were undertaken in separate locations in the USA, (Texas, Florida, Alabama and Georgia). The use of international reports for the demonstration of efficacy in RIFA was considered acceptable as the species is a recent invasion to Australia and is subject to an active eradication program which would render the ‘untreated control’ sites as impractical.

The field studies undertaken on RIFA demonstrated greater than 90% control at 60 days post application when applied as a broadcast treatment.

The application of SIESTA GRANULAR ANT BAIT as a mound treatment was tested at two sites, one in Alabama and one in Georgia. At the Alabama site, 100% control was noted at 30 days after treatment and the Alabama site showed 96% control at day 35. The delay in effectiveness at the Alabama site was likely to have been due to weather induced decline in foraging activity of the ants.

Trials were conducted in Australia against coastal brown ant (Pheidole megacephala), and black ants (Iridomyrmex sp) in Australia.

Sites with black ant infestations in the vicinity of Warwick Farm, Queensland were selected. Five sites were treated with the proposed product and another 5 with an industry standard applied at label rate and another 5 left as untreated controls. SIESTA GRANULAR ANT BAIT was scattered by hand at a rate of 3.36 g/20m2 on the test sites, the control sites were untreated. Assessment of ant numbers at 2 and 4 weeks post treatment indicated that there was significantly less ants in the treated area compared to the control site and that there was no significant difference between the industry standard and the proposed product.

Sites with brown costal ant infestations in the vicinity of Holloways Beach, Cairns, Queensland were selected. Five sites were treated with the proposed product and another 5 with an industry standard applied at label rate and another 5 left as untreated controls. SIESTA GRANULAR ANT BAIT was scattered by hand at a rate of 3.36 g/20m2 on the test sites, the control sites were untreated. Assessment of ant numbers at 2 and 4 weeks post treatment indicated that there was significantly less ants in the treated area compared to the control site and that there was no significant difference between the industry standard and the proposed product.

No phytotoxicity to target or non-target plants is expected from the intended application of SIESTA which is formulated and applied as a dry granular ant bait at a low application rate. Terrestrial plant toxicity tests were performed for both seedling emergence and vegetative vigour using 4 standard monocotyledon and 6 standard dicotyledon test species, no mortality was observed up to 694–856 g ac/ha, which is >400 times higher than the proposed rate for Siesta Granular Ant Bait. There were no effects on emergence, shoot length or biomass (plant weight) at 25% or higher than control plants for any species, so no further plant toxicity testing was considered necessary.

The data submitted was considered to be supportive of claim for efficacy against red-imported fire ant and nuisance ants by broadcast or mound treatment at the rate proposed (3–5 g/20m2) (maximum 2.5 kg/ha for mound application).

9 LABELLING REQUIREMENTS

CAUTION

KEEP OUT OF REACH OF CHILDREN

READ SAFETY DIRECTIONS BEFORE OPENING OR USING

SIESTA GRANULAR ANT BAIT

ACTIVE CONSTITUENT: 0.63 g/kg METAFLUMIZONE

For the control of nuisance ant species such as coastal brown ant, black ant and red imported fire ant as specified in the DIRECTIONS FOR USE in the attached booklet.

IMPORTANT: READ THE ATTACHED BOOKLET BEFORE USE

NET CONTENTS: 170 g, 450 g, 680g, 11.34 kg

STORAGE AND DISPOSAL:
Store in a cool, dry, secure place away from children, animals, food and fodder, and keep container tightly closed after use. SIESTA is formulated in an oil bait and prolonged exposure to air may turn oil rancid and reduce the attractiveness of the bait. For best results, use within 3 months of opening although correctly stored product should provide control beyond this time. Wastes resulting from the use of this product may be disposed of on-site by uniform spreading. If quantity is large, collect and dispose of at an approved waste disposal facility. Break, crush, or puncture and deliver empty packaging to an approved waste management facility. If an approved waste management facility is not available bury the empty packaging 500mm below the surface in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots, in compliance with relevant Local, State or Territory government regulations. DO NOT burn empty containers or product.

SAFETY DIRECTIONS:
May irritate the skin. Repeated exposure may cause allergic disorders. Sensitive workers should use protective clothing. Avoid contact with the skin. When preparing product for use and using the product, wear elbow-length chemical resistant gloves. Wash hands after use. After each day's use, wash gloves.

FIRST AID:
If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 131126.

SAFETY DATA SHEET:
Additional information is listed in the Safety Data Sheet.

CONDITIONS OF SALE:
All conditions and warranties rights and remedies implied by law or arising in contract or tort whether due to the negligence of BASF Australia Ltd or otherwise are hereby expressly excluded so far as the same may legally be done provided however that any rights of the Buyer pursuant to non- excludable conditions or warranties of the Trade Practices Act 1974 or any relevant legislation of any State are expressly preserved but the liability of BASF Australia Ltd or any intermediate Seller pursuant thereto shall be limited if so permitted by the said legislation to the replacement of the goods sold or the supply of equivalent goods and all liability for indirect or consequential loss or damage of whatsoever nature is expressly excluded. This product must be used or applied strictly in accordance with the instructions appearing hereon. This product is solely sold for use in Australia and must not be exported without the prior written consent of BASF Australia Ltd.

CAUTION

KEEP OUT OF REACH OF CHILDREN

READ SAFETY DIRECTIONS BEFORE OPENING OR USING

SIESTA GRANULAR ANT BAIT

ACTIVE CONSTITUENT: 0.063% Metaflumizone

For the control of nuisance ant species such as coastal brown ant, black ant and red imported fire ant as specified in the DIRECTIONS FOR USE table.

IMPORTANT: READ THIS BOOKLET BEFORE USE

BASF Australia Ltd ABN 62 008 437 867
Level 12, 28 Freshwater Place Southbank VICTORIA 3006

Website: www.pestcontrol.basf.com.au
Customer Service Hotline: 1800 006 393

Directions for Use:

Restraints

DO NOT irrigate treated areas within 48 hours of application.

DO NOT apply when the ground is saturated with water, heavy dew, or if heavy rain is likely within 48 hours of application.

DO NOT apply more than 6 times per annum in the same area.

DO NOT apply to fruit trees, vegetables or parts of plants that are to be eaten.

DO NOT place bait in locations that are accessible to domestic animals, livestock or poultry.

SITUATION	PEST	STATES	RATE	CRITICAL COMMENTS
Gardens, golf courses, industrial areas, lawns, parks, turf, sports grounds and other non-crop land and non-food bearing nursery stock	Nuisance Ants, including: Coastal brown ant (*Pheidole megacephala*) Black ant (*Iridomyrmex* sp)	All states	3–5 g per 20m^2	Evenly distribute granules over infested area using a hand held rotary granule spreader or equivalent applicator or gloved hand. Apply in early morning of later afternoon when ants are most active. Re-treat when ant activity becomes troublesome again. Allow at least 30 days between applications in the same area. For best results, allow 7 days between bait application and use of a contact insecticide on the bait treated area.
	Red imported fire ant (*Solenopsis invicta*)			

NOT TO BE USED FOR ANY PURPOSE, OR IN ANY MANNER, CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION.

GENERAL INSTRUCTIONS:

Siesta Granular Ant Bait is a slow-acting insecticide which is designed to be collected by ants and carried back to the nest as food for the colony. The bait is eaten and passed along to the queen and other nest-mates. Typically, in 1–4 weeks, the queen and a number of ants are killed and a visible reduction in activity results.

APPLICATION

Broadcast method (all ant types)

Apply granules using a hand held rotary granule spreader or equivalent spinning disk type applicator which ensures uniform distribution. For small areas, granules may be uniformly sprinkled by hand using elbow-length rubber gloves.

Individual mound treatments (mound building ant types)

Where nest entrances or foraging trails are easily identified, a more concentrated sprinkling of granules in these areas will lead to faster control. DO NOT disturb the mound. DO NOT apply to top of mound. Uniformly distribute the product within 1 meter of mound. Where ants are active throughout a given area or it is likely that nest entrances may be hidden and therefore missed in individual mound treatments, then the Broadcast method of treatment is recommended. If individual mounds are treated, DO NOT exceed 2.5 kg/ha.

DO NOT use in conjunction with contact insecticide aerosol sprays or any other ant remedy that will kill or repel foraging ants in the areas to be treated. Allow 7 days between bait application and use of a contact insecticide on the bait treated areas.

EQUIPMENT CLEAN-UP

Thoroughly empty equipment of all granules before use with other pesticides. DO NOT contaminate water bodies when disposing of equipment washwaters.

COMPATIBILITY

DO NOT apply in a mixture with any other product e.g. granular fertilisers, as this can cause uneven distribution and variable ant control.

PRECAUTION:

For professional use only.

PROTECTION OF LIVESTOCK

Metaflumizone is moderately toxic to bees. This product may be attractive to animals. If product is spilt, collect or spread granules to discourage eating.

DO NOT graze treated turf or lawn; or feed turf or lawn clippings from any treated area to poultry or livestock.

PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT:

Toxic to birds and wild mammals. Cover, incorporate or clean up granules that are spilled.
Very toxic to aquatic life with long lasting effects. DO NOT apply directly to water. DO NOT contaminate wetlands or watercourses with this product or used containers. This product may only be applied within the areas specified on the label.

STORAGE & DISPOSAL:

Store in a cool, dry, secure place away from children, animals, food and fodder, and keep container tightly closed after use. Siesta is formulated in an oil bait and prolonged exposure to air may turn oil rancid and reduce the attractiveness of the bait. For best results, use within 3 months of opening although correctly stored product should provide control beyond this time.
Triple-rinse containers before disposal. Dispose of rinsate or any undiluted chemical according to state/territory legislative requirements. Break, crush, or puncture and deliver empty packaging to an approved waste management facility. If an approved waste management facility is not available bury the empty packaging 500mm below the surface in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots, in compliance with relevant Local, State or Territory government regulations. DO NOT burn empty containers or product.

SAFETY DIRECTIONS:

May irritate the skin. Repeated exposure may cause allergic disorders. Sensitive workers should use protective clothing. Avoid contact with the skin. When preparing product for use and using the product, wear elbow-length chemical resistant gloves. Wash hands after use. After each day’s use, wash gloves.

FIRST AID:

If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 13 11 26. New Zealand 0800 764 766.

ABBREVIATIONS

AC/ac	active constituent
ADI	Acceptable Daily Intake (for humans)
ai	active ingredient
APVMA	Australian Pesticides and Veterinary Medicines Authority
ARfD	Acute reference dose
atm	atmospheres
BAF	Bioaccumulation Factor
BCF	Bioconcentration Factor
BMF	Biomagnification Factor
bw	bodyweight
°C	Degrees Centigrade
cm	centimetre
CMAU	Case Management and Administration Unit
d	Day
DT_{50}	Time taken for 50% of the concentration to dissipate
EC_{50}	concentration at which 50% of the test population are adversely impacted
FOMC	First-Order Multi-Compartment
g	gram
GLP	Good Laboratory Practice
h	hour
ha	hectare
HSIS	Hazardous Substance Information System
IRAC	Insecticide Resistance Action Committee
IUPAC	International Union of Pure and Applied Chemistry
in vitro	outside the living body and in an artificial environment
in vivo	inside the living body of a plant or animal

K_d	distribution coefficient for adsorption
kg	kilogram
K_{oc}	Organic carbon adsorption coefficient
K_{ow}	Octanol-Water Partition Coefficient
L	Litre
LC_{50}	concentration that kills 50% of the test population of organisms
LD_{50}	dosage of chemical that kills 50% of the test population of organisms
LOEL	Lowest Observable Effect Level
LR_{50}	Application rate that kills 50% of the test population of organisms
m	metre
mg	milligram
mL	millilitre
MoA	Mode of Action
MOE	Margin Of Exposure
mol	mole
SDS	Safety Data Sheet
NOHSC	National Occupational Health and Safety Commission
NOEC	No Observable Effect Concentration
NOEL	No Observable Effect Level
OC	Organic Carbon
OCS	Office of Chemical Safety (Department of Health)
OM	Organic Matter
Pa	Pascals
PHED	Pesticide Handler Exposure Database
P_{ow}	octanol/water partition coefficient
ppb	parts per billion
RIFA	Red imported fire ants

s	second
SCBI	Sodium Channel Blocker Insecticide
SFO	Single-First Order
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
$T_{1/2}$	Elimination Half-Life
T_{max}	Time to achieve maximum concentration
µg	microgram
US EPA	U.S. Environmental Protection Agency

GLOSSARY

Active constituent	The substance that is primarily responsible for the effect produced by a chemical product
Acute	Having rapid onset and of short duration.
Carcinogenicity	The ability to cause cancer
Chronic	Of long duration
Efficacy	Production of the desired effect
Formulation	A combination of both active and inactive constituents to form the end use product
Genotoxicity	The ability to damage genetic material
Log P_{ow}	Log to base 10 of octanol water partitioning co-efficient, synonym K_{OW}
Metabolism	The chemical processes that maintain living organisms
Photolysis	Breakdown of chemicals due to the action of light
Toxicokinetics	The study of the movement of toxins through the body
Toxicology	The study of the nature and effects of poisons

REFERENCES

Australian Pesticides and Veterinary Medicines Authority 2008, *Ag MORAG: Manual of Requirements and Guidelines*, APVMA, Canberra now superseded by the APVMA application requirements and data guidelines. Available at: apvma.gov.au/

National Occupational Health and Safety Commission (NOHSC), *Approved Criteria for Classifying Hazardous Substances, 3rd Edition [NOHSC:1008(2004)]*, NOHSC, Canberra, 2004. Available at: www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/ns2004criteriaforclassifyinghazardous

Safe Work Australia (SWA), *Hazardous Substances Information System (HSIS) Database*, SWA, Canberra, 2015. Available at: hsis.safeworkaustralia.gov.au/

United States Environmental Protection Agency (US EPA), *The Pesticide Handlers Exposure Database (PHED), Version 1.1–PHED Surrogate Exposure Guide, Estimates of Worker Exposure*. US EPA, Washington, DC, United States, 1998