Australian Government

Australian Pesticides and Veterinary Medicines Authority

PUBLIC RELEASE SUMMARY

on the evaluation of the new active BISPYRIBAC SODIUM in the product NOMINEE® HERBICIDE

APVMA Product Number 63233

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Website: This publication is available from the APVMA website: http://www.apvma.gov.au

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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 and Ageing, Office of Chemical Safety and Environmental Health (OCSEH), Department of Sustainability Environment, Water, Population and Communities Arts (DSEWPaC), 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 undertaken according to accepted scientific principles. Details are outlined in the APVMA's publications *Ag MORAG: Manual of Requirements and Guidelines* and *Vet MORAG: Manual of Requirements and Guidelines*.

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 persons 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 **NOMINEE® HERBICIDE** 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 grounds are **public health aspects, occupational health and safety, chemistry and manufacture, residues in food, environmental safety, trade** and **efficacy**. Submissions should state the grounds on which they are based. Comments received outside these grounds cannot be considered by the APVMA.

Submissions must be received by the APVMA by close of business on **Tuesday 19 July 2011** 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)
- Postal Address
- Email Address (if available)
- The date you made the submission.

All personal and ***confidential commercial information (CCI)***[1] material contained in submissions will be treated confidentially.

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

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:

Contact Officer
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Phone: (02) 6210 4700
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Further information

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

Copies of full technical evaluation reports covering toxicology, occupational health and safety aspects, residues in food and environmental aspects are available from the APVMA on request.

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

1 INTRODUCTION

Applicant

Sumitomo Chemical Australia Pty Ltd

Details of Product

It is proposed to register NOMINEE® HERBICIDE containing 100g/L bispyribac sodium as a suspension concentrate intended for use in the control of winter grass (*Poa annua*) in Creeping Bentgrass greens on golf courses in Southern Australia. NOMINEE® HERBICIDE is intended to used at 10 mL product / 100 square metres.

Poa annua infestations are a major challenge for managers of golf course greens. Poa infestations of greens are a nuisance for Golf players, as it forms clumps that interfere with the smooth run of Golf balls; furthermore, poa infestations look unattractive and make greens look untidy. Registration of NOMINEE® HERBICIDE will allow better herbicide resistance management of *Poa annua*.

NOMINEE® HERBICIDE contains bispyribac sodium is a group B herbicide with aceto lactase inhibition mode of action.

Bispyribac sodium is a new active constituent to the Australian market. The Herbicide Resistance Action Committee (a specialist technical group of CropLife International) has classified bispyribac sodium as having the target site as an inhibitor of acetolactate synthase (Group B) belonging to the chemical group Pyrimidinylthiobenzoates.

NOMINEE® HERBICIDE will be packaged in containers between 500 mL and 5 L.

Bispyribac sodium is currently contained in turf products registered in the U.S.A., Japan and South Africa. Bispyribac sodium is also in registered products used in rice in U.S.A., Japan, Korea, Philippines, Taiwan, Thailand, Vietnam, India and Indonesia.

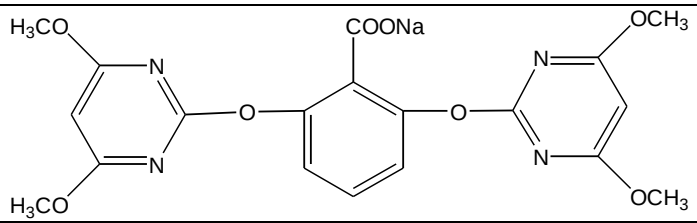
This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of NOMINEE® HERBICIDE, and approval of the new active constituent, bispyribac sodium.

2 CHEMISTRY AND MANUFACTURE

2.1 Active Constituent

Bispyribac sodium is a new active constituent for use in turf for the control of winter grass (*Poa annua*).

The chemical active constituent of NOMINEE® HERBICIDE has the following properties:

COMMON NAME (ISO):	Bispyribac sodium
IUPAC NAME:	Sodium 2,6-bis[(4,6-dimethoxy-2-pyrimidinyl)oxy)benzoate
CAS NAME:	Sodium 2,6-bis[(4,6-dimethoxy-2-pyrimidinyl)oxy)benzoate
CAS REGISTRY NUMBER:	125401-92-5
MOLECULAR FORMULA:	$C_{19}H_{17}N_4NaO_8$
MOLECULAR WEIGHT:	452.4
STRUCTURE:	
CHEMICAL FAMILY:	Pyrimidinyloxybenzoic acid herbicide

Proposed APVMA Active Constituent Standard for NOMINEE® HERBICIDE

CONSTITUENT	SPECIFICATION	LEVEL
Bispyribac sodium	Odourless white powder	Minimum 970 g/kg

Physicochemical Properties of the Active Constituent

COLOUR:	White
ODOUR:	Odourless
PHYSICAL STATE:	Powder
MELTING POINT:	223 ºC to 224 ºC. Decomposition observed.
DENSITY:	0.0737 g/mL
UV ABSORPTION:	ε (L mol^{-1} cm^{-1}]): 16877 at 246.0 nm (at pH 6.95)
OCTANOL/WATER PARTITION COEFFICIENT (KOW):	-1.03 at 23 °C
VAPOUR PRESSURE AT 25°C:	< 1 x 10^{-7} mm Hg at 25 ºC
SOLUBILITY AT 25°C: IN WATER: (PURITY OF ACTIVE 99.0%; PH 8.1) IN ORGANIC SOLVENTS: (PURITY OF ACTIVE 95.2%)	In water 73.3 g/L In organic solvents (purity 95.2%) ethyl acetate 1.98×10^{-4} g/100 mL dichloromethane 5.13×10^{-4} g/100 mL
HENRY'S LAW CONSTANT:	3.12×10^{-11} Pa m^3/mol
DISSOCIATION CONSTANT IN WATER:	Weak carbonic acid anion & Na^+
FLAMMABILITY:	Non-flammable
EXPLOSIVE PROPERTIES:	Not an oxidizing substance
OXIDISING PROPERTIES:	Not corrosive
CORROSION CHARACTERISTICS	Not corrosive
DANGEROUS GOODS CLASSIFICATION	Not a dangerous Good according to ADG Code

2.2 Product

NOMINEE® HERBICIDE

DISTINGUISHING NAME	NOMINEE® HERBICIDE
FORMULATION TYPE	Suspension concentrate (SC)
ACTIVE CONSTITUENT CONCENTRATION	Bispyribac sodium (100 g/L)

Physical and Chemical Properties of NOMINEE® HERBICIDE

PHYSICAL STATE:	Viscous suspension liquid concentrate
COLOUR:	Off-white
ODOUR:	Almost odourless
SPECIFIC GRAVITY:	1.03 – 1.10 @ 20 °C
PH (1% SOLUTION):	9 - 10
VISCOSITY:	430 – 650 mPa s @ 20 °C
EXPLOSIVE PROPERTY:	Not explosive
OXIDISING PROPERTIES:	Not an oxidising substance
WET SIEVE RESIDUE:	Max. 0.10% (>45 μm)
POURABILITY:	Max 5%
PERSISTENT FOAMING:	10 mL after 1 minute at 1% solution
SUSPENSIBILITY:	Min. 90%
SPONTANEITY OF DISPERSION:	Min. 80%
DANGEROUS GOODS CLASSIFICATION:	Not classified as Dangerous Goods
STORAGE STABILITY:	Stability data provided by the applicant indicates that the product is expected to remain within specification for at least 2 years when stored under normal conditions in HDPE container.
LOW TEMPERATURE STABILITY:	Chemically and physically stable after 7 days at 0 °C

3 TOXICOLOGICAL ASSESSMENT

The submitted studies on the active constituent showed that bispyribac sodium is very rapidly and completely absorbed by the oral route and is rapidly excreted. Bispyribac sodium has low acute oral, dermal and inhalational toxicity, is not a dermal irritant in rabbits but is a slight irritant to the eye of rabbits. It is not a skin sensitiser in guinea pigs.

Repeat dose studies evaluated on bispyribac sodium technical material have been conducted with mice, rats and dogs. The liver and choledochus were identified as the main target organs of toxicity regardless of the duration of exposure. Bispyribac sodium is not an *in vivo* genotoxicant or a carcinogen in mice, rats or dogs. Additionally, the major metabolites were not mutagenic *in vitro* and have low acute toxicity profiles. Bispyribac sodium is not a developmental or reproductive toxicant.

Based on the findings of the toxicological studies evaluated, the product, NOMINEE® HERBICIDE, has low acute oral, dermal and inhalational toxicity. It is not an eye or skin irritant and is not a skin sensitiser.

3.1 EVALUATION OF TOXICOLOGY

The toxicological database for bispyribac sodium, which consists primarily of toxicity tests conducted in rats, mice, rabbits and dogs, is considered sufficient to determine the toxicology profile of bispyribac sodium and characterise the risk to humans. 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 animal studies. Toxicity tests should also indicate dose levels at which the specific toxic effects are unlikely to occur. Such dose levels as the No-Observable-Effect-Level (NOEL) are used to develop acceptable health limits at which no adverse health effects in humans would be expected.

The Office of Chemical Safety and Environmental Health (OCSEH) within the Department of Health and Ageing, Australia conducted the toxicology assessment of bispyribac sodium.

Bispyribac sodium is to be included in Schedule 5 of the SUSMP at greater than 10% on 1 September 2011

Toxicokinetics and Metabolism

Radiolabelled bispyribac sodium was absorbed very quickly (<15 minutes) in rats and mice dosed at 30 mg/kg bw and 100 mg/kg bw respectively and within 1-2 hours in rats dosed at 600 mg/kg bw. Distribution patterns within the tissues tested in both sexes and species were similar, with the highest radioactivity seen in the plasma, lung, liver and gastrointestinal tract. Lowest levels were found in the bone and brain. A difference was observed between male and female animals, with radioactivity consistently higher in male

than in female rat tissues by approximately 2-fold and the terminal half life for the disappearance of radioactivity in male rats was about 30 hours in plasma and 34 hours in red blood cells (RBC). In females it was approximately 30 hours in plasma and 27 hours in RBC. The metabolites identified in urine and faeces of both mice and rats were MeBA, Me_2BA, DesMe-2023, BX-180, 5-OH-5750 and bispyribac sodium. In addition to these, at least three other un-identified metabolites were identified. The majority of radioactivity was excreted as unchanged parent compound in both species. In bile duct cannulated rats, biliary elimination accounted for approximately 37% and 27% in males and females respectively for both doses. Taking this into account, it is considered that in male and female rats, following oral administration of bispyribac sodium, between 50% and 60% of the dose is absorbed across the GI tract. Biliary excretion was not determined in mice, though it is expected that the total absorption is similar to that in rats.

Acute toxicity studies

Bispyribac sodium was of low acute oral toxicity to rats and mice, and of low acute dermal and inhalational toxicity in rats. The compound was non-irritating to the skin and slightly irritating to the eye of NZW rabbits and non-sensitising to the skin of guinea pigs.

The formulated product, NOMINEE® HERBICIDE, containing 100 g/L bispyribac sodium, has low acute oral, dermal and inhalational toxicity in rats. It is not an eye or skin irritant in rabbits and is not a skin sensitiser in guinea pigs.

Systemic toxicity potential

Short-term, sub-chronic and chronic oral toxicity studies were submitted for rats, mice and dogs, plus one 21-day dermal toxicity study in rats. The repeat-dose dermal study in rats did not result in any systemic toxicity or other treatment related findings. The lowest dose in repeat-dose oral studies that resulted in treatment related findings was at a dose of 100 mg/kg bw/d in a 52-week oral (dietary) study in Beagle dogs. The liver and the choledochus were identified as the main target organs of toxicity regardless of duration of exposure. The lowest NOEL for short term oral toxicity was 51.4/56.6 mg/kg bw/d (M/F) from a 4-week F344 rat dietary study. For sub-chronic toxicity, the NOELs were similar between rats and mice at 71.9/79.9 mg/kg bw/d (M/F) and 68.6/79.0 mg/kg bw/d (M/F) respectively. For chronic toxicity, the lowest NOEL was 10 mg/kg bw/d from a 52 week oral (capsule) dog study. Male rats and mice appeared to be more sensitive across all studies, which is consistent with the higher rate of elimination in males compared to females as demonstrated in rat ADME studies. Although the NOELs for males and females were at similar doses, more effects were generally observed in males at these doses.

Developmental and Reproductive toxicity

There was no evidence of a reproductive or developmental toxicity potential in well conducted studies in CDVAF/Plus rats. Further, there was no evidence of a developmental toxicity potential in a well conducted study in JW-NIBS rabbits.

Carcinogenicity

In a 52-week beagle dog oral study up to 750 mg/kg bw/d, a 104-week dietary study in B6C3F_1 mice up to 903 mg/kg bw/d and a 104 –week dietary study in F344 rats up to 715 mg/kg bw/d, bispyribac sodium administration showed no evidence of a carcinogenic potential.

Genotoxicity

Bispyribac sodium was tested for its genotoxicity potential in three *in vitro* tests and one *in vivo* test. These comprised a reverse mutation (Ames) test with and without metabolic activation, a chromosome aberration test with and without metabolic activation and a UDS test, as well as an *in vivo* micronucleus test. Based on the findings in these studies, bispyribac sodium shows no evidence of a mutagenic or genotoxic potential *in vitro*, or a genotoxic potential *in vivo*. Additionally, three impurities and six metabolites were tested *in vitro* and demonstrated no evidence of a mutagenic potential with and without metabolic activation.

Neurotoxicity

Bispyribac sodium was not tested for neurotoxicity however there was no evidence of neurotoxicity in any of the acute or repeat dose studies submitted.

3.2 PUBLIC HEALTH STANDARDS

Poisons Scheduling

In April 2011, the delegate to the Secretary of the Department of Health and Ageing considered the toxicity of the product and its active ingredients and assessed the necessary controls to be implemented under states' poisons regulations to prevent the occurrence of poisoning.

The delegate to the Secretary to the Department of Health and Ageing made a delegate only decision on bispyribac. The Secretary's delegate noted and agreed with the OCSEH report's scheduling recommendation that 10 per cent or greater of bispyribac be included in Schedule 5 of the SUSMP. Therefore, the decision of the Secretary's delegate is that bispyribac be included in Schedule 5 of the SUSMP at greater than 10% and that this scheduling decision be implemented on 1 September 2011.

3.3 NOAEL/ADI /ARfD

The Acceptable Daily Intake (ADI) is that quantity of an agricultural or veterinary chemical which can safely be consumed on a daily basis for a lifetime and is based on the lowest NOEL obtained in the most sensitive species. This NOEL is then divided by a safety factor which reflects the quality of the toxicological database and takes into account the variability in responses between species and individuals.

The acute reference dose (ARfD) is the maximum quantity of an agricultural or veterinary chemical that can safely be consumed as a single, isolated event. The ARfD is derived from the lowest NOEL as a single or short-term dose which causes no effect in the most sensitive species of experimental animal tested, together

with a safety factor which reflects the quality of the toxicological database and takes into account the variability in responses between species and individuals.

No ADI or ARfD was established for bispyribac sodium as NOMINEE® HERBICIDE will not be used in food-producing crops or animals.

4 RESIDUES ASSESSMENT

As NOMINEE® HERBICIDE is not intended for use in food-producing crops or animals, a residue assessment is not required. The label of the NOMINEE® HERBICIDE requires the inclusion of a limitation of use statement “DO NOT graze treated turf/lawn; or feed turf/lawn clippings from any treated area to poultry or livestock.” to prevent exposure to residues in turf clippings.

5 ASSESSMENT OF OVERSEAS TRADE ASPECTS OF RESIDUES IN FOOD

As NOMINEE® HERBICIDE is not intended for use in food-producing crops or animals, an overseas and trade aspects of residues in food assessment is not required.

6 OCCUPATIONAL HEALTH AND SAFETY ASSESSMENT

The main occupational use of the proposed product will be by golf course superintendants and golf course employees. Workers may be exposed to the product when opening containers, mixing/loading, application, and cleaning up spills and equipment. The main route of exposure to the product will be dermal with inhalation exposure from the spray also possible.

In the absence of exposure data for the proposed mode of application, the Pesticide Handler Exposure Database (PHED) Surrogate Exposure Guide was used to estimate exposure. Exposure to the product during boom spray application and/or via application using equipment carried on the back of the user in the absence of mitigating personal protective equipment (PPE), when mixing/loading and applying the herbicide, was determined not to be an undue hazard to human health. No re-entry or re-handling statement is required.

Health hazards

Bispyribac sodium is not listed on the Safe Work Australia's (SWA) Hazardous Substances Information System (HSIS) Database (SWA, 2011). With the available toxicology information, OCSEH has not classified bispyribac sodium as a hazardous substance according to NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004). No human health risk phrases will be required for this new active constituent.

Based on the product toxicology information, NOMINEE® HERBICIDE is not classified as a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004). The product will not require human health risk phrases.

Formulation, packaging, transport, storage and retailing

The active constituent, bispyribac sodium, will be manufactured overseas. The product, NOMINEE® HERBICIDE will be formulated overseas and imported into Australia. It will be available in three pack sizes, including a 500mL, 1000mL and a 5000mL HDPE container with a HDPE screw top lid.

Use pattern

The product is intended for the control of Winter Grass (*Poa annua*) in Creeping Bentgrass (*Agrostis stolonifera*) greens on golf courses in the Southern, temperate climate zones of Australia. For best results, two consecutive applications 14 to 21 days apart are intended. Application should be applied between the months of September and February. The product should not be applied more than twice per year.

The expected method of application is by small tractor drawn or mounted boom spray, or by hand sprayer with a knapsack or a vehicle mounted spray tank.

Exposure during use

Golf course superintendants and golf course employees will be the main users of the product. It is unlikely that professional operators will be employed to treat all golf courses in a region. Rather, the superintendent (greens keeper) of a particular golf course or "pitch and putt" is likely to be the primary user of this product.

Workers may be exposed to the product when opening containers, mixing/loading, application and cleaning up spills and equipment. The main route of exposure to the product will be via the dermal route with the possibility of inhalational or ocular exposure.

Because the product is only intended for use in the Southern, temperate regions of Australia on golf course greens planted with Bentgrass (*Agrostis stolonifera*), and used primarily by the golf course superintendent, users of the product are likely to be exposed infrequently and intermittently.

In the absence of exposure data for the proposed mode of application, the Pesticide Handler Exposure Database (PHED) Surrogate Exposure Guide was used to estimate exposure. The toxic endpoint of concern and identified NOEL is derived from 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 interspecies extrapolation and intraspecies variability.

The MOE for boom spray application is at an acceptable level (i.e. >100) in the absence of mitigating PPE. Therefore, this application method is not expected to pose an undue hazard to human health. Similarly, the MOE for application equipment carried on the back of the user (e.g. backpack/knapsack application methods) is acceptable (i.e. > 100) in the absence of mitigating PPE. Therefore, this application method is not expected to pose an undue hazard to human health.

The potential risk associated with re-entry to treated areas by workers to perform either high or low exposure activities is low. Based on assessment of these activities and on the low acute toxicity profile of this product, it is considered that a re-entry or re-handling statement for NOMINEE® HERBICIDE is not required.

Recommendations for safe use

Users should follow the First Aid Instructions on the product label.

Conclusion

NOMINEE® HERBICIDE 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 Material Safety Data Sheet.

7 ENVIRONMENTAL ASSESSMENT

7.1 ENVIRONMENTAL CHEMISTRY AND FATE

Hydrolysis

In sterile aquatic systems at 25ºC, bispyribac sodium showed pH-dependent hydrolysis with maximum degradation observed in a pH 5 buffer system, leading to a DT50 value of 88 days. Me2BA was found as the major metabolite at pH 5. Very slow hydrolytic degradation was observed in pH 7 and pH 9 buffers, with DT50s of ≥476 days.

Photodegradation

Aqueous:

Bispyribac sodium was found to be stable in a sterile aqueous photolysis study at pH 7.

Soil:

Bispyribac sodium underwent a moderate degradation when exposed to sunlight. The half-life for [^{14}C] bispyribac sodium ranged from 32.04 days for the irradiated samples to 41.82 days for the dark control samples treated at 2 ppm. In addition to the parent compound, up to 12 other degradates were detected at various time points in both the irradiated and dark control samples. The degradates observed were very similar between both the irradiated and dark control samples suggesting that aerobic soil metabolism processes predominated over soil photolysis processes. The identified degradates were Me2BA, Na-BX-180, DesMe 2023, MeBA, DesMe 180 and $^{14}CO_2$, as identified in the laboratory fate studies.

Biodegradation

Soils aerobic:

Bispyribac sodium dissipated readily under aerobic soil conditions with a half-life of 18.6-19.1 days in one soil. Up to 57% of applied bispyribac sodium mineralised to CO_2. Between 15-30% of applied radioactivity remained soil-bound following base extraction. Concentrations of all extractable degradates did not exceed 0.01 ppm. However, BX-180, MeBA, Me2BA, 2,6-DBA and its methylated derivative 2,6-MDB are present in soil extracts at peak concentrations between 7.6-12.1% of applied radioactivity. Degradates 2,6 DBA and 2,6-MDB were only extractable under harsh base conditions and were not available for plant or animal uptake. Also, significant amounts of degradates DesMe-180, BX-180, MeBA and Me2BA were only recoverable after a harsh base extraction of the soil-bound residues. Other identified degradates present at concentrations smaller than 10% of applied radioactivity were DesMe, DesMe-180 and bispyribac methyl ester. All extractable degradates declined from their peak concentrations by 348 DAT. At the end of the study >95% of the applied bispyribac sodium was accounted for as evolved $^{14}CO_2$ and strongly bound radioactivity.

Water aerobic:

In two systems ^{14}C-Bispyribac sodium was biotransformed (>20% degraded) in 30 days with 61.9-79.9% of the initial measured dose (IMD) remaining after 30 days of incubation in silt loam and sandy loam soils under aerobic aquatic conditions. The half-lives of bispyribac sodium were determined to be in the range of 45.4-102 days. These should be viewed with caution as they are up to 3X the length of the study. The decline of bispyribac sodium resulted in the formation of a few degradates confirmed by HPLC, TLC and/or mass spectrometry. Only DesMe-2023 exceeded 10% of IMD in silt loam soil. Other degradates, MeBA and BX-180 were also detected at >0.01 ppm at least in one sample, but the duration of the study did not allow full examination of the metabolite profile.

Water anaerobic

In two systems ^{14}C-bispyribac sodium was biotransformed (>90% degraded) significantly with 5.22-10.8% of IMD remaining in silt loam and sandy loam soils after 12 months of incubation under anaerobic aquatic conditions. Major degradates identified by 2-dimensional TLC and/or mass spectroscopy were DesMe-2023, DesMe-180, Me2BA, MeBA, and 2,6-DBA. The half-lives of bispyribac sodium were determined to be in the range of 81.1-133 days for the two soils. Mineralisation was significant (~22.4% $^{14}CO_2$) in the silt loam soil, but was below 7% in the other soils.

Mobility

Volatility:

Based on the vapour pressure and the Henry's Law Constant, no significant volatilisation of bispyribac sodium was to be expected. Additionally, the chemical lifetime of bispyribac sodium in the troposphere was calculated to be 2.3 h. Hence, an accumulation of bispyribac sodium in the air and contamination by wet or dry deposition were not to be expected.

Adsorption/desorption:

From a batch equilibrium study on 5 soils, based on the adsorption coefficients Koc (range 144-604), bispyribac sodium is classified as being of low to high mobility depending on soil type. The Koc values estimated (2-178) using HPLC method suggest a mobility class ranging from medium to very high mobility for bispyribac sodium and its polar metabolites. Abiotic and biotic environmental fate studies conducted on bispyribac sodium indicate that degradation and extensive incorporation into the soil matrix predominate over mobility.

Leaching:

In a column leaching study, the recovered residues of bispyribac sodium following aerobic aging for 30 days in sandy loam and silt loam soils remained in the top 10 cm of the columns at approximately 70 and 80% of the applied material, respectively. The degradation half-lives were determined to be ranged from 14.1-20.7 days in soils over the 30 days period. The significant degradation products detected in the column segment extracts were MeBA and DesMe-2023. The degradation of KIH-2023 leads to a significant incorporation of

the test material into the soil matrix with 5.66-9.70% of IMD recovered in the leachate fractions. Therefore, bispyribac sodium following aerobic aging is not expected to leach to any significant degree in soils.

Field Dissipation

Soils:

The application of bispyribac sodium to turf at two sites at 107-148 g ac/ha over a period of 42 days resulted in its limited penetration to soils through the thatch. Under field conditions, residues of bispyribac sodium that reached the surface soil were rapidly dissipated. MeBA residues were detected in the 7.5 to 15 cm horizon. At all sampling intervals, analysis of the soil profile to 30 cm demonstrated no movement of bispyribac sodium or its degradates below 15 cm. The first order exponential decay analysis and log-linear first order regression analysis of the bispyribac sodium data produced half-life estimates of 8.9-10.8 days from 1 of 2 sites (not sufficient data to calculate the other). The half-life estimates for MeBA were not calculated. Based on the limited penetration, rapid rate of dissipation, and the lack of movement of bispyribac sodium and degradate residues below the upper 15 cm of soil, the leaching potential of bispyribac sodium and degradates was very low for the proposed use rate.

Water:

Bispyribac sodium was applied to two rice paddy soils at 60 g ac/ha followed by flooding. At one site bispyribac sodium levels were detected in the 10-20 cm layer beginning on day 5 and dissipated below the LOQ of 0.001 ppm by day 56. The dissipation half-life of bispyribac sodium in the 0-10 cm layer was determined to be 60 days for the 182 days duration but was 11 days for the first 42 days. DesMe-2023 residues were found in the 0-10 cm soil layer on days 1, 3, 5 and 28. No residues of DesMe-2023 were found in the 0-10 cm layer on any sampling date after day 28. No other residues were found on any sampling day in any soil layer for the duration of the study.

At the other site residues in the 0-10 cm layer increased through day 1 (0.031 ppm), then dissipated to 0.0022 ppm by day 28. Residues were <0.001 (LOQ) at all layers on day 56 and thereafter. DesMe-2023 residues were found in the 0-10 cm soil layer in samples collected following application on days 3, 5 and 7. No DesMe-2023 residues were found in the 0-10 cm soil layer after day 120. No residues were found in any soil layer below the 0-10 cm depth on any sampling day for the duration of the study. The dissipation half-life for bispyribac sodium in soil (11 days) was found to be consistent with that of the other site.

At one site the bispyribac sodium residue concentrations in water showed a decline by day 22 with a residue level below the LOQ of <0.001 ppm. The dissipation half-life of bispyribac sodium in water was determined to be 7 days. No DesMe-2023 residues were found at or above the LOQ of 0.001 ppm in any water sample taken on any sampling day for the duration of the study. Me2BA residues in water samples dissipated to below the LOQ of 0.001 ppm by day 15 after the application.

At the other site the bispyribac sodium residues were too low to allow dissipation half-life of bispyribac sodium to be determined in water. DesMe-2023 residues were found in water samples at 0.0012 ppm 8 days after application. No residues were found at or above the LOQ of 0.001 ppm following 8 days after

application for the duration of the study. No residues of Me2BA were found at or above the LOQ for soil or water sample taken on any sampling day for the duration of the study.

No dissipation half-life was able to be determined in soil or water for either of the metabolites. The data indicate that significant leaching of Me2BA and DesMe-2023 did not occur under the proposed use.

Metabolites

Metabolites exceeding 10% of the applied radioactivity were identified as DesMe-2023, Na-DesMe-180, Me2BA, MeBA and DesMe-180. From soil dissipation studies, it can be concluded that none of these metabolites appeared to be of environmental significance from the proposed turf use. No residues detected below the 0-10 cm soil layer at any time of the field dissipation studies were above the LOQ or LOD (metabolites). Based on these results, ecotoxicity data for the major metabolites were not considered necessary for the proposed use on bentgrass greens.

Accumulation/Bioaccumulation

No studies were submitted. Bispyribac sodium has a log K_{ow} of -1.03 and thus it is unlikely to bioaccumulate in the aquatic organisms.

As bispyribac sodium has a field dissipation half-life of 8.9-10.9 days, residue accumulation in soil is unlikely to occur. Furthermore, metabolites were below the limit of detection in the field dissipation study.

7.2 ENVIRONMENTAL EFFECTS

Avian

Bispyribac sodium is practically non-toxic to birds, based on 5-day dietary testing in bobwhite quail and mallard ducks (LC_{50} >5620 ppm) and 14-day acute oral testing in bobwhite quail (LD50 >2250 mg/kg). The dietary administration of bispyribac sodium on reproduction of the bobwhite quail and Mallard duck over 20 weeks produced no significant effects on the reproductive capacity of birds at dose levels up to 1000 ppm.

Aquatic organisms

Acute toxicity studies on rainbow trout, bluegill sunfish and sheepshead minnow indicate that bispyribac sodium is practically non-toxic to fish (96 h LC50 >100 mg ac/L).

Acute toxicity studies on *Daphnia magna* (48 h EC50 >100 mg/L), mysid shrimp and eastern oyster (96 h LC/EC50 >100 mg ac/L) and a chronic study on *Daphnia magna* (NOEC = 110 mg/L) indicate that bispyribac sodium is practically non-toxic or very slightly toxic to aquatic invertebrates.

Toxicity tests with bispyribac sodium using green algae gave a 96 h EC50 = 0.28 mg ac/L and 24-48 h ErC50 = 2.2 mg ac/L, and a 120 h EC50 >1.0 mg ac/L for blue-green algae, freshwater and marine diatoms, showing this herbicide exhibits moderate to high toxicity to green alga based on ErC50 and EC50 values and at worst moderately toxic to blue green alga and diatoms. For duckweed the toxicity levels of bispyribac

sodium were determined to be 14 days EbC50 = 0.012 mg ac/L, indicative of a very highly toxic effect to these species.

Non-target Invertebrates (Terrestrial)

Bees

The contact 48 h LD50 in the honey bee was determined to be >25 µg ac /bee, the highest concentration tested in the study. The results indicate that honey bees were not acutely sensitive to contact applications of bispyribac sodium.

Earthworms

A study performed on the effects of bispyribac sodium on earthworms indicate that bispyribac sodium is very slightly toxic to earthworms at concentrations of 1000 mg/kg. The 14 days LC50 was determined to be >1000 mg ac/kg.

Phytotoxicity

Two studies on 10 species of non-target plants were tested using a single pre-emergent and post-emergent application of bispyribac sodium. Each species was subjected to application rates of up to 59.36 g ac/ha and the test duration was 21 days after application. The number of emerged seedlings was observed and the plant height and total shoot weight were determined at test termination. For the pre-emergence study radish was the most sensitive of the ten plant species tested with an EC50 = 3.58 g/ha based on the plant dry weight endpoint and an NOEC = 0.73 g ac/ha based on the phytotoxicity endpoint.

For the post-emergence study the results indicate that only oat and ryegrass had EC50 values above the highest rate tested. Plant height, seedling survival and plant dry weight were the most sensitive end-points. The most sensitive plant was determined to be radish based on plant height with an EC50 =1.57 g ac/ha and an NOEC = 0.73 g ac/ha. These results indicate bispyribac sodium is likely to exhibit phytotoxicity towards a large range of non-target plant species, particularly from post-emergent exposure. Therefore, for the risk assessment of the terrestrial non-target vegetation, the NOEC = 0.73 g ac/ha was used as the phytotoxic endpoint.

7.3 PREDICTION OF ENVIRONMENTAL RISK

Birds

Exposure at the time of application could occur by birds eating contaminated insects or by direct contact with the spray or indirect contact with treated turf. Estimated concentrations resulting in birds' diets exclusively based on such exposure ranged between 3.88-10.48 mg bispyribac sodium/kg feed. These worst case concentrations are well below the 5-day dietary LC50 values for the two tested bird species. Consequently, the proposed use is not likely to present an acute or dietary risk to birds.

Aquatic organisms

Contamination of a shallow (15 cm deep), static waterbody with a direct overspray at the application rate of 100 g ac/ha is calculated to give a notional concentration in the water of 66 µg ac/L. Based on the relevant ecotoxicity endpoints, acute risks from a direct overspray to sensitive aquatic species tested were unacceptable. With a 10% spray drift, the acute risk of bispyribac sodium to duckweed is considered unacceptable. A further refinement of risk to duckweed from spray drift of bispyribac sodium is possible from use of the AgDRIFT model for ground application taking into account two applications per year for turf use. This shows that a downwind buffer distance of 5 m is considered necessary based on the likely extent of spray drift for acceptable aquatic risk.

The run-off of bispyribac sodium has been modelled using DSEWPaC's recently developed model taking into account dissipation and binding to soils/sediments. This modelling indicates that the risk to aquatic ecosystems from the run-off of bispyribac sodium is acceptable taking into consideration the abiotic and biotic degradations of bispyribac sodium in thatch. Risk to groundwater from leaching is not anticipated from the proposed use pattern.

Non-target invertebrates

Given that bispyribac sodium is considered to be very slightly or practically non-toxic to bees and earthworms and the limited exposure of the proposed product in bentgrass greens to other non-target arthropods, there is unlikely to be an unacceptable risk to terrestrial invertebrates under the proposed use pattern.

Micro-organisms

Laboratory studies show that the use of bispyribac sodium does not constitute a risk to soil micro-organisms up to the application rate of 150 g ac/ha which is higher than the amended application rate for two applications of 134 g ac/ha.

Non-target vegetation

Based on the toxic effects of the most sensitive plant observed, a risk assessment can be performed on non-target vegetation using the AgDRIFT model for terrestrial assessment. Based on the estimated application rate of 134 g ac/ha after two consecutive applications, an acceptable risk to non-target vegetation at a downwind buffer distance of 15 metres is estimated.

7.4 CONCLUSION

DSEWPaC has considered submitted data with particular attention given to the potential risk to the aquatic organisms and terrestrial plants from spray drift and run-off from the proposed use on bentgrass greens. The risk assessment determined that the chemical is unlikely to pose an environmental risk under the proposed use pattern provided recommended no-spray zones are followed.

In order to be satisfied that the proposed use of NOMINEE® HERBICIDE will not lead to an unintended effect that is harmful to animals, plants or things or to the environment at the proposed rate and following good agricultural practice, DSEWPaC recommends that the following statement under **PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT** on the draft label:

"Very toxic to aquatic life. Do not contaminate dams, waterways or drains with the chemical or used containers."

Acceptance of buffer recommendations and the DSEWPaC's proposed label statements allows DSEWPaC to recommend that the APVMA be satisfied that the proposed use of NOMINEE® HERBICIDE would not be likely to have an unintended effect that is harmful to animals, plants, or things or to the environment.

8 EFFICACY AND SAFETY ASSESSMENT

8.1 Proposed use pattern

NOMINEE® HERBICIDE is intended for the control of Winter Grass (*Poa annua*) in Creeping Bentgrass (*Agrostis stolonifera*) greens on golf courses in the Southern, temperate climate zones of Australia, at application rates f 10 mL / 100 square metres. For best results, two consecutive applications 14 to 21 days apart are intended. Application should be applied between the months of September and February. The product should not be applied more than twice per year.

8.2 Summary of Evaluation of Efficacy and Crop safety

The evaluation program submitted by the applicant, Sumitomo Chemical Australia Pty Ltd, comprised descriptions and summaries from 15 trials conducted by contractors. Three of these trials evaluated the efficacy only of NOMINEE® HERBICIDE, four focussed on the safety only of the herbicide and eight examined both efficacy and safety parameters. The experiments comprised both small-plot trials on golf greens (12 trials, conducted in NSW 5, Vic 2, SA 1 and WA 4) and glasshouse trials (3). These replicated trials were conducted and reported according to an appropriately high standard of scientific investigation, including the use of statistical designs and analyses that were sufficiently robust to determine meaningful treatment effects.

Assessment of study/trial data

The information available and the results from each set of trials were adequately and accurately presented and summarised by the applicant. The efficacy of NOMINEE® HERBICIDE was consistent across the entire experimental program. At the application rate recommended (10 mL/100 m2 = 1.0 g ai/100 m2), this herbicide provided adequate control (>60% reduction) of winter grass within six weeks after either a single application or the first of consecutive applications (as recommended on the draft label) at this rate. In addition to reducing the presence of winter grass, NOMINEE® HERBICIDE suppressed the production of further seed heads from surviving winter grass plants. Overall, the control of winter grass achieved by NOMINEE® HERBICIDE was considerably better than that achieved by the only other product available commercially, which frequently achieved only poor or fair control (20-50%). An acceptable level of transient yellowing of bentgrass was observed following the application of NOMINEE® HERBICIDE at the recommended rates.

8.3 CONCLUSION

The efficacy of the product and its safety to target and non-target species, the application by Sumitomo Chemical Australia Pty Ltd for the registration of NOMINEE® HERBICIDE is **supported**.

9 LABELLING REQUIREMENTS

KEEP OUT OF REACH OF CHILDREN

NOMINEE®

HERBICIDE

ACTIVE CONSTITUENT: 100g/L Bispyribac Sodium

GROUP	B	HERBICIDE

For the control and the suppression of seed heads of *Poa annua* in Creeping Bentgrass greens

IMPORTANT: READ THE DIRECTIONS FOR USE BEFORE USING THIS PRODUCT

CONTENTS 500 mL, 1 L, 5 L

APVMA Approval No. 63233/45088

SUMITOMO CHEMICAL

SUMITOMO CHEMICAL AUSTRALIA PTY LTD
242 Beecroft Road
EPPING NSW 2121
Tel: 02 8752 9000
A B N: 21 081 096 255

DIRECTIONS FOR USE:

RESTRAINTS: DO NOT apply in autumn or winter
DO NOT apply to plants that are stressed by moisture or temperature extremes.
DO NOT apply if rain is expected within twelve hours of application.
DO NOT irrigate for 24 hours after application
DO NOT mow for 24 hours after application
DO NOT apply more than twice per year.
DO NOT sow Creeping Bentgrass for at least 42 days after application of NOMINEE.
DO NOT apply NOMINEE for at least 42 days after seeding of Creeping Bentgrass.

SPRAY DRIFT RESTRAINTS

DO NOT apply with spray droplets smaller than a **MEDIUM** spray droplet size category according to *"APVMA Compliance Instructions for Mandatory COARSE or Larger Droplet Size Categories"* located under this title in the GENERAL INSTRUCTIONS section of this label.

DO NOT apply when wind speed is less than 3 or more than 20 kilometres per hour as measured at the application site.

DO NOT apply during surface temperature inversion conditions at the application site.

Users of this product **MUST make an accurate written record** of the details of each spray application within 24 hours following application and **KEEP** this record for a minimum of 2 years. The spray application details that must be recorded are: **1** date with start and finish times of application; **2** location address and paddock/s sprayed; **3** full name of this product; **4** amount of product used per hectare and number of hectares applied to; **5** crop/situation and weed/pest; **6** wind speed and direction during application; **7** air temperature and relative humidity during application; **8** nozzle brand, type, spray angle, nozzle capacity and spray system pressure measured during application; **9** name and address of person applying this product. (Additional record details may be required by the state or territory where this product is used.)

MANDATORY NO-SPRAY ZONES

DO NOT apply if there are aquatic and wetland areas including aquacultural ponds or surface streams and rivers downwind from the application area and within the **mandatory no-spray zones** shown in the table below.

FOR GROUND APPLICATION (medium droplet size)	
Windspeed Range at Time of Application	**Downwind Mandatory No-Spray Zone**
3 to 20 kilometres per hour	5 metres

DO NOT apply if there are sensitive crops, gardens, landscaping vegetation, protected native vegetation or protected animal habitat within the **mandatory no-spray zones** shown in the table below

FOR GROUND APPLICATION (medium droplet size)	
Windspeed Range at Time of Application	**Downwind Mandatory No-Spray Zone**
3 to 20 kilometres per hour	15 metres

SITUATION	WEEDS CONTROLLED	RATE (mL/100 square meters)	CRITICAL COMMENTS
Golf course greens planted with Bentgrass (*Agrostis stolonifera*)	*Poa annua* (winter grass)	10	For best results, two consecutive applications should be applied 14 to 21 days apart. NOMINEE is slow acting. The *Poa* will take several weeks before dying. This allows the Bentgrass to grow into the space vacated by the dying *Poa*. NOMINEE also provides useful seedhead suppression of *Poa* plants that survive the applications. **CAUTION**: Two applications of NOMINEE can result in transient yellowing of the Bentgrass. Symptoms appear about two weeks after application, but the Bentgrass will fully recover approximately 4 to 6 weeks after the second application. NOMINEE can inhibit germination and growth of young Bentgrass seedlings.

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

DO NOT GRAZE TREATED TURF/LAWN; OR FEED TURF/LAWN CLIPPINGS FROM ANY TREATED AREA TO POULTRY OR LIVESTOCK.

10 GENERAL INSTRUCTIONS

General information

NOMINEE® HERBICIDE is a selective post-emergence herbicide that, when used in accordance with the label, will selectively control winter grass (*Poa annua*) that is growing within established Bentgrass turf. NOMINEE will also suppress seed head production by winter grass. NOMINEE displays excellent activity against emerged weeds, but has almost no pre-emergent activity and will therefore not control weeds that germinate after application.

Plant uptake and performance of NOMINEE is influenced by environmental conditions, cultural practices and spray coverage. For best results, apply NOMINEE only when turf and weeds are actively growing. Irrigation is not required to activate NOMINEE. Turfgrass should not be mowed or irrigated for 24 hours after application in order to allow time for the active ingredient to be absorbed and translocate within foliage.

NOMINEE has not been evaluated under all microclimates or against all biotypes of winter grass. Therefore performance may be less effective in some locations, and against some biotypes of this weed species.

Tolerance of creeping bentgrass to NOMINEE

NOMINEE is a very active herbicide, and users should use exercise good judgment and caution until familiarity is obtained with the product. Due to natural variability, growth stages and environmental conditions, potential users are encouraged to evaluate this product under typical growing conditions in a small area, and evaluate treated turf for 28 days for phytotoxicity, before widespread application.

When applied in accordance with the label, NOMINEE has not caused commercially unacceptable injury to creeping bentgrass. However, treated turf may exhibit temporary chlorosis (yellowing) and mild growth regulation. These symptoms take longer to appear under cool and cloudy conditions, but are more persistent because the turfgrass is growing less vigorously.

NOMINEE may injure creeping bentgrass that is not well established. Observe the waiting periods recommended by this label.

RESISTANT WEEDS WARNING

GROUP	B	HERBICIDE

NOMINEE® HERBICIDE is a member of the B group of herbicides. NOMINEE® HERBICIDE has the inhibition of aceto-lactase synthase (ALS) mode of action. For weed resistance management, NOMINEE® HERBICIDE is a Group B Herbicide. Some naturally-occurring weed biotypes resistant to NOMINEE® HERBICIDE and other Group B Herbicides may exist through normal genetic variability in any weed population. The resistant individuals can eventually dominate the weed population if these herbicides are used repeatedly. These resistant weeds will not be controlled by NOMINEE® HERBICIDE or other Group B Herbicides.

Since the occurrence of resistant weeds is difficult to detect prior to use, Sumitomo Chemical Australia Pty Ltd accepts no liability for any losses that may result from the failure of NOMINEE® HERBICIDE to control resistant weeds.

CLEANING SPRAY EQUIPMENT

Before using NOMINEE

Ensure that the recommended clean-out procedure for the previous product (particularly sulfonylurea herbicides) sprayed with the equipment was done properly.

After using NOMINEE

Empty the tank and drain the whole system.

Thoroughly wash inside the tank using a pressure hose, drain the tank and clean all filters in the tank, pump line and nozzles.

Use of a household detergent will aid in cleaning the equipment. Add detergent to the part-filled spray tank and thoroughly circulate through pumps, hoses and nozzles. Drain the system and thoroughly rinse twice with clean water.

Rinse water should be discharged onto a designated disposal area, or if this is unavailable, onto unused land away from desirable plants and water sources.

MIXING
To ensure even mixing, half-fill the spray tank with clean water and add the required amount of product. Add the remainder of the water under agitation.

APPLICATION:
NOMINEE® HERBICIDE should be applied with calibrated spray equipment producing a median droplet range of 200 to 300 microns VMD. Apply in a minimum of 250 litres of water per hectare..

COMPATIBILITY:
NOMINEE does not require an adjuvant. Tank mixing NOMINEE with a surfactant or crop oil causes unacceptable chlorosis in tolerant turf grass.
For information on compatibility of products not listed, please refer to Sumitomo Chemical Australia Pty Ltd.

PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT
Very toxic to aquatic life. DO NOT contaminate dams, waterways or drains with the chemical or used containers.

STORAGE AND DISPOSAL:
Store in the closed, original container in a dry, cool, well-ventilated area out of direct sunlight. Protect from frost.
Triple or preferably pressure rinse containers before disposal. Add rinsings to spray tank. DO NOT dispose of undiluted chemicals on site. If recycling, replace cap and return clean containers to recycler or designated collection point.
If not recycling, break, crush, or puncture and deliver empty packaging for appropriate disposal to an approved waste management facility. . If an approved waste management facility is not available bury the empty packaging 500 mm 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.

FIRST AID:
If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia Tel. 131126; New Zealand 0800 764 766.

MATERIAL SAFETY DATA SHEET:
Additional information is listed in the Material Safety Data Sheet (MSDS) obtained from Sumitomo Chemical.

EXCLUSION OF LIABILITY
Unless otherwise expressly stated in writing neither Sumitomo Chemical Australia Pty Ltd nor the distributor has any knowledge of the particular use to which the buyer proposes to put this product. In purchasing this product the buyer must rely solely upon their own skill and judgement as to its suitability for the particular purpose for which it is required. Except to the extent that exclusion or denial of liability is prohibited under the Trade Practices Act or any relevant state legislation, Sumitomo Chemical Australia Pty Ltd and the distributor expressly exclude any warranty as to the quality or fitness of any goods sold for any purpose whatsoever and deny all responsibility in contract tort negligence or otherwise for any harm or damage resulting from the use of such goods or from acting on the advice or recommendations as to such use given in good faith by any representative of Sumitomo Chemical Australia Pty Ltd or the distributor. If these conditions are unacceptable to the buyer, the goods should be returned to Sumitomo Chemical Australia Pty Ltd unopened within seven (7) days for refund of purchase price.

In a Transport Emergency Dial **000** Police or Fire Brigade	SPECIALIST ADVICE IN EMERGENCY ONLY **1800 024 973** ALL HOURS - AUSTRALIA WIDE

Batch No

Date of Manufacture

® NOMINEE is the registered trademark of Kumiai Chemical Industry Co. Ltd., Japan
[1] Registered Trademark of Sumitomo Chemical Co Japan
* Registered Trademark

ABBREVIATIONS

ac	active constituent
ADI	Acceptable Daily Intake (for humans)
ai	active ingredient
bw	bodyweight
CCI	Commercial Confidential Information
d	day
DAT	Days After Treatment
DT_{50}	Time taken for 50% of the concentration to dissipate
E_bC_{50}	concentration at which the biomass of 50% of the test population is impacted
EC_{50}	concentration at which 50% of the test population are immobilised
E_rC_{50}	concentration at which the rate of growth of 50% of the test population is impacted
g	gram
h	hour
ha	hectare
HPLC	High Pressure Liquid Chromatography *or* High Performance Liquid Chromatography
in vitro	outside the living body and in an artificial environment
in vivo	inside the living body of a plant or animal
kg	kilogram
K_{oc}	Organic carbon partitioning 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
LOD	Limit of Detection – level at which residues can be detected
LOQ	Limit of Quantitation – level at which residues can be quantified
mg	milligram

mL	millilitre
MSDS	Material Safety Data Sheet
NOEC/NOEL	No Observable Effect Concentration / Level
PPE	Personal Protective Equipment
ppm	parts per million
RBC	Red Blood Cell Count
s	second
SC	Suspension Concentrate
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
µg	microgram

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
Desorption	Removal of an absorbed material from a surface
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
Hydrophobic	Water repelling
Leaching	Removal of a compound by use of a solvent
Log Pow	Log to base 10 of octonol water partitioning co-efficient
Metabolism	The conversion of food into energy
Photodegradation	Breakdown of chemicals due to the action of light
Photolysis	Breakdown of chemicals due to the action of light
Subcutaneous	Under the skin
Toxicokinetics	The study of the movement of toxins through the body
Toxicology	The study of the nature and effects of poisons

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