Environmental Protection Authority
Te Mana Rauhī Taiao

DECISION

Application for the Reassessment of a Group of Hazardous Substances

under Section 63 of the Hazardous Substances and New Organisms Act 1996

26 June 2013

APP201051: Antifouling paints containing any of the following:
3(2H)-Isothiazolone, 4,5-dichloro-2-octyl- (DCOIT), chlorothalonil, copper (I) oxide, copper pyrithione, copper thiocyanate, dichlofluanid, diuron, irgarol 1051, mancozeb, octhilinone, thiram, tolyfluanid, zinc pyrithione, zineb, ziram.

Chair's introduction

Antifouling paints are used worldwide on submerged surfaces, especially seagoing vessels of all sizes and types and are an integral part of maintenance activities when vessels are taken out of the water. The reason they are used is to stop the growth of all forms of aquatic life on below water surfaces of vessels that reduce performance and fuel efficiency. Their importance to biosecurity has grown with the knowledge that unwanted organisms have been introduced and spread by fouled vessels.

To serve their purpose antifouling paints have to be toxic enough to kill all kinds of microorganisms, plants and animals and stop them attaching to surfaces and structures. There are different paint technologies available to be used for specific conditions like vessel speed and water temperature but all are essentially slow release toxic coatings that last for around 2 to 3 years before having to be reapplied.

New Zealand has an extensive coastline and many people own boats for business, recreation and sport. All the time that antifouled vessels are in the water, toxic substances are released into the environment. Where numbers of boats are moored together, in marinas and harbours, these toxic substances can reach concentrations that cause adverse effects to people and the environment.

The EPA (previously ERMA) resolved to reassess antifouling paints based on new information on environmental and health effects that had led to some substances in paints being banned from use in the USA, Europe and Australia. There were also concerns raised by Māori over a number of years, who wanted confidence that the risks from toxic substances used in antifouling paints could be mitigated.

The reassessment process is now complete and this document provides the decision of the Committee that considered the application for reassessment. Antifouling paints containing irgarol or chlorothalonil will no longer be able to be manufactured or imported as the approvals to do so have been declined. Paints containing diuron, octhilinone or ziram have a time-limited approval of 4 years and thiram 10 years. All other substances assessed continue to be approved but their future use is subject to additional controls on the application and removal of these paints to better manage and mitigate risks to people and the environment. It is important to note that the approved substances in antifouling paints all contain copper and co-biocides and are toxic, they have to be or they would not serve their purpose. Antifouling paints are not safe for anyone to apply or remove without wearing personal protective equipment and removed paint debris must be collected and disposed of in an appropriate way. Accordingly these controls equally apply to all DIY and professional users.

This document provides the information used in the decision-making process for this antifouling paints reassessment. The Committee notes that research on new antifouling paint technologies is on-going around the world and considers that an effective replacement for copper is highly desirable.

Overview of the reassessment process

Grounds Application – Grounds approved 23/9/11

Grounds must be established in order for an application for a reassessment to be lodged. An application for grounds is lodged with the EPA and is heard by an independent decision-making committee established under HSNO.

Reassessment Application – Notified for public consultation 23/1/13 – 7/3/13

Once grounds have been established, an application for a reassessment is received and notified for public consultation.

Evaluation and Review Report – Circulated 3/5/13

After receipt of submissions on the Application, EPA Staff prepare an evaluation and review report taking into account information that has been submitted. This will be considered by the decision-making committee.

Public Hearing – 21/5/13–22/5/13

Once the staff have evaluated the submissions a public hearing is held, where submitters can speak to the decision-making committee.

Decision

After consideration of the application, the decision-making committee will issue its final decision.

This is the decision document.

Table of Contents

1. Summary of decision

Application code	APP201051	
Application type	To reassess a group of hazardous substances under section 63 of the Hazardous Substances and New Organisms Act 1996 ("the Act")	
Applicant	The Chief Executive of the EPA	
Purpose of the application	To reassess the group of antifouling paints.	
Date application received	18 January 2013	
Submission period	23 January 2013 – 7 March 2013	
Submissions received	31 submissions were received.	
Hearing dates and location	21 – 22 May 2013, Crowne Plaza Hotel, Auckland	
Considered by	A decision- making committee of the Environmental Protection Authority (EPA): Dr Val Orchard (Chair) Dr Kerry Laing Dr Shaun Ogilvie Ms Gillian Wratt	
Decision	Approved with controls	See Table 7
	Approved with controls for a limited time	See Table 8
	Declined	See Table 9

1.1. The reassessment application relates to antifouling paint formulations approved under HSNO. In total, 60 approvals for paint formulations manufactured in New Zealand or imported are included in the reassessment. The substances being considered contain at least one of the following active ingredients.

- 3(2H)-Isothiazolone, 4,5-dichloro-2-octyl- (DCOIT)
- Chlorothalonil
- Copper (I) oxide
- Copper pyrithione
- Copper thiocyanate
- Dichlofluanid
- Diuron
- Irgarol 1051
- Mancozeb
- Octhilinone
- Thiram

- Tolyfluanid
- Zinc pyrithione
- Zineb
- Ziram

1.2. Antifouling paints containing irgarol or chlorothalonil will no longer be able to be manufactured or imported as the approvals to do so have been declined. Antifouling paints containing diuron, octhilinone or ziram have a time-limited approval of four years and thiram ten years. All other substances assessed continue to be approved but are subject to additional controls. The full list of the approvals covered by this reassessment and the Committee's decision on each of them is set out in Tables 7, 8 and 9.

1.3. The Committee considers that as well as the default controls already in place on these approvals based on their hazard classification, five additional controls should be applied to all antifouling paints. These are:

- A variation to the personal protective equipment control which clarifies that the requirement applies to all people who handle the substance
- A requirement to have a controlled work area when applying antifouling paints, including signage warning of the risks
- A requirement to collect and dispose of waste containing antifouling paint when it is removed from a vessel
- A requirement to include the additional controls on the label
- A variation to the requirement for a safety data sheet which standardizes the information in line with current best practice.

2. Background

Antifouling paints

2.1. Antifouling paints are slow-release, surface-acting pesticides applied to prevent biofouling on submerged surfaces such as the hulls of vessels, nets and wharves. They play a key role in biosecurity, and also help to increase vessel fuel efficiency which has practical cost benefits as well as reducing harmful greenhouse gas emissions.

2.2. Early antifouling techniques involved spreading lime or other pesticidal compounds on ships' hulls. During the 1960s antifouling paints began to make use of metallic compounds in order to become more effective and reduce cost. One of these compounds, tributyltin (TBT), proved very effective and became so popular that by the 1970s, most seagoing vessels were using it. It soon became apparent that TBT was causing a range of adverse environmental effects, and a resolution to prohibit antifouling paints containing TBT was adopted by the International Maritime Organisation in 1999 (to be implemented between 2003 and 2008). This action highlights the importance of substance reassessment and the balance that has to be struck between antifouling paint efficiency and toxic effects on the wider environment, harbours and marinas.

2.3. In order to replace the very effective TBT, manufacturers began to use copper in the form of copper (I) oxide or for aluminium hulls copper thiocyanate. Unfortunately copper alone did not provide sufficient efficacy to maintain the same lengths of service life that commercial vessel owners had become used to with TBT-based paints.

2.4. At this point, co-biocides were introduced into antifouling paint formulations to compliment copper, in order to inhibit the growth of microorganisms and prevent slime development (one of the first signs of fouling). As concerns rose around growing copper concentrations in some environments, there was a push to reduce both the amount of copper and its leaching rate and the importance of co-biocides became even clearer.

2.5. All antifouling paints are toxic and ecotoxic. Almost all the substances being reassessed are skin sensitisers and/or eye irritants or corrosives. By their very nature, antifouling paints are highly toxic to the aquatic environment.

Antifouling paints in New Zealand

2.6. In New Zealand, many antifouling paints were transferred from former chemical management regimes to management under the HSNO Act in 2004. Since that time, five active ingredients used in antifouling paints have been included on the EPA's Chief Executive Initiated Reassessment (CEIR) List. This list comprises hazardous substances where information that the EPA is aware of suggests there may be a need to review their approvals.

2.7. Under Part 5 of the HSNO Act there have also been other antifouling paints approved since the transfer.

Group reassessment approach

2.8. The EPA determined that it would be more efficient and effective to reassess a larger group of antifouling paints than individually.

2.9. The rationale for the group reassessment approach was:

- Dealing with substances which have similar effects in a single group reassessment will ensure that any risks that may arise from the substitution of one antifouling paint substance for another are properly understood and managed.
- Substance-by-substance reassessments of antifouling paints may lead to a gradual decrease in the available products. Reassessing these substances as a group will result in greater certainty for industry and government agencies about the tools available to them in future. Certainty about future availability should help to direct research and development in alternative long-term solutions for biofouling.
- An integrated approach will ensure consistent and effective controls to manage risks are put in place across the group of substances.
- The approach is a more efficient use of industry and EPA resources by reducing the number of reassessments being undertaken.
- Reassessing the group of antifouling paints will allow the EPA to meet the needs of industry and ensure that there are tools for responding to biosecurity events while protecting the health and safety of people and the environment.

3. The reassessment of antifouling paints

Grounds

3.1. On 8 August 2011 the Chief Executive of the EPA submitted an application to establish whether there are grounds for reassessment of antifouling paints (ERMA200111).

3.2. On 23 September 2011 a decision-making Committee of the EPA considered the grounds application in accordance with section 62(2) of the HSNO Act, and decided that there were grounds for reassessment. The decision was made on the basis of the following points:

- There is new information available about the effects of these substances which has led overseas regulators to restrict the use of many antifouling paints based on the effects of these substances on the environment and on human health.
- There are significant concerns held by Māori around the adverse effects that antifouling paints might be having on the mauri of aquatic ecosystems.
- Ngā Kaihautū Tikanga Taiao requested the then ERMA make the reassessment of antifouling paints a priority.

The application

3.3. An application for the reassessment of antifouling paints was prepared by EPA staff on behalf of the Chief Executive under section 63 of the Act.

3.4. Prior to the application being made, EPA staff sought information from a wide range of industry sectors and user sources in a “Call for Information” document. To help increase engagement, this process was advertised to users via a single page information sheet that was delivered to marinas. Information from that call for information was then incorporated into a preliminary risk assessment which was circulated and which invited comment on the methodology, data sources, data gaps and assumptions that were used.

3.5. As well as the call for information, the EPA distributed information nationally over a 24 month period and held a series of hui in regions where antifouling paint use is high (Northland, Auckland, Central North Island, Tauranga and Blenheim) prior to the application being publicly notified. In addition, a presentation on the reassessment was made at the EPA’s 2012 Māori Environmental Management Hui, which had significant Māori attendance from across the country.

3.6. EPA staff also engaged with the paint and marine industry, commercial and recreational boat users, regional councils and government Ministries and Departments. Communication methods varied from phone and email contact to workshops, presentations at national and international conferences and visits to marinas and paint applicators.

3.7. During these rounds of stakeholder engagement and data gathering, feedback was also sought on the practicality, economic viability and sustainability of proposed additional controls, and on the benefits associated with use of antifouling paints.

3.8. EPA staff obtained toxicological and ecotoxicological data specific to the substances under review from international regulatory bodies.

3.9. Throughout the process, the EPA also obtained reviews of specific aspects of the evaluation from external specialists:

- The data used in the risk modelling were reviewed by toxicology consultant Lynne Clapham and ecotoxicology consultant Dr Robin Toy
- Economic cost/benefit information was researched and analysed by Covec Limited
- Controls have been reviewed in consultation with members of the New Zealand antifouling paint industry, applicators, marina operators and members of the boating community
- A report was prepared by the EPA's statutory Māori advisory committee Ngā Kaihautū Tikanga Taiao.

Legislative basis for the application

3.10. The application for the reassessment of antifouling paints was lodged pursuant to section 63 of the Act and, as required under that section, deemed to be an application made under section 29 of the Act. Section 29 requires the decision-making Committee to consider positive and adverse effects of the substance and to make a decision based on whether or not the positive effects of the substance outweigh the adverse effects of the substance.

3.11. Consideration of the application followed the relevant sections of the HSNO Act (the Act) and the decision-making HSNO (Methodology) Order (the Methodology) established under section 9 of the Act.

Appointment of Committee

3.12. The following members of the HSNO Committee were appointed to consider the application in accordance with a delegation under section 19(2)(b): Dr Val Orchard, Dr Shaun Ogilvie, Dr Kerry Laing, along with a member of the EPA Board, Ms Gillian Wratt.

Timeline

3.13. The timeline for the application was as follows:

Table 1: Application milestones

Action	Date
Application formally received	18 January 2013

Application publicly notified	23 January 2013
Public submissions closed	7 March 2013
Evaluation and Review Report circulated	3 May 2013
Hearing held	21 - 22 May 2013

Time limits and waivers

3.14. Under section 59(5), the Committee waived the following statutory time limits:

- Section 59(1)(d) fix a date for commencement of the hearing not more than 30 working days after the closing date of submissions.
- Section 58(2) any information received by the Committee should be made available to all submitters at least 10 working days before the hearing.

3.15. Before waiving these time periods the Committee satisfied itself that:

- The applicant and the persons making submissions consent to that waiver; or
- Any of those parties who have not so consented will not be unduly prejudiced.

Ministerial call-in

3.16. The Minister for the Environment was advised of the application on 11 January 2013 in accordance with section 53(4)(a) of the Act and given the opportunity to ‘call-in’ the application under section 68. This action was not initiated.

Notification of the application

3.17. In accordance with section 53 of the Act, the application was publicly notified on the EPA website and advertised in the Christchurch Press, Dominion Post, New Zealand Herald, Otago Daily Times, Waikato Times, Northland Advocate, Bay of Plenty Times, and Southland Times on 23 January 2013.

3.18. The application summary was also sent to government agencies which were identified as having a specific interest in the application and interested parties who had indicated that they wished to be notified of this application.

Evaluation and Review (E&R) report

3.19. EPA staff prepared an E&R report to provide the decision-making Committee and submitters with a review of the submissions received in response to the public notification of the reassessment application. In preparing this report, EPA staff reviewed all the submissions and prepared responses to issues raised.

3.20. The E&R report was circulated on 3 May 2013.

Information available for the consideration

3.21. The decision-making Committee had available for its consideration the:

- Application
- Written submissions
- E&R report
- 'Economic analysis to support the reassessment of antifouling paints' prepared by Covec Ltd (the Covec report)
- Ngā Kaihautū Tikanga Taiao report
- Hazard Classification update report

Public consultation, hearings and site visits

3.22. In total, 31 public submissions were received, with nine submitters indicating that they wished to be heard in support of their submissions.

3.23. In accordance with section 60 and clause 2(b), a hearing was held on 21 and 22 May 2013 at the Crowne Plaza Hotel, Auckland.

3.24. In addition, the Committee went on site visits on 23 May 2013 to a commercial boat cleaning and spray painting operation, a recreational boat harbour and a large vessel dry-dock facility. The purpose of the site visits was to see these operations and to help provide practical context.

3.25. The hearing was formally closed on 27 May 2013.

Hearing

3.26. The Committee wishes to acknowledge and thank all the submitters for investing significant resources in making their submissions to us. These submissions have greatly assisted us in understanding the issues that arise in relation to the various recommendations we have considered. The Committee wishes to assure all submitters that all of the submissions received have been fully considered as part of this decision.

3.27. In this section the Committee would like to make note of several points that were raised during the hearing and in written submissions, which have been given particular consideration.

3.28. During the hearing, the Committee asked one manufacturer what the increase would be in the price of paints, if the staff recommendations were adopted. The manufacturer estimated that if diuron and thiram were no longer available, the likely alternatives would cost ten times as much. When those increases are incorporated into the cost of a tin of paint the manufacturer estimated a four to five per cent increase in price. We accept these values are likely representative of the price increases that consumers will face when diuron and thiram become unavailable. We do not consider these cost increases to be significant in light of the overall cost of maintaining a boat.

Scope of this reassessment

3.29. The scope of this reassessment is defined and constrained by two factors; the grounds that were established for reassessing antifouling paints and the HSNO Act. This reassessment is for all

HSNO approvals to import or manufacture antifouling paint formulations. Therefore, requests made for the EPA to require all boats to be antifouled are outside the scope of this reassessment.

3.30. As the approvals being considered are for the import or manufacture of antifouling paints, the decisions made in this reassessment will not affect vessels entering New Zealand waters. The exception to this being vessels carrying any antifouling paint onboard must be approved under HSNO, and must comply with the controls described in Appendix E. All vessels are subject to international (IMO) requirements (e.g. no TBT antifouling paints) as well as the requirements of their home countries, a number of which have banned some of the antifouling paint active ingredients considered in this reassessment.

3.31. These approvals cover antifouling paints to be used on vessels and on any other submerged structures such as aquaculture structures, fishing equipment or wharves.

3.32. This reassessment is not concerned with the agricultural uses of substances containing these active ingredients. Submitters expressed concern about this, claiming that the boating industry was being unfairly targeted by this reassessment. This reassessment looks at the risks, costs and benefits of antifouling paints, which act by slow release of the active compounds directly into the marine environment. There are other mechanisms to control marine pollution from land based activities, and any EPA review of the active ingredient uses in agriculture would need to consider the risks, costs and benefits specific to those uses.

3.33. A key difference between antifouling paints and agricultural formulations (which may share active ingredients) is that controls can be applied to agricultural formulations used in the terrestrial environment which protect the aquatic environment from adverse effects. This option is not available for antifouling paints.

3.34. While we acknowledge that there may be significant contamination of marina environments from land-based sources, this reassessment is focussing on the specific role played by antifouling paints and the risks that they pose to human health and the environment.

3.35. Another component in an antifouling paint which can cause harm is the solvent used. The risk assessment did not include the risk of solvents but the Committee noted that the hazards of solvents will be incorporated into the classification of a substance, and will trigger appropriate default controls to mitigate health and environmental risks.

3.36. Concerns were raised about the effects of antifouling paints used in aquaculture on food safety. While not falling under the scope of the HSNO Act, the Committee noted that there are stringent monitoring and quality assurance requirements for commercially harvested seafood, administered by the Ministry for Primary Industries (MPI).

Risk assessment

3.37. The E&R report describes the EPA's reasoning for not accepting the leaching rate reduction factor of 2.9 as proposed by AkzoNobel. The Committee accepts the EPA reasoning, noting that even if the proposed factor was applied to the assessment the staff recommendations would remain the same.

3.38. During the hearing, comments (echoing those provided in submissions), were made around the lack of data on native species able to be used in the assessment. The Committee considers that while it is desirable to have data on native species, the assessment used reasonable surrogates for New Zealand species and there is no reason to suggest that the values used would not be representative of native flora and fauna.

3.39. A question was asked at the hearing about how the recommendation for DCOIT could change from decline in the application to approve with controls in the E&R report. The staff explained how the additional data provided by the manufacturer allowed for the revision of the predicted non effective concentration (PNEC) value and the effect that this revision had on the revised risk assessment.

3.40. One submitter questioned what the rationale was for the different recommendations for paints containing thiram, compared to copper when they had similar RQ values. The staff explained that although the levels of adverse environmental effects between the two active ingredients were similar, the benefits were different resulting in different recommendations.

3.41. In the application and the E&R report, it is acknowledged that there is very limited epidemiological evidence of adverse effects of antifouling paints on human health apart from anecdotal evidence. Given this, several submitters questioned why the reassessment was being conducted. During the hearing, the staff responded by emphasising that the reassessment was largely driven by adverse environmental effects.

3.42. The fact that the recommendation for a time limited approval for diuron was at odds with Australian regulations was highlighted during the hearing. A review by the Australian Pesticides and Veterinary Medicines Authority (APVMA) led to continued support for diuron-containing antifouling paints, while restricting many other uses of the substance. The EPA staff have reviewed the modelling on which the APVMA decision was based. The APVMA used the OECD European Union default marina and harbour scenarios, whereas the EPA used scenarios created using the specific characteristics of New Zealand marinas and harbours which are smaller and often have restricted tidal flushing. The APVMA note in their assessment that although they have predicted acceptable levels of risk 'it is apparent that poorly flushed marinas may contain sufficient diuron levels to pose a risk to algae and aquatic plants.' EPA use of NZ customised modelling explains the difference between jurisdictions for diuron.

3.43. Some submitters were concerned that any restriction on the availability of antifouling paints would adversely affect New Zealand's biosecurity system. The Committee were assured by MPI

that should the Committee accept the recommendations in the E&R Report there would be sufficient co-biocides available to ensure that biosecurity was not compromised.

Controls

3.44. An approved handler control was suggested by the staff in one of the early consultation documents as one possible way to help mitigate the adverse effects of antifouling paints and this was endorsed by a regional council in their submission. However the application did not recommend this control and this action was supported by submitters to the hearing who expressed concerns about whether an approved handler control would achieve the desired effect.

3.45. Given the nature of several comments during the hearing and submission process, the Committee would like to make it clear that this decision affects all users of antifouling paints, whether DIY or professionals, as the decision applies to the paints themselves. The staff risk assessment for human health modelled the two groups of users applying paint (professionals routinely exposed, who usually spray and who wear full PPE and DIY applicators who have only occasional exposure, apply with a brush and roller but who do not wear full PPE). The result indicates that all users should wear PPE whether they are regularly exposed or not. Accordingly the additional controls described in Section 11 make no mention of who is using the substances because they are put in place to protect all users, DIY and professional, and to protect the environment from the harmful effects of antifouling paints.

3.46. The Committee heard from submitters who maintained that the risks of exposure during the removal of antifouling paints, when the user gets covered in debris and paint flakes, were just as great as application. The Committee acknowledges this concern.

3.47. The Committee would like to emphasise that the additional controls imposed do not add new restrictions on use of antifouling paints, for example the current controls require that full PPE be used. Rather, the additional controls are focussed on helping users become much more aware of the current controls that are not being universally complied with and this is putting users and the environment at unacceptable risk.

Justification for the time limited approvals

3.48. The Committee are concerned by the adverse effects of several antifouling paints, but for the moment the lack of alternatives and the biosecurity need for antifouling paints means that the positive effects outweigh the adverse effects; but only just.

3.49. However, there is research and development underway on alternative substances, and so the balance in favour of positive effects of some current formulations can only be sustained for a limited time.

3.50. When deciding on the length of time to approve these substances, we have considered how long it takes for new products to come to market and the need for effective antifouling paints in the

interim. During the hearing we asked a manufacturer to describe the research and development process and timeframes to inform the decision on how long paints containing thiram, diuron, octhilinone and ziram should be approved for.

3.51. The manufacturer indicated that work was already underway on replacing the paints which contain diuron and octhilinone, but less so for thiram which plays a larger role in the current range of antifouling paints on the market.

3.52. The Committee also notes from the staff's risk assessment that thiram poses less risk to the environment than diuron and octhilinone, and less risk to human health than ziram, diuron and octhilinone.

3.53. The Committee considers that antifouling paints containing diuron, thiram, octhilinone or ziram have positive effects which marginally outweigh their adverse effects. Based on the higher reliance on thiram by users, and its lower risk profile, the Committee have determined that it is appropriate to approve paints containing thiram for a longer time period than paints containing octhilinone, diuron or ziram.

4. Sequence of the consideration

4.1. In accordance with the Methodology, and as outlined in the Decision Path used (Appendix B), the approach to the consideration that the Committee adopted was to:

- Review the available information (Methodology clause 8)
- Establish the hazard classifications for each substance and derive the default controls that are prescribed under section 77 of the HSNO Act for each classification
- Identify potentially significant risks, costs and benefits (covered by clauses 9 and 11)
- Assess the potentially significant risks and costs (risks were assessed in accordance with clause 12, and costs in accordance with clause 13) using recognised techniques (clause 24). The adequacy of the default controls prescribed under section 77 was considered alongside the assessment of risks and costs to determine whether those controls should be varied and identify where additional controls need to be applied, under section 77A, to mitigate any acceptable risks
- Consider all the risks and costs and determine whether the individual risks and costs (when combined) are negligible or non-negligible
- Review any non-negligible residual risks and determine whether the decision should follow clause 26 or clause 27
- Establish the approach to risk with respect to the individual non-negligible risks in accordance with clause 33
- Consider (a) whether any of the non-negligible risks could be reduced by varying the controls in accordance with sections 77 or 77A, and (b) the cost-effectiveness of the application of controls in accordance with clause 35 and sections 77 and 77A
- Assess the benefits associated with this application in accordance with clauses 9, 11, 13 and 14 and section 6(e)
- Taking into account the risk characteristics established under clause 33, weigh up the risks, costs and benefits in accordance with clause 26 or clause 27 and clause 34 and section 29 taking into account aspects of uncertainty (clauses 29, 30 and 32) and determine whether the application should be approved or declined
- Confirm and set the controls.

5. Treaty of Waitangi (Tiriti ō Waitangi)

Introduction

5.1. In accordance with section 8 of the HSNO Act the Committee is required to take into account the principles of the Treaty of Waitangi (Tiriti o Waitangi).

Consultation

5.2. The Committee notes the consultative efforts of EPA (and previously ERMA) staff to provide information nationally to Māori and to hold discussions with Māori in high use regions. These consultative efforts are documented in the table below. We consider that the consultation process was appropriate for this application.

Table 2: Consultation with Māori

Date	Action
September 2002	Report prepared by Ngā Kaihautū Tikanga Taiao recommending a reassessment of antifouling paints be undertaken due to concerns raised by Māori
2004	Ngā Kaihautū Tikanga Taiao commission Dr Carol Stewart to peer review antifouling paint application received by ERMA
April 2006	Presentation given by Dr Carol Stewart at the Māori National Network meeting in Christchurch. The presentation was a review of antifouling paints both historical and current, as a case study of a class of hazardous substances in the marine environment. Review recommends reassessment of antifouling paints.
Tauranga 2010	Discussions with iwi representatives in the Tauranga region about iwi specific concerns and interests relating to antifouling paints.
17 November 2011, Auckland	Discussion with iwi representatives in the Auckland region about specific concerns relating to antifouling paints.
4 August 2012, Porirua	Workshops held around the impacts of antifouling paints at the Māori National Network Environmental Management Hui
September 2012	Application/consultation information sent out to members of the Māori National Network
2 October 2012, Blenheim	Hui held with local iwi representatives to discuss the antifouling paints reassessment.
11 October 2012, Whangarei	Hui held with local iwi representatives to discuss the antifouling paints reassessment.
18 October 2012, Rotorua	Hui held with local iwi representatives to discuss the antifouling paints reassessment.

Date	Action
	Communication updates provided through Te Pūtara (EPA newsletter for Māori)
23 January 2013 – 7 March 2013	Application – Notified for public consultation
3 May 2013	Evaluation and Review Report – Circulated

5.3. The Committee heard from Mr Gerald Coates, a member of the HSNO Committee of Te Rūnanga o Ngāi Tahu (TRoNT), who expressed concern about the level of consultation undertaken by the EPA. The TRoNT submission noted that "the EPA has to be far more assiduous in having a meaningful consultation with Māori in the future, especially for applications of this magnitude and complexity". TRoNT suggested that the EPA should better utilise Te Herenga[1] for applications of this kind, holding specific hui about such significant applications rather than including it on the programme of more general environmental hui.

5.4. Although the approach to engagement for this application was consistent with previous applications of this nature, the Committee acknowledges the level of concern expressed by TRoNT. We also note that during the 2012 Environmental Management Hui (hosted by the EPA) some participants were concerned about 'consultation fatigue' and resource limitations highlighting that what works for some iwi may not for others.

5.5. Given the level of formal and informal feedback received during and prior to the submission of this application, the Committee is comfortable that it had sufficient information on which to base a decision on matters affecting the interests of Māori. However, the suggestions for improving the engagement approach used by the EPA have been noted and the Committee recommends that the EPA continue to work with parties (including Te Herenga) to improve engagement with Māori stakeholders in the future.

Active Protection

5.6. The Committee recognises that the principle of active protection requires that positive steps are taken to ensure Māori interests are protected.

5.7. The Committee notes that the priority given to the reassessment of antifouling paints was driven from concerns about taonga species and water-body health raised by Ngā Kaihautū Tikanga Taiao from as early as 2002.

5.8. In 2006 Ngā Kaihautū commissioned a peer review of an antifouling paint application submitted to ERMA, which found new research estimating that the environmental profile of that particular antifouling paint was less favourable than suggested by the applicant. The grounds for this

[1] Formerly known as the Māori National Network, Te Herenga is a network of Māori resource and environmental managers/practitioners. The purpose of this network is to provide for the continued improvement of the value and effectiveness of Māori engagement in decision-making by the EPA

reassessment were based on those concerns and other international data highlighting new information relating to the effects of the substances.

5.9. TRoNT stated in their presentation at the hearing that there seemed to be a general glossing over of Māori concerns in the E&R report and urged the EPA to be more mindful of its responsibilities for active protection under the Treaty of Waitangi. They considered that "active protection means you take steps to do things that actually bring about what you want to happen in order to protect the taonga of Māori".

5.10. The Committee considers the undertaking of a full and comprehensive reassessment of this kind, including the opportunity to review information and management practices, to be consistent with the principle of active protection. The reassessment has resulted in the removal of some substances and the tightening of controls for others. It has also highlighted for industry and local regulatory authorities the need for improved practice, management and enforcement.

5.11. TRoNT suggested that active protection requires a more proactive approach to monitoring and research. The Committee recommends the EPA explore these needs further with Māori and other appropriate Crown agencies.

6. Hazard classifications

6.1. As part of the reassessment, EPA staff have reviewed the HSNO classifications for the antifouling paints approved in New Zealand. A number of changes to the classifications were proposed. The implications of these changes to users are that the default controls triggered by the classification may have changed.

6.2. Classifications for the active ingredients were reviewed based on data from international regulators and other authorities. For the formulated substances containing the active ingredients, classifications took into account:

- The revised classifications for the active ingredients
- Changes in the mixture rules applied by the EPA in establishing classifications (summation rules, rather than additivity, are now used to derive ecotoxicity classifications for mixtures)
- Any changes in the classification of the other components of the mixtures that may have occurred since the original classification was carried out.

6.3. A summary of the classification changes for the active ingredients is provided in Appendix C.

6.4. The Committee has adopted the classifications proposed by EPA staff as set out in Appendix C.

7. Assessment of benefits

Summary

7.1. The Committee's view, set out in more detail below, is that the benefits of the antifouling paints considered in this reassessment application are significant. The benefits of antifouling paints are expected to be realised, provided a sufficient number of approvals remain following reassessment.

Introduction

7.2. The Committee reviewed the EPA staff assessment of the potential benefits associated with antifouling paints, as set out in the Application and the E&R Report.

7.3. In addition, the Committee took account of the submissions made on the application and heard from a number of submitters who described the need for antifouling paints, particularly for biosecurity purposes.

Biosecurity

7.4. The Committee heard that the most significant benefit from the use of antifouling paints relates to their use as a biosecurity tool by helping to prevent the spread of unwanted organisms around New Zealand waters. This is a generic benefit of all antifouling paints, and it is driven by copper's biocidal activity which is generally complimented by a co-biocide.

7.5. One of the key concerns for biosecurity is limiting the spread of unwanted aquatic pests, as vessels travel between waterways, carrying with them any organisms attached to the hull. A properly antifouled vessel restricts attachment to the hull, limiting the spread of unwanted organisms.

7.6. Quantification of the value of protecting New Zealand's marine environment from the introduction and spread of pest species was not carried out as part of this reassessment. The Ministry for Primary Industries (MPI) has a comprehensive Marine Biosecurity Programme with the objective of "protecting New Zealand's precious and unique marine environment". MPI commented in its submission that "regular maintenance of a vessel's hull (involving the application of antifouling paint and the cleaning/removal of growth) provides the most effective means of preventing the translocation of non-indigenous species." The Committee considers that the use of antifouling paints as a tool in preventing the introduction of pest species offers significant benefits to the environment, society and communities, and to the market economy.

7.7. Some Māori consultees and submitters also recognised the benefits posed by antifouling paints as a general tool to support kaitiakitanga in the protection of taonga species, and Māori commercial fisheries interests. The importance and value of these fisheries interests (which largely resulted from the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992) to Māori is

significant in pure economic terms, but also to the cultural health and wellbeing of iwi, hapū and whanau. Kaitiakitanga is explained more fully later in this report[2].

Other benefits

7.8. We also heard that antifouling paints provide cost and efficiency benefits to vessel operators. Biological growth attached to hull surfaces, create increased frictional resistance which slows vessels down. By avoiding this, benefits are realised in terms of time spent travelling, and the amount of fuel consumed. This increase in efficiency not only decreases costs, it also reduces the amount of greenhouse gases being emitted into the atmosphere.

7.9. Some of these generic benefits of antifouling paints can be achieved through regular cleaning of boats, but this activity is much more effective on vessels which are properly antifouled.

7.10. In addition to the generic benefits, benefits specific to copper and each of the co-biocides were also considered. It was noted that different co-biocides are preferred for different uses. Copper aside though, there was little evidence presented to the Committee demonstrating specific benefits of any particular co-biocide apart from the low cost of diuron and thiram compared to alternatives, a fact likely to explain their current market dominance.

Copper

7.11. The main biocide used in antifouling paints is copper. It is responsible for the majority of the paints' efficacy and for the benefits identified above. The Committee recognise the specific benefits of copper in antifouling paints.

[2] See 'Relationship of Māori to the environment' section

8. Assessment of adverse effects

Introduction

8.1. Antifouling paints are known to be toxic to people and the environment. The mode of action by which they kill biofouling organisms also affects non-target aquatic species.

8.2. The Committee reviewed the EPA staff assessment of the potential risks associated with the use of antifouling paints. The assessment included risks to human health and the environment as well as cultural risks.

Adverse effects on human health

8.3. Antifouling paints have hazardous properties ranging from toxic effects that are elicited after a short exposure (such as acute toxicity or skin and eye irritation and corrosivity) to long term exposure effects (such as systemic target organ toxicity, reproductive/developmental toxicity or carcinogenicity).

8.4. These risks arise during the paint application and removal phases, and can be mitigated by the use of an appropriate level of personal protective equipment (PPE).

Adverse effects on the environment

8.5. Antifouling paints are also harmful to the environment. They are very toxic to the aquatic environment, with some paints also being toxic to the terrestrial environment. The likelihood of a terrestrial environment being exposed to a significant level of antifouling paint is considered unlikely given compliance with HSNO controls, and so the risk assessment focussed on the risk posed to the aquatic environment. Acute and chronic risks for fish, aquatic invertebrates and aquatic plants have been identified for all of the antifouling paints under review. Some antifouling paint ingredients also tend to persist in the environment, though no evidence was found to suggest significant bioaccumulation.

8.6. With the exception of off-target paint deposition during application, and dumping of removed paint scraping waste into the water (both of which are isolated events which will be mitigated by the additional controls) these risks arise during the slow release of toxic substances in the use phase of the substance and there are no ways to mitigate the risks.

Risk Assessment

8.7. EPA staff undertook human health and environmental risk assessments for the antifouling paints currently approved in New Zealand.

8.8. The risks of adverse effects on human health were assessed by comparing predicted or measured exposures of the operators to substances, with the maximum levels of exposure that are generally not expected to result in harmful effects. Professional and DIY users were modelled based on use of appropriate PPE.

8.9. The risks of adverse effects on the environment were assessed by comparing predicted exposures of the substances to aquatic environments against concentrations not expected to cause any effects.

8.10. The data relating to the toxicological and ecotoxicological effects are based on animal or human studies. Where possible, the toxicity and ecotoxicity data specific to the substances evaluated are those used by other international regulators. In some instances key information relevant to the risk assessment, such as dermal absorption data, were not available. In these instances EPA staff used reasonable worst-case scenarios or default values, which is standard practice.

8.11. Environmental exposure was assessed based on information from manufacturers which allowed staff to calculate the leaching rates of the paints.

8.12. The risk assessment assumed that the default controls triggered by the hazard classifications of the substances were in place.

8.13. Full details on the risk assessment approach and results can be found in the Application.

Human health risks

8.14. A summary of the level of risk to human health identified by EPA staff for each antifouling active ingredient is presented in Table 3.

Table 3: Summary of risk quotients for human health. Numbers above 1 in red indicate risk above the level of concern (LOC)

Active Ingredient	Brush and Rolling (Non-Professional)	Brush and Rolling (Professional)	Mixing and Loading (Professional)	High-Pressure Spraying (Professional)
Irgarol 3%	0.25	0.02	0.35	0.64
Zineb and Mancozeb 6.92%	0.66	0.04	0.81	0.40
Tolyfluanid 5%	0.74	0.02	0.45	0.44
Chlorothalonil 7.9%	0.84	0.05	0.38	0.56
Dichlofluanid 4.2%	**1.33**	0.03	0.28	0.24
Dichlofluanid 2.92%	0.92	0.02	0.19	0.17
Pyrithione (copper and zinc) 3%	**1.56**	0.12	0.81	0.56
Copper 52.4%	**2.50**	0.24	0.87	0.65

Copper 38.1%	**1.82**	0.18	0.64	0.85
Copper 16.8%	0.80	0.08	0.52	0.87
Octhilinone 1.4%	**4.96**	0.09	0.85	0.50
Thiram 3%	**4.58**	0.10	0.82	0.55
DCOIT 2.13%	0.39	0.01	0.14	0.19
DCOIT 2.13% Globic	0.81	0.02	0.2	0.21
Diuron 7%	**15.83**	0.43	**2.45**	**1.08**
Diuron 4.23%	**9.56**	0.26	**1.48**	0.77
Diuron 2%	**4.52**	0.12	0.95	0.81
Ziram 5%	**63.26**	**1.18**	**9.43**	**3.61**

Numbers in red are RQs above the LOC

	= No PPE (Personal Protective Equipment) Non-Professional)
	= Gloves only (Non-Professional)
	= PPE but no RPE (Respiratory Protective Equipment) (Professional)
	= PPE and RPE 4*
	= PPE and RPE 10*
	= PPE and RPE 20*
	= PPE and RPE 40*

* Level of RPE is described in the application document. In simple terms, the level of protection offered by the RPE increases depending on the equipment being used from RPE 4 to RPE 40.

Environmental risks

8.15. A summary of the level of risk to the environment identified by EPA staff for each antifouling active ingredient is presented in Table 4. Risk quotients (RQs) above 1 are in red and indicate concern.

Table 4: Risk quotients for all active ingredients in different exposure scenarios on the basis of "Average" predicted environmental concentrations (PECs)

Active ingredient	Half Moon Bay marina	Lyttelton Harbour	Kinloch marina
Chlorothalonil	100	23	30
Copper	3.3	0.6	7.5
DCOIT	0.62	0.18	1.8
Dichlofluanid	0.71	0.29	0.17
Diuron	15	3.1	4.7
Irgarol	240	49	150
Mancozeb	2	0.6	4.9
Octhilinone	8.6	1.8	2.8
Pyrithione (Copper)	2.3	0.59	2.4
Pyrithione (Zinc)	4.1	1.1	4.4
Thiram	2.7	0.65	7.6
Tolyfluanid	4.5	1.7	1.1
Zineb	0.27	0.12	0.063
Ziram	0.97	0.31	2.2

Copper

8.16. Tables 3 and 4 indicate that the modelled adverse effects of copper are above the level of concern. As copper is a key component of all antifouling paints, the Committee notes that this means that all antifouling paints present risks to human health and the environment.

Relationship of Maori to the Environment

8.17. The Committee acknowledges the unique relationship of Māori to the environment, their connection through whakapapa to natural resources, and their kaitiakitanga duty to manage the health and wellbeing of taonga for future generations. We are also aware of the importance of manaakitanga as it relates to the customary harvest of kaimoana and its subsequent impact on the identity and self-determination of Māori groups.

8.18. With reference to this relationship, the Committee notes that much of the information provided by Māori (either during consultation or in submissions) referred to:

- the direct, indirect and cumulative effect of antifouling paints on native and taonga species and their ecosystems

- the subsequent impact of those effects to cultural values and practices
- concern about ineffective and inconsistent controls, compliance and enforcement relating to the substances, their use and the management of associated facilities.

8.19. In discussing these issues Te Rūnanga o Ngāi Tahu noted the lack of data and modelling for New Zealand native species and recommended more research of specific relevance to the New Zealand environment. Ngāti Whatua, Ngāti Wai and Ngā Kaihautū similarly noted the lack of local impacts data, as well as the need to better monitor contamination. This issue is generally addressed elsewhere in this decision, including noting that the EPA commissioned a report from NIWA to identify New Zealand appropriate parameters for inputting into the model scenarios. However in terms of the relationship of Māori to the environment, we recognise specific concerns relating to impacts to mahinga kai (traditional food sources); sites or species of significance for cultural or other reasons; and where overall ecosystem health may be at particular risk through the degradation of mauri.

8.20. The Committee recognises the level of concern expressed by Māori about the effects of antifouling paints on kaimoana and the potential for those effects to be felt disproportionately by Māori communities. For Māori (particularly coastal iwi, hapū and marae) the intergenerational management and use of mahinga kai and the practice of gathering kaimoana is an active expression of kaitiakitanga and therefore integral to their identity and daily lives.

8.21. Consultees and submitters noted that mahinga kai and other species of significance were already under threat from a range of other contaminants in the environment. In addition (as noted elsewhere in this decision) they recognised the important role of antifouling paints in protecting kaimoana and other species of significance (particularly commercial fisheries species), from the threat of invasive exotic organisms. There was general agreement that measures were required to ensure the use and management of antifouling paints was undertaken in a controlled way that removed or minimised potential adverse effects while enabling the biosecurity benefits.

8.22. On considering these issues, as well as other issues noted elsewhere in this decision, the Committee has declined the approvals for a number of the available anti-fouling paints where the risks of their use outweighed the benefits posed. The Committee identified several substances that will be given a time-limited approval for a four or ten year period. The intention of the time-limits on those approvals is to minimise further risk from the use of those paints and to provide incentive for the development and use of less hazardous options.

8.23. In addition, several controls have been added to ensure the minimisation of adverse effect to both the health and wellbeing of people and the environment both physically and culturally. Controls on the use of personal protective equipment by both DIY and professional persons during application and removal of paint, improved labelling and safety data sheet requirements will better support the understanding and practices of all users. Work area signage and the

mandatory collection of contaminated waste from maintenance activities will reduce the opportunity for off target effects on people, terrestrial, aquatic and taonga species.

8.24. With these additional measures in place for the use and management of remaining antifouling paint products, the Committee considers that the benefits to the relationship of Māori and their culture and traditions with their ancestral lands, water, sites waahi tapu, valued flora and fauna and other taonga outweigh the risks.

9. International obligations

9.1. No international obligations were identified that may be impacted by this reassessment.

10. Commentary around additional controls

10.1. Where a substance poses non-negligible risks, controls should be imposed on the substance to help manage those risks. The staff's risk assessment has indicated that additional controls are required to mitigate the risks for all of the antifouling paints being considered. These controls will apply in addition to, or in place of, the default controls triggered by the hazard classifications. The controls for each substance can be found in Appendix E.

10.2. The additional controls were developed in consultation with stakeholders. The controls reflect conditions of use and user obligations that are required to help mitigate the risks that may arise through the lifecycle of the substance.

10.3. The additional controls are proposed in accordance with section 77A(4)(a) of the HSNO Act, on the basis that "the proposed control is more effective in terms of its effect on the management, application, and risks of the substance". The intent of each additional control and the wording is provided in Table 5.

10.4. The Committee considers that these additional controls will help to mitigate the risks that were not quantitatively modelled in the risk assessment, such as the risks to bystanders and the risks to the environment from off-target deposition of antifouling paints during application or removal. They will also help to ensure users are better aware of the controls and able to comply with them.

10.5. The Committee recommends to the EPA that in addition to Safety Data Sheets, the EPA work with the industry (manufacturers/suppliers and marinas/hard-stand operators) to develop a user-friendly summary fact sheet of the controls and make it freely available particularly to DIY operators.

10.6. Additionally, the time-limited approvals for those substances where the benefits only marginally outweigh the risks provides a risk management tool by eliminating the pathway to exposure by

removing the availability of a substance from New Zealand over time.

Table 5: Description of additional controls for the mitigation of risks arising from antifouling paints

Control Code	Intent of control	Control
R-1	**Personal protective equipment** Control T5 (refers to Reg. 8 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations 2001) requires that people handling antifouling paints use protective clothing or equipment that prevents them from coming into contact with the substance, either via skin contact or through inhalation. This control will apply to any person (DIY or professional) applying or removing antifouling paints, including in locations that are not designated as workplaces. For clarity around situations where no workplace exposure standards exist for the relevant components of an antifouling paint, a variation is proposed to the default control T5 (use of PPE) that specifies when subclause (1)(b) applies.	Subclause (1) of Reg. 8 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations 2001 should be replaced by the following: 1. Any person who handles the substance must use protective clothing or equipment that is designed, constructed, and operated to ensure that the person— a. does not come into contact with or inhale, the substance; and b. is not exposed to a concentration of the substance that exceeds the workplace exposure standard (WES) for that substance, if a WES for that substance exists.
R-2	**Controlled work area and signage** To protect sensitive areas from exposure arising from spraydrift of the substance, the application of the substance by spray techniques is permitted provided that it is done in a controlled work area. The extent of the controlled area should be sufficient to ensure that off-target deposition of the substance is avoided. Additionally, this will also protect bystanders from involuntary exposure to antifouling paints during application. In order to inform people that spray painting activity is being undertaken, signage must be placed at the entrance of the controlled work area.	*This control comes into effect on 1 July 2015.* **Controlled work area** 1. Any person applying the substance must ensure that application of the substance is carried out in a **controlled work area**. 2. The **controlled work area**, as referred to in subclause (1) is a designated area in which antifouling paints are applied, using a method and located such that off-target deposition of the substance, including onto bystanders, is avoided by taking all practicable steps. 3. Any person applying the substance in a controlled work area must avoid off-target deposition of the substance. To avoid doubt, this requirement includes avoiding off-target deposition of the substance onto persons outside of, but within the immediate vicinity of, the controlled work area. **Signage** 4. Any person applying the substance must ensure that signs are placed at every point of entrance into the controlled work area. Signs must be posted from the start of application, until the end

		of the application. 5. Signs erected in accordance with (4) must— a. warn that an application is being carried out using a substance that is toxic to humans; b. identify the person in charge of the application; c. state that entry into the controlled work area is not permitted unless personal protective equipment (PPE) is worn by the person entering the controlled work area; and d. comply with regulation 34 and regulation 35 of the Hazardous Substances (Identification) Regulations 2001 as if the distance referred to in regulation 35(3) is not less than 10 metres. 6. The conditions of (4) and (5) do not apply when the substance is applied using non-dispersive methods.
R-3	**Collection of substances from maintenance activities** Boat maintenance activities remove the antifouling substance, biofouling waste and other contaminants from the hull of a boat. Used antifouling paints removed from the hull of boats during maintenance present a risk to the operator and to the terrestrial and aquatic environments. Collecting used antifouling paints generated from maintenance activities will reduce the risk of these substances entering the environment. It is intended that this control should apply to all antifouling paint waste so that it is a requirement to collect waste for any antifouling paint removed from a vessel‘s hull.	*This control comes into effect on 1 July 2015.* 1. Any person who removes any antifouling paint coating from the hull of a boat must ensure that waste containing antifouling paint residue is collected; and 2. All collected waste, as referred to in subclause (1) must be disposed of in accordance with the Hazardous Substances (Disposal) Regulations 2001.
R-4	**Additional labelling requirements** In order to mitigate risks to both people and the environment, additional information must be provided on antifouling product labels. The product label is a key mechanism to ensure that information about the hazardous properties of the antifouling paint is made available to the end-user. These controls will impose labelling requirements that are additional to the current	*This control comes into effect on 1 July 2015.* For formulated antifouling substances: 1. Labels must include the following statements (or similar): a. When applying this substance by spraying, you must sufficiently enclose the area to ensure that the substance is not deposited on off-target sites and has no adverse effects on bystanders

	standard of labelling required by Hazardous Substances (Identification) Regulations 2001. Subclause (1)(a) relates to Control R-2. Subclause (1)(b) relates to Control R-3.	b. You must ensure that waste generated from maintenance activities does not enter the environment 2. A person must not supply a hazardous substance to any other person unless the substance label shows the information required by (1).
R-5	**Safety data sheets (SDS)** This control modification will require 16-header SDS to be provided for antifouling paints rather than the more generic "documentation" requirements. This will standardise the presentation and format of safety information accompanying the substance. This control replaces the requirements of: • regulations 37 to 50 of the Hazardous Substances (Identification) Regulations 2001; • regulations 16 to 18 of the Hazardous Substances (Emergency Management) Regulations 2001; and • regulation 13 of the Hazardous Substances (Disposal) Regulations 2001.	See Appendix E for the exact wording of this control.

10.7. The revised controls will come into effect after a transition period in order to allow for compliance with the revised controls to be arranged. These transitional periods are described below:

- R-1: Personal protective equipment control variation (immediate)
- R-2: Controlled work area and signage (2 years)
- R-3: Collection of substances from maintenance activities (2 years)
- R-4: Additional labelling requirements (2 years)
- R-5: Safety data sheets modification (6 months)

11. Overall evaluation of significant adverse and positive effects

11.1. The overall evaluation of risks, costs and benefits was carried out having regard to the tests in clause 27 of the Methodology and section 29 of the Act.

11.2. Clause 34 of the Methodology sets out the approaches available to the Authority in evaluating the combined impact of risks, costs and benefits i.e. weighing up the risks, costs and benefits.

11.3. Risks and benefits for each active ingredient under review are set out in Table 6. Risks above the Level of Concern (LOC, which is a value of 1) are in red, and are considered to be non-negligible (NN). The values in green are below the LOC and are considered to be negligible (N).

Table 6: Summary of the risk–benefit analysis conducted by the Committee

Active ingredient	Environmental risks (RQ)	Human health risks (RQ)	Benefits	Decision
Chlorothalonil	NN (100)	N (0.84)	Generic antifouling benefit	Risks > (outweigh) Benefits Decline
Copper	NN (7.5)	NN (2.5)	Very high level of specific benefit	Benefits > Risks Approve with controls
Copper pyrithione	NN (2.4)	NN (1.6)	Generic antifouling benefit	Benefits > Risks Approve with controls
DCOIT	NN (1.8)	N (0.81)	Generic antifouling benefit	Benefits > Risks Approve with controls
Dichlofluanid	N (0.71)	NN (1.3)	Generic antifouling benefit	Benefits > Risks

Active ingredient	Environmental risks (RQ)	Human health risks (RQ)	Benefits	Decision
				Approve with controls
Diuron	NN (15)	NN (15)	Low level of specific benefit	Benefits marginally > risks Approve with controls for four years
Irgarol	NN (240)	N (0.64)	Generic antifouling benefit	Risks > Benefits Decline
Mancozeb	NN (4.9)	N (0.81)	Generic antifouling benefit	Benefits > Risks Approve with controls
Octhilinone	NN (8.6)	NN (5.0)	Generic antifouling benefit	Benefits marginally > risks Approve with controls for four years
Thiram	NN (7.6)	NN (4.6)	Low level of specific benefit	Benefits marginally > risks Approve with controls for ten years
Tolyfluanid	NN (4.5)	N (0.74)	Generic antifouling benefit	Benefits > Risks Approve with controls
Zinc pyrithione	NN (4.4)	NN (1.6)	Generic antifouling benefit	Benefits > Risks Approve with controls
Zineb	N (0.27)	N (0.81)	Generic antifouling benefit	Benefits > Risks Approve with controls
Ziram	NN (2.2)	NN (63)	Generic antifouling benefit	Benefits marginally > risks Approve with controls for four years

11.4. The Committee identified substantial generic benefits from the use of antifouling paints with regards to biosecurity and vessel efficiency. These benefits are considered to be possessed by all antifouling paints.

11.5. In addition to the generic benefits of antifouling paints, the Committee also took note of the specific benefits provided by some substances, in particular the critical need for copper, which is the key biocide in all antifouling paints at this time.

11.6. The Committee also identified risks for human health and the environment from the use of all the antifouling paints. Risks to society and the economy were also considered, particularly the cultural concerns that Māori had expressed around the mauri of aquatic environments.

11.7. With the correct use of PPE (and RPE in the case of using high pressure spray as the application method), the human health risks of applying and removing most antifouling paints are relatively low and as such, the Committee's decisions have predominantly been driven by environmental risks. These risks are greatest for formulations containing irgarol or chlorothalonil as a co-biocide.

11.8. The Committee is of the view that the high level of benefits provided by use of antifouling paints outweighs the adverse effects of many of these substances. Although copper poses a greater level of risk than many of the co-biocides, it possesses a much greater level of specific benefit as well. We consider that the benefits of copper outweigh the adverse effects.

11.9. For two of the co-biocides, irgarol and chlorothalonil, the environmental risks are far greater than for the other co-biocides. The Committee considers that the risks from use of these two substances outweigh any beneficial effects.

11.10. For antifouling paints containing diuron, octhilinone or ziram as the co-biocide, we consider that the benefits outweigh, though only marginally, the adverse effects of these substances. As such we consider that they should be approved for a limited time period of four years. This is considered to be sufficient time to allow industry to find alternatives for these products. Ziram poses the greatest human health risk of all the antifouling paints assessed and users may wish to use an alternative and must be diligent with PPE.

11.11. Similar reasoning has been used for the decision on antifouling paints containing thiram. Thiram is a widely-used co-biocide and the popularity of antifouling paints containing it was taken into account when we considered the length of time it would take industry to find alternatives for these paints. As the magnitude of risks associated with thiram are generally lower than for diuron, octhilinone or ziram, the Committee considers that approving paints containing thiram for a period of ten years is appropriate.

12. Recommendations

12.1. The Committee makes the following recommendations to applicants, the EPA and other agencies responsible for health and the environment, R&D of new paint formulations, monitoring environmental contamination and hazardous substances education.

- Undertake or encourage further research on safer alternatives to the current antifouling paints. This may include, for example, non-biocidal alternatives (such as paints containing silicone coatings) or biomimetic coatings which imitate shark skin to stop the attachment of organisms
- Better monitoring of contaminant concentrations in New Zealand marinas. It is particularly important that this data, once collected, should become a shared resource and become more widely available than is current practice
- Engage further with Māori organisations, on research and monitoring needs in relation to antifouling paints, and provide input to government environmental research funding priorities as required
- Instigate the development of guidance material provided by industry to consumers summarising the outcomes of the reassessment, including a simple fact sheet outlining the controls required for the application and removal of antifouling paints

13. Decision

13.1. Pursuant to sections 63 and 29, the Committee has considered this application to reassess antifouling paints.

13.2. Based on consideration and analysis of the information provided on the possible effects of antifouling paints, in accordance with the Act and the Methodology and taking into account the application of current controls (as varied) and the additional controls, the Committee is satisfied, for the reasons set out in this decision, that the positive effects (benefits) associated with the use of a number of antifouling paints outweigh the adverse effects (risks and costs) (see Table 7).

13.3. The Committee also considers that there are a group of antifouling paints which possess positive effects that only outweigh the adverse effects by a slim margin. These substances are antifouling paints containing diuron, octhilinone, thiram or ziram (see Table 8). The Committee considers that the scales may tip the other way with the passage of time, particularly as alternative substances become available.

13.4. There are also a number of substances included in the reassessment application for which the adverse effects outweigh the positive effects. These substances are antifouling paints containing either chlorothalonil or irgarol (see Table 9).

13.5. The Committee's decision is summarised in Tables 7, 8 and 9 below.

13.6. The substances have the hazard classifications set out in Appendix C.

13.7. The controls for each substance are listed in Appendix E.

Val Orchard	**Date: 26 June 2013**
Chair, Decision Making Committee **Environmental Protection Authority**	

Table 7: Substances which have been approved with controls

Substance	Known product names	Active ingredient(s)	Decision	HSNO Approval
Hempel's Antifouling Globic	-	3(2H)-Isothiazolone, 4,5-dichloro-2-octyl-, Copper (I) oxide	Approved with controls	HSR000112
ABC7 ANTIFOULING	-	3(2H)-Isothiazolone, 4,5-dichloro-2-octyl-, Copper (I) oxide	Approved with controls	HSR001748
Antifouling Seavictor 50 (from HSR000931)	-	3(2H)-Isothiazolone, 4,5-dichloro-2-octyl-, Copper (I) oxide	Approved with controls	HSR100846
SeaSafe Ultra	-	3(2H)-Isothiazolone, 4,5-dichloro-2-octyl-, Copper thiocyanate	Approved with controls	HSR100427
Waterbased Antifouling Range	-	Copper (I) oxide	Approved with controls	HSR000041
Antifouling paint containing 195 g/litre cuprous oxide	*Flexgard VI*	Copper (I) oxide	Approved with controls	HSR000919
Antifouling paint containing 245 g/litre cuprous oxide	*Norimp 2000*	Copper (I) oxide	Approved with controls	HSR000920
Antifouling paint containing 521 g/litre cuprous oxide	*Hempels Antifouling 7177*	Copper (I) oxide	Approved with controls	HSR000921
Antifouling paint containing 1000 g/kg cuprous oxide (Part B)	*VC Offshore Extra (Part B)*	Copper (I) oxide	Approved with controls	HSR000922
Antifouling paint containing 754 g/litre cuprous oxide and 550 g/litre zinc oxide	*Warpaint Marine Fouling Inhibitor*	Copper (I) oxide	Approved with controls	HSR000929

Substance	Known product names	Active ingredient(s)	Decision	HSNO Approval
Antifouling paint containing 780 g/litre cuprous oxide and 220 g/litre zinc oxide	*Antifouling Seavictor 40*	Copper (I) oxide	Approved with controls	HSR000930
Antifouling paint containing 840 g/litre cuprous oxide and 350 g/litre zinc oxide	*Antifouling Seaguardian*	Copper (I) oxide	Approved with controls	HSR000931
Hempel's Antifouling Olympic 86901 colour range	-	Copper (I) oxide	Approved with controls	HSR002484
Hempel's Antifouling Olympic 86951 colour range	-	Copper (I) oxide	Approved with controls	HSR002698
Antifouling paint containing 640-655g/L cuprous oxide	-	Copper (I) oxide	Approved with controls	HSR100080
Micron 77 Red	-	Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100057
Micron 77 Blue	-	Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100058
Micron 77 Black	-	Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100059
Micron 77 Navy	-	Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100060
Hempel’s A/F Globic NCT (from HSR000036)	*Hempel’s A/F Globic NCT 8190M* *Hempel’s A/F Globic NCT 8195M*	Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100851
Antifouling SeaQuantum Ultra	-	Copper (I) oxide, Copper	Approved with controls	HSR100854

Substance	Known product names	Active ingredient(s)	Decision	HSNO Approval
(from HSR000036)		pyrithione		
Antifouling Seaquantum Classic (from HSR000036)	-	Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100849
Antifouling paint containing 408 - 494 g/litre cuprous oxide and 34 - 42 g/litre dichlofluanid	*Ultra (Black, Red, Blue)* *Ultra Dover White*	Dichlofluanid, Copper (I) oxide	Approved with controls	HSR000923
Antifouling paint containing 215 g/litre copper thiocyanate and 36 g/litre dichlofluanid	*Trilux*	Dichlofluanid, Copper thiocyanate	Approved with controls	HSR000889
Alloy C Antifouling Range	-	Tolyfluanid, Copper thiocyanate	Approved with controls	HSR000952
Optima Activator (Black)	-	Zinc pyrithione	Approved with controls	HSR000103
Optima Activator (Blue)	-	Zinc pyrithione	Approved with controls	HSR000104
Optima Activator (Red)	-	Zinc pyrithione	Approved with controls	HSR000105
Optima Activator (White)	-	Zinc pyrithione	Approved with controls	HSR000106
Antifouling paint containing 640 g/litre cuprous oxide and 60 g/litre zinc pyrithione	*Intersmooth Ecoloflex 360* *Intersmooth Ecoloflex 460* *Micron 66 (Red, Black or Blue)*	Zinc pyrithione, Copper (I) oxide	Approved with controls	HSR000932
Antifouling paint containing cuprous oxide and zinc pyrithione (from HSR000932)	*Sea Hawk Biocop TF Black Antifouling Paint*	Zinc pyrithione, Copper (I) oxide	Approved with controls	HSR100850
Trilux 33 White	-	Zinc pyrithione, Copper thiocyanate	Approved with controls	HSR000121
Alloy B Antifouling Range	-	Zinc pyrithione, Copper	Approved with controls	HSR000951

Substance	Known product names	Active ingredient(s)	Decision	HSNO Approval
		thiocyanate		
Antifouling paint containing 648 g/litre cuprous oxide and 70 g/litre zineb	*Interspeed BRA 240 RED*	Zineb, Copper (I) oxide	Approved with controls	HSR000933
SeaForce 60	-	Zineb, Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100411
SeaForce 90	-	Zineb, Copper (I) oxide, Copper pyrithione	Approved with controls	HSR100412
Antifouling paint containing 290 g/litre copper thiocyanate, 220 g/litre zinc oxide and 55 g/litre zineb	*Antifouling Seasafe*	Zineb, Copper thiocyanate	Approved with controls	HSR000918

Table 8: Substances which have been approved with controls for a limited time period

Substance	Known product names	Active ingredient(s)	Decision	HSNO Approval
Antifouling paint containing 20 g/litre diuron (Part A)	*VC Offshore Extra (Part A)*	Diuron	Approved with controls for four years	HSR000934
Antifouling paint containing 450 - 849 g/litre cuprous oxide and 40 - 70 g/litre diuron	*Interspeed 642 BQA 407 Red/BQA 412 Blue* *Micron Extra* *Intercleane 165 BWA 900 Bright Red* *Interspeed 642 BQA 405 Dark Red*	Diuron, Copper (I) oxide	Approved with controls for four years	HSR000924
Antifouling paint containing 450 - 849 g/litre cuprous oxide and 40 - 70 g/litre diuron (aspiration hazard) (Substance A) (from HSR000924)	*Micron CSC (Black, Blue, Burgundy & White)* *Longlife (Black, Blue & White)*	Diuron, Copper (I) oxide	Approved with controls for four years	HSR100852
Antifouling paint containing 450 - 849 g/litre cuprous oxide and 40 - 70 g/litre diuron (aspiration hazard) (Substance B) (from HSR000924)	*Coppercoat Extra* *Longlife Extra (Blue, Red & Black)* *Micron Extra Dover White*	Diuron, Copper (I) oxide	Approved with controls for four years	HSR100853
Antifouling paint containing 580 g/litre cuprous oxide, 65 g/litre diuron and 320 g/litre zinc oxide	*Mille Dynamic 7170*	Diuron, Copper (I) oxide	Approved with controls for four years	HSR000925
Antifouling paint containing 760 g/litre cuprous oxide, 62 g/litre diuron and 165 g/litre zinc oxide	*Hempel's Antifouling Nautic*	Diuron, Copper (I) oxide	Approved with controls for four years	HSR000926

Substance	Known product names	Active ingredient(s)	Decision	HSNO Approval
Alloy Antifouling Range	-	Diuron, Copper thiocyanate	Approved with controls for four years	HSR000038
Antifouling paint containing 230 g/litre copper thiocyanate and 40 g/litre diuron	*Cruiser Superior (White, Scarlet, Blue & Black)*	Diuron, Copper thiocyanate	Approved with controls for four years	HSR000916
Reduced Copper Antifouling Range (Range D)	-	Octhilinone, Copper (I) oxide	Approved with controls for four years	HSR007955
Hard B Antifouling Range	-	Octhilinone, Tolyfluanid, Copper (I) oxide	Approved with controls for four years	HSR000040
ABC #3 Antifouling	-	Ziram, Copper (I) oxide	Approved with controls for four years	HSR007897
Ablative A Antifouling Range	*Coastal Copper Antifouling* *Awlcraft No.5*	Thiram, Copper (I) oxide	Approved with controls for ten years	HSR000035
AF1000 (from HSR000035)	-	Thiram, Copper (I) oxide	Approved with controls for ten years	HSR100847
Antifouling paint containing 750 g/litre cuprous oxide, 50 g/litre thiram and 260 g/litre zinc oxide	*Gemcoat AB*	Thiram, Copper (I) oxide	Approved with controls for ten years	HSR000928
Reduced Copper Antifouling Range (Range C) (from HSR002484)	-	Thiram, Copper (I) oxide	Approved with controls for ten years	HSR100848

Table 9: Substances which have been declined

Substance	Known product names	Active ingredient(s)	Decision
Antifouling paint containing 138 g/L chlorothalonil and 722 g/L cuprous oxide	*271 Longlife Antifouling black* *271 Longlife Antifouling blue* *271 Longlife Antifouling red*	Chlorothalonil, Copper (I) oxide	Declined
Antifouling paint containing 84-138 g/L chlorothalonil and 517-690 g/L cuprous oxide	*Transocean Longlife Tin-free Antifouling 2.71* *Transocean Cleanship 200 Antifouling 2.74*	Chlorothalonil, Copper (I) oxide	Declined
Antifouling paint containing chlorothalonil 62 g/L and 518 g/L cuprous oxide and 82 g/L mancozeb	*AF500 Cleanship Antifouling red* *AF500 Cleanship Antifouling black* *AF500 Cleanship Antifouling blue* *AF500 Cleanship Antifouling green*	Chlorothalonil, Mancozeb, Copper (I) oxide	Declined
Ablative B Antifouling Range	-	Irgarol 1051, Copper (I) oxide	Declined
Hard A Antifouling Range	-	Irgarol 1051, Copper (I) oxide	Declined
Antifouling paint containing 570 g/litre cuprous oxide and 20 g/litre irgarol	*Seahorse Formula 1000 (Corroless Heavy Duty Copper Antifouling)*	Irgarol 1051, Copper (I) oxide	Declined
Antifouling paint containing 220 g/litre copper thiocyanate and 20 g/litre irgarol	*Seahorse propulsion*	Irgarol 1051, Copper thiocyanate	Declined
Ablative A1 Antifouling Range	*Ablative A1 Antifouling Range*	Irgarol 1051, Tolyfluanid, Zinc pyrithione, Octhilinone, Copper	Declined

Substance	Known product names	Active ingredient(s)	Decision
		(I) oxide, Copper pyrithione	

Appendix A: Names of those who made oral presentations at the hearing

Table 1: Submitters who spoke at the hearing

Submission number	Submitter
21 May 2013	
102719	Eugene Georgiades, Ministry for Primary Industries
102718	Don MacLeod
102703	Gerald Coates, Te Rūnanga O Ngāi Tahu
102720	Alan Boyd
102706	Keith Ingram, Professional Skipper Magazine and on behalf of NZ Marine Transport Association, NZ Recreational Fishing Council and Buckland's Beach Yacht Club
102698; 102713	David Hollingsworth, Westpark Marina and on behalf of New Zealand Marina Operators Association
22 May 2013	
102811	Richelle Kahui-McConnell, Ngāti Whātua o Ōrākei Māori Trust Board
102708	Alison Undorf-Lay, Sanford Limited
102705	Neil Debenham, Altex Coatings
	Tipene Wilson, Ngā Kaihautū Tikanga Taiao

Appendix B: Decision path for the reassessment of antifouling paints

Context

This decision path describes the decision-making process for the application to import or manufacture antifouling paints. This application is made under section 63 (Reassessment) of the HSNO Act, and determined under section 29 of the Act.

Introduction

The purpose of the decision path is to provide the HSNO decision maker[3] with guidance so that all relevant matters in the HSNO Act and the Methodology have been addressed. It does not attempt to direct the weighting that the HSNO decision maker may decide to make on individual aspects of an application.

In this document 'section' refers to sections of the HSNO Act, and 'clause' refers to clauses of the Methodology.

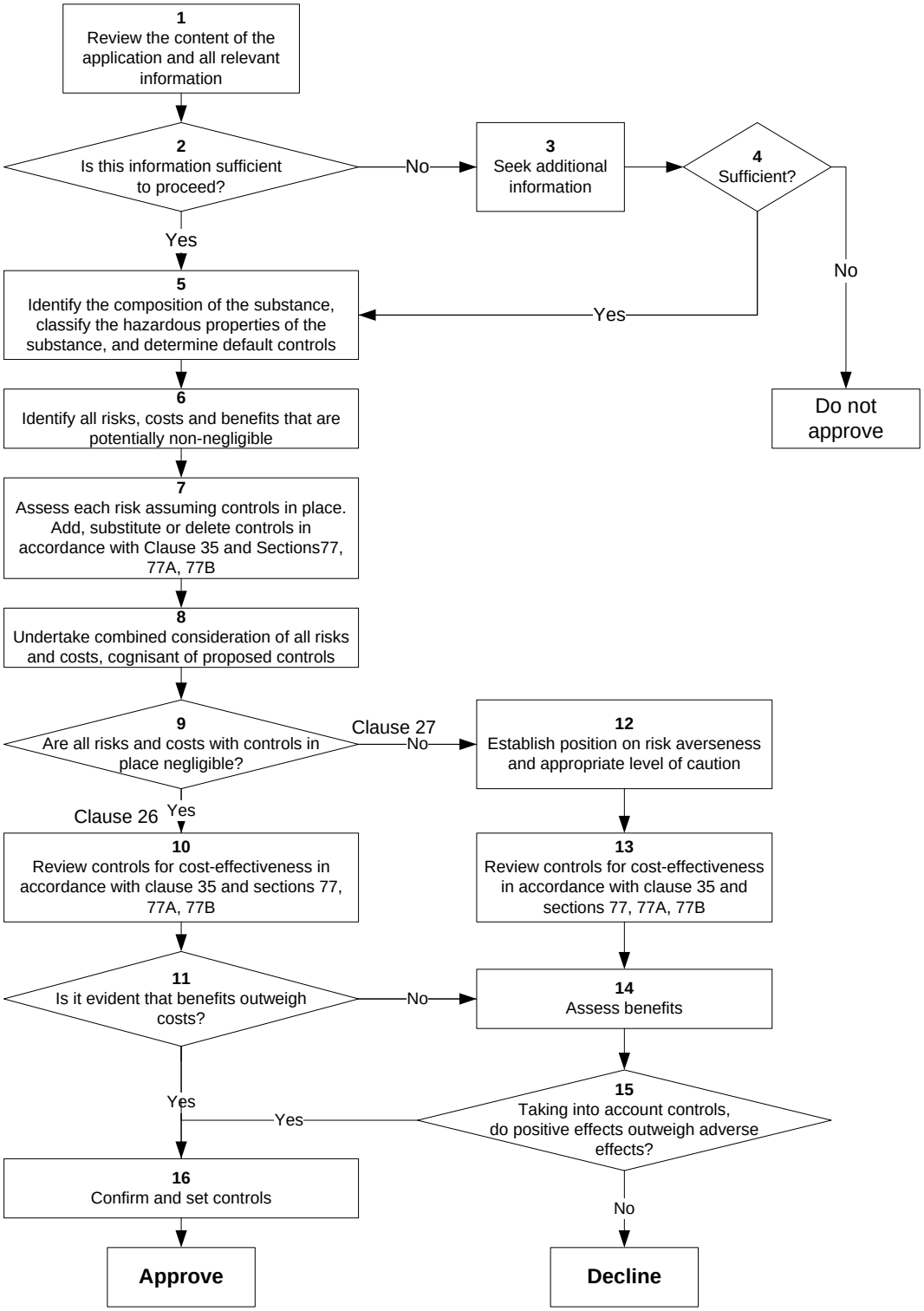
The decision path has two parts –

- Flowchart (a logic diagram showing the process prescribed in the Methodology and the HSNO Act to be followed in making a decision), and
- Explanatory notes (discussion of each step of the process).

Of necessity the words in the boxes in the flowchart are brief, and key words are used to summarise the activity required. The explanatory notes provide a more comprehensive description of each of the numbered items in the flowchart, and describe the processes that should be followed to achieve the described outcome.

[3] The HSNO decision maker refers to either the EPA Board or any committee or persons with delegated authority from the Board.

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



Explanatory Notes

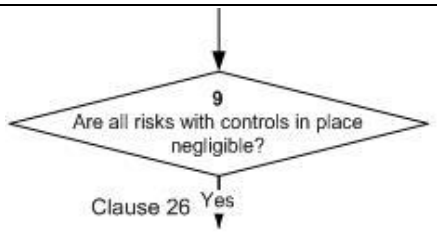
Item 1:	**Review the content of the application and all relevant information** Review the application, the E&R Report, and information received from experts and that provided in submissions (where relevant) in terms of section 28(2) of the Act and clauses 8, 15, 16 and 20 of the Methodology.
Item 2:	**Is this information sufficient to proceed?** Review the information and determine whether or not there is sufficient information available to make a decision. The Methodology (clause 8) states that the information used by the HSNO decision maker in evaluating applications shall be that which is appropriate and relevant to the application. While the HSNO decision maker will consider all relevant information, its principal interest is in information which is significant to the proper consideration of the application; i.e. information which is "necessary and sufficient" for decision-making.
Item 3:	**(if 'no' from item 2) Seek additional information** If there is not sufficient information then additional information may need to be sought from the applicant, the EPA staff or other parties/experts under section 58 of the Act (clause 23 of the Methodology).
Item 4	**Sufficient?** When additional information has been sought, has this been provided, and is there now sufficient information available to make a decision? If the HSNO decision maker is not satisfied that it has sufficient information for consideration, then the application must be declined under section 29(1)(c).
Item 5:	**(If 'yes' from item 2 or from item 4) Identify the composition of the substance, classify the hazardous properties, and determine default controls** Identify the composition of the substance, and establish the hazard classifications for the identified substance. Determine the default controls for the specified hazardous properties using the regulations 'toolbox'.
Item 6:	**Identify all risks, costs and benefits that are potentially non-negligible**[4] Costs and benefits are defined in the Methodology as the value of particular effects (clause 2). However, in most cases these 'values' are not certain and have a likelihood attached to them. Thus costs and risks are generally linked and may be addressed together. If not, they will be addressed separately. Examples of costs that might not be obviously linked to risks are direct financial costs that cannot be considered as 'sunk' costs (see footnote 1). Where such costs arise and they have a market economic effect they will be assessed in the same way as risks, but their likelihood of occurrence will be more certain (see also item 11). Identification is a two-step process that scopes the range of possible effects (risks, costs and

[4] Relevant effects are **marginal effects**, or the changes that will occur as a result of the substance being available. Financial costs associated with preparing and submitting an application are not marginal effects and are not effects of the substance(s) and are therefore not taken into account in weighing up adverse and positive effects. These latter types of costs are sometimes called 'sunk' costs since they are incurred whether or not the application is successful.

	benefits).	
	Step 1:	Identify all possible risks and costs (adverse effects) and benefits (positive effects) associated with the approval of the substance(s), and based on the range of areas of impact described in clause 9 of the Methodology and sections 5 and 6 of the Act[5]. Consider the effects of the substance through its lifecycle (clause 11) and include the likely effects of the substance being unavailable (sections 29(1)(a)(iii) and 29(1)(b)(iii)). Relevant costs and benefits are those that relate to New Zealand and those that would arise as a consequence of approving the application (clause 14). Consider short term and long term effects. Identify situations where risks and costs occur in one area of impact or affect one sector and benefits accrue to another area or sector; that is, situations where risks and costs do not have corresponding benefits.
	Step 2:	Document those risks, costs and benefits that can be readily concluded to be negligible[6], and eliminate them from further consideration. Note that where there are costs that are not associated with risks some of them may be eliminated at this scoping stage on the basis that the financial cost represented is very small and there is no overall effect on the market economy.
Item 7:	**Assess each risk assuming controls in place. Add, substitute or delete controls in accordance with clause 35 and sections 77, 77A and 77B of the Act.** The assessment of potentially non-negligible risks and costs should be carried out in accordance with clauses 12, 13, 15, 22, 24, 25, and 29 to 32 of the Methodology. The assessment is carried out with the default controls in place. Assess each potentially non-negligible risk and cost estimating the magnitude of the effect if it should occur and the likelihood of it occurring. Where there are non-negligible financial costs that are not associated with risks then the probability of occurrence (likelihood) may be close to 1. Relevant information provided in submissions should be taken into account. The distribution of risks and costs should be considered, including geographical distribution and distribution over groups in the community, as well as distribution over time. This information should be retained with the assessed level of risk/cost. This assessment includes consideration of how cautious the HSNO decision maker will be in the face of uncertainty (section 7). Where there is uncertainty, it may be necessary to estimate scenarios for lower and upper bounds for the adverse effect as a means of identifying the range of uncertainty (clause 32). It is also important to bear in mind the materiality of the uncertainty and how significant the uncertainty is for the decision (clause 29(a)). Consider the HSNO decision maker's approach to risk (clause 33 of the Methodology) or how risk averse the HSNO decision maker should be in giving weight to the residual risk, where residual risk is the risk remaining after the imposition of controls. See EPA report 'Approach to Risk' for further guidance[7].	

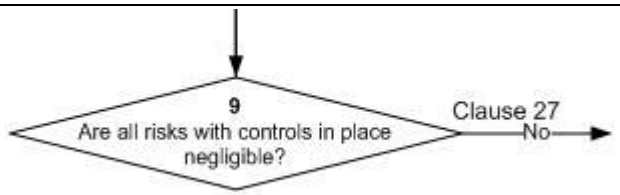
[5] Effects on the natural environment, effects on human health and safety, effects on Maori culture and traditions, effects on society and community, effects on the market economy.

[6] Negligible effects are defined in the Annotated Methodology as "Risks which are of such little significance in terms of their likelihood and effect that they do not require active management and/or after the application of risk management can be justified by very small levels of benefits.

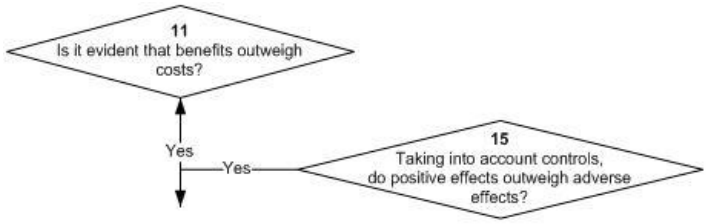
	Where it is clear that residual risks are non-negligible and where appropriate controls are available, add substitute or delete controls in accordance with sections 77 and 77A of the Act to reduce the residual risk to a tolerable level. If the substance has toxic or ecotoxic properties, consider setting exposure limits under section 77B. While clause 35 is relevant here, in terms of considering the costs and benefits of changing the controls, it has more prominence in items 10 and 13 If changes are made to the controls at this stage then the approach to uncertainty and the approach to risk must be revisited.
Item 8:	**Undertake combined consideration of all risks and costs, cognisant of proposed controls** Once the risks and costs have been assessed individually, if appropriate consider all risks and costs together as a 'basket' of risks/costs. This may involve combining groups of risks and costs as indicated in clause 34(a) of the Methodology where this is feasible and appropriate, or using other techniques as indicated in clause 34(b). The purpose of this step is to consider the interactions between different effects and determine whether these may change the level of individual risks.
Item 9:	**Are all risks with controls in place negligible?** Looking at individual risks in the context of the 'basket' of risks, consider whether all of the residual risks are negligible.
Item 10:	 **(from item 9 - if 'yes') Review controls for cost-effectiveness in accordance with clause 35 and sections 77, 77A and 77B** Where all risks are negligible the decision must be made under clause 26 of the Methodology. Consider the practicality and cost-effectiveness of the proposed individual controls and exposure limits (clause 35). Where relevant and appropriate, add, substitute or delete controls whilst taking into account the view of the applicant, and the cost-effectiveness of the full package of controls.
Item 11:	**Is it evident that benefits outweigh costs?** Risks have already been determined to be negligible (item 9). In the unusual circumstance where there are non-negligible costs that are not associated with risks they have been assessed in item 7. Costs are made up of two components: internal costs or those that accrue to the applicant, and external costs or those that accrue to the wider community. Consider whether there are any non-negligible external costs that are not associated with risks. If there are no external non-negligible costs then external benefits outweigh external costs. The fact that the application has been submitted is deemed to demonstrate existence of internal or private net benefit, and therefore total benefits outweigh total costs[8]. As indicated above, where risks are deemed to be negligible, and the only identifiable costs resulting from approving an application are

[7] http://www.epa.govt.nz/Publications/Approach-to-Risk.pdf

[8] Technical Guide 'Decision making' section 4.9.3. Where risks are negligible and the costs accrue only to the applicant, no explicit cost benefit analysis is required. In effect, the HSNO decision maker takes the act of making an application as evidence that the benefits outweigh the costs. See also Protocol Series 1 'General requirements for the Identification and Assessment of Risks, Costs, and Benefits'.

	shown to accrue to the applicant, then a cost-benefit analysis will not be required. The act of an application being lodged will be deemed by the HSNO decision maker to indicate that the applicant believes the benefits to be greater than the costs. However, if this is not the case and there are external non-negligible costs then all benefits need to be assessed (via item 14).
Item 12:	 **(if 'no' from item 9) Establish position on risk averseness and appropriate level of caution** Although 'risk averseness' (approach to risk, clause 33) is considered as a part of the assessment of individual risks, it is good practice to consolidate the view on this if several risks are non-negligible. This consolidation also applies to the consideration of the approach to uncertainty (section 7).
Item 13:	**Review controls for cost-effectiveness in accordance with clause 35 and sections 77, 77A and 77B** This constitutes a decision made under clause 27 of the Methodology (taken in sequence from items 9 and 12). Consider whether any of the non-negligible risks can be reduced by varying the controls in accordance with sections 77 and 77A of the Act, or whether there are available more cost-effective controls that achieve the same level of effectiveness (section 77A(4)(b) and clause 35(a)). Where relevant and appropriate, add, substitute or delete controls whilst taking into account the views of the applicant (clause 35(b)), and making sure that the total benefits that result from doing so continue to outweigh the total risks and costs that result. As for item 7, if the substance has toxic or ecotoxic properties, consider exposure limits under section 77B.
Item 14:	**(if 'no' from item 11 or in sequence from item 13) Assess benefits** Assess benefits or positive effects in terms of clause 13 of the Methodology. Since benefits are not certain, they are assessed in the same way as risks. Thus the assessment involves estimating the magnitude of the effect if it should occur and the likelihood of it occurring. This assessment also includes consideration of the HSNO decision maker's approach to uncertainty or how cautious the HSNO decision maker will be in the face of uncertainty (section 7). Where there is uncertainty, it may be necessary to estimate scenarios for lower and upper bounds for the positive effect. An understanding of the distributional implications of a proposal is an important part of any consideration of costs and benefits, and the distribution of benefits should be considered in the same way as for the distribution of risks and costs. The HSNO decision maker will in particular look to identify those situations where the beneficiaries of an application are different from those who bear the costs[9]. This is important not only for reasons related to fairness but also in forming a view of just how robust any claim of an overall net benefit might be. It is much more difficult to sustain a claim of an overall net benefit if those who enjoy the benefits are different to those who will bear the costs. Thus where benefits accrue to one area or sector and risks and costs are borne by another

[9] This principle derives from Protocol Series 1, and is restated in the Technical Guide 'Decision making'.

	area or sector then the HSNO decision maker may choose to be more risk averse and to place a higher weight on the risks and costs. As for risks and costs, the assessment is carried out with the default controls in place.
Item 15:	**Taking into account controls, do positive effects outweigh adverse effects?** In weighing up positive and adverse effects, consider clause 34 of the Methodology. Where possible combine groups of risks, costs and benefits or use other techniques such as dominant risks and ranking of risks. The weighing up process takes into account controls proposed in items 5, 7, 10 and/or 13. Where this item is taken in sequence from items 12, 13 and 14 (i.e. risks are not negligible) it constitutes a decision made under clause 27 of the Methodology. Where this item is taken in sequence from items 9, 10, 11 and 14 (i.e. risks are negligible, and there are external non-negligible costs) it constitutes a decision made under clause 26 of the Methodology.
Item 16:	 **(if 'yes' from items 11 or 15) Confirm and set controls** Controls have been considered at the earlier stages of the process (items 5, 7, 10 and/or 13). The final step in the decision-making process brings together all the proposed controls, and reviews for overlaps, gaps and inconsistencies. Once these have been resolved the controls are confirmed.

Appendix C: Classifications of the approvals being considered

Table 1: Classification changes for the active ingredients

Active Ingredient	Classification Changes
3(2H)-Isothiazolone, 4,5-dichloro-2-octyl- (DCOIT)	Add 6.1D oral (value 567 mg/kg) Add 9.3B
Chlorothalonil	9.2B changed to 9.2C
Copper (I) oxide	None
Copper pyrithione	Remove 6.3A Add 6.8B and 6.9A oral and inhalation Add 9.3B
Copper thiocyanate	Remove 6.9B
Dichlofluanid	Remove 6.1D oral Add 9.4C
Diuron	Remove 6.4A Add 6.7B 9.3C changed to 9.3B
Irgarol 1051	Remove 6.4A
Mancozeb	None
Octhilinone	None
Thiram	6.1C changed to 6.1B (value 0.5 mg/L) Remove 6.3B Add 6.8B
Tolyfluanid	Remove 6.1C oral
Zinc pyrithione	Remove 6.3A Add 6.9A inhalation
Zineb	Remove 9.2C

Ziram	Remove 6.3B

Table 2: HSNO classifications of antifouling paints

Substance Description and Trade Name	Approval Number	HSNO Hazard Classification
Hempel's Antifouling Globic	HSR000112	3.1C, 6.3B, 6.4A, 6.5B, 6.6A, 6.8B, 6.9B, 9.1A
ABC7 ANTIFOULING	HSR001748	3.1C, 6.1D, 6.3A, 8.3A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3C
SeaSafe Ultra	HSR100427	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.3C
Waterbased Antifouling Range	HSR000041	6.1D, 6.3B, 6.4A, 6.8A, 6.9B, 9.1A, 9.3B
Antifouling paint containing 195 g/litre cuprous oxide	HSR000919	6.1E, 6.4A, 6.9B, 9.1A, 9.3C
Antifouling paint containing 245 g/litre cuprous oxide	HSR000920	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3C
Antifouling paint containing 521 g/litre cuprous oxide	HSR000921	3.1C, 6.1D, 6.3B, 6.4A, 6.5B, 6.7B, 6.8B, 6.8C, 6.9B, 9.1A, 9.3B
Antifouling paint containing 1000 g/kg cuprous oxide (Part B)	HSR000922	6.1D, 6.4A, 6.9B, 9.1A, 9.3B
Antifouling paint containing 754 g/litre cuprous oxide and 550 g/litre zinc oxide	HSR000929	3.1C, 6.1D, 6.3B, 6.4A, 6.5B, 6.9B, 9.1A, 9.3B
Antifouling paint containing 780 g/litre cuprous oxide and 220 g/litre zinc oxide	HSR000930	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3B
Antifouling paint containing 840 g/litre cuprous oxide and	HSR000931	Split approval into 2 approvals 1. Antifouling paint containing 840 g/litre cuprous oxide and

350 g/litre zinc oxide		350 g/litre zinc oxide HSR000931 3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.8C, 6.9B, 9.1A, 9.3B
		2. Antifouling Seavictor 50 HSR100846 3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.8C, 6.9B, 9.1A, 9.3B
Hempel's Antifouling Olympic 86901 colour range	HSR002484	Split approval into 2 approvals 1. Hempel's Antifouling Olympic 86901 colour range HSR002484 3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.3B
		2. Reduced Copper Antifouling Range (Range C) HSR100848 3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.8C, 6.9B, 9.1A, 9.3B
Hempel's Antifouling Olympic 86951 colour range	HSR002698	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.3B
Antifouling paint containing 640-655g/L cuprous oxide	HSR100080	3.1C, 6.1D, 6.3B, 6.4A, 6.5B, 6.9B, 9.1A, 9.3B
Micron 77 Red	HSR100057	3.1C, 6.1D, 6.3A, 6.7B, 6.8B, 6.8C, 6.9B, 8.3A, 9.1A, 9.3B
Micron 77 Blue	HSR100058	3.1C, 6.1D, 6.3A, 6.7B, 6.8B, 6.8C, 6.9B, 8.3A, 9.1A, 9.3B
Micron 77 Black	HSR100059	3.1C, 6.1D, 6.3A, 6.7B, 6.8B, 6.8C, 6.9B, 8.3A, 9.1A, 9.3B
Micron 77 Navy	HSR100060	3.1C, 6.1D, 6.3A, 6.7B, 6.8B, 6.8C, 6.9B, 8.3A, 9.1A, 9.3B
Antifouling paint containing	HSR000923	3.1C, 6.1D, 6.3B, 6.4A, 6.5B,

408 - 494 g/litre cuprous oxide and 34 - 42 g/litre dichlofluanid		6.8B, 6.9B, 9.1A, 9.3B
Antifouling paint containing 215 g/litre copper thiocyanate and 36 g/litre dichlofluanid	HSR000889	3.1C, 6.1E, 6.3B, 6.4A, 6.5B, 6.8B, 6.9B, 9.1A
Antifouling paint containing 20 g/litre diuron (Part A)	HSR000934	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.2B, 9.3C
Antifouling paint containing 450 - 849 g/litre cuprous oxide and 40 - 70 g/litre diuron	HSR000924	Split approval into 3 approvals 1. Antifouling paint containing 450 - 849 g/litre cuprous oxide and 40 - 70 g/litre diuron HSR000924 3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.2A, 9.3B
		2. Antifouling paint containing 450 - 849 g/litre cuprous oxide and 40 - 70 g/litre diuron (aspiration hazard) (Substance A) HSR100852 3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.2A, 9.3B
		3. Antifouling paint containing 450 - 849 g/litre cuprous oxide and 40 - 70 g/litre diuron (aspiration hazard) (Substance B) HSR100853 3.1C, 6.1D, 6.3B, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.2A, 9.3B
Antifouling paint containing 580 g/litre cuprous oxide, 65	HSR000925	3.1C, 6.1D, 6.4A, 6.7B, 6.8B,

g/litre diuron and 320 g/litre zinc oxide		6.9B, 9.1A, 9.2A, 9.3B
Antifouling paint containing 760 g/litre cuprous oxide, 62 g/litre diuron and 165 g/litre zinc oxide	HSR000926	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.2A, 9.3B
Alloy Antifouling Range	HSR000038	3.1C, 6.1D, 6.3A, 8.3A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.2A, 9.3C
Antifouling paint containing 230 g/litre copper thiocyanate and 40 g/litre diuron	HSR000916	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.2A, 9.3C
Ablative A1 Antifouling Range Trade Names Ablative A1 Antifouling Range Antifouling SeaQuantum Classic Antifouling SeaQuantum Ultra Hempel's A/F Globic NCT 8190M Hempel's A/F Globic NCT 8195M	HSR000036	Split approval into 3 approvals 1. Hempel's A/F Globic NCT HSR100851 3.1C, 6.1D, 6.3A, 8.3A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.3B
		2. Antifouling SeaQuantum Ultra HSR100854 3.1C, 6.1D, 6.3A, 8.3A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3B
		3. Antifouling Seaquantum Classic HSR100849 3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3B
Reduced Copper Antifouling Range (Range D)	HSR007955	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.9B, 9.1A, 9.3B
Hard B Antifouling Range	HSR000040	3.1C, 6.1D, 6.3A, 8.3A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3B
Ablative A Antifouling Range	HSR000035	Split approval into 2 1. Ablative A Antifouling Range HSR000035

		3.1C, 6.1D, 6.3A, 8.3A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3B
		2. AF1000 HSR100847 3.1C, 6.1D, 6.3A, 8.3A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3C
Antifouling paint containing 750 g/litre cuprous oxide, 50 g/litre thiram and 260 g/litre zinc oxide	HSR000928	3.1C, 6.1D, 6.3B, 6.4A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3B
Alloy C Antifouling Range	HSR000952	3.1C, 6.1D, 6.3B, 6.4A, 6.5B, 6.8A, 6.9B, 9.1A, 9.2B, 9.3C
Optima Activator (Black)	HSR000103	6.1C, 6.8B, 6.9A, 8.3A, 9.1A, 9.3C
Optima Activator (Blue)	HSR000104	6.1C, 6.8B, 6.9A, 8.3A, 9.1A, 9.3C
Optima Activator (Red)	HSR000105	6.1C, 6.3B, 8.3A, 6.8B, 6.9A, 9.1A, 9.3C
Optima Activator (White)	HSR000106	6.1C, 6.8B, 6.9A, 8.3A, 9.1A, 9.3C
Antifouling paint containing 640 g/litre cuprous oxide and 60 g/litre zinc pyrithione	HSR000932	Split approval into 2 approvals 1: Antifouling paint containing 640 g/litre cuprous oxide and 60 g/litre zinc pyrithione HSR000932 3.1C, 6.1D, 6.3A, 8.3A, 6.7B, 6.8B, 6.8C, 6.9B, 9.1A, 9.3B
		2.Antifouling paint containing cuprous oxide and zinc pyrithione HSR100850 3.1C, 6.1D, 6.3B, 8.3A, 6.7B, 6.8B, 6.8C, 6.9B, 9.1A, 9.3B

Trilux 33 White	HSR000121	3.1C, 6.1D, 6.3B, 8.3A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3C
Alloy B Antifouling Range	HSR000951	3.1C, 6.1D, 6.3B, 8.3A, 6.5B, 6.8A, 6.9B, 9.1A, 9.2B, 9.3C
Antifouling paint containing 648 g/litre cuprous oxide and 70 g/litre zineb	HSR000933	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.8B, 6.9B, 9.1A, 9.3B
SeaForce 60	HSR100411	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.3B
SeaForce 90	HSR100412	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.9B, 9.1A, 9.3B
Antifouling paint containing 290 g/litre copper thiocyanate, 220 g/litre zinc oxide and 55 g/litre zineb	HSR000918	3.1C, 6.1D, 6.3A, 6.4A, 6.5B, 6.7B, 6.8B, 6.8C, 6.9B, 9.1A, 9.3C
ABC #3 Antifouling	HSR007897	3.1C, 6.1D, 6.3A, 6.5B, 6.8B, 6.9B, 8.3A, 9.1A, 9.3B

Appendix D: Abbreviations and acronyms

Term	Definition
Acute	Adverse effect that occurs after a single exposure which usually lasts for a short time.
Approved Handler	A person who holds a current test certificate certifying that the person has met the requirements of Hazardous Substances and New Organisms (Personnel Qualifications) Regulations 2001 in relation to an approved handler for one or more hazard classifications or hazardous substances.
Benefit	The value of a positive effect expressed either in monetary or non-monetary terms.
Biocide	A substance that is solely designed for biocidal action as defined in Schedule 6 (1) of the Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001.
Chronic	Adverse effect that occurs after a repeated exposure and which usually is long lasting and recurring.
Co-biocide	A co-biocide is a second active ingredient added into a formulation in order to make it more effective against a wider range of microorganisms.
Cost	The value of an adverse effect expressed either in monetary or non-monetary terms.
Exposure	Human or environmental organism contact with a substance.
HSNO	The Hazardous Substances and New Organisms Act 1996.
Likelihood	The probability of an effect occurring.
LOC	The Level of Concern is a point above which there is a risk of an adverse effect occurring. For this reassessment the LOC is equivalent to a risk quotient of 1.
Magnitude	Expected level of effect.
SDS	Safety Data Sheets contain data regarding the properties of a substance and procedures for handling or working with that substance.
PNEC	Predicted Non Effective Concentration is the calculated concentration of a chemical that could be safely present in the environment, with no species being affected.
PPE	Personal Protective Equipment including any item of equipment used to protect a person from hazards e.g. safety helmet, goggles, gloves, boots, respirator.
RPE	Respiratory Protective Equipment (a type of PPE).
Risk	The combination of the magnitude of an adverse effect and the probability of its occurrence.
RQ	Risk quotient is the ratio of predicted exposure concentration to the predicted no effect concentration.

Appendix E: Controls for antifouling paints

For the full list of controls applying to each of the approved substances, see the separate document ‘APP201051 Appendix E: Controls for antifouling paints’, which can be found on the EPA website.