greater WELLINGTON
REGIONAL COUNCIL

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Committee **Environment Management**
Authors **Juliet Milne, Surface Water Quality Scientist**
Bruce Croucher, Contamination and Land Scientist

Antifouling co-biocides in Wellington's coastal waters

1. Purpose

To present the analytical results of water samples collected in the Wellington region as part of a national investigation into the concentrations of antifouling co-biocides in New Zealand's coastal waters[1].

2. Background

In February 2006, seawater samples were collected from seven sites in boating areas around the western Wellington coastline and analysed for the antifouling co-biocides Irgarol 1051 and diuron. This investigation was undertaken as a follow-up to the previous survey of New Zealand's coastal waters and sediments in 2003. The earlier survey did not include any sampling in the Wellington region. Greater Wellington provided funding to ensure that Wellington sites were included in the 2006 investigation.

2.1 Antifouling paints and co-biocides

Antifouling paints are applied to the hulls of both commercial and recreational vessels to prevent or slow down the growth of fouling organisms. In preventing growth on boat hulls, antifouling paints may also limit the spread of invasive species.

Current formulations of marine antifouling paints have copper as the primary biocide, with a *co-biocide* added to boost the toxicity of the paint to fouling species. The use of co-biocides has come under increasing scrutiny during the past decade, particularly in Europe and Scandinavia. In the United Kingdom,

[1] This paper is a brief summary of the following report: Stewart, C. (2006). *Antifouling co-biocides in New Zealand coastal waters: 2006 resurvey.* A report prepared for the Ministry for the Environment, April 2006.

five co-biocides have been deregistered for antifouling use because of health or environmental concerns. However, the use of co-biocides is predicted to increase globally, because the previous generation of marine antifouling paints based on tributyltin is being phased out over 2003-2008 and being replaced by co-biocide-based paints.

In New Zealand, there are currently 45 marine antifouling paints registered under the HSNO legislation, of which about 75% contain co-biocides. A survey funded by the Ministry for the Environment in 2003 determined concentrations in seawater and sediment of the co-biocides Irgarol 1051 (an s-triazine herbicide developed specifically for antifouling uses) and diuron (a general-purpose urea herbicide). These co-biocides work by inhibiting photosynthesis, and because they are broad-spectrum rather than selective herbicides, they are toxic to a wide range of aquatic plants, including phytoplankton, macroalgae (seaweeds), macrophytes such as reeds and seagrasses, and mangroves. They are also highly toxic to corals and, as the compounds are persistent in surface waters, they have a tendency to bioaccumulate in aquatic plants. The key finding of the 2003 study was that concentrations of Irgarol 1051 do not currently pose a risk to New Zealand's marine environment, but that diuron was widespread in coastal waters at concentrations similar to those reported in Europe.

3. Objectives of the national investigation

The objectives of the 2006 national follow-up investigation were:

- to determine terrestrial inputs of diuron to coastal waters
- to discern any changes in seawater concentrations of the co-biocides between 2003 and 2006
- to extend the previous work more widely into more representative aquatic areas; and
- to use the recent data for an updated risk assessment.

4. Results and discussion

Irgarol was not detected in any samples from the Wellington region or in any samples from other regions. However, measurable concentrations of diuron were found in six of the seven seawater samples collected in the Wellington region (and 23 of the 30 samples collected nationally). The highest concentrations in the Wellington region were recorded at Seaview marina and Mana marina (250 ng/L and 220 ng/L respectively). Lower concentrations, in the range of 30-90 ng/L were found at Evans Bay marina, Port Nicholson Yacht Club and Chaffers marina. Diuron was not detected in the Onepoto Arm of Porirua Harbour (adjacent to Whitireia Park).

Overall, the national resurvey found diuron concentrations were highest at marina sites[2], with the concentrations recorded at Seaview and Mana marinas amongst the highest of the 30 seawater samples collected in the survey, and similar to those found in Auckland marinas. At present, the data set is too small and preliminary to determine whether diuron inputs to Wellington Harbour, both from recreational boats and also larger boats (e.g., fishing boats, ferries and commercial shipping), are leading to contamination in areas outside of marinas, as was observed for the Waitemata Harbour in Auckland. It is expected that wider contamination is less likely to be problem in Wellington as recreational boating occurs on a much smaller scale.

In general, the findings of the 2006 investigation suggest that the risks associated with diuron exposure are largely limited to marinas, and even the marina samples exceed only the most conservative (United Kingdom) guideline values. However, diuron levels in far-field samples from some areas are not much lower than levels in United Kingdom estuaries prior to the review and deregistration of diuron as an antifouling co-biocide. In addition, sampling has only been carried out in summer, and it is not known whether diuron concentrations vary seasonally. The author of the national investigation therefore recommends continued monitoring of diuron in coastal waters.

5. Conclusion

The current use of co-biocide-based antifoulants is not resulting in unacceptable risks to the marine environment but continued monitoring of diuron in coastal waters is advisable.

6. Strategic context

This report gives effect to the following objectives of the Regional Policy Statement and Regional Coastal Plan:

- Coastal water quality is of a high standard
- High quality water in the coastal marine area is protected and not degraded from human activities.

7. Communications

No further public communication is necessary for this report.

[2] The highest concentration was recorded at Nelson marina (480 mg/L).

8. Recommendations

It is recommended that the Committee:

1. ***Receive** the report; and*

2. ***Note** the contents.*

Report prepared by:

Juliet Milne
Surface Water Quality Scientist

Report prepared by:

Bruce Croucher
Contamination and Land Scientist

Report approved by:

John Sherriff
Manager, Resource Investigations

Report approved by:

Nigel Corry
Divisional Manager,
Environment Management