Office of the
PARLIAMENTARY COMMISSIONER FOR THE ENVIRONMENT

CHE/6G

20 March 1987

Dr R.W.G. Blakeley
Secretary
Ministry for the Environment
PO Box 10362
WELLINGTON

Attention: J. O'Grady
Director
Pollution Management Directorate

Dear Roger

THE EFFECT OF TRIBUTYL TIN (TBT) BASED ANTI-FOULING PAINTS ON THE MARINE ENVIRONMENT

I enclose copies of reports on the above topic, recently compiled by this office.

The report on the 'overseas experience' shows that scientists in the northern hemisphere are becoming increasingly concerned about the effects of TBT-based anti-fouling paints on non-target organisms and coastal ecosystems generally. France has banned the use of TBT-based paints on vessels less than 25 m, the British Government has restricted the use of TBT paints and the United States and Japan are considering similar moves. TBT is extremely toxic and there are similarities with DDT.

The question arises as to whether or not the New Zealand administrative response has been adequate to date, taking into account factors such as:- the northern hemisphere experience, the widespread use of TBT paints in this country, recent findings by Ministry of Agriculture and Fisheries (MAF) scientists in and adjacent to NZ marinas, possible adverse effects on oyster farming operations near Warkworth and the increasing popularity of pleasure boating in this country. I think that, for a variety of reasons, this question should be addressed sooner rather than later.

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Since the enclosed reports were completed, it has been drawn to my attention that in 1985 staff at the Hamilton Science Centre (MWD) prepared a brief internal report on anti-fouling paints in response to an information request from the Commission for the Environment. This report, with recommendations, was referred to Head Office MWD (Water and Soil Directorate) but I understand that it was never placed before the National Authority (NWASCA) because Directorate staff were aware that the issue was under investigation by MAF scientists, with the assistance of the DSIR.

I suggest that it would be appropriate for your Ministry, pursuant to section 31c of the Environment Act, to convene a meeting of interested parties including the Health Department, MAF, DSIR, MWD (Water and Soil Division), Harbours Association, user groups, and representatives of the NZ Paint Manufacturers Association to discuss the matter.

I would be grateful if you could keep me informed.

Yours sincerely

Helen R Hughes
Parliamentary Commissioner for the Environment

Encl

PRELIMINARY INVESTIGATION REPORT

File No: CHE 6/G
Investigating Officer: B Armstrong
Date: 17 March 1987
Topic: The effect of Tributyl Tin (TBT) based anti-fouling paints on the marine environment.

Reason for Investigation:

Follow-up to letter from P. J. Roberts, Howick, Auckland drawing Parliamentary Commissioner's attention to the potentially serious impact of anti-fouling paints on the marine environment, estuarine areas in particular.

Relevance of Topic to PCE's Mission and Functions:

The suggestion is that there is a real threat to the integrity of coastal marine ecosystems, arising from the use of anti-fouling paints. Consequently, the issue is relevant to all of the matters set out in Section C of the long title to the Environment Act 1986.

Section 16(c) of the Act states that it is within the Commissioner's powers to investigate any matter in respect of which, in the Commissioner's opinion, the environment may be or has been adversely affected.

Section 17 provides for the Commissioner to have regard to -

(a) the maintenance of ecosystems;

(b) any areas which are part of the heritage of the tangata whenua and which contribute to their well being;

(d) whether any action is likely to result in (i) increased pollution; (ii) the occurence of hazardous substances.

Environmental Implications:

Very little work has been undertaken on the environmental impact of anti-fouling paints in New Zealand. Consequently it has been necessary to draw from the overseas experience and a separate report has been prepared to this effect (attached). It is important that the latter be read before proceeding with the rest of this report.

Overseas, controversy has surrounded the use and environmental effects of a substance called tributyl tin (TBT) - a biocidal component of anti-fouling paints. TBT, like DDT, is extremely toxic at low levels, affects non-target organisms and is able to be bioaccumulated. TBT has been linked with serious adverse effects on commercial oyster farming operations (shell

malformation, reduced growth, spatfall failure) in France and the UK, a phenomenen called "imposex" in marine gastropods, reduced diversity of life in marinas and harbours and a range of adverse sublethal effects at different trophic levels. Details are provided in the attached report.

Relevant Legislation

Toxic Substances Act 1979

Section 12(c) of the Act requires the Toxic Substances Board to advise the Minister or the Director-General of Health on any matter relating to the protection of the environment from the harmful effects of any toxic substance.

Water and Soil Conservation Act 1967

Section 34(1b) states that it is an offence to discharge any waste (= matter that is poisonous or harmful to birds or fish) into any natural water

and

Section 34(3) provides that a person shall be deemed to discharge waste into natural water if he places or causes to be placed any waste in a position where it is liable to be washed or percolate into any natural water.

Fisheries Act 1983

Section 75 of the Act, states that it is unlawful to injure, poison, kill or detrimentally affect any fish, fish spawning ground or food of fish in any water (including estuaries) by allowing any toxic substance to fall, flow or percolate into any such waters.

Environment Act 1986

Part II, section 31c provides that the functions of the Ministry for the Environment shall include the control of hazardous substances, including the management of the manufacture, storage, transport and disposal of hazardous substances.

Administering Authorities

- The Health Department administers the Toxic Substances Act 1979
- The Ministry of Works and Development administers the Water and Soil Conservation Act 1967
- The Ministry of Agriculture and Fisheries administers the Fisheries Act 1983

- The Ministry for the Environment is responsible for the functions set out in Part II of the Environment Act 1986.

Administering Authority Response
(Officer-level discussion)

Health Department:

Michael Bates:

The Department is aware of overseas concern with respect to the environmental effects of anti-fouling paints, the TBT component in particular. However, the Department has not yet investigated the matter because its priorities relate to protection of human health, rather than to matters of more general environmental concern. To date there has been no suggestion that TBT poses a threat to human health.

Bates counselled against extrapolating from UK findings to the NZ situation because in the UK the concern related largely to the impact on cultivated oysters and his understanding is that the oyster farms were close to, or sharing estuaries with, marinas. He also suggested that one has to address the question of just how important it is if a 'restricted area' is affected.

Most substances are 'toxic' according to the definition in the Act (a 'grab-all') but certain substances have been included in the 4 schedules to be controlled according to labelling, availability etc. Again, the schedules are orientated towards human health protection. It would be inappropriate to include TBT in the schedules; if TBT is considered to be a real problem then it would be more appropriate for the Department to promote a special regulation to control its use and this would need to be put in front of the Toxic Substances Board.

Judy Barker:

no evidence to suggest that there is a problem in terms of the Food Act which controls the composition, contamination and consumption of food in New Zealand.

Ministry of Works and Development

Russell Howie:

Suggested that further to the relevant provisions of the Water and Soil Conservation Act (above), the use of toxic anti-foulants would appear to be an offence. The matter has not been before NWASCA, to his knowledge. It would not be possible to get a water right to use toxic anti-foulants, under the wording of the current Act.

Ministry of Agriculture and Fisheries

Dr Peter Smith, Dr Dinimani, Fisheries Research, Greta Point:

MAF became involved in early 1986 as a result of the Minister being petitioned by a group of oyster farmers from Maharanga Bay, near Warkworth, for a ban on boats using TBT in that area. The farmers felt that there was probably a cause-effect relationship (similar to that found in the UK) between the increasing number of pleasure boats using the area and poor spat-falls since the early 1980's.

MAF has found levels of TBT in seawater samples from marina sites at Westhaven (Auckland), Port Nicholson and Evans Bay (Wellington), Picton and Havelock ranging from 100-1900 ppt. These levels are considered "biologically significant" because they are greater than those known to be lethal to larvae of marine shellfish tested in overseas laboratory experiements. MAF has also found abnormally thickened rock oysters in Westhaven and abnormally thickened Pacific oysters in Half Moon Bay, Auckland - similar to that which occurs in oysters in France known to have been exposed to TBT. Further, MAF, has tentatively identified cases of "imposex" in the oyster borer, Lepsiella species, in Auckland marinas.

Dr Dinimani is undertaking further research into the relationship between TBT, shell thickening and imposex in NZ coastal waters.

On the basis of their work MAF scientists have concluded that it would be wise to restrict the imput of TBT into the marine environment. Accordingly MAF has produced a set of guidelines for the anti-fouling user, based on UK guidelines. These have been published in the December 1986 issue of Catch magazine (copy attached) and will be widely distributed to boat owners and marina operators. The guidelines cover the application, cleaning off and disposal of anti-fouling.

Ministry for the Environment (MFE)

J. O'Grady:

MFE is aware of overseas concern with respect to TBT in the acquatic environment and is aware of the potential existence of a problem in some parts of New Zealand (MFE has opened a file on the topic and this was made available to the PCE's office during the course of this investigation).

MFE has received letters from the Waitemata Harbour Maritime Planning Authority and the Thames Valley United Council (copies attached) expressing concern about the possible impact of TBT - based anti-fouling paints in relation to marina proposals in their respective regions and requesting MFE and MAF to study the issue as a matter of urgency and to inform them of any steps being taken.

MFE has yet to study the TBT issue in any depth.

Comments from Other Parties

NZ Paint Manufacturers Association

Colin Gooch (President):

TBT, TBTO and 'co-polymer' forms are all "very important" components of NZ anti-fouling paints. The use of tin in NZ would "not be dissimilar" to the UK. (NB. in 1982 over 90 percent of the UK's small yachts used TBT anti-fouling paints).

The PMA is very much aware of the problem and is looking for alternative technology. Anti-fouling paints are available which do not have TBT in them but generally these are not so efficient and permit only a restricted colour range. The individual manufacturers do not publish formulations because of commercial sensitivity. NZPA has a lot of information on the topic and would like to be kept informed of developments.

Investigation by Others:

MAF, Research Division, Greta Point appears to be the only agency undertaking investigations into the effect of TBT in the NZ marine environment and this research is of limited scope. TBT in the freshwater environment is not being investigated.

Public Interest, Media Reports, Scientific Literature

There appears to be no scientific papers on the effect of TBT in the NZ aquatic environment. Two newspapers, the New Zealand Herald (29.11.86) and the Northern Advocate (14.3.87), have carried stories on overseas findings and MAF's preliminary findings in NZ. The journals Catch (December 1986) and Commercial Fishing (February 1982) have published articles based on the (new) MAF guidelines for anti-fouling users.

Assessment

The main points to emerge from this investigation are:

(1) Tributyl Tin (TBT), a man-made component of modern anti-fouling paints, is toxic to marine and fresh water life at levels of a few parts per billion.

(2) Overseas there is growing concern amongst marine scientists as to the effect of TBT on non-target organisms. TBT is particularly toxic to the juvenile stages of marine organisms and to zooplanktan. It has also been shown to inhibit algal production at low levels.

(3) TBT has been linked, through field observations and laboratory experiements, with shell malformations, reduced flesh growth and spatfall failure in oyster farms in France and the UK. TBT is also thought to be responsible for a phenomenen called 'imposex' and reduced reproductive success in certain species of marine gastropod. A number of adverse effects have been demonstrated in the laboratory at TBT concentrations substantially below lethal levels.

(4) There are suggestions that TBT is accumulating in, and adversely affecting, fish and birdlife in the UK but the evidence for this has not been investigated during the course of this study.

(5) Shell malformations and imposex are not restricted to areas of high boating activity but are prevalent in such areas. Estuarine shellfish areas appear to be particularly susceptible due to the hydrology and sedimentary characteristics of estuaries and the ability of shellfish to bio-concentrate TBT from both water and suspended material.

(6) Marine biologists are concerned that adverse effects may be much more widespread than suggested by the readily observable effects. Parallels have been drawn between DDT and TBT but there are significant differences between the two from a toxicological perspective.

(7) Scientists in the US have correlated TBT water levels in excess of 100 parts per trillion (.1 ppb) with a significant decline in the diversity of marine life in marinas and UK scientists have suggested a maximum "safe level" of 20 ppt in seawater.

(8) In New Zealand, MAF scientists have recorded TBT levels of 100-1900 ppt in marina waters, levels known to be greater than those lethal to marine shellfish larvae. In Auckland and Wellington marinas MAF has found cases of shell thickening and 'imposex' similar to those report overseas. Oyster farmers near Warkworth have claimed a correlation between increased pleasure boating activity and reduced spat-fall, since the early 1980's.

(9) Questions yet to be addressed in the NZ context, include the possible effect of TBT on marine life further up the food chain (fish/birds) and the possible effect of TBT in the freshwater environment e.g., lake boat harbour areas.

(10) The French Government has banned the use of TBT paints on vessels less than 25 m. The British Government has introduced special regulations banning the manufacture of high TBT anti-fouling paints and has threatened to ban the use of TBT paints altogether. The US Environmental

Protection Agency has proposals to regulate the use of TBT paints by 1988 and one leading researcher in the US has recently recommended a total ban on the use of TBT paints. The Japanese Government is apparently considering bringing in legislation to control the use of TBT paints.

The central question is whether or not the response of NZ authorities to date has been adequate in terms of overseas findings and the type of response considered appropriate overseas. Although there may be differences between the NZ and UK situation in terms of the flushing rate of harbours and estuaries and the total amount of TBT released into the marine environment, there appears to be no reason to suggest that TBT effects in NZ are likely to be significantly different from those experienced in the UK and elsewhere.

To date the only substantive action taken by administering authorities in NZ has been the publishing of guidelines for the anti-fouling user by the Ministry of Agriculture and Fisheries. It is debatable whether this approach is adequate by itself but it has clearly been deemed not to be so, in France and Great Britain.

Tackling the problem via avenues such as the offence provisions of the Water and Soil Conservation Act 1967 and the Fisheries Act 1983 is inappropriate, for obvious reasons. It would be more appropriate to seek control at source (manufacturing) via the provisions of the Toxic Substances Act - the Health Department could promote a special regulation. Another possibility is for TBT paint to be declared a 'pesticide' to be controlled by the Pesticides Act 1979, an approach adopted by the British Government.

Recommendation:

That

(1) This report and the accompanying report on the overseas situation, be forwarded to all interested parties including the Health Department, Ministry for the Environment, Ministry of Agriculture and Fisheries and the NZ Paint Manufacturers Association, for information and comment.

(2) MFE be requested to convene a meeting of all interested parties at its earliest possible convenience. The purpose of such a meeting would be to discuss whether or not controls on the use of TBT-based anti-fouling paints are warranted in New Zealand and, if so, what form these controls should take.