DREDGINGS DISPOSAL IN THE HAURAKI GULF

FIRST REPORT OF THE TECHNICAL REVIEW PANEL

Office of the
PARLIAMENTARY COMMISSIONER FOR THE ENVIRONMENT
Te Kaitiaki Taiao a Te Whare Pāremata

PO Box 10-241, Wellington, NEW ZEALAND

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1.0 INTRODUCTION

1.1 Background to the Dredgings Disposal

Ports of Auckland Ltd (POAL) applied to the Auckland Regional Water Board in 1990 for water rights to dredge the port and dispose of the spoil in the Hauraki Gulf at a site 34 km from the wharfs. Dredging of the port is required to ensure that the wharfs are usable by all vessels. In the case of the Auckland port, dredging of approximately 40,000 m^3 per annum is required. Because the port had not been dredged for 5-6 years, a backlog of 270,000 m^3 of dredgings was needed.

The application was heard by the Auckland Regional Water Board and its decision was appealed to the Planning Tribunal in 1991. The Planning Tribunal's decision,[1] in December 1991, upheld the water right granted by the Regional Water Board although some conditions were added to the monitoring programme as a result of negotiations between the Maruia Society and the POAL.

The dredging operation commenced in August 1992 and was the focus of public concern and extensive media coverage.

1.2 Establishment of the Panel

The Parliamentary Commissioner for the Environment consulted with Ports of Auckland Ltd, the Auckland City Council and the Auckland Regional Council to seek a way to address some of the issues causing the public concern. The Commissioner suggested to the public authorities that the establishment of an independent technical review panel could be a suitable mechanism to ensure that the public of Auckland had confidence in the monitoring programme and its ability to evaluate the environmental effects of the dredgings disposal.

Both the Ports of Auckland Ltd and the Auckland Regional Council supported the formation of a panel with Ports of Auckland Ltd making a financial contribution. The Commissioner established the Panel under the Environment Act 1986 and chairs the Panel.

The Commissioner consulted widely among the scientific community in New Zealand and Australia for people to participate in a panel. The people chosen were:

- Dr K. Black. Principal Research Scientist, Victorian Institute of Marine Sciences, Melbourne, Australia
- Dr K. Hunter. Associate Professor of Chemistry, University of Otago, Dunedin
- Dr K. Probert. Manager Portobello Marine Laboratory, University of Otago, Dunedin.

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1. New Zealand Underwater Association Incorporated and Maruia Society Incorporated v The Auckland Regional Council and Ports of Auckland Ltd. Decision No a 131/91. Planning Tribunal.

1.3 Function of the Panel

The terms of reference of the Technical Review Panel are:

1. To review the results of the monitoring programme.

2. Note any appropriate modifications and additions that should be included in future monitoring programmes by identifying any missing objectives and reviewing the methodology of the existing monitoring programme.

3. Report findings to the Parliamentary Commissioner for the Environment, Ports of Auckland Ltd and the Auckland Regional Council.

The Panel will meet from time to time to assess the progress of the monitoring programme. The Panel is not part of the statutory process of consent granting and cannot alter or amend the operation of the monitoring programme which is the responsibility of the Port Company or the evaluation of the data which is the function of the Regional Council. There is, however, scope for the Regional Council to review some of the special conditions at the end of the first year of monitoring in August 1993.

The Panel met in Auckland in February 1993 for the first meeting and was briefed by the Regional Council, the Port Company and its consultants and representatives of the New Zealand Underwater Association. The briefing included background to the application to dispose of the spoil and details of the monitoring programme as defined by the conditions of the water right.

This report is the Panel's initial evaluation of the monitoring programme.

1.4 Summary of the Monitoring Programme

The Panel is assessing the monitoring programme at and near the disposal site and has not assessed the monitoring of the dredging operation which took place over a three month period.

The monitoring programme provides for the establishment of standard sampling locations. It stipulates that where a statistically significant difference for any parameter is detected between pre- and post-disposal mean values at the standard sites, then sampling for that parameter is to be carried out at additional sites. The programme also requires establishment of bioaccumulation sampling locations between the disposal site and the Noises Islands, north of the disposal site, and two control sites in areas comparable to the vicinity of the disposal site.

Separate programmes are provided for physical, biological and chemical monitoring. Physical monitoring involves a bathymetric survey of the disposal site and surrounding seabed; and analysis of sediment samples for particle size and presence of

anthropogenic materials. Biological monitoring includes analysis of samples of benthic biota for total abundance and biomass of all macrofauna; and bioaccumulation testing of scallops for stated contaminants. Chemical monitoring involves analysis of samples collected from the standard sites for stated metals and organic carbon content; and comparison with pre-disposal samples.

A detailed description of the monitoring programme is contained in the publication *Immediate Maintenance Dredging 1992 Monitoring Programme. Prepared for Ports of Auckland Ltd by Beca Carter Hollings and Ferner. November 1992.*

1.5 Operation of the Monitoring Programme

The Panel is satisfied that sample collection and sample analysis is being carried out to high technical standards. The way in which monitoring requirements are addressed and become incorporated into a programme depends, to some extent, on the expertise of individuals involved in the process. The quality and thoroughness of the consultants' work is impressive. The laboratories being used for the analytical work have suitable procedures for replication of analyses and control of sample identification.

2.0 INITIAL EVALUATION OF THE MONITORING PROGRAMME

2.1 Sediment Chemistry Monitoring

The first of the two sets of sediment chemistry measurements was due to be made in April 1993 so comment on the meaning and interpretation of the results was not possible when the Panel met in February 1993. This aspect of the programme involves study of sediments from both the disposal site itself and from locations surrounding the disposal site. The purpose of studying sediments from the disposal site is to determine that the material actually deposited at the disposal site has a chemical composition similar to the average composition of the dredged material as determined in the assessments prior to the water right application.

Provision is made in the water right for further toxicity testing of the sediment if its composition proves to be outside statistical limits. The whole protocol procedure will be run through again if the sediment concentrations fall more than three standard deviations above the pre-dredging mean values.

This seems a reasonably well designed component of the programme. Its stated purpose is clear and straightforward and the measurements should answer the questions posed.

The purpose of repeating the tests one year later is unclear. The same results as the first set of measurements should be evident in the second series of tests unless:

- there has been a massive shift in the deposited dredge spoil, or

- the variation in chemical composition of the spoil is very large such that the pre-disposal and the two post-disposal surveys all give different results.

The monitoring is undertaken by sampling from locations adjacent to the edge of the disposal site together with control sites to the north-west of the disposal site. Sampling from additional stations may be required.

The purpose of the sediment chemistry monitoring at locations surrounding the disposal site to determine if contaminated sediments from the disposal cells have moved e.g. through wave dispersal, outside of the disposal site. This analysis is made possible by the enrichment of the dumped sediments in a number of chemical components i.e. trace metals and trace organics relative to the native sediments of the disposal area. As such, this is a reasonably designed test protocol for this particular disposal situation in that it provides some degree of sensitivity for detecting sediment movement after disposal. This method may not be applicable to the disposal of sandy uncontaminated sediments or may not be applicable to other disposal sites.

2.2 Biological Monitoring

This part of the monitoring programme does address key questions relating to impact on benthic communities. However, the Panel considers there may be scope to simplify the monitoring without undermining the purposes of the programme. The benthic sampling programme at the disposal site generates more information than is used in the appraisal and offers the possibility of employing other multivariate methods to examine possible community-wide responses to spoil disposal.

The biological monitoring will, in itself, generate valuable data on spatial and temporal variability of benthic populations. Few studies of this type have been undertaken in New Zealand.

The degree to which the disposal ground is a containment site clearly has implications for the design of the monitoring programme. It is possible though, that the benthic community at sampling locations in the vicinity of the disposal site may be able to cope with considerable dispersal of dredge spoil without exhibiting clear signs of stress.

The REMOTS[2] monitoring, while not part of the conditions of the water right, provides useful information on the sediment profile. The purpose of the REMOTS surveys is to monitor the rate of recolonisation of the dredge spoil on the seabed. The technique depends on photographic interpretation and deducing the stage of succession from the animal-sediment characteristics that are observed. It will be valuable to have this information on the pattern of recolonisation but there is no requirement for parallel biological information to help interpret the images. There is scope to improve the coordination of the REMOTS work with the biological work.

An appreciation of the nature and extent of benthic recolonisation would be assisted by taking box-core samples from within the disposal site.

Although it is not a requirement of the special conditions of the water right, some biological sampling has since been carried out at the disposal site.

Inclusion of the Noises ecological monitoring arises from the concern that 'sensitive' habitats may be exposed to impacts. The relevance and provision of this type of monitoring will be largely site-specific. The measured currents and the depth of the disposal site both indicate that the concentrations of any toxic material will be highly diluted after travelling over 3.5 km between the spoil site and the Noises. Biota vary naturally at annual and inter-annual time scales. The surveys at the Noises may ultimately provide ambiguous results on the environmental effects of spoil disposal at downstream locations.

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[2] The REMOTS camera photographs vertical slices of the surface sediment layer of deposited material.

A repetitive photographic survey has been voluntarily undertaken by the New Zealand Underwater Association (NZUA). The Association has photographed along a transect in deeper water (18 to 22 metres) than the quadrat surveys in the monitoring programme. NZUA suggest that the shallow sites are too prone to regular wave activity for turbidity to have an impact. If sedimentation does occur at greater depths, it will be disturbed less frequently due to lower wave energies at depth, and therefore any excessive turbidity due to the dredging may have a bigger impact on biota.

2.3 Bioaccumulation Monitoring

The intended purpose of this monitoring appears to be to demonstrate whether or not contaminated sediments or leached contaminants can be transported from the disposal site and subsequently affect biological organisms at a typical adjacent site (in this case the Noises).

Although this monitoring programme is part of the conditions of the water right, the Panel has some doubts as to its effectiveness in assessing whether the arrival of sediment at the Noises can be attributed to the dredge spoil disposal.

2.4 Sediment Monitoring

The sediment monitoring is an important part of the overall monitoring programme. The principal means of monitoring is by bathymetric surveys. The surveys use soundings which are accurate to ± 100 mm in absolute levels and are repeated using the same techniques each time. These surveys will provide some reasonable estimate of the volume changes of the spoil and will check the containment capability of the site. If the adjacent seabed is stable, the mound of spoil will show up as a perturbation above a natural datum and repetitive surveys should show volume changes, including consolidation of the material. The accuracy of the results should be specified.

The predicted height of the mound after disposal was up to 7 metres. The height after spoil disposal was nearer 900 mm. The high water content of the spoil may be responsible for the difference between the prediction and the reality. The other explanation is that some sediment has been lost from the site.

Turbidity monitors on the spoil disposal site and on any adjacent control site would have identified any differences in sediment load. Simultaneous measurements of currents and wave orbital motion would have provided essential data needed to place the results in the context of the annual tidal, wave and weather patterns. If storms occurred during the critical period of spoil consolidation, large amounts of sediment could be lost from the site.

A more detailed time series of weather during the monitoring programme should be obtained as the weather on the day of the surveys is not a sufficient indicator of the dynamics of the coastal environment.

Some current meter data has been obtained at the disposal site. Data was collected before the spoil was disposed and during the time the sediment plumes from the disposal operation were being tracked. Current meter data is not being collected during the monitoring programme.

3.0 GENERAL ISSUES

3.1 Design of the Monitoring Programme

In the absence of any New Zealand guidelines for monitoring the environmental effects of spoil disposal, the consultants have considered carefully the problem of a suitable framework for evaluating potential effects. The relevant procedures adopted by international and national agencies have been critically assessed and the tiered approach, particularly to characterisation of the sediment requiring dredging, has much to recommend it.

The Panel understands that the monitoring programme is based on the assumption that the disposal site is a depositional site. The seabed material in a depositional area may be subject to resuspension and, in extreme conditions, transportation but overall, it should accumulate material (i.e. the amount of material leaving the site is less than the amount of material entering the site). A containment site should be located in a depositional area. Both verbal and written evidence that this is so was presented to the Planning Tribunal hearing. The site is in deep water (about 30 metres) which is less affected by swell and wind-driven flows. The site is in an intermediate tidal flow category.

Once the nature of the disposal site was accepted as providing containment, the primary concern was not verification of this finding but verification that the physical, chemical and biological characteristics of the area surrounding the disposal site remained unaffected by the disposal operation. The studies were directed at downstream impacts because the disposal site was assumed to be a containment site.

The degree to which the disposal ground is regarded as a containment site has basic implications for the design of the monitoring programme including the position of sampling locations.

The issue of whether the disposal site is a containment site has been raised by the Panel. At the end of the monitoring programme, the Panel considers that questions of whether most of the material has remained on site and been recolonised will be of great interest to all stakeholders.

3.2 Permissible Levels of Change

One of the problems with any biological monitoring programme is what is the acceptable level of change that can be tolerated and that is ecologically meaningful. It is rare to find with benthic communities, for example, that sufficient information about spatial and temporal variability of populations is available to indicate the amount of change that might be considered abnormal.

Even if it is possible to attribute a difference in some biological index (e.g. abundance or diversity) to human impact, what level of change is acceptable, both in extent and duration?

There is a similar dilemma in considering what is an acceptable level of resuspension of spoil material after dredging compared to that which can occur during storms at sea.

4.0 SUMMARY

The purpose of the Panel's first meeting was to gain an appreciation of the dredgings disposal monitoring programme and the considerable discussions on the issue that had taken place over the past two years.

The initial evaluation is that the monitoring programme has been carefully constructed and does address most of the key questions in assessing the biological and sediment chemistry impacts of the spoil disposal. The lack of monitoring for sediment dynamics as to what is happening to the mound of spoil appears to rest with the assumption that the disposal site is a containment site.

The Panel noted possible changes to some of the conditions that might be able to be achieved within the framework of the present statutory monitoring programme to improve the outcome of the programme. These included:

- refining the biological monitoring programme,

- coordinating the REMOTS camera work with the biological monitoring,

- the use of general automated systems for collecting data.

These issues will be further discussed at the Panel's second meeting in August 1993.