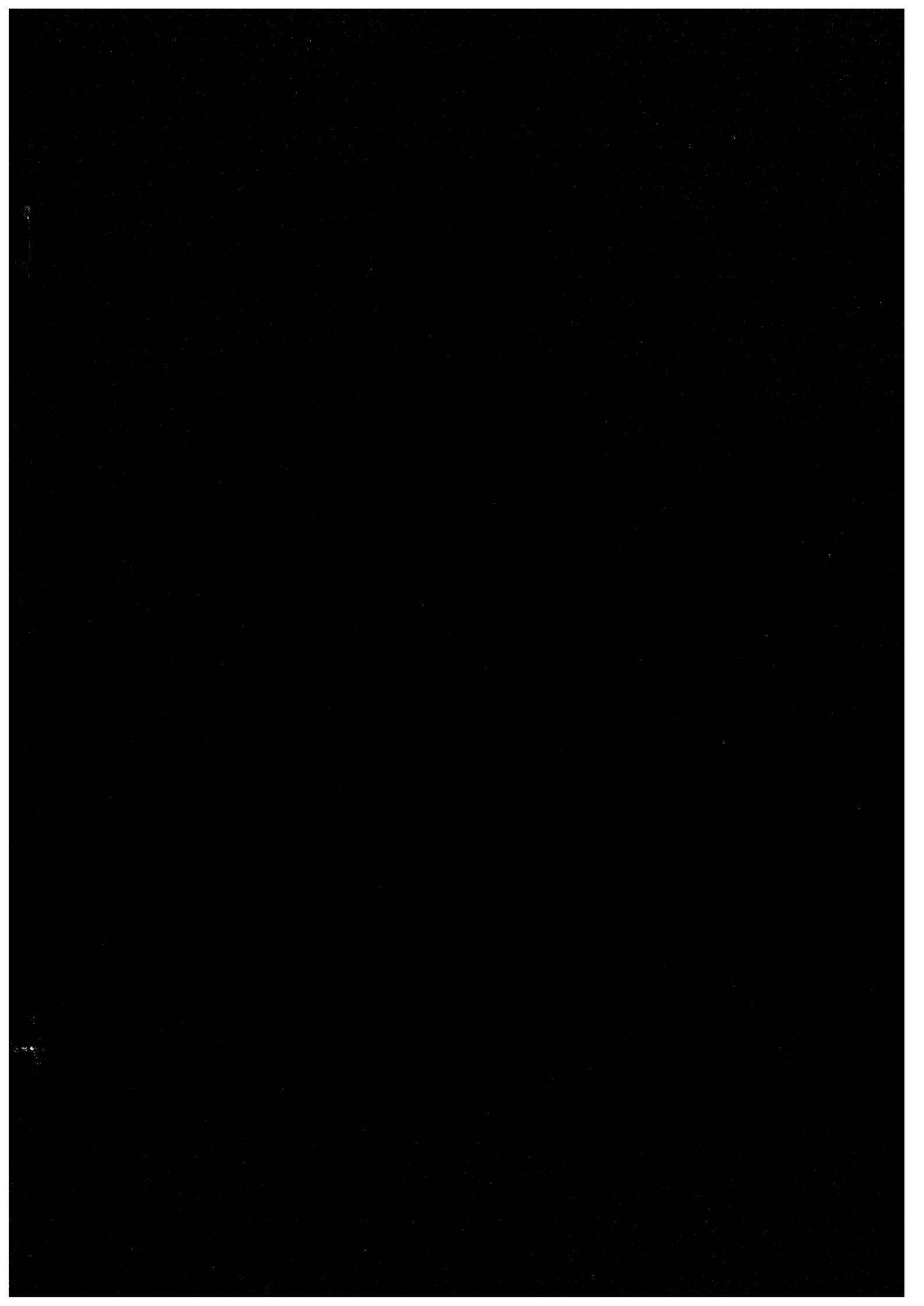

RESOURCE MANAGEMENT IDEAS

# No. 10:
# "REASONABLE MIXING"

## A discussion of reasonable mixing in water quality management

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## Introduction

The Resource Management Act 1991 (the "RM Act") contains several references to "reasonable mixing"[1] but this term is not defined nor is there a clear set of rules in the RM Act for deciding what constitutes reasonable mixing. The words reasonable mixing also appeared in the Water and Soil Conservation Act 1967 (the "WSC Act") and the same concepts appear in the water pollution legislation of the United Kingdom and many other countries. A clear definition of reasonable mixing does not emerge, however, from these other jurisdictions. The provision for reasonable mixing under the RM Act is similar to that contained in the WSC Act[2]. However, there is a wide divergence of opinion about what constitutes reasonable mixing.

## Objectives

This ideas piece:

- identifies legal provisions relating to water classification;
- describes mixing zones and non-compliance zones using practical examples; and
- proposes situations in relation to the size of, location of, and conditions within non-compliance zones under which reasonable mixing may be said to have occurred.

The paper is intended to stimulate discussion amongst planners, engineers, scientists, managers and environmentalists and to improve understanding of the role of mixing zones in water quality management. Comments are encouraged and should be sent to:

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[1] see sections 69,70,107 and the Third Schedule of the RM Act

[2] the small amount of case law under the WSC Act may be applicable to the RM Act although this remains to be tested in the courts

## Water management under the RM Act

The concepts of reasonable mixing and water classification are intimately linked and we begin by reviewing the objectives of water classification.

The purpose of the RM Act is "to promote the sustainable management of natural and physical resources" (s5). This differs from the objectives of the WSC Act notably in the emphasis on sustainable management and the requirement to "avoid, remedy or mitigate adverse effects". The RM Act places emphasis on managing the effects of water uses rather than managing the uses themselves; although where it is clear that an activity is incompatible with the purpose for which the water is being managed, it can be prohibited (s68).

Under the RM Act

> "No person may discharge any ... contaminant or water into water ... unless the discharge is expressly allowed by a rule in a regional plan ... a resource consent, or regulations ..." (s15).

### Minimum standards

The RM Act imposes national minimum standards on all waters (including those that are not classified). Discharge or coastal permits are not to be granted:

> "... allowing the discharge of a contaminant or water into water ... if, after reasonable mixing, the contaminant or water discharged ... is likely to give rise to all or any of the following effects in the receiving water:
>
> (c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
> (d) any conspicuous change in the colour or visual clarity;
> (e) any emission of objectionable odour;
> (f) the rendering of fresh water unsuitable for consumption by farm animals;
> (g) any significant adverse effects on aquatic life ..." (s107(1)).

There are a number of exceptions to this restriction on granting discharge permits (s107(2)). In addition, the provisions in s5 and s17 require the avoidance, remedying and mitigating of adverse effects of activities on the environment.

### Regional plans and classification

Under the WSC Act, classification involved identifying the various uses of a water body, deciding on the single best use (having regard to the needs of fisheries, wildlife habitat,

recreation and wild and scenic values) and specifying water quality standards to maintain this best use.

The RM Act also provides for classification. A regional council may prepare one or more regional plans covering parts of the region (s65) and must have regional coastal plans covering the entire coastal marine area of the region (s64). These plans may include rules (s68) which provide for permitted, controlled, discretionary, non-complying, prohibited and restricted coastal activities[3].

More stringent standards than those in s107 can be imposed by preparing a plan and classifying the waters (which involves deciding on the purposes for which the waters are to be managed and setting appropriate water quality standards). Councils may choose to classify waters at the time they prepare or change a regional plan or a coastal regional plan, but there is no compulsion to classify waters.

The Third Schedule of the RM Act lists eleven classes of water, each of which is based on the purpose for which the waters are being managed[4]. This is in contrast with the nine classes in the WSC Act, which were not explicitly related to use or value of the water. The Third Schedule of the RM Act also lists water quality standards for each class.

Water quality standards are usually specified in narrative form (e.g. there shall be no "significant adverse effects on aquatic life"). Where there is sufficient scientific information, the standard is translated into numeric form (e.g. "the concentration of dissolved oxygen shall exceed 80% of saturation concentration"). The list of standards and classes in the Third Schedule is not exhaustive and a regional council may develop its own classes and standards where those in the Third Schedule are not adequate or appropriate. This allows considerably more flexibility than the nine classes with fixed water quality standards given in s26 of the WSC Act.

Classification of waters should be considered in situations where there are significant existing or potential conflicts over water quality and use. The classification process enables interested parties to debate the various alternatives and, after full public discussions, to agree on the purposes for which the waters are to be managed. Appropriate water quality standards can then be set.

Once in place, the classification makes clear to existing and potential water users the purposes for which the waters are being managed, greatly assisting planning. The fact that classification is not mandatory gives councils the flexibility to focus their attention on waters where there are obvious conflicts and to defer classifying other waters where the need is less pressing.

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[3] defined in Section 2 of the RM Act

[4] the eleven classes and purposes listed in the Third Schedule are: AE(aquatic ecosystem), F(fishery), FS(fish spawning), SG(shellfish gathering or cultivation for human consumption), CR(contact recreation), WS(water supply), I(irrigation), IA(industrial abstraction), NS(natural state), A(aesthetic), C(cultural)

The procedure for setting rules and classifying water is set out in s69 and can be summarised as follows:

- Where a regional council provides rules in a plan for the management of waters for any of the purposes described in the Third Schedule, the rules shall require the observance of the standards specified for those purposes in the Third Schedule.
- If, in the council's opinion, the standards in the Third Schedule are not adequate or appropriate then the rules may state standards that are more stringent or specific.
- If the classes specified in the Third Schedule are not adequate or appropriate, the council may state new classes and standards in the plan.
- Standards may not be set that may result in a reduction of water quality unless it is consistent with the purposes of the Act to do so.

The last requirement stems from the important decision[5] of Sir Robin Cooke in *Water Resources Council v Southland Skindivers Club Inc*[6] where it was held that not only the desired uses, but also the existing water quality, must be considered when classifying water.

> " ... If the existing quality is found to be high, then the classification should reflect that existing quality, unless it is demonstrated that in the public interest there should be the freedom to lower the quality in the future in order that the water may be put to the best advantage while still maintaining it in good condition. If the existing quality of the water is found to be low, then an inquiry should be had into the cause of the low quality. If the cause is found to be pollution and if the public interest requires that the quality of the water should be raised ... then the classification should ideally reflect such higher desirable quality as is achievable...".

**Characteristics of mixing zones**

The RM Act requires that any standards imposed through classification or through s107 be met "after reasonable mixing"[7]. This implies the existence of a zone in which the

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[5] this decision relates to the now repealed WSC Act but is relevant to the RM Act

[6] [1976] 1 NZLR 1.

[7] "...subject to the need to allow for reasonable mixing of a discharged contaminant or water, a regional council shall not set standards in a plan which result, or may result, in a reduction of the quality of the water..unless it is consistent with the purposes of this Act to do so..." (s69(3))
"... before a regional council includes in a regional plan a rule that allows .. a discharge .. into water .. the regional council shall be satisfied that none of the following effects are likely to arise in the receiving waters, after reasonable mixing, as a result of the discharge of the contaminant..." (s70)
"...a consent authority shall not grant a discharge permit...if, after resonable mixing, the contaminant or water discharged...is likely to give rise to all or any of the following effects in the receiving water..." (s107)
"... the standards listed for each class apply after reasonable mixing of any contaminant or water with the receiving water and disregard the effect of any natural perturbations that may affect the water body..." (heading to the Third Schedule)

underlying standards need not be met. It is important to appreciate the distinction between the near-field mixing zone, the point of complete mixing and the non-compliance zone.

Effluents generally have contaminant concentrations higher than those in the receiving waters. There is an area close to the outfall, called the "near-field mixing zone", where the effluent mixes rapidly with the receiving water because of the momentum and/or buoyancy of the effluent and turbulence in the receiving water.

Close to a river outfall contaminant concentrations usually drop quite rapidly, while further away from the outfall transverse dispersion often takes a long time to completely mix contaminants across the entire flow (especially in wide, straight river channels). In the ocean the initial rate of dilution close to the outfall is usually high because of jet momentum and/or mixing induced by the buoyancy of the effluent, but once the plume reaches the surface the subsequent rate of dispersion by wind and tidal currents is often significantly lower.

"Complete mixing" occurs once the effluent is completely dispersed through the receiving waters. The concept of complete mixing is only relevant in flows confined between banks (such as rivers and estuaries). In unbounded flows (such as lakes and the oceans) mixing continues more or less indefinitely. There is a common misconception that mixing is only "reasonable" once it is complete. There is, however, nothing in the legislation or the case law to support this notion[8].

As mixing does not occur instantaneously, contaminant concentrations close to the point of discharge often exceed the water quality standards for the receiving waters. The area where the standards are not met is of great significance for water management and we define this to be the "non-compliance zone"[9].

**The non-compliance zone**

The size of the non-compliance zone depends on the:

- effluent flow rate and concentration;
- design of the outfall;
- depth, velocity and rate of turbulent mixing of the receiving water; and
- ambient concentrations in the receiving water.

The size of the non-compliance zone is not fixed but varies over time with variations in the factors listed above. It may, however, be possible to estimate an upper limit for the size of

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[8] see also the discussion in Example 1 below.

[9] In the past, many people have used the term "mixing zone" to describe this area. The term "non-compliance zone" is preferable because it avoids giving the impression that this zone is controlled solely by natural mixing processes. It also focuses on the fundamental point that this is the area within which water quality does not meet classification standards.

the non-compliance zone by estimating the location of its boundaries under realistic worst-case conditions and this is often done when deciding on discharge consent conditions. Some statistical analysis may be required. It is also important to appreciate that the size of the non-compliance zone is not determined solely by conditions within the receiving waters and that it can be controlled (to some extent) by the discharger altering the level of treatment, the effluent flow and the design of the outfall.

Two questions about which there is considerable debate are:

- What size should the non-compliance zone be?
- What controls (if any) should be placed on water quality within the non-compliance zone?

**The size of the non-compliance zone**

Consider first the question of the size of the non-compliance zone. Like its predecessor the WSC Act, the RM Act stops short of giving clear guidance about what constitutes "reasonable mixing". We must look instead to the purposes of the Act and the objectives of any classification (i.e. the purposes for which the waters are being managed) for guidance.

Sections 5 and 17 contain the important requirements for avoiding, remedying and mitigating adverse effects. Adverse effects are most likely to occur within the non-compliance zone where pollutant concentrations are highest. It will often be possible to minimise adverse effects by ensuring that the non-compliance zone is small. The decision of *Mahuta and Others v National Water and Soil Conservation Authority*[10] states the general principle that this zone should be as small as possible:

> "...we hold that it is the intention of the [WSC Act] that mixing shall occur as quickly as possible in order that the intention of maintaining the classified standard is not frustrated...".[11]

The *Mahuta* decision, however, stops short of defining rules for deciding on the size of the non-compliance zone:

> "...what is a reasonable mixing zone[12] will be a question of fact and degree in each particular case..."[13]

It has been suggested from time to time that simple rules of thumb should be developed for estimating the size of the non-compliance zone. For example, effluent originating from

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[10] [1973] 5 NZTPA 73.

[11] page 81

[12] in our nomenclature, "what is a reasonable non-compliance zone"

[13] page 81

a point source in a river usually becomes completely mixed across the channel within a distance of about 100 times the channel width. Why not always define the non-compliance zone in a river as being 100 times the channel width? This approach has the merits of simplicity but runs the risk of being applied indiscriminately. The main weakness of only considering the hydraulics of the receiving water is that no consideration is given to water quality close to the discharge and the impacts this might have on the purposes for which the waters are being managed.

These points are illustrated by way of example.

**Example 1.**

- Consider a river which is being managed to maintain its fishery values. It is proposed to discharge waste containing ammonia (which is potentially toxic to fish) from a mid-river outfall.

The effluent load and river flows are such that under worst-case conditions once the effluent becomes completely mixed with the entire river flow, the ammonia concentration will be below the chronic (long-term) toxic limit. Prior to complete mixing, however, ammonia concentrations will exceed the chronic toxic limits although they will be below the lethal limits for acute (short-term) exposure. It is assumed that fish will detect high ammonia concentrations near the outfall and avoid spending long periods of time within the plume, but that fish migration will not be adversely affected.

Once effluent becomes fully mixed there is unlikely to be a significant fish toxicity problem. Fish are likely, however, to be prevented from living permanently close to the outfall although concentrations are unlikely to be high enough to either kill fish that swim through the plume or to disrupt migration.

- Assume that effluent from a point source in mid-channel becomes completely mixed about 300 meters below the source. The question then arises whether the existence of a non-compliance zone 300 metres long from which fish are excluded, but which has no other adverse effect, frustrates the intention of the underlying classification.

This question can be addressed by estimating the proportion of the total available fish habitat likely to be lost as a result of the discharge. If the only adverse effect of the discharge is to exclude fish from the non-compliance zone (as appears to be the case here) and the resulting loss of habitat is small, it could be argued that the discharge does not frustrate the intention of the classification and hence is reasonable. If the non-compliance zone represents a significant proportion of the total habitat, contains a significant proportion of the available spawning gravels, or poses a significant threat to migration, it might not be considered reasonable.

**Predicting the size of the non-compliance zone**

When preparing to apply for a resource consent to discharge waste into a water body, the applicant should (with the appropriate technical assistance) estimate the size and shape of the effluent plume for a range of different diffuser designs under realistic worst-case conditions. The concentrations of contaminants likely to be found at various distances from the source should then be estimated. This assessment of effects should be in such detail as corresponds with the scale and the significance of the effects the discharge may have on the environment (s88(6) of the RM Act).

In a river, vertical mixing occurs within a short distance of the outfall and the plume is always confined within the banks. Plume width and concentration are determined by the:

- effluent flow rate and concentration;
- river flow;
- nature of the outfall (e.g. a point source or a multi-port diffuser);
- rate of transverse mixing; and
- upstream (ambient) concentration.

Effluent mixing in coastal waters is more complicated. Plume concentrations depend on the initial dilution (which occurs close to the source as the effluent plume rises) and the far-field dilution (which occurs once the effluent field has reached the surface and moves away from the discharge point). Initial dilution depends on the:

- design of the outfall (e.g. single or multi-point diffuser, port velocity etc);
- depth of water over the outfall;
- density difference between the effluent (usually freshwater) and the receiving water (often saline) which determines its buoyancy;
- speed and orientation of currents across the outfall; and
- degree of stratification in the water column which may limit vertical mixing.

Far-field concentrations depend on the:

- tidal and wind-driven currents;
- topography of the coastline;
- rate of breakdown and inactivation of the waste; and
- mixing characteristics within the waterbody itself.

Methods for predicting plume concentrations are described in two recent texts[14].

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[14] Wood, I.R., Bell, R.G., Wilkinson, D.L. 1993. *Ocean Disposal of Wastewater*. Advanced Series on Ocean Engineering - Vol 8, World Scientific Publishing Co., Singapore;
Rutherford, J.C. 1994. *River Mixing*. John Wiley & Son, Chichester.

**Assessing the effects of the non-compliance zone**

Once estimates have been made of pollutant concentrations at various distances from the outfall and their frequency of occurence, then it is possible to make an informed assessment of whether or not the proposed discharge is likely to frustrate the intention of the classification.

This can be illustrated by the following example:

**Example 2.**

- Consider a proposal to locate a sewage outfall 1 kilometre offshore from a beach which has been classified CR (waters managed for contact recreation purposes) and is being managed for bathing. Only the waters within 200 metres of the swimming beach are classified CR and waters further offshore are classified F (waters managed for fishery purposes).

After conducting field experiments and modelling investigations, the discharge is found to be satisfactory in all respects except one. Under realistic worst-case conditions (e.g. neap tides near slack water with moderate on-shore winds), the concentrations of indicator organisms (enterococci and *E. coli* ) within 200 metres of the swimming beach are likely to exceed the single sample maximum levels considered safe for bathing waters[15]. The non-compliance zone would, therefore, include parts of the swimming beach. Whether this could be considered to represent "reasonable mixing" would depend on the actual and perceived impacts on the management objectives for the waters concerned. It is possible that any breach of the bathing water microbiological standards would be considered inconsistent with the objective of managing these waters for bathing. This possibility could be avoided by ensuring that the non-compliance zone does not extend into the class CR waters of the bathing beach.

- Consider the situation where the applicant subsequently proposes to increase the level of treatment so that under worst-case conditions the concentrations of enterococci and *E. coli* are only likely to exceed the bathing water standards within 100 metres of the outfall.

There is now very little likelihood that the discharge will result in a breach of the standards near the swimming beach and so the discharge now meets the management objectives for those waters near the swimming beach. The waters close to the outfall have an underlying classification of F (waters managed for

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[15] see Department of Health, 1992. *Provisional Microbiological Water Quality Guidelines for Recreational and Shellfish-gathering Waters in New Zealand.* Public Health Services, January 1992.

fishery purposes) for which there is no microbiological standard. The fact that there is a zone of 100 metres diameter around the outfall within which the bathing water standards are not met does not conflict with the objectives of the underlying F classification of the waters around the outfall. Note that it would also need to be established that water quality within the non-compliance zone did not pose a significant threat to the fishery before the mixing could be considered to be reasonable.

Windsurfing and sailing could bring members of the public to within 100 metres of the outfall where they would be exposed to a health risk. In this example the waters around the proposed outfall are being managed for the fishery and not for contact recreation. The regional council is not required to ensure that the waters close to the outfall are safe for wind-surfing and sailing although they may have a duty of care to notify the public of the potential health risk arising from the outfall. If there is a widespread desire amongst the community to manage the waters around the outfall for windsurfing and sailing, this is best accomplished by reviewing the regional coastal plan and reclassifying the waters CR. Note that it is permissible under the RM Act to assign more than one class to the same body of water and in this example, both classes CR and F could be applied to the same body of water.

Hence, determining whether or not reasonable mixing has occurred may require an assessment of whether or not the size and location of the non-compliance zone frustrates the intentions of the underlying classification.

**Controls on water quality within the non-compliance zone**

When assessing the impact of a proposed discharge on the environment and setting conditions on a discharge permit, attention is often focused on assessing the impacts of the effluent outside the non-compliance zone and deciding how big this zone should be. It is also important to consider the effects that contaminants have within the non-compliance zone and to answer the following questions:

- Does water quality within the non-compliance zone cause an adverse effect outside the zone?
- Are there adverse effects within the non-compliance zone that frustrate the objectives of the underlying classification?

**Does water quality within the non-compliance zone cause an adverse effect outside the zone?**

**Example 3.**

- Consider the cooling water discharge from a large power station into a river that is an important native fishery. Of particular concern is the impact of the discharge on the upstream migration of juvenile native fish. Cooling water is discharged from a bankside outfall designed to mix across half the river width: the rationale being to leave the other half of the river substantially free from cooling water.

The non-compliance zone extends across half the river width and for several hundred metres downstream. Monitoring has failed to demonstrate any adverse effects on fish arising from the cooling water outside the non-compliance zone. High temperatures close to the outfall, however, have been shown to disrupt the upstream migration of juvenile native fish during summer low flows. Some migrants affected by the cooling water plume, cross the river and probably continue migrating up the opposite bank. These fish may not cross back soon enough to enter important tributary streams just above the power station. Thus high plume temperatures within the non-compliance zone disrupt fish migration and this poses a potential threat to fish recruitment above the power station (i.e. well outside the non-compliance zone).

**Are there adverse effects within the non-compliance zone that frustrate the objectives of the underlying classification?**

It is worth emphasising that it may be reasonable to allow some degradation of water quality and some adverse effects on aquatic life within the non-compliance zone - provided the adverse effect is minor and does not frustrate the management objectives of the waters. This point is illustrated by an example:

**Example 4.**

Consider two ocean outfalls (A and B) where organic matter settles on the bed creating conditions unsuitable for certain species of benthic invertebrates.

- At outfall A benthic invertebrates are only excluded from a small area near the outfall and the species excluded are widely distributed throughout the region. The waters surrounding the outfall are classified F (waters managed for fishery purposes) and the loss of benthic invertebrate habitat within the mixing zone has little effect on the fishery.

Since the discharge from outfall A does not conflict with the purposes for which the waters are being managed, it is likely to be considered reasonable.

- Outfall B is located in a part of the coast where the benthic invertebrate communities are rare and are of great ecological significance. The surrounding waters are classified AE (waters managed for aquatic ecosystem purposes), signalling the intention to manage these waters in order to protect such communities.

Since outfall B will adversely affect important benthic invertebrate communities within the non-compliance zone, it will conflict with the purposes for which these waters are being managed and hence may not be considered to be reasonable. This will depend on the size of the non-compliance zone in relation to the total area of habitat classified AE and the significance of the loss of the benthic communities from this area. What constitutes an "adverse effect" and therefore what constitutes "reasonable mixing" are matters for debate amongst the various parties to the planning process. As a general rule, however, the size of the non-compliance zone should be as small as is practicable, which is the thrust of the *Mahuta* decision quoted earlier.

**Non-compliance zones and classification**

Recently some regional councils have considered classifying large tracts of coastal waters AE (aquatic ecosystem), which requires meeting high water quality standards[16]. It is recognised that there are several quite large existing waste discharges into these waters and that there are several potential new discharges. The intention is that these discharges are to be provided with a fairly large non-compliance zone around each outfall within which the AE water quality standards need not be met.

This may raise two possible problems:

- Firstly, by classifying the receiving waters AE an expectation is given that these waters will be afforded a very high level of protection. Having created this expectation, allowing a non-compliance zone (which may be several hundreds of meters in diameter) within which the water quality is permitted to be significantly below the AE standards may not be considered reasonable.

- Secondly, it is bad planning practice to impose a single blanket classification over large tracts of coastal waters without good reason. One of the principal objectives of regional planning, and of classification in particular, is to identify any significant conflicts over water use and to set management objectives for these waters. Once the

[16] in particular class AE requires that there be "no adverse effect on aquatic life" cf ss70, 107 which require that there be "no significant adverse effect on aquatic life..."

management objectives have been decided, it is far easier to decide whether or not a given activity is permissible, needs to be restricted in some way, or should be prohibited. A clear statement of the management objectives for waters throughout a region aids good planning.

Incomplete knowledge about the ecological importance of the coast and a general desire to prevent pollution may lead a regional council to consider a blanket AE classification over large tracts of coastal waters. A better approach, however, may be to classify only those coastal waters AE in which protection of the aquatic ecosystem is especially important. This signals that any discharges to such waters will have to meet very high standards. Other parts of the coastal waters where it is less important to provide a very high level of ecosystem protection should be identified and either classified accordingly (e.g. to class F if the waters are to be managed as a fishery) or be left unclassified pending further investigation. As discussed above, provisions of s5 and s107 may be applied to discharges to unclassified waters, and stringent site specific controls can be imposed if appropriate.

## Conclusions

Legislation

- The RM Act provides for national minimum standards of water quality.
- The Act also allows waters to be classified for specific purposes and for higher water quality standards to be set if these are required.
- Water quality standards are to be met after "reasonable mixing".

Water classification

- Classification is an efficient way of identifying the purposes for which waters are to be managed and setting the water quality standards required for these purposes.
- Classification should be considered where conflicts exist about existing or potential water quality and/or water use.
- Classification involves:
  - identifying the management objectives for various waters having regard to existing and potential water quality, uses and values, and
  - setting water quality standards necessary to ensure that the management objectives can be met.
- Targeting waters where management problems exist is preferred over blanket classifications.

What happens at the point of discharge?

- Mixing does not occur instantaneously at the point of discharge.
- The effluent at the point where it leaves the pipe normally has elevated contaminant concentrations.
- As a result, contaminant concentrations in the receiving waters are usually elevated close to the point of discharge.
- Close to point of discharge, there is an area where mixing of the effluent occurs rapidly. This is the nearfield mixing zone.
- In rivers, complete mixing occurs some distance below the point of discharge where contaminant concentrations are uniform across the channel. In lakes and oceans, mixing continues more or less indefinitely.
- There is a common misconception that mixing is only "reasonable" once it is complete, but there is no justification for this notion.
- The zone of significance for water management is that within which the concentrations of contaminants do not always comply with the standards set for the receiving waters. This is the non-compliance zone.
- The size of the non-compliance zone depends partly on the hydrodynamics of the receiving water (e.g. the river flow rate, tidal currents, wind-driven currents, water depth and mixing rates) and partly on the nature of the discharge (e.g. effluent flow, level of treatment and outfall design).
- The discharger can, to some extent, control the size of the non-compliance zone by varying the effluent flow, concentration and outfall design.

What matters need to be considered when deciding on "reasonable" mixing?

- Reasonable mixing may be said to have occurred when the management objectives of the receiving water are not compromised by the non-compliance zone.
- This will require an assessment of the size and location of the non-compliance zone, and the conditions within it.
- Generally
  - the size of the non-compliance zone should be minimised
  - any adverse effects should be confined to the non-compliance zone
  - any adverse effects within the non-compliance zone should be minor
- If the predicted impact of the discharge is not consistent with the classification objectives, the consent application should be declined. The discharger should:
  - alter the location of the discharge, the quality of the effluent, or the mixing characteristics of the outfall; or
  - seek a variation to the classification.