

WATER QUALITY

*The Public Health
Commission's Advice
to the Minister of
Health*

1993-1994

Water Quality

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Advice to
the Minister of Health
1993-1994*

Public Health Goal

To promote a social and physical environment which improves and protects the public health.

Objectives

To improve and protect the public health by developing strategies to reduce the adverse impacts of noise, ozone depletion and global environmental conditions, air quality, water quality and safety, and hazardous substances on health.

To improve and protect the public health by developing strategies to maximise the positive effects of the local social and physical environment on health.

To improve and protect the public health by developing strategies to maximise the positive effects of workplaces on health.



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Foreword

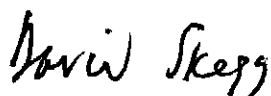
One of the key functions of the new Public Health Commission (PHC) is to advise the Minister of Health on measures that could be taken to improve and protect the health of New Zealanders. Advice is given on particular problems as they arise, but there is also a need to stand back and take a longer view. This paper is one of a series developed for the Government during the PHC's first year.

A Strategic Direction to Improve and Protect the Public Health provides an overall framework for improving the public health. It should be read in conjunction with the *Advice* papers which address particular issues.

The PHC's advice to Government results from a process of consultation on a scale never previously attempted in the public health field in New Zealand. Staff of the PHC, led by Dr Gillian Durham (Chief Executive) and Dr John Eastwood (Group Director, Programmes) have had to sift and analyse advice and submissions from hundreds of individuals and groups. My colleagues and I on the Board wish to thank the staff for completing this task under considerable time pressure. We believe that the advice submitted provides a sound basis for improving public health programmes in New Zealand.

The Board of the Public Health Commission does not expect that the Government will necessarily adopt all of its recommendations. An important feature of the health reforms is that the PHC is able to offer independent advice to the Minister of Health, and that this advice is open to public scrutiny. Governments, like individuals, have to make choices and we accept that the Government may take account of factors that we have not considered. It is our responsibility to ensure that the public health perspective is clearly presented.

The PHC invites comment on the implementation of proposals contained in each of the papers. Please send your written comments to the address shown at the back of this document.



Professor David Skegg
Chair of the Board
Public Health Commission

Acknowledgements

I would like to thank all of the people who presented submissions on the discussion document *Towards Healthy Lives For New Zealanders: Planning for better health*, and to the many people who attended the public meetings, community consultation meetings, hui, focus groups and special interest group meetings held at 21 venues throughout New Zealand.

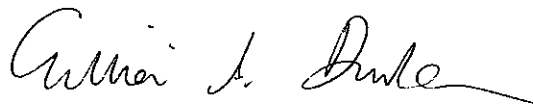
The valuable advice and comments provided assisted the Public Health Commission (PHC) in developing the framework for public health presented in the document, *A Strategic Direction to Improve and Protect the Public Health*.

I would also like to thank the many people who commented on the drafts of a variety of issues-based papers prepared by the PHC. These comments helped formulate the PHC's *Advice to the Minister of Health*. Comments on the draft documents were received from:

- regional health authorities
- Crown health enterprises
- academic departments
- industry
- independent service providers
- ministries and government departments
- individuals and groups with an interest in public health
- non-government organisations and other statutory bodies.

All comments received were carefully considered by the PHC and changes made where appropriate.

I hope that the publication of *A Strategic Direction to Improve and Protect the Public Health* and the *Advice* papers provided to the Minister of Health illustrate the importance the PHC places on the consultation process.



Dr Gillian Durham
Chief Executive
Public Health Commission

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Introduction

The Public Health Commission was established on 21 June 1993 under the Health and Disability Services Act to improve and protect the public health; and to meet the Crown's objectives for public health.

Public health services are concerned with whole populations, or population groups such as children, or older people, rather than individuals.

The PHC's areas of responsibility include environmental health (for example, water quality), nutrition and food, the prevention and control of communicable diseases, major lifestyle and public health problems (such as the prevention of cancer and road traffic injuries), as well as the public health needs of Maori and of special groups.

The functions of the PHC are:

- to monitor the state of the public health and to identify public health needs
- to advise the Minister of Health on matters related to public health. This includes personal health matters, and regulatory matters, relating to public health
- to purchase, or arrange for the purchase of, public health services.

A Strategic Direction to Improve and Protect the Public Health relates to the advice function. It provides a framework for public health in New Zealand and forms the basis for the development of the PHC's Advice to the Minister on:

Immunisation
Melanoma
Sudden infant death syndrome (SIDS)
Child hearing loss
Hazardous substances
Water quality
Water safety
Alcohol
Road traffic injuries
Tobacco products
Cervical cancer
HIV/AIDS
Food and nutrition
Food safety.

A Strategic Direction to Improve and Protect the Public Health provides recommendations at three levels of detail: public health goals, objectives and targets.

The issues-based papers provide recommendations on outcome targets and policy, programme and research and information targets to achieve the outcomes. These initiatives may be new, or they may be established initiatives which require improvements in effectiveness and efficiency. Targets developed to date for 11 of the objectives identify the contribution that the Government could make to achieve the objectives.

All of the papers on specific issues have a common structure which is summarised as follows -

- **Title**

- **Background**

- **Objective**

The objectives identify some priorities for consideration for particular settings or groups.

- **Setting Outcome Targets**

This briefly describes the health status issues and provides justification for the choice of some outcome targets. Where relevant, there is discussion of risk factors and protective factors. Recommendations for outcome targets are included.

- **Setting Healthy Public Policy Targets**

This section recognises the PHC's co-ordinating function. As well as providing specific policy advice that the Government can consider accepting, the PHC may also provide justification for further policy development work. This may include, for example, recommendations for developing discussion documents or holding consensus conferences.

Further consultation in the public policy area will generally start once the PHC receives advice to proceed with a particular area.

- **Setting Public Health Programme Targets**

These include recommendations for programmes which could be purchased in the 1994-1995 financial year and succeeding financial years. Each paper identifies the responsibilities of purchasers for achieving public health goals and objectives.

These responsibilities are specified as 'Population-Based Public Health Services' which are the responsibility of the PHC, and 'Personal Health Services' which have been identified as the RHAs' responsibility.

- **Research and Information Targets**

These include recommendations for research. This would normally be funded by research funding agencies. The recommendations provide information for research workers who may wish to develop research proposals in these areas. Funders such as the Health Research Council may want to consider funding high quality proposals to address the hypotheses listed.

The information recommendations are studies which the PHC could purchase and, therefore, have the same standing as the programme targets.

- **Summary of Benefits**

Benefits of the proposed programmes are listed in the papers. Detailed costing of the proposals has been undertaken by the PHC and provided to the Minister. As with personal health services, formal cost benefit studies are currently available for only a minority of public health programmes.

- **References**

The references which have been used for each paper are listed.

Background

This paper deals with the physical, chemical or microbiological quality of water in relation to the risks of waterborne illness, and to the risks and benefits associated with treating water with chemicals.

In determining suitable health objectives and targets for water quality, various uses of water have to be considered which may impact on public health. These include:

- drinking water, including public reticulated supplies (treated and untreated), and other sources used by private households, in camping sites, and for use in preparing and processing food
- swimming and other recreational uses including marine waters, lakes and rivers, public and private swimming pools, and geothermal waters
- as a source of food (eg, shellfish gathering)
- air-conditioning and water systems in buildings.

Water can be both a direct and indirect source of infectious agents, or contain chemical contaminants which present risks to public health. Cultural values are also important when considering the effects of water contamination.

The main problem in proposing objectives and targets for water quality has been the lack of sufficient information on:

- the incidence of illness caused by water contaminants
- public drinking water supplies, and recreational and shellfish gathering waters, which fall below standards developed to protect health
- the prevalence and significance of *Legionella*
- the health effects of chemically treating public drinking water supplies.

Drinking Water

Access to safe, wholesome supplies of water is an essential part of any programme designed to protect public health and maintain or improve public health standards. Every New Zealander has a right to expect that all public water supplies are safe to drink, and public water supply authorities have a responsibility to meet that expectation.

The risks associated with drinking water include:

- (a) *waterborne diseases*: depending on the organism involved, the source and transmission route of some diseases spread in water may also be spread by other means such as in food, by person-to-person contact, or by animal contact. The precise sources and routes by which waterborne diseases are transmitted will often be difficult to identify. In New Zealand, on the basis of disease notification, campylobacteriosis and hepatitis A appear to have increased in recent years.¹

- (b) *chemical contamination*: contamination can occur naturally in the storage and distribution system, or as by-products of chemical treatment.

The impacts of chemical contamination on human health depend on such factors as the concentration and toxicity of the contaminant and an individual's exposure and sensitivity to it.

Risk assessment is often difficult because of the wide range of toxic compounds which can be present in water, the different exposure routes (including air and food), and people's mobility.

The potential sources of these risks include:

- (a) *water*: natural sources of contamination, as well as contamination of groundwater and surface water by human and animal wastes, agricultural run-off and industrial discharges and of underground aquifers by leachates or leaking underground storage tanks.
- (b) *water treatment plants*: inability to remove or deactivate potentially harmful micro-organisms and chemicals (such as ineffective plants or mismanagement of them) or treat unacceptable physical characteristics such as odour, taste or colour.
- (c) *water distribution*: contamination of drinking water due to the maintenance and condition of the reticulation system, loss of pressure and inadequate backflow protection, as well as the influence of materials used in the reticulation and the characteristics of the water (eg, its corrosiveness).

Fluoridation of public water supplies as a means of promoting dental health continues to be a contentious public health issue in New Zealand and other countries such as Australia and the United States. A draft PHC policy statement on fluoridation of water supplies was released for public comment² and submissions are being analysed.

Fluoridation of drinking water

Recreational and Shellfish Gathering Waters

Recreational water includes that used for swimming (both indoor and outdoor), bathing, diving, and various other water sports, or activities in which full contact is made with the water. The health issues associated with recreational use of water include:

- waterborne gastro-intestinal illnesses
- skin, eye and ear infections
- respiratory effects (such as those due to airborne neurotoxins from marine algae, chlorinated nitrogen compounds in indoor swimming pools).

The risks of contracting water or foodborne illness from infectious agents or toxins can be reduced by:

- eliminating or treating the source of contamination
- ensuring that only those waters which meet minimum requirements for microbiological and chemical quality are classified as suitable for recreational use and for shellfish gathering
- informing the public about the health risks and the means of avoiding them.

Contamination of shellfish gathering areas by human and animal wastes, toxin-producing algae, or heavy metals, has serious implications for public health, for Maori access to traditional seafoods, and for commercial and recreational fishing interests.

In terms of commercial shellfish growing areas, a detailed methodology was established and recently reviewed to assess water quality to protect public health. The public health requirements for growing waters are specified in the US Food and Drug Administration (USFDA) National Shellfish Sanitation Programme (NSSP) Manuals, and the Ministry of Agriculture and Fisheries (MAF) has produced a National Management Plan for Marine Biotoxin Control. In some cases, local authorities and/or public health authorities are involved in monitoring commercial growing areas. This includes surveillance of the sources of potential contamination from run-off, which also benefits adjacent recreational waters and non-commercial shellfish areas.

Legionellosis

Legionella (L pneumophila) have been isolated from hot water systems, air-conditioning cooling towers or evaporative condensers, hot and cold water taps and showers, and from creeks and ponds and the soil from their banks. The organism can survive for months in tap or distilled water. Airborne transmission is the most common route for the infection - legionellosis.³

In general, the proliferation of *Legionella* occur as a result of the inter-relationships between temperature, environmental microflora and sediments, and the chemical composition of waters in various systems or locations.

Objectives

- To improve and protect the public health by developing strategies to reduce the adverse impacts of noise, ozone depletion and global environmental conditions, air quality, water quality and safety, and hazardous substances on health.
- To improve and protect the public health by developing strategies to maximise the positive effects of the local social and physical environment on health.
- To improve and protect the public health by developing strategies to maximise the positive effects of workplaces on health.

Setting Outcome Targets

Health Status

There are difficulties in establishing links between people's health and the microbiological and chemical quality of water, except in extreme contamination cases. This is because many waterborne illnesses may also be contracted through contaminated food and poor personal hygiene.

There are also difficulties in determining the impact on health status of recreational water quality. This is due partly to the current practice of assessing the suitability of water for recreational use based on overseas microbiological criteria, in the absence of New Zealand epidemiological data.

Protective Factors

- Dental caries affects large sections of the population, but those who are socially disadvantaged are particularly at risk. Dental decay poses a risk for people with specific health problems, such as heart valve disease and those whose immunity is compromised.
- In 1990, 48 percent of five year olds and 64 percent of Form 2 children had experienced tooth decay.
- In many studies around the world, fluoride at one part per million (ppm) in water has been shown to significantly reduce dental decay.
- In New Zealand, dental caries more severely affects those people who are socially disadvantaged, and Maori.
- In communities which discontinue fluoridation, decay rates are seen to increase to the levels experienced by communities without fluoridation.

Adjusting fluoride in reticulated drinking water supplies to 1ppm is the most effective and efficient way of preventing dental caries in the community. Some recent studies have suggested that fluoridated water supplies may be associated with an increased risk of bone fractures, but these studies all have important limitations - either because they do not use information on individuals or because the levels of fluoride consumption are high.

There is no epidemiological evidence of any other adverse health effects of water which has been artificially fluoridated. The balance of evidence is that there is no justification for changing current policy on fluoride.²

At this stage, it is inappropriate to set an outcome target for fluoridation of water supplies until submissions on the PHC's draft policy on fluoridation are analysed, and policy recommendations are agreed to by Government.

Waterborne
contaminants

Fluoridation of
water supplies

Risk Factors

Drinking water

Microbiological or chemical contamination of drinking water supplies pose risks to health, which vary depending on the location of the source, the quality of the source water, the nature of any treatment applied to the water, the management of any treatment process, and any contamination picked up in the water storage and distribution system.

A programme introduced in March 1993 by the former Department of Health,⁴ will undertake a countrywide water supply grading over the following three years. The purpose of the grading is "to provide a public statement of the extent to which a public water supply achieves, and can ensure, a consistently safe, wholesome product". It is intended to assess and grade the water source as well as the treatment and distribution systems.

Eventually, public supplies will be graded as follows:

Grade Description

- A1 Completely satisfactory, negligible level of risk, demonstrably high quality
- A Completely satisfactory, very low level of risk
- B Satisfactory - low level of risk
- C Marginal - moderate level of risk, may be acceptable for small communities
- D Unsatisfactory - high level of risk
- E Completely unsatisfactory - very high level of risk.

Disinfection of public water supplies protects against microbial disease, but may also produce chemical by-products that on their own may pose other risks to public health. For example, chlorination may produce chemical disinfection by-products (DBPs), the most noted of which involves the long-term risk of cancer. Cancer risk stems primarily from chlorine by-products, such as chloroform and other trihalomethanes (THMs), which form when the chemical is added to water containing organic materials.^{5,6}

In general, where microbiological contamination occurs disinfection will be the primary consideration. DBPs can be limited by water quality standards and controlled through treatment techniques designed to reduce the precursors of DBPs.

Analytical data collated by the Institute of Environmental Science and Research Ltd (ESR) (Christchurch Science Centre), suggest the main source of significant chemical contamination, where it was found, is the treatment process and/or the quality of the source water. To date, the only national survey of organic contaminants in potable water found samples from one in five New Zealand drinking water supplies included in the review between 1987 and 1991 (or 26 percent of chlorinated supplies) had chloroform levels exceeding World Health Organisation (WHO) and New Zealand guideline levels.^{7,8}

This analysis has identified the need for a risk reduction target for reticulated public drinking water, based on the new system of grading water supplies. However, it will not be possible to set a realistic target until the revised water grading survey has been completed. For major public water supplies (serving communities of 500 or more), this will be completed by June 1994. For the remainder the survey is expected to be completed by June 1996.

Legionellosis is an acute bacterial disease which takes the form of either "Legionnaires' disease" or "Pontiac fever". Both are initially characterised by anorexia, malaise, myalgia and headache. In Legionnaires' disease the condition may progress to respiratory failure. The overall fatality rate has been as high as 15 percent in hospitalised cases of Legionnaires' disease, and is generally higher among those with compromised immunity.

Pontiac fever is not associated with pneumonia or death, and people with the condition recover within two to five days without treatment.³

Legionellosis became a notifiable disease in 1980. The annual number of notified cases of legionellosis between 1988 and 1992 varied between 11 (1992) and 60 (1988). The average rate over this period was 0.72 per 100 000 population.¹ Most New Zealand cases appear to be sporadic, with the only recorded outbreak occurring in Christchurch in 1990, when seven people were affected. Other common source outbreaks may have occurred without being recognised.

Although the incidence of legionellosis appears to be relatively low, the risks of exposure to *Legionella* for people with compromised immunity are high. These risks can be avoided or reduced by simple preventive measures, such as proper care and maintenance of air-conditioning and water systems in buildings.

Because of its low incidence, it is considered inappropriate at this stage to set a target reduction for legionellosis. However, recommendations are made later for policies, programmes and research/information targets to address the need for preventive measures to minimise the risks.

Risks
associated
with
Legionella

Setting Healthy Public Policy Targets

Drinking Water

The 1984 New Zealand Drinking Water Standards (NZDWS)⁹ contain guideline values for concentration limits of organisms and substances which affect water quality. They are currently being reviewed by the Ministry of Health and will be completed by June 1994.

Although referred to as "standards", the NZDWS are only guidelines - not statutory requirements. The Ministry of Health (MoH) uses the NZDWS as the basis for surveying drinking water quality.

The Water Supplies Protection Regulations 1961 (regulation 15) prohibit the drawing of water which is not wholesome drinking water into any public water supply system. The regulations also require disinfection of any new reservoir or reticulation system, or the carrying out of repairs, alterations, and the like, to a water supply system, to be to the satisfaction of the Medical Officer of Health. However, the regulations do not cite the NZDWS as a means of complying with the Medical Officer of Health's requirements.

Information on the extent of waterborne illness caused by contaminants in water is inadequate because:

- notifications of waterborne illnesses are variable
- subsequent investigations may identify sources or routes of illness transmission to be other than by water.

It is important that in setting future objectives and targets for water quality, and in carrying out follow-up investigations, an effective system for recording and reporting information on illness caused by water contamination must be developed.

The MoH is planning to review public health regulation. It would be appropriate to consider in this review:

- the effectiveness of the Water Supplies Protection Regulations 1961 (particularly regulation 15)
- whether the NZDWS should become a statutory requirement to be met by all public supply authorities, or whether, for example, supply authorities should be required to report regularly on their compliance with the NZDWS
- what role the grading of water supplies should play in ensuring all public drinking water supplies are safe
- any conflicting objectives in public health regulations in maintaining water quality (eg, between the Water Supplies Protection Regulations and the Building Code in relation to backflow preventers for the protection of public water supply).

MAF also has an interest in water quality policy mainly because of its legislative responsibilities and from some key foreign market access requirements for primary produce. To meet these responsibilities, water quality standards have been set for some commercial food processing activities which are regularly monitored by MAF.

Proposal: That the MoH's review of public health regulation address:

- **the maintenance and protection of the quality of public drinking water supplies to avoid or reduce public health risks**
- **improvements in the notification and investigation of waterborne illnesses.**

A draft policy on the fluoridation of water was published by the PHC in May 1993.² Submissions have been received and are currently being analysed to prepare recommendations.

Proposal: That the PHC prepares recommendations on the fluoridation of water supplies.

Fluoridation of water

Recreational Water

Health risks and the management of water quality differ between public beaches (marine or freshwater), public or private swimming pools, and public or private spa pools. In relation to open public swimming areas such as coastal waters, lakes, and rivers, current provisional microbiological water quality guidelines for recreational waters have separate limits for marine and fresh waters. The latter are based on overseas studies and relate to the risk to bathers of contracting gastroenteritis.

These guidelines, published by the Department of Health,¹⁰ are not mandatory. They are recommended by the Department (now Ministry) of Health based on currently available information, and are subject to revision or adjustment as new and more significant data become available.

The Resource Management Act 1991 enables regional councils to classify waters in their regional plans. The classes of waters are specified in the Third Schedule to the Act and include class CR water - water managed for contact recreational purposes. Where a regional council has classified its waters according to their use, the standard of quality is contained in the Third Schedule. The schedule has no numerical microbiological standard for recreational water, but a generally stated requirement that "the water shall not be rendered unsuitable for bathing by the presence of contaminants".

The quality of swimming pool and thermal pool waters can also have significant effects on public health. If not properly maintained, these bodies of water can act as a medium for the transmission of disease.¹¹ As outlined earlier, there is a lack of information on the incidence of illness in New Zealand from recreational activities involving contact with water.

In order to minimise health risks associated with the recreational use of water, it is important to:

- know what the risks are (determined by epidemiological studies)
- encourage regional councils to classify waters for recreational purposes if they meet at least minimum microbiological water quality requirements. Otherwise, regional councils should clearly identify existing or potential recreational waters which do not meet minimum microbiological water quality guidelines. This is done by identifying those areas in the regional plan, and consulting with the regional public health provider on the need to place warning signs around areas of high public health risk
- encourage regional councils to prohibit inappropriate disposal of waste waters, especially sewage, into or near recreational waters
- encourage the proper management of waters used for recreational purposes involving water contact, including public swimming pools.

Shellfish Gathering Areas

The Third Schedule to the Resource Management Act includes class SG, being water managed for the gathering or cultivating of shellfish for human consumption. To be classified SG, the requirement is: “aquatic organisms shall not be rendered unsuitable for human consumption by the presence of contaminants”.

An approach similar to that for recreational waters, in relation to minimising health risks, could be applied to shellfish gathering waters.

Proposals: That the PHC and the MoH provide advice to regional councils and regional public health providers on:

- **the classification of waters used for contact recreational purposes (Class CR) and for shellfish gathering (Class SG), under the Third Schedule to the Resource Management Act 1991, to ensure that, where waters are so classified, they meet at least minimum requirements for the protection of health**
- **monitoring and surveillance of the microbiological quality of recreational and shellfish gathering areas, and advising the public of potential public health risks associated with these uses of water.**

That the PHC and the MoH provide advice to regional public health providers to encourage high standards of operation and maintenance of public swimming and thermal pools to avoid or reduce public health risks.

Legionellosis

New Zealand Guidelines for the Control of *Legionella*, produced by the New Zealand Communicable Disease Centre,¹² is still in draft form but provides a useful guide to preventive strategies which reduce the risk of an outbreak in air-conditioned buildings. These draft guidelines are supported by the New Zealand Institute of Refrigeration, Heating and Air Conditioning Engineers (IRHACE), who were involved in the preparation.

Other guidance on the hygiene of air and water systems in buildings include:

- NZS 4302: 1987, *Code of Practice for the Control of Hygiene in Air and Water Systems in Buildings*
- Standards Australia SAA HB 32 - 1992, *Control of Microbial Growth in Air Handling and Water Systems in Buildings*
- Compliance Schedule 9 of the New Zealand Building Code.

Following the development of suitable guidelines on the prevention and control of *Legionella* in air-conditioning and water systems, recommendations on the means of implementing and complying with the guidelines should be prepared. For example, this may include adoption of guidelines for the control of *Legionella* as an "approved document" under the New Zealand Building Code.

Proposal: That the PHC, in collaboration with appropriate agencies:

- **assists in the completion of the New Zealand Guidelines for the Control of *Legionella***
- **prepares policy recommendations on the means of implementing and complying with these guidelines.**

Healthy Public Policy Recommendations

Drinking Water

That the MoH's review of public health regulation address:

- the maintenance and protection of the quality of public drinking water supplies to avoid or reduce public health risks
- improvements in the notification and investigation of waterborne illnesses.

Fluoridation

That the PHC prepares recommendations on the fluoridation of water supplies.

Recreational and Shellfish Gathering Waters

That the PHC and the MoH provide advice to regional councils and regional public health providers on:

- the classification of waters used for contact recreational purposes (Class CR) and for shellfish gathering (Class SG), under the Third Schedule to the Resource Management Act 1991, to ensure that where waters are so classified, they meet at least minimum requirements for the protection of health
- monitoring and surveillance of the microbiological quality of recreational and shellfish gathering areas and advising the public of potential public health risks associated with these uses of water.

That the PHC and the MoH provide advice to regional public health providers to encourage high standards of operation and maintenance of public swimming and thermal pools to avoid or reduce public health risks.

Legionellosis

That the PHC, in collaboration with appropriate agencies:

- assists in completing the New Zealand Guidelines for the Control of *Legionella*
- prepares policy recommendations on the means of implementing and complying with these guidelines.

Setting Public Health Programme Targets

Population-Based Public Health Services

Information on the grading of the major public drinking water supplies should become available during 1993/94. This should identify areas where there are deficiencies in the quality of the source water, in the treatment process (including plant management), and in the reticulation system.

Programmes should then focus on addressing those deficiencies, including programmes which:

- improve the monitoring and surveillance of supplies from the source to the tap
- improve the training of treatment plant operators, the people who grade water supplies, and those who carry out the surveillance of public water supplies
- inform communities about the quality of their drinking water.

Proposal: That the PHC purchases programmes to:

- **improve the local monitoring and surveillance of public drinking water supplies from the source of supply to the tap**
- **inform communities about water quality and treatment, and the risks associated with poor quality drinking water**

following completion of the grading of public water supplies and the revision of the 1984 drinking water standards by the MoH.

Programmes should be designed to:

- inform building owners, plant operators and maintenance staff about preventing and controlling the proliferation of *Legionella*
- increase public awareness about the risks and control of *Legionella*, particularly among those whose immunity is compromised.

Proposal: That the PHC, in collaboration with other agencies, purchases a programme to increase public awareness about the health risks associated with *Legionella*, and to advise on the control of *Legionella* and other micro-organisms in air-conditioning and water systems.

Drinking water

Legionellosis

Public Health Programme Recommendations

Population-Based Public Health Services

Drinking water

That the PHC purchases programmes to:

- improve the local monitoring and surveillance of public drinking water supplies from the source of supply to the tap
- inform communities about water quality and treatment, and the risks associated with poor quality drinking water

following completion of the grading of public water supplies and the revision of the 1984 drinking water standards by the MoH.

Legionellosis

That the PHC, in collaboration with other agencies, purchases a programme to increase public awareness about the health risks associated with *Legionella*, and to advise on the control of *Legionella* and other micro-organisms in air-conditioning and water systems.

Setting Research and Information Targets

In the absence of specific regulatory requirements, public demand and industry requirements (eg, food processing and export industries) are likely to be the major incentives for water supply authorities and regional councils to improve the grading and quality of public drinking water and recreational/shellfish gathering waters. These demands may be expressed in various ways, including submissions on the local authority's policies and plans.

In order to participate in the development of water policies and plans, communities must be made aware of the local issues which influence the quality of their water and must be provided with information which enables them to understand how risks to public health are being managed.

The MoH collects and publishes information on the quality of public drinking water supplies, which assists both local authorities and the public to make informed decisions about the management of their water supplies.

Information Systems

A database has been established by the MoH to determine the extent of compliance or non-compliance with water quality guidelines designed to protect public health. This covers public drinking water, recreational and shellfish gathering waters and *Legionella* sources. This information will be useful for identifying:

- public drinking supplies which need to be upgraded
- recreational and shellfish gathering waters which need to be upgraded or reclassified as being unsuitable for these purposes
- significant sources of *Legionella*.

Proposals: That the MoH completes grading of all public drinking water treatment plants and reticulation systems.

That the PHC and the MoH, in consultation with water supply authorities and regional public health providers, will ascertain the significance of the lower grade (that is lower than "B") to achieving the overall goal of improving and protecting the public health.

Research

Recreational and shellfish gathering waters

A pilot epidemiological study was carried out at two beaches in Auckland (Milford and Wenderholm) during the 1992/93 summer.¹⁰ The study included a site affected by animal wastes to enable the effects of human and animal faecal residues to be compared.

Results from this study are not yet available, but discussions involving the MoH, the Ministry for the Environment, the PHC, regional councils and others have been taking place to carry out a nationwide survey enabling appropriate methodology, indicators and microbiological standards for New Zealand waters to be developed.

The national epidemiological study is tentatively proposed for the summer of 1994/95. Decisions on proceeding with a nationwide study depend partly on the results from the pilot study in Auckland and partly on funding. Funding sources include regional councils and the Ministry for the Environment. Since the results will benefit the PHC in developing future public health objectives and targets, as well as providing public information about safe bathing and shellfish gathering areas, and the health risks associated with contaminated water, it is proposed the PHC also contribute funds to this nationwide study.

Proposal: That the PHC contributes to the funding needed for the national epidemiological study of recreational waters.

Microbiological standards

Currently, there is a lack of consistency among regional councils in the methods used to monitor microbiological quality of recreational water. As a result, health risk comparisons are difficult to make.

The Department of Health's provisional microbiological water quality guidelines for recreational and shellfish gathering waters¹³ recommend these indicators:

- freshwater full-contact recreation: enterococci or *E coli*
- coastal water full-contact recreation: enterococci
- shellfish gathering waters: faecal coliforms.

At present, regional councils responsible under the Resource Management Act for monitoring water quality within their regions, do not apply a consistent method of monitoring microbiological water quality.

Some are testing for faecal coliforms and/or *E coli* in recreational waters, some focus only on enterococci, while others examine all three indicators. It is important to co-ordinate any monitoring and surveillance of recreational water quality, by regional councils and public health authorities, to ensure programmes are effective, avoid duplication, and enable information to be shared.

Regional public health providers, as well as being involved in a national shellfish sanitation programme set up under the Food Act 1984, also monitor non-commercial shellfish gathering areas.

To enable a proper nationwide comparison to be made, it will be necessary to agree on a standard and methodology for assessing the microbiological quality of recreational and shellfish gathering waters. This will require consultation between the MoH, the PHC, the Ministry for the Environment, public health providers and regional councils. In terms of recreational water, it would be better to wait until a nationwide epidemiological study is carried out before deciding on appropriate indicators.

The prevalence and significance of *Legionella* contamination in air-conditioning and hot tap water systems in New Zealand is unknown. On the basis of notified cases of legionellosis, the incidence rate appears to be relatively low (an average of 0.72 per 100 000 between 1988 and 1992), although many cases may go unreported.

A survey of 95 apartments in Chicago¹⁴ showed that 32 percent of the hot tap water systems were contaminated by *L pneumophila* ranging in concentration from one to 10⁴ organisms per litre. This study found that hot tap water systems maintained at less than 60°C are frequently contaminated by *L pneumophila*, but systems with low levels of contamination (less than 10⁴ organisms per litre) did not appear to be an important source of infection for healthy individuals.

Groups at increased risk from legionellosis include smokers, alcoholics and people whose immunity to infection is low owing to illness or treatment.¹⁵

To determine the prevalence and significance of *Legionella* contamination in air-conditioning and reticulated water systems in New Zealand, it is proposed that a survey be undertaken of a random sample of public buildings and domestic properties.

Proposal: That the priorities in research funded by agencies such as the Health Research Council or the Foundation for Research, Science and Technology, include research into the prevalence and significance of *Legionella* contamination in air-conditioning and reticulated water systems in New Zealand.

Legionellosis

Research and Information Recommendations

Drinking water

That the MoH completes grading of all public drinking water treatment plants and reticulation systems.

That the PHC and the MoH, in consultation with water supply authorities and regional public health providers, will ascertain the significance of the lower grade (that is lower than "B") to achieving the overall goal of improving and protecting the public health.

Recreational and shellfish gathering waters

That the PHC contributes to the funding needed for the national epidemiological study of recreational waters.

Legionellosis

That the priorities in research funded by agencies such as the Health Research Council or the Foundation for Research, Science and Technology include research into the prevalence and significance of *Legionella* contamination in air-conditioning and reticulated water systems in New Zealand.

Summary of Benefits

The overall benefits of these proposals include a reduction in risks to public health and safety from exposure to contaminated water.

Specifically, the benefits include:

- improved surveillance of the microbiological and chemical quality of water used for drinking, recreational purposes, food gathering, food processing, and in heating, ventilating and water distribution systems in buildings
- reduced risk of contracting a waterborne illness
- benefits to the food and tourist industries of New Zealand's "clean, green" image.

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- 14 Arnow PM, Weil D, Para MF. Prevalence and significance of *Legionella pneumophila* contamination of residential hot-tap water systems. J Infect Dis 1985; 152(1): 145-51.
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Glossary

Aquifers: A layer of rock or soil able to hold or transmit water.

Chemical disinfection by-products (DBPs): By-products of the disinfection of water by chemicals, usually chlorine.

Dental caries: Tooth decay.

Environmental microflora: Minute plants which assist in an environment.

Fluoridation: The addition of fluoride to the public water supply.

Health status: A set of measurements which reflect the health of populations. The measurements may include physical function, emotional wellbeing, activities of daily living, etc.

Incidence: The number of new cases or deaths that occur in a given period in a specified population.

Leachates: Liquid effluent which has percolated through material deposited in a landfill.

Maori ethnic group: In the case of the 1991 Census of Population and Dwellings, this refers to those persons who stated "New Zealand Maori" as either their sole ethnic group or one of several ethnic groups to which they belong.

Marine biotoxin control: Refers to the control of toxic algae and toxic shellfish poisoning.

Microbial disease: Disease caused by micro-organisms.

Monitoring: The performance and analysis of routine measurements, aimed at detecting changes in the environment or health status of populations.

Neurotoxins: Toxins (or poisons) which affect the nervous system.

Objective: The end result a programme seeks to achieve.

Prevalence: The number of instances of a given disease or other condition in a population at a designated time. Prevalence includes both new (incidence) and existing instances of a disease.

Public health services: Goods, services, or facilities provided for the purpose of improving or protecting public health.

Rate: In epidemiology a rate is the frequency with which a health event occurs in a defined population. The components of the rate are the numbers of deaths or cases (numerator), the population at risk (denominator) and the specified time in which the events occurred. All rates are ratios, calculated by dividing the numerator by the denominator.

Reticulation system: The network of pipes and pumps which distribute drinking water from the source to the user.

Risk factor: An aspect of personal behaviour or lifestyle, an environmental exposure, or an inborn or inherited characteristic that is associated with an increased risk of a person developing a disease.

Risk: The probability of harmful consequences arising from a hazard.

Surveillance: Ongoing scrutiny, generally using methods distinguished by their practicability, uniformity, and frequently their rapidity, rather than by complete accuracy. Its main purpose is to detect changes in trend or distribution in order to initiate investigative or control measures.

Target: An intermediate result towards the objective that a programme seeks to achieve.

Trihalomethanes (THMs): A group of by-products from the chemical disinfection of water.

WHO: World Health Organisation of the United Nations.

Written Comments Received on the Draft of *Water Quality*

Accident Rehabilitation and Compensation Insurance Corporation (ACC)
Ashburton and Community Health Services, Canterbury Health
Auckland Regional Council
Bay of Plenty Regional Council
Building Industry Authority
Central Regional Health Authority
Christchurch City Council
Community Health Services, Auckland Healthcare
Dunedin City Council
Franklin District Council
GB McBride, National Institute of Water & Atmospheric Research Ltd
Gas Association of New Zealand
Gas Direct
Hamilton City Council
Hauraki District Council
Health Development & Community Services, Southern Health
Health Research Council of New Zealand
Health Waikato
Local Government Group, Department of Internal Affairs
Manawatu Wanganui Regional Council
Mayoral Chambers, Lower Hutt
Midcentral Health
Midland Regional Health Authority
Ministry for the Environment
Ministry of Agriculture and Fisheries
Ministry of Health
Ministry of Women's Affairs
Nelson City Council
New Plymouth District Council
New Zealand School Trustees Association
New Zealand Water and Wastes Association

Northern Regional Health Authority
Northland Regional Council
Otago Regional Council
Parliamentary Commissioner for the Environment
Planning & Development Services, Auckland City Council
Public Health Services, Health South Canterbury
Public Health Services, Waitemata Health
Public Health Services, Hutt Valley Health
Public Health Unit, Good Health Wanganui
Queenstown Lakes District Council
Rodney District Council
Selwyn District Council
South Taranaki District Council
Southern Regional Health Authority
Southland Regional Council
Tararua District Council
Tasman District Council
Te Waka Hauora O Aotearoa
Timaru District Council
Upper Hutt City Council
Water Care Services Ltd
Western Bay Health

The Public Health Commission would like your comments on the implementation of proposals contained in this document. They should be addressed to:

**The Chief Executive
Public Health Commission
PO Box 1795
WELLINGTON**