# DRINKING WATER QUALITY REGULATORY FRAMEWORK FOR VICTORIA

# REGULATORY IMPACT STATEMENT

# FOR THE

# SAFE DRINKING WATER REGULATIONS 2004

**September 2004**

Victoria
The Place To Be

## HAVING YOUR SAY

This Regulatory Impact Statement is prepared in accordance with the requirements of the *Subordinate Legislation Act* 1994. Its purposes are to explain the likely impact of the proposed regulations and to inform and facilitate the process of public consultation. It was prepared for the Department of Human Services (Victoria) by Jaguar Consulting Pty Ltd (ABN: 56089 615 636).

Among other things, the Statement assesses the costs and benefits of the proposed regulations and other feasible alternative means of achieving the same objectives. It concludes that the benefits of the proposed regulations are likely to outweigh the expected costs.

Further copies of the Regulatory Impact Statement and the proposed regulations may be obtained from Mr Brian Labza of the Department of Human Services, on (03) 9637 4088, by email request from brian.labza@dhs.vic.gov.au or downloaded from the Department's environmental health website at:

www.health.vic.gov.au/environment/water/drinking

Supplementary material will also be available on the web site during the consultation period.

Written submissions are invited from any interested industry, stakeholder or community group and from the public in relation to any matter relevant to the proposed regulations.

Submissions must be received by 5 PM on **Monday 25 October 2004**.

Submissions should be marked **Safe Drinking Water Regulations 2004 - Submission** and addressed to:

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Public Health Group
Department of Human Services
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or by email to: brian.labza@dhs.vic.gov.au

Please note that all comments and submissions received will be treated as public documents.

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## SUMMARY

The *Safe Drinking Water Act* 2003 established a new legislative framework for assuring drinking water quality in Victoria. The Act is based on:

- The adoption of a 'catchment to tap' risk management approach;
- The specification of standards at the customer tap for key water quality criteria;
- The establishment of information disclosure obligations for water suppliers; and
- The adoption of systemic community consultation processes.

This approach is consistent with regulatory best practice for the management of complex and inter-dependent risks.

The objectives of the proposed regulations are to give effect to key aspects of the *Safe Drinking Water Act* 2003. In particular they:

- specify the major elements to be incorporated in risk management plans; and
- specify standards for the quality of drinking water supplied to customers of water suppliers; and
- specify criteria for accreditation of analysts and for approval of auditors; and
- specify information disclosure requirements in relation to annual reports for drinking water quality.

In conceptual terms, the attribution of costs and benefits to the Act and the regulations is difficult. This is an inevitable result of the inter-dependent nature of these instruments. The total costs of the legislative framework as a whole have been estimated to have a net present value of $68.2 million over ten years. This includes $10.6 million for the levy.

Around $39.9 million of these net present value costs relate to the standards established via the regulations, including the capital and operating expenses entailed in reaching compliance with the standards, the monitoring of compliance and reporting. These costs are considered to be clearly attributable to the regulations.

Some $17.7 million of the net present value costs relates to the cost of implementing risk management plans. Some part of this cost can be considered attributable to the regulations, since they specify the particular matters that must be included in the plans. However, the actual requirement to prepare the plans is contained in the legislation.

The **expected benefits** of the regulations relate to:

- Reductions in the risk of acute disease;
- Reductions in the risk of chronic disease;
- Reductions in the costs of avoidance behaviours in the event of contamination of the water supply;
- Increased consumer confidence; and
- Improved efficiency in the management of water businesses.

A full quantification of these benefits has not been possible, largely as a result of the fact that incidences of water contamination are relatively rare and unpredictable in relation to both frequency and impact. However, a detailed analysis of some key contamination incidents, including that in Sydney NSW in 1998, has been undertaken.

The cost of the Sydney incident is estimated at approximately A$350 million. On this basis, it is noted that the new legislative framework can be considered to entail net benefits to the community if it succeeds in reducing the probability of a contamination incident such as that in Sydney by a factor of 0.02, or one in fifty years. It is considered that the far reaching nature of the legislative change – involving, *inter alia*, a move toward systematic risk management practices - suggests that an impact of this magnitude, or greater, is highly likely. Thus, it is considered appropriate to proceed with the making of the regulations.

Two alternatives to the proposed regulations were considered. The first involved the specification of a wider range of standards for water quality parameters. The second involved specifying no parameters and relying solely on the risk management approach.

The former alternative was assessed as having net present value costs of $71.5 million over ten years, or $3.3 million greater (in net present value terms) than the proposed regulations. However, while it was considered that there may be some additional consumer confidence benefits derived from this alternative, they were not considered to be commensurate with the additional costs involved. This conclusion depends in part on the fact that monitoring will necessarily be undertaken at different stages of the water supply process by water suppliers as a result of their adoption of risk management practices.

The latter alternative would involve potentially lower costs in relation to both monitoring activity and in a lesser need to undertake capital works to ensure that specific standards were met. However, this alternative was considered to be contrary to the overall approach specified in the legislation, which is based on ensuring both risk management and enforceable standards are pursued, to ensure that safe and good quality drinking water is supplied in Victoria.

Thus, the proposed regulations are preferred to the two identified alternatives.

# MAIN REPORT

## 1. Background

The *Safe Drinking Water Act* 2003 came into effect in Victoria on 1 July 2004. The Act is the first Act in Victoria to deal specifically with the regulation of drinking water supplies. Previously, drinking water had been regulated through instruments such as the *Health Act* 1958, the Health (Quality of Drinking Water) Regulations 2002 and a number of subordinate contractual documents and licences.

The *Safe Drinking Water Act* 2003 (the Act) constitutes a wholly new approach to the regulation of drinking water quality in Victoria. The regulatory approach set out under the Act is based on the creation of general duties on water suppliers to ensure the quality of the drinking water they supply and requires them to adopt a risk management framework in complying with these duties. The Act also sets out obligations on water storage managers, as entities that supply water to water suppliers.

The regulatory framework provides for an integrated system of quality assurance for drinking water which is at international best practice and which responds to significant criticisms made in recent years of Victoria's previous regulatory arrangements. In particular, it requires water suppliers to develop and implement an integrated risk management framework for drinking water quality, comply with specific standards for various water quality parameters and undertake periodic monitoring to verify that compliance, communicate effectively with all stakeholders and publicly disclose relevant water quality information.

An effective regulatory framework is essential because drinking water quality is essential to public health and the quality of drinking water is something over which consumers cannot readily exercise individual control. Further, drinking water is generally supplied in Victoria by capital intensive natural monopolies subject to significant information asymmetry on quality issues. Clear obligations set by Government will set appropriate drivers for investment decisions by water suppliers and provide confidence to consumers.

The integrated risk management framework and public disclosure requirements are also essential to the regulatory framework. In particular, they address the quality of the management activities of water suppliers and water storage managers and address issues not readily addressed via standard setting, such as catchment management issues. It should be noted in this context that sound management of water supplies is a concept that embraces both management of the capital assets and the day-to-day process management of the system.

When complied with, the risk management requirements, public disclosure requirements and standards can together be expected to provide sufficient transparent evidence to consumers, regulatory agencies and Government that drinking water supplies in Victoria are aesthetically satisfactory and unlikely to pose a risk to public health.

The Act applies to the most significant water suppliers in Victoria, namely the three metropolitan water companies, the fifteen regional urban water authorities, Melbourne Water Corporation, and, to the extent that their activities relate to drinking water, Parks Victoria, alpine resorts management boards and rural water authorities in Victoria.

Further detail on the major elements of the Act is as follows:

- **Requirement to implement risk management plans and systems**

Water suppliers and water storage managers, as defined in the Act, are required to develop risk management plans and to have these independently audited. This means that water suppliers and water storage managers must identify and address all sources of significant risk in the process of providing drinking water to the consumer. In particular, the risk management plan must address incident and emergency management, information management and the relationship with other stakeholders in the catchment-to-tap delivery chain (for example, land holders or catchment management agencies).

Risk management plans are also to cover certain types of water that are not suitable or intended for drinking (i.e. non-potable supplies). Here, the water supplier concerned must take all reasonable steps to ensure that water supplied under these circumstances was not inadvertently consumed and was also suitable for its intended purpose. This again forms an essential component of a water supplier's risk management framework.

- **Requirement to comply with drinking water standards**

The Act obliges water suppliers to ensure that all drinking water complies with standards established by regulation. The proposed regulations which are the subject of this Regulatory Impact Statement would, *inter alia*, establish these standards. Prior to the passage of the Act, water businesses in Victoria had no regulatory duty to comply with specific water quality standards, although standards were set via contractual and other arrangements.

- **Disclosure and reporting obligations**

The Act requires water suppliers to disclose to the Secretary to the Department of Human Services if they have grounds to believe there is, or may be, any contravention of standards in the drinking water they are supplying. Officers of water suppliers, water storage managers or councils must also report any incident where drinking water is suspected of causing an illness.

The Act also establishes public reporting requirements in relation to drinking water quality, including the preparation of annual reports on the quality of water supplied. The results of any monitoring of water quality that is conducted must also be made publicly available seven days after they are compiled.

- **Powers of the Secretary where there is a risk to public health**

The Act provides the Secretary to the Department of Human Services with substantial powers where (s)he believes there is a risk to public health associated with the supply of drinking water. These include the power to direct water suppliers to undertake certain actions including taking specified corrective action in relation to water quality, purifying water to certain standards, supplying alternative sources of water and the power to enter premises and gather information and evidence.

- **Payment of a levy**

The Act provides for the payment of a levy by each water supplier and water storage manager in order to fund the administration of the Act. It is intended that a drinking water quality regulatory office will be established as a specific function within the Department of Human Services and that the proceeds of this levy will be used to fund the Office. The Act sets out detail on how the levy will be determined and collected.

- **Consequential amendments**

Part 6 of the Act repeals sections 79, 80 and 81 of the *Health Act* 1958, which deal with drinking water quality and, as a result, the previous Health (Quality of Drinking Water) Regulations 2002. It also amends the applicability of the *Food Act* 1984 to water supply authorities in Victoria and amends provisions in the *Water Act* 1989.

## Further information

Further information is available from the Department's environmental health website at:

www.health.vic.gov.au/environment/water/drinking

The *Safe Drinking Water Act* 2003 can be downloaded from the Victorian Government Parliamentary web site at: http://dms003.dpc.vic.gov.au/sb/2003_Act/A01263.html. Printed copies of the Act are also available for purchase from Information Victoria[1].

For background and technical information regarding drinking water issues in Australia, the reader may wish to consult the most recent version of the "*Australian Drinking Water Guidelines*" (National Health and Medical Research Council, Canberra, 2001 update). This can be downloaded from the National Health and Medical Research Council web site:

www.nhmrc.gov.au/publications/pdf/eh19.pdf

Other information about issues relating to water quality management and health risk relating to drinking water supplies, including a summary of links to other useful web sites, can be found on the web site of the Co-operative Research Centre for Water Quality and Treatment, at:

www.waterquality.crc.org.au

Information about water can be found on the Victorian Government's water web site, at:

www.ourwater.vic.gov.au

[1] A paper summarising the regulatory framework and explaining the specific obligations of the Act was also published in June 2004, as:

**Labza B**: (2004) Landmark Safe Drinking Water Legislation For Victoria. *Water - Journal of the Australian Water Association*, Volume 31 No 4 June 2004: pages 79 – 82.

## 2. Regulatory objectives

The bulk of the requirements referred to above are incorporated in the Act. This includes the requirement to develop risk management plans, to deliver water that complies with standards and to disclose water quality information. However, the regulations are required in order to give effect to certain of the obligations set out in the Act, particularly in relation to the risk management plans and standards.

Thus, the objectives of the proposed regulations are to "*… make further provision for the supply of safe drinking water"* (Regulation 1). The regulations make further provisions in the following main areas:

- Specifying standards for the quality of drinking water supplied to customers of water suppliers and associated detail regarding monitoring;
- Specifying the major elements to be incorporated in the risk management plans to be developed by water suppliers and water storage managers;
- Specifying criteria for accreditation of analysts and for approval of auditors; and
- Specifying information disclosure requirements in relation to annual reports for drinking water quality.

## 3. Authorising provision

The proposed regulations are to be made under the authority of Section 56 of the *Safe Drinking Water Act* 2003.

## 4. Nature and extent of the problem

Victoria has historically had low levels of public health problems deriving from the supply of drinking water. However, a number of reports in recent years highlighted failings in the regulatory regime that was responsible for ensuring drinking water quality. These included reports by the Productivity Commission, the Victorian Auditor-General and the then Office of the Regulator-General (now the Essential Services Commission)[2].

The major deficiencies identified, which the Act and the proposed regulations have been designed to address, are:

- The absence of a coherent regulatory and enforcement framework for drinking water quality, including specific legislation and a dedicated regulator, that applies consistently to both metropolitan and non-metropolitan areas across the state;
- The absence of specific obligations on water suppliers to supply water that meets a comprehensive set of microbiological, chemical and physical (i.e. aesthetic) requirements, set out in legislation;
- The absence of specific requirements for water suppliers to adopt pro-active risk management based approaches to the management of drinking water quality;
- The lack of consistent requirements for water suppliers to disclose information to consumers regarding drinking water quality; and
- The absence of regulatory oversight of a range of smaller water suppliers, including Parks Victoria and the alpine resorts management boards.

The above deficiencies effectively meant that high quality drinking water in Victoria could not be systematically assured. Thus, the new legislative structure was directed at providing a comprehensive and systematic approach to ensuring drinking water quality.

The proposed regulations constitute an integral part of this new regulatory structure, since the specific quality indicators against which water quality is assessed are to be created via the regulations, as are the monitoring arrangements to be required. As well, the regulations will set out the essential requirements for inclusion in risk management plans.

This means that the ability of the new legislation to address the problems identified above is critically dependent on the passage of the proposed regulations.

[2] See *'Arrangements for Setting Drinking Water Standards'*, Productivity Commission, 2000. International Benchmarking, AusInfo, Canberra;
*'Melbourne's Retail Water & Sewerage Companies Performance Report July 1998 – June 1999'*, Office of the Regulator-General, Victoria, January 2000;
*'Non-metropolitan urban water authorities - Enhancing performance and accountability'*, Victorian Auditor-General's Office, Melbourne November 2000;
*'Report on Ministerial Portfolios, May 1999'*, Victorian Auditor-General's Office, Melbourne.

## 5. Summary description of the regulations

This section provides a general description of the regulations, highlighting the purpose of particular provisions and their relationship to the Act. A copy of the exposure draft of the regulations is attached as an appendix to this Regulatory Impact Statement.

The proposed regulations are in four Parts, as follows:

- Part 1: Preliminary
- Part 2: Management of Risks to Water Supply
- Part 3: Drinking Water Quality Standards
- Part 4: Other Matters

In addition, there are two Schedules.

### Part 1: Preliminary

This part of the regulations establishes the objective of the regulations as being "*… to make further provision for the supply of safe drinking water*". Regulation 1(2) outlines the Regulations, thus establishing the means by which this will be achieved. Regulation 2 identifies the authorising provision for the regulations as being Section 56 of the *Safe Drinking Water Act* 2003. Regulation 3 defines a range of relevant terms.

**Regulation 4** provides for the Secretary to the Department of Human Services to specify an area that is supplied with drinking water to be a "Water Sampling Locality" for the purposes of these regulations. This is to be done by publication of a notice in the Government Gazette. In specifying a Water Sampling Locality, the Secretary may have regard to the nature and design of the water distribution system and the source(s) of drinking water supplied in that area.

The effect of declaring a Water Sampling Locality is that water samples will need to be taken from that locality and that water quality and compliance with standards will be assessed pursuant to these localities. Essentially, they are a means by which all water supply systems across Victoria can be catalogued and subdivided so as to ensure that all drinking water across the state uniformly complies with regulatory objectives, rather than being rolled up into large scale summaries.

**Regulation 5** provides for the Secretary to specify water sampling points, within water sampling localities, for the purpose of ensuring that samples taken are representative of the drinking water supplied in that locality.

### Part 2: Management of Risks to Water Supply

This Part sets out the matters that must be incorporated in the risk management plans mandated for water suppliers and water storage managers in the Act. It also establishes requirements for the audit of the plans.

**Regulation 6** sets out the required contents of risk management plans. The main requirements are:

- Identification of the persons responsible for managing water quality risks and hazards;
- Details of the activities undertaken to manage water quality risks and hazards;
- Details of the features of the water supply system that are designed to assist in the management of risks and hazards;
- For water suppliers, details of processes for consultation with water storage managers or other suppliers on risk and hazard management;
- Details of procedures and management systems designed to ensure the addition of chemicals to drinking water does not adversely affect its quality; and
- Details of emergency management procedures.

As well, Regulation 6 sets out the specific kinds of risk that must be addressed in a risk management plan . These include risks to health arising from:

- Pathogenic micro-organisms;
- Inorganic chemicals, including inorganic disinfection by-products;
- Organic chemicals, including pesticides and organic disinfection by-products;
- Radiological parameters;
- Algae toxins; and
- Incidents or events that may cause any of the above to enter the water supply on an episodic basis.

Regulation 6 sets out a minimum set of inclusions, rather than a complete set of requirements. It does not detract from the general duty, established in section 9 of the Act, for the water suppliers and water storage managers to manage all risks in connection with the supply of drinking water.

**Regulation 7** specifies the documents that must be reviewed in audits of the risk management plans. Regulation 8 provides for the form of audit certificates to be supplied (found at Schedule 1) and regulation 9 covers the approval criteria for auditors of risk management plans.

### Part 3: Drinking Water Quality Standards

Part 3 makes operational the Act's requirements that drinking water supplied to consumers must meet water quality standards.

**Regulation 10** requires that, if any of the substances listed in Schedule 2 to the regulations is present in drinking water supplied within a given water sampling locality, its concentration must meet the standard specified in the Schedule. Schedule 2 includes one micro-organism (*E. coli*), turbidity (an important aesthetic parameter relating to the cloudiness of water, which can also serve as an indicator of other potential water quality problems) and seven chemicals or chemical by-products that are used in or arise from the use of different water treatment processes and are regarded as the most significant by-products in the context of Australian water supplies.

The proposed standards for chemicals are for aluminium, bromate, formaldehyde, total trihalomethanes and three individual haloacetic acids (mono-, di- and trichloroacetic acids). These latter parameters are often referred to as THM's (or total THM's) and HAA's respectively. The standards themselves are based on the appropriate guideline value set out in the "*Australian Drinking Water Guidelines*"[3].

**Regulation 10** (c) also requires that any other substances (i.e. other than those identified in Schedule 2) must not be present in drinking water in amounts that would pose a risk to human health.

**Regulation 11** sets out requirements for the frequency of water sampling activities in respect of the parameters identified in Schedule 2. Testing is required on a weekly basis for *E. coli* and turbidity and on a monthly basis for the remaining substances. The regulation permits variation of monitoring frequency depending on local circumstances and risk profiles.

**Regulation 12** provides that samples must be analysed by an accredited analyst, while regulation 13 provides for the accreditation of analysts.

**Regulation 14** requires monthly reporting of summaries of the results of the analysis of water samples to the Secretary to the Department of Human Services.

### Part 4: Other matters

**Regulation 15,** which comprises Part 4 of the regulations, sets out in substantial detail the matters that must be included in the annual reports of water suppliers or water storage managers. These include evidence of their compliance or non-compliance with water quality standards, actions taken to deal with water quality problems, actions taken in respect of emergencies, incidents and the like, an analysis of water sample information and information on how aesthetic criteria are managed. As well, annual reports must summarise the water disinfection processes undertaken, list all chemicals used to disinfect water supplies and summarise the results of risk management plan audits.

### Incidence of the regulations

It should be noted that, like the parent Act, the Safe Drinking Water Regulations apply to the three Melbourne metropolitan water companies (Yarra Valley Water, City West Water and South East Water), the fifteen regional urban water authorities, Melbourne Water Corporation, and, to the extent that their activities relate to drinking water, Parks Victoria, alpine resorts management boards and rural water authorities in Victoria. This covers the vast majority of drinking water supplies in Victoria but excludes some minor suppliers of water, those provided by bottled water suppliers, small supplies controlled by private co-operatives, water on private properties and water for irrigation purposes.

Auditors and laboratories that provide analytical services to water businesses in Victoria may also be affected by the new legislation.

[3] See '*Australian Drinking Water Guidelines'* National Health and Medical Research Council, Canberra, 1996 (updated 2001, available from www.nhmrc.gov.au/publications/pdf/eh19.pdf).

# 6. Expected benefits of the proposed regulations

The proposed regulations form an integral part of the larger legislative structure that is created for Victoria by the *Safe Drinking Water Act* 2003 and its subordinate legislation. This means that there are substantial conceptual difficulties in attributing costs and benefits specifically to the regulation themselves, or to the Act *per se.* It is thus more appropriate to consider the total benefits and costs that flow from the implementation of the legislative structure as a totality.

For this reason, the following sections discuss the expected benefits and costs of the whole legislative structure, while also attempting to highlight the specific impact of the proposed regulations where possible. However, the reader should bear in mind that the expected benefits will be achieved only via implementation of the totality of these legislative and regulatory provisions.

The expected benefits of the proposed regulatory framework are necessarily subject to considerable uncertainty. This degree of uncertainty is, in part, the result of the relatively limited data available in relation to a number of key variables. It also reflects the fact that major outbreaks of water-borne disease and illness are relatively rare and unpredictable events in developed nations, with widely varying consequences. Thus, estimation of benefits that, in large part, relate to reducing the incidence of these events is necessarily difficult and uncertain.

Given this context, the following discussion of expected benefits contains two parts. In the first part, a qualitative discussion of the expected benefits is presented, which seeks to highlight the different types of benefit expected and to give a general indication of the relative importance of each of these benefits. In the second part, quantitative benefit estimates are provided. However, given the uncertainties highlighted above, these estimates should be considered as indicative only.

Thus, the role of this section is essentially to indicate the order of magnitude of the expected benefits and establish that they are proportionate to the estimated costs. The discussion contained in the following sections will seek to address this uncertainty by identifying key assumptions or estimates and indicating the extent of likely variations in benefit estimates, based on differing values of the key variables.

## 6.1 Qualitative discussion of expected benefits

### 6.1.1. Source of expected benefits

In general terms, the expected benefits to Victoria from implementing the new legislative structure for drinking water policy are expected to derive from:

- Improved management of water supply activities due to the mandating of a systemic approach to quality assurance via requirements for risk management plans to be prepared, implemented and subject to auditing;
- Clear establishment of standards for the quality of drinking water supplies to consumers, including the matters set out in the Schedule and the general requirement to ensure that no substances are present at concentrations that would pose a risk to human health; and

- Improved ability for stakeholders to respond to health risks that may arise from failures in water quality management by water suppliers or water storage managers, by providing a wider range of powers able to be exercised by the Secretary to the Department of Human Services to order specific actions to address problems.

Within this context, the specific contribution of the proposed regulations is that they will:

- Provide a degree of guidance detailing the major elements required to be included in the risk management plans; and
- Specify the standards and monitoring frequencies required to assess compliance with the standards.

Given this, the regulations are clearly of substantial importance to the achievement of the overall benefits expected to arise from the legislative package.

### 6.1.2. Types of expected benefits

In general, better water quality management is expected to lead to a reduction in the incidence of water quality falling below acceptable quality levels, to better detection of any problems that do arise and to an improvement in the efficiency and effectiveness of actions taken to deal with problems that occur.

Following from this, the potential benefits from improving drinking water quality are of several types. Firstly, there are **health benefits** in terms of reduced incidence of infectious disease outbreaks (epidemics) and reduced severity of outbreaks as a result of improved management. Secondly, there are health benefits in terms of reduced endemic incidence (i.e. long term or background levels) of disease. Thirdly, there are the benefits associated with the reduced need to take costly **avoidance action** in the case of contamination incidents or disease outbreaks (e.g. purchase of bottled water or boiling tap water for drinking).

Fourth, there are the benefits of **increased consumer confidence** that drinking water is free from risks to health and that water system management and monitoring are of a high standard. While essentially intangible and thus unquantifiable in nature, this public confidence benefit is of considerable importance. The recent experience of contamination of the Sydney drinking water supply indicates the potential significance of outbreaks that undermine this public confidence.

#### *Acute health related benefits*

The potential benefits of reduced rates of acute health problems as a result of water quality improvement are critically dependent on existing water quality. While the current incidence of acute health problems is low, events such as the recent contamination incident that affected the Sydney NSW water supply in 1998 (discussed later in this chapter) point to the risk of major, infrequent, acute health related problems.

It is expected that the new legislative structure will reduce the risk of such incidents occurring, particularly as a result of the requirements that it includes for a pro-active and systematic risk management approach to be taken.

### *Chronic health related benefits*

The preceding section notes that the acute health implications of drinking water quality essentially derive from its microbiological aspects. However, the proposed regulations also include chemical parameters related to the by-products of disinfection or water treatment activity. The specification of these parameters will ensure that good practices are maintained in these areas and that disinfection chemicals added to drinking water by or on behalf of a water supplier or water storage manager do not pose a long term risk to human health.

The basic reasons for setting standards for these substances are:

- that they have a health-related guideline value in scientific literature and consequently are regarded as having health-related implications if consumed over time at higher levels;
- data indicates that the parameter in question has been detected or may be detected in drinking water in Australia at levels approaching or in the order of magnitude of such a limit; and
- if present in water received by consumers then this is as a result of an applied intervention by a water business – that is, arising from a chemical or process added to the water under the control of the water supplier or water storage manager.

In general, these parameters do not originate in a catchment (protected or otherwise), although key precursor chemicals in the form of natural organic matter often exist in the raw water. There is therefore a higher expectation of good quality control over levels of these parameters in drinking water to justify actions taken by water suppliers or water storage managers when adding or considering adding chemicals to drinking water.

The exception is aluminium, which is proposed as a standard for aesthetic and quality control purposes. It is most relevant for water supplies for which aluminium-based chemicals are added for water treatment purposes. In these cases the form of aluminium from the catchment (mainly as a component of soils and clays) is usually not bio-available whereas the bio-available fraction, as represented by the acid soluble assay, may arise from an intervention by a water supplier or water storage manager.

A number of other parameters may be present in drinking water as a result of an action by a water supplier, the most notable being chlorine itself, lime and fluoride. However, chlorine, and a number of other organic by-products, is a taste and odour issue at lower levels before becoming a health concern. Fluoride levels are normally controlled by fluoridation legislation. Excessive lime can be controlled by the aluminium standard. However, in all these cases the same principle applies, namely that a considerable expectation is placed by consumers and regulators on water suppliers or water storage managers to control levels of chemicals added to or by-products created within water intended for drinking.

In addition to the specific parameter values specified for the above substances, the general requirement that no other substances be present at levels which pose a risk to human health will, in effect, ensure that water suppliers manage risks in relation to substances which could potentially be of concern in the specific water supply system.

It is expected that water businesses would base their judgements as to the concentrations at which different substances could pose a risk to health on the most recent standards set in this areas, which are set out in the "*Australian Drinking Water Guidelines*" (NHMRC, Canberra, 2001 update) [4].

It is considered that the approach of setting a general requirement to ensure that health risks are not created is a better means of ensuring that other, naturally occurring substances are appropriately managed than in a compulsory testing regime covering a wide range of such substances. This is because the range of substances likely to be present at levels that may be of concern will differ substantially between water supplies.

Thus, providing a generic duty allows water suppliers and water storage managers to tailor their monitoring and testing strategies to suit the specific risks likely to be encountered in their catchment. A specific testing regime could have required all businesses to adopt similar approaches, regardless of their individual circumstances, and would thus be less efficient.

No acute health impacts are likely to be associated with water that does not meet these chemical criteria in the context of the range of values likely to be observed in Victoria. Instead, the inclusion of these criteria reflects a view that exposures to relatively low levels of these substances must be limited in order to avoid the risk of adverse long-term, or chronic, health effects.

It is expected that the main benefits accruing in this regard will occur in parts of regional Victoria. Substantial improvements have been made in recent years in bringing various non-metropolitan water supplies into closer conformity with drinking water guideline values for the various parameters of water quality. However, there remains some incidence of non-compliance, which is expected to be addressed in the context of the implementation of the proposed regulations and the Act. The fact that these benefits will accrue in regional areas is reflected in the fact that most of the capital cost implications of the proposed regulations are expected to be incurred by non-metropolitan water suppliers (see following sections).

### *Consumer confidence benefits*

The following sections identify direct and indirect costs likely to be related to an outbreak of disease due to contamination of the water supply. While data limitations, particularly in relation to frequency of occurrence, prevent the calculation of expected values for such costs, it is theoretically possible to calculate these costs. By extension, benefits due to a reduced probability of disease outbreaks can be determined. These benefits are clearly central to the case for the new legislative framework, including the proposed regulations.

However, such expected value calculations necessarily imply a risk-neutral population. That is, they assume that a population is indifferent between a higher frequency of disease outbreaks and a lower one, provided that full compensation is received for the costs they incur in connection with disease outbreaks.

[4]By contrast, the previously applicable requirements, established via Memoranda of Understanding and by contractual arrangements, were based on two sets of superseded drinking water guidelines – the WHO 1984 guidelines and the 1987 NHMRC guidelines.

In practice, such an assumption is not likely to be reasonable. Rather, populations are likely to exhibit significant degrees of **risk aversion** in respect of drinking water supplies. If risk aversion exists, there is an additional benefit in improving water safety, beyond that implied by the reduction of direct and indirect costs associated with disease outbreaks.

The substantial and long lasting adverse public reaction to the 1998 Sydney NSW water contamination incident can be taken as indicative of this risk aversion. Surveys undertaken by Sydney Water have indicated that levels of customer satisfaction with drinking water quality dropped substantially after the 1998 incident and are only now returning to pre-incident levels[5]. The public reaction to the Walkerton incident in Canada, described later in this chapter, also supports this view. The adverse impact of a waterborne disease outbreak on public perceptions of water safety is therefore likely to be long-standing.

While the degree of risk aversion is theoretically quantifiable, it is not considered possible to provide quantitative estimates of the value of these benefits in the current context. However, it is clear that the size of this benefit is significant and that it must be considered in determining the merits of the proposed regulatory framework. Increased consumer confidence is expected to result from knowledge of the requirements for systemic risk management activities to be undertaken, for regular auditing of those activities, and from increased monitoring of actual performance.

***Efficiency benefits in management of water businesses***

An important benefit anticipated to result from the proposed legislative requirements is that of improved management of water businesses. This benefit relates particularly to the requirement for all water suppliers and water storage managers to implement risk management plans. As noted above, the metropolitan water businesses and many of the regional urban water authorities have already moved voluntarily to implement risk management processes in their operations. This move clearly indicates that these businesses have themselves made the judgement that such an approach to their business operations is likely to yield net benefits.

It is anticipated that the adoption of the risk management requirements is likely to result in similar benefits accruing to other non-metropolitan water suppliers, while the specific requirements for auditing should also increase the quality of this process. To the extent that the proposed regulations give practical effect to the Act's risk management requirements, these benefits can be considered to be partially attributable to the regulations.

The **benefits** likely to arise from the risk management approach are those resulting from a more systematic and proactive approach to system management. The risk management requirements will result in a whole of system approach being taken to management issues. This will in turn mean that better decisions will result in terms of investment, management and maintenance of water supply systems, as well as responses to developing issues.

To the extent that these benefits arise, the net cost of the risk management requirement is reduced, *vis-à-vis* the gross cost estimates discussed below. As noted, the voluntary

[5] '*Giving Customers A Voice: Sydney Water's Experience'*, Roseth N, AWA Water Journal, June 2002, p25.

adoption of elements of the risk management requirements suggests that there may in fact be no net costs attributable to this requirement. Indeed, it is very plausible that there are net benefits, arising from improved management of risk and improved operational and investment decision making.

Given that benefits are likely to be highly specific to individual businesses, it is not possible to estimate the extent of the likely benefits for Victoria. However, it is noted that the risk management approach represents an increasingly widely adopted operational best practice where multiple source risks are concerned. The adoption of this approach in the context of the proposed legislative structure is underlain by a view that the benefits of these requirements to the businesses involved will exceed their costs.

## 6.2 Indicative quantitative benefit estimation

The main quantifiable benefits of improved drinking water quality are those relating to reduction in acute disease. This essentially comprises reduction in the incidence of waterborne intestinal infectious disease (IID).

### 6.2.1. Endemic disease

The potential benefits of reduced IID rates as a result of water quality improvement are critically dependent on existing water quality. Evidence of the quality of Melbourne water is available from a 2001 study of the incidence of IID in Melbourne[6] involved 600 people, half of whom drank unfiltered tap water over the period of the study, while the remainder drank filtered tap water. The result of this study was that there was no significant difference detected in the incidence of IID between the two groups.

This suggests that the quality of drinking water is such that there are few if any incidences of IID that are attributable to waterborne micro-organisms where the water is obtained from highly protected catchments, such as those supplying the Melbourne metropolitan area. The potential health benefits in terms of endemic disease reduction attributable to further significant improvements in the microbiological quality of drinking water in Melbourne may therefore be limited.

It is arguable that the potential health benefits of improved microbiological water quality are greater in non-metropolitan areas. Data suggests that the microbiological quality of some non-metropolitan water supplies remains below the necessary standard. This indicates the possibility that there may be a significant incidence of IID attributable to microbiological water quality and that there may, as a result, be substantial health-related benefits from improving water quality.

However, the incidence of water-borne IID is essentially a function of the microbiological quality of the water supply. In this respect, the proposed standards will essentially be the same as the existing obligations, except that they will be extended to the alpine resorts and supplies managed by Parks Victoria. Thus, a small benefit in terms of reduced levels of endemic IID can be attributed to the proposed regulatory framework, when assessed on a statewide scale, due to the implementation of equivalent water quality standards for these supplies.

6 '*A randomised blinded controlled trial investigating the gastrointestinal health effects of drinking water quality*.' Hellard ME, Sinclair MI, Forbes AB and Fairley CK. (2001). Environmental Health Perspectives 109(8): p773-8.

### 6.2.2. Epidemic disease

In addition to the adoption of new water quality standards, the proposed regulatory framework will require significant attention to water supply management, through the implementation of requirements for risk management plans.

It can be expected that these measures will reduce the probability of outbreaks of epidemic disease and lead to improved management of any such outbreaks, so as to reduce their duration and severity. Because such outbreaks are relatively uncommon, and their severity can vary considerably, it is not possible to provide firm estimates of the expected benefits of improvements in this regard. However, a number of indicators of the magnitudes involved can be considered.

While data are incomplete, it is estimated that a significant water-borne disease outbreak may occur with a frequency in the vicinity of once every ten years in Victoria. The two most recent known disease outbreaks occurred in Sunbury in 1987 and in Kyabram in 1997. A general model for considering the monetary costs of acute water-borne disease was developed in a study conducted by Monash University and the National Centre for Epidemiology and Population Health[7].

The model generated sets out the following major sources of costs due to an outbreak of IID:

- **Direct costs of illness**. These include the costs of medical and the associated costs of drugs prescribed to treat the illness;
- **Indirect costs of illness**. These are the production losses associated with absences from work and, more speculatively, with reduced productivity on days when the sufferer attends the workplace;
- **Costs of avoidance behaviour**. These are the costs people incur via their attempts to avoid catching the disease in circumstances of an outbreak; and
- **Management costs**. These are costs borne by governments in investigating and managing disease outbreaks and those borne by water suppliers and consumers in complying with the orders of government regulators.

Costs relating to the number of mortalities due to IID and to pain and suffering associated with IID occurrence can be added to the above categories. These costs are, necessarily, more difficult to quantify.

The relative importance of the quantifiable costs noted above was found to vary with assumptions as to disease incidence. However, in the study's base case, the distribution of these costs in relation to epidemic disease was as follows:

- **Direct costs:** 3.2 per cent
- **Indirect costs:** 19.5 per cent
- **Costs of averting behaviours:** 65.8 per cent
- **Management costs:** 11.5 per cent

[7] '*Drinking Water Quality: Risk Assessment – Cost Benefit Analysis Report'*. Department of Epidemiology & Preventive Medicine, Monash University, and National Centre for Epidemiology & Population Health, Australian National University (ANU). 1997.

The Monash/ANU study is based on costings for a 'typical' town of 11,000 people. For such a town, the cost of an epidemic outbreak of IID if it occurred was estimated at $1.8 million.

Potential benefits deriving from the reduction in epidemic frequency or severity could notionally be derived from this figure. For example, a 50 per cent reduction in epidemic severity due to earlier detection and better incident management would have a notional benefit of $0.9 million.

Taking the costs estimated by the Monash/ANU study, and applying the assumption that the average costs of an outbreak are directly proportional to the population of the town, the two most recent disease outbreaks in Victoria may have entailed costs of the order of $4.2 million. As these calculations are at 1995 prices, the equivalent in 2004 prices would be approximately $5.3 million.

If it is assumed that these two known outbreaks of waterborne disease represent the only occurrences in Victoria over this fifteen year timeframe, the figure of $5.3 million may represent the upper bound of potential benefits due to reduced outbreak severity and incidence. The actual benefit from this source constitutes some proportion of the $5.3 million, according to the expected effectiveness of the proposed regulatory framework in reducing outbreak incidence.

For example, if it were assumed that outbreak related costs would be reduced by 50 per cent, the benefit would be $2.6 million over this fifteen year timeframe, or around $175,000 per annum. On the other hand, to the extent that other disease outbreaks have, to date, gone unreported, this figure would underestimate the true benefits of improved management.

The above indicative data is necessarily subject to a further uncertainty, in addition to those already discussed. Given the infrequent nature of outbreaks of epidemic waterborne disease, the observation of two outbreaks over fifteen years does not necessarily represent a long term average incidence of outbreaks. That long-term average is both inherently unknowable and subject to significant variance.

An **additional benefit** of improved water supply system management is that of reducing the risks of a large scale epidemic outbreak, with potential costs significantly greater than those estimated above. Depending on assumptions made about the degree of risk aversion of the population in relation to these issues, this represents a potentially significant additional source of benefits.

As noted above, the relative infrequency of major outbreaks of disease prevents precise estimation of their probability and, therefore, of the expected value of actions that reduce that probability. However, the following table provides data on a range of known outbreaks of giardiasis and cryptosporidiosis in the United States in recent years.

It serves to illustrate that such disease outbreaks constitute a real risk, even in developed countries. The apparent frequency of these disease outbreaks serves to indicate qualitatively the potential benefits of improved water quality management.

Table 1 **Selected outbreaks of cryptosporidiosis and giardiasis**[8]

| Outbreak | Year | Details |
|---|---|---|
| Carrollton, Georgia, USA | 1987 | 13,000 cases of cryptosporidiosis, caused by sub-optimal filtration of drinking water. |
| Jackson county, Oregon, USA | 1992 | 15,000 cases of cryptosporidiosis, due to water treatment failures. |
| Milwaukee, Wisconsin, USA | 1993 | 403,000 cases of cryptosporidiosis among a population of 1,600,000, due to a failure of effective filtration. |
| Las Vegas, Nevada, USA | 1994 | At least 20 deaths of HIV infected persons as a result of a cryptosporidiosis outbreak. |
| Rome, New York, USA | 1975 | 5,300 cases of giardiasis. |
| Pittsfield, Massachusetts, USA | 1985-6 | 3,800 cases of giardiasis among a population of 50,000 in a chlorinated but unfiltered water supply. |
| USA (total) | 1965 - 1984 | 90 outbreaks of giardiasis reported in the USA in this period, totalling 23,776 cases. Approx. 3/4 of these were linked to contaminated water supplies. |

### Potential costs of large-scale outbreaks and contamination incidents

The following discussions of the incident in 1998 in which the Sydney water supply system was contaminated with *Cryptosporidium* and *Giardia*, and the disease outbreak in Walkerton, Ontario (Canada) in 2000 indicates the potential costs of such large-scale outbreaks. As noted at the outset, the calculations set out below should be seen only as providing an indication of the order of magnitude of the costs that can be associated with major water-borne disease outbreaks – and hence of the benefits.

### Sydney NSW – 1998 *Cryptosporidium* and *Giardia* contamination incident

During July and August 1998, both Cryptosporidium and Giardia were detected in the Sydney water supply system. Contaminated samples were identified in relation to a large number of testing sites across the Sydney water supply system. Management of the incident involved the issuing of three boil water alerts during this period, with the alerts being in place for a total of 35 days. The geographical extent of these alerts varied during this time according to changes in the testing results. Few adverse effects on acute health were detected during this time. A Royal Commission was established during the course of the incident to investigate its causes and the management of it.

The Productivity Commission recently published estimates of the costs to Sydney water that are attributable to this incident [9]. Overall, the incident was reported to have resulted in an abnormal operating expense of $55.4 million and foregone revenue of $19.2 million. The abnormal operating expense was composed of the following elements:

- $15 payment to affected customers (total, $19.2 million);
- Paid and estimated outstanding insurance claims (total, $14.0 million);
- Additional monitoring and testing costs (total, $12.5 million);
- Costs associated with the McClellan Inquiry (total, $2.0 million); and
- Other costs (total $7.7 million).

[8] From Sydney Water Inquiry – 5th Report. Details are at www.premiers.nsw.gov.au

[9] '*Financial Performance of Government Trading Enterprises, 1995-6 – 1999-2000*'. Productivity Commission, Canberra, 2001, p120.

The foregone revenue of $19.2 million was the result of a decision to defer a planned price increase for twelve months.

The above represents the costs of the incident only from the viewpoint of Sydney Water Corporation. For the purposes of economic impact assessments of public policy proposals, it is necessary to consider costs from the whole of society viewpoint.

From this latter perspective, the bulk of the foregone revenue of $19.2 million represents a transfer from Sydney Water Corporation to its customers, rather than a real resource cost. A similar perspective applies in relation to the $15 rebate to affected customers. Thus, the real resource costs among the total costs borne by Sydney Water represent $36.2 million, rather than the $74.6 million its accounts indicate as the total costs to the organisation.

The total resource costs to society comprise not only those borne by Sydney Water, but those borne by its customers, the NSW Government and other parties. The Monash/ANU model discussed above indicates that key additional costs to be taken into account are the following:

- **Direct health costs**. These costs may have been near zero, as no measurable increase in IID was detected in Sydney during the course of the incidents.

- **Indirect costs**. These too will be near zero if there was no elevation in the incidence of IID.

- **Costs of averting behaviours**. These costs are likely to have been extremely large, as boil water alerts were in place across large areas of Sydney for extended periods. The Monash / ANU study argues that estimates of the time and resource costs of avoidance measures such as purchasing bottled water or other tap-water substitutes or boiling tap water must be considered as part of the cost of the outbreak. In addition, losses of utility due to activities abandoned as a result of the water alert should also be included, as should the costs associated with an increased incidence of scald injuries (while engaged in boiling water). Thus, the costs of averting behaviours are incurred partly as cash expenditures and partly through loss of utility (i.e. time, convenience, etc.).

- **Management costs**. The $2 million cost to Sydney Water Corporation of its participation in the McClellan Inquiry represents one part of these costs. However, a much larger part of these costs were borne by the NSW Government. These include the costs of establishing and running the Inquiry and the costs of other NSW Government agencies' representation at the Inquiry. Management costs would also be borne by non-governmental bodies.

Estimation of the likely size of these additional costs is very problematic. Some evidence able to indicate the general order of magnitude is contained within the Monash/ANU report, which quotes an earlier study in relation to the costs of averting behaviours associated with a giardiasis outbreak[10]. This contains a best estimate of these costs of $3.59 per exposed person per day. This is equivalent to $4.89 in 2004 prices.

[10] '*Epidemiology of Salmonella solia in Australia'*. Harrington CS, Lanser JA, Manning PA, Murray CS. Applied Environmental Microbiology, 1991, 57: 223-7.

The contamination incident in Sydney in 1998 lasted for a total of 35 days, although the extent of the incident (i.e. the area covered by the Boil Water Alerts) varied during this time. For much of the time, however, the alert applied to all areas served by the Prospect water filtration plant, which supplies around 85 per cent of Sydney's drinking water[11].

If it is speculated that half of Sydney's population of 3,600,000 was affected by the Boil Water Alerts during their 35 days total duration, this would imply total aversion behaviour costs equal to:

**$4.89 per day x 35 days x 1.8 million people = $308.1 million**

**Thus, adding this hidden cost to the cash costs to Sydney Water Corporation noted above, the true cost of the Sydney water contamination incident may have approached $350 million.**

### Walkerton, Ontario (Canada) – 2000 outbreak of waterborne disease

The above estimate of the total costs of the Sydney incident relates to an event in which there were few identifiable adverse health impacts. It is apparent that substantially larger costs are likely to be incurred where there are incidences of illness and death.

The potential for this to occur in a developed country context is indicated, *inter alia*, by an incident principally caused by the presence of a pathogenic (disease causing) form of *E. coli* bacteria in the drinking water supply of Walkerton, Ontario (Canada) in May and June 2000[12].

Walkerton, a town of around 5,000 people, is located in a rural area of Ontario, Canada. The drinking water supply draws from bores which abstracted ground water from an aquifer beneath adjacent farming land. After heavy rainfall in May 2000, water from this aquifer became contaminated with effluent from farming activities. The water supply system at the time was not filtered, nor was it effectively disinfected. As a result of this contamination, a total of seven people died, while approximately 2,300 were made ill.

The waterborne disease outbreak in Walkerton led to the establishment of an Inquiry in June 2000, which reported in 2002. Commissioned Paper No. 14[13], prepared for the Inquiry, estimated the tangible economic costs of the outbreak and arrived at a total figure of C$64.5 million (A$76.0 million). This figure was arrived at via a survey of 400 households and most businesses in Walkerton to ascertain the impacts on them of the outbreak. Table 2, below, summarises the major elements of the above cost estimate (as shown in Canadian dollars).

[11] See '*Sydney's 1998 Water Quality Crisis'* Clancy, JL, American Water Works Association Journal, March 2000.
[12] The disease and deaths were also attributed to *Campylobacter jejuni* bacteria from the water supply system.
[13] '*The Economic Costs of the Walkerton Water Crisis'* John Livernois. The Walkerton Inquiry, Commissioned Paper No. 14, Toronto, 2002.

Table 2 **Summary of cost estimates – Walkerton outbreak**

| Category | Estimated Cost (C$) |
|---|---|
| Water authority costs of remediation/repair | $9,222,215 |
| Walkerton Inquiry costs | $9,000,000 |
| Costs to households | $6,916,949 |
| Other local government costs | $6,548,523 |
| Walkerton health study | $5,000,000 |
| Cost of drinking water | $4,167,139 |
| Cost of local public health unit | $2,775,000 |
| Long-term health costs | $2,497,932 |
| Walkerton business costs | $1,460,139 |
| Lost productivity | $1,234,296 |
| Household property values | $1,106,136 |
| Private legal expenses | $1,000,000 |

Source: Livernois, D. Commissioned Paper No. 14 (2002), Walkerton Inquiry.

The following list of major responses to the disease outbreak at Walkerton provides some background for the above cost estimates:

- A boil water alert was in place for a total of seven months (cf. 35 days in Sydney in 1998);
- A water distribution centre was established at the time of the outbreak and was continuing to operate over twelve months later. The distribution centre provided bottled water to residents, which is provided by the provincial government;
- A class action lawsuit was commenced and subsequently settled (cost currently unknown);
- Some C$11 million of upgrades to the town water supply system were implemented as a direct result of the outbreak, including an ultrafiltration system[14];
- The Inquiry continued for approximately two years before delivering its final reports.

The cost estimates contained in the study do not include the intangible costs of lives lost or illnesses caused, arguing that such valuation is impossible. However, a companion paper[15] does include such estimates, based on a statistical value of a life saved of C$8 million and of a serious illness avoided of C$15,000.

Using these figures, the statistical cost of the lives lost and illnesses attributed to the outbreak totals C$90.8 million. Adding this figure to the value of the tangible costs, cited above, brings the total estimated cost of the outbreak at Walkerton to C$155.3 million. This is equivalent to A$182.9 million.

[14] '*Walkerton – One Year Later'* by Patrick Raftis. Walkerton Herald-Times, 15 May, 2001.
[15] '*Value of Life Estimates in an Economic Cost Assessment'*. John Livernois. Walkerton Inquiry, Commissioned Paper No. 15, Toronto, 2002.

**Box 1: The statistical value of a life**

The concept of a statistical value of a life is needed to facilitate public policy choices as to different possible expenditures that will have the effect of reducing the risk of death – i.e. of saving lives. In effect, the statistical value of a life is a measure of what society is willing to pay to reduce the number of deaths caused in a particular context, by making some improvement in safety. The values arrived at via research vary considerably depending on factors including the size of the risks involved and the nature of those risks (e.g. whether individuals have any degree of control over the risk). The figure of C$8 million used by Livernois is a typical figure in this context.

This cost estimate relates to a town with a population of only 5,000 people. Comparing this estimate with the cost estimate of around A$300 million for the recent Sydney contamination incident clearly indicates the potential for very much higher costs to be incurred in the event that substantial health impacts result from an outbreak. Thus, the potential benefits flowing from even a relatively small reduction in the probability of such incidents, due to the better water supply system management expected to flow from the proposed legislation, are extremely substantial.

It should be noted that the Second Report of the Walkerton Inquiry, released in May 2002, made 93 recommendations about key areas of water supply management for Ontario Canada[16]. These recommendations, including catchment to tap risk management, appropriate standard setting, legislation and regulatory oversight, are very similar in effect to those proposed for the drinking water quality regulatory framework for Victoria.

[16] '*Part Two Report of the Walkerton Inquiry: A Strategy for Safe Drinking Water'*, Ontario Ministry of the Attorney General, Canada, 2002. Details at www.attorneygeneral.jus.gov.on.ca/english/about/pubs/walkerton/

# 7. Expected costs of the proposed regulations

As is the case in relation to the analysis of the expected benefits of the new legislative structure, the attribution of the expected costs between the Act and the proposed regulations is conceptually difficult. For this reason, the following provides an overview of all the costs associated with the new legislative structure in Victoria, before focusing more specifically on those that are considered reasonably attributable to the proposed regulations themselves.

## 7.1 Costing methodology

Initial cost estimates in relation to the drinking water quality regulatory framework were prepared by economic consultants to DHS in conjunction with relevant DHS policy officers. In relation to most cost items, these estimates were based on detailed breakdowns of the duties that would be created, with individual cost items being estimated with the assistance of advice from water businesses in Victoria.

An extensive consultative process was undertaken during 2001 and again in late 2003, which had the objective of obtaining detailed cost estimates from industry and verifying the basis for these estimates as far as possible. As a result of this process, robust estimates of the range of expected costs associated with the new drinking water regulatory framework have been developed and are used in the following analysis.

The cost estimates used were based on calculation of the expected incremental cost associated with the new legislative program. A key conceptual issue to be resolved was that of whether, in the context of a legislative process that requires water businesses to assess and address risks to the safety of their drinking water supplies, the cost of addressing these existing risks could be seen as being attributable to the legislation.

It was determined that the cost of undertaking the risk management requirements was attributable to the legislation. However, the costs of addressing existing risks that had been identified or highlighted as part of this process, but that would in any case need to be addressed as part of the normal business processes of the water supplier or water storage manager, were not attributable to the legislation. Similarly, the costs of upgrading water quality to meet pre-existing quality standards were excluded. This is consistent with standard approaches for Regulatory Impact Statements, which measure the incremental cost of a regulation as the cost of moving from a point of compliance with the former regulated standard to compliance with the newly proposed regulation.

Since the regulatory framework also applies to the Victorian alpine resorts and Parks Victoria, the costs of works undertaken to bring their water supplies into compliance have also been included in the following calculations. All costs are expressed in Australian dollars.

## 7.2 Main cost items

Five main cost items can be identified as resulting from the implementation of the Act and the currently proposed regulations, as follows:

### 7.2.1. Costs of drinking water regulatory office

As part of the implementation of the requirements of the legislation it is envisaged that a specific drinking water regulatory office will be established within the Department of Human Services (DHS). Initial costings developed within DHS suggest that the annual incremental cost of implementing the regulatory functions assigned to the Secretary to DHS by the Act will be of the order of $1,370,000 per annum. These costs will be recovered via a levy on water suppliers and water storage managers. These costs are clearly attributable to the Act, since the provisions establishing the levy are contained in Division 4 of Part 4 of the Act.

### 7.2.2. Costs of reporting

Section 26 of the Act requires water suppliers or water storage managers to provide an annual report:

> *"… on the issues relating to the quality of drinking water and regulated water that are specified by the regulations …".*

This annual report must be provided to the Secretary to DHS and must also be made publicly available. Regulation 15 sets out a range of matters that are proposed to be included in these annual reports. The estimated statewide incremental cost of these reporting requirements is $423,800 per annum. The distribution of these costs is provided in Table 3, at the end of this chapter.

These costs are largely attributable to the regulations, since the specific requirements for inclusion in the annual reports are set out in some detail in the regulations, while the Act itself merely establishes a generic reporting requirement.

### 7.2.3. Costs associated with risk management plans

Part 2 of the Act establishes requirements for water suppliers and water storage managers to develop and implement risk management plans. The Act specifies in broad terms the required contents of the plans, including requirements that the plans include a description of the water supply system, an identification of risks to water quality, an assessment of those risks and a description of measures to be taken to control those risks. The Act also sets out procedural requirements, including requirements to review and update them as needed and requirements to periodically audit the content and implementation of the plans.

Regulations 6 to 9 provide additional detail on required inclusions in the plans as well as additional requirements in relation to auditing. Given this, the costs associated with risk management plans can be considered to be attributable in part to the Act and in part to the regulations. However, the degree of detail regarding risk management plans contained in the Act is sufficient to lead to the conclusion that it is likely to be the primary driver of the costs involved.

The incremental costs associated with risk management plans have been identified as follows (statewide totals):

- Initial establishment of risk management plans: A one-off cost of $5,699,000;
- Costs attributable to the requirement for annual improvements to risk management plans: $1,127,000 per annum;
- Costs associated with audits of risk management plans: $467,000 per annum.

Further detail on the incidence of these costs is provided in Table 3.

### 7.2.4. Costs associated with meeting specific water quality standards

While the basic approach to drinking water quality required by the Act to be taken is a systemic one, the regulations also provide specific standards for the quality of drinking water supplied to consumers. In relation to *E. coli*, the standard is slightly stricter than that previously set via contractual arrangements with water businesses. The bulk of the remaining substances covered by these standards are substances added as an element of the disinfection or water treatment process or substances that arise as by-products of these processes. These standards will exist for the first time for Victoria. Consequently, there is the potential for there to be additional capital and operating costs, attributable to the regulations, associated with the need to conform to these revised standards.

In addition, as noted in Chapter 5, above, Regulation 10(c) requires that no chemical or substance is present in drinking water in such amounts that it may pose a risk to human health. In practice, it is considered that drinking water suppliers will have regard to health-related guideline values identified in the "*Australian Drinking Water Guidelines*" in determining what actions are required in order to comply with this requirement. This includes the question of appropriate monitoring frequencies with respect to different substances, sufficient to provide a high level of confidence that compliance is being achieved.

The incremental capital costs in relation to these requirements have been estimated at $19,315,000 (statewide total), while the incremental operating costs are estimated as $841,000 per annum. Detail on the incidence of these costs is also contained in Table 3.

These costs are based on the cost data provided by the water industry in 2001 and 2003 and are clearly attributable to the regulations. It should be noted that none of these incremental costs pertain to the metropolitan water sector.

### 7.2.5. Costs associated with compliance monitoring

Regulations 11 to 14 establish requirements in respect of the monitoring of drinking water quality, specifically in relation to the substances identified in Schedule 2 to the regulations. These requirements relate to monitoring frequency, analytical requirements and reporting for compliance purposes. Additional costs have been identified in relation to these requirements, particularly due to the fact that some monitoring frequencies are greater than those historically employed. This was especially so for the three haloacetic acids and for instances where some water suppliers have moved from historical monthly monitoring of microbiological criteria (such as *E. coli*) to the new weekly frequency.

The additional costs in relation to compliance monitoring for *E. coli* are estimated at $813,000 per annum (statewide total), while the incremental costs associated with compliance monitoring for the physical and chemical criteria are estimated at $928,000 per annum. These costs are clearly attributable to the regulations.

## 7.3 Total estimated costs

### 7.3.1. Overview

Given the above, the statewide total incremental costs identified in respect of both the Act and the proposed regulations are:

- **Capital or one off costs totalling approximately $25 million**; and
- **Annual operating costs totalling approximately $6 million.**

The one-off or capital costs identified consist of only two elements: expenditures required to upgrade water supply systems to meet the standards, comprising $19.3 million (77 per cent of the $25 million total) and expenditures required to develop risk management plans, comprising $5.7 million (23 per cent of the $25 million).

The major annual cost elements are (of the statewide total of $6 million):

- Monitoring water quality parameters: $1.7 million, or 29 per cent, comprising $813,000 per annum for monitoring of microbiological parameters and $928,000 per annum for monitoring the physical and chemical parameters;
- Annual improvements and audits of risk management plans: $1.6 million, or 27 per cent, comprising $1,127,000 for annual improvements and $467,000 in audit costs;
- Water levy, funding DHS regulatory functions: $1,370,000, or 23 per cent;
- Increased operating costs relating to compliance with the standards: $841,000, or 14 per cent; and
- Annual Reporting: $423,800, or 7 per cent.

In present value terms, these costs are equal to $68.2 million over a ten year period (calculated on the basis of a 5% real discount rate). This present value figure assumed the necessary capital expenditures were spread over five years. Such works necessarily require time to plan and execute effectively, while the three-yearly cycle of water pricing determinations is also relevant to the timing of actual expenditures. Section 30 of the Act allows for water suppliers and water storage managers to enter into 'undertakings' to bring water supply fully into compliance with obligations over an identified period. In reality, some of the capital works may require more than the five years used in the calculations.

### 7.3.2 Distribution of expected costs

The distribution of the expected costs between the different water sectors is also shown in Table 3. The Table indicates that a substantial majority of the expenditures required to reach compliance with the new legislative framework will occur in the regional urban water supply sector. In present value terms, expenditures in this sector will total $51.6 million over ten years, compared with $9.4 million over ten years in the metropolitan sector and $7.2 million over ten years for Parks Victoria and the alpine resorts.

This cost distribution reflects the fact that, while the water quality management systems and the specific water quality parameter requirements to be implemented will be uniform across Victoria, the current position of different water businesses varies significantly. In general, the major areas in which current water supply arrangements fall short of the new legislative requirements are the regional ones. It should also be noted that the costs for Parks Victoria and the alpine resorts reflects the fact that these sectors are to be brought under the umbrella of water quality for the first time.

The above costs should be seen in the context of annual total revenues in the Victorian water sector of around $1.6 billion. Thus, they represent a very small incremental cost in relation to existing arrangements.

### 7.3.3 Attribution of costs to the proposed regulations

As noted above, the attribution of costs between the Act and the proposed regulations poses conceptual difficulties. Nonetheless, given the requirement for the Regulatory Impact Statement to provide a benefit/cost analysis of proposed regulations, Section 7.2 has attempted such an attribution. In sum:

- the costs associated with meeting particular water quality standards and with undertaking periodic monitoring to verify compliance with the standards are clearly attributable to the regulations, since the regulations set both the standards and the required monitoring frequencies;
- the costs associated with the provision of annual reporting are essentially attributable to the regulations, since they set out the detailed information requirements for inclusion in the Annual Reports mandated by the Act;
- the costs associated with the preparation and implementation of risk management plans are partly attributable to the regulations, since the regulations again specify much of the detail of the required contents of risk management plans and make provisions regarding auditing requirements; and
- The costs associated with the proposed levy are attributable to the legislation.

In net present value terms, the combined cost of meeting the proposed water quality standards, undertaking required monitoring and publishing annual reports is estimated at **$39.9 million over ten years**. Table 4, overleaf, sets out the derivation of this total costing. All present values were calculated on the basis of a 5% real discount rate.

The figure of $39.9 million can be taken as the minimum cost attributable to the regulations over ten years and represents 58 per cent of the total estimated costs. As well, some part of the cost of risk management plans may be regarded as attributable to the regulations. This cost component has a net present value of $17.7 million over ten years (26 per cent of the total estimated cost). The net present value cost of $10.6 million over ten years for the levy is attributable to the primary legislation. This represents 16 per cent of the total estimated cost.

In sum, the cost of the specific requirements established in the proposed regulations represents a majority of the total cost of the new legislative arrangements for ensuring drinking water quality. This is the result of the fact that the regulations make operational the main structures established in the Act by specifying the particular requirements which water suppliers and water storage managers are required to meet.

Table 3 **Summary of estimated costs of elements of the regulatory framework**

| SECTOR | LEGISLATION | | | | REGULATIONS | | | | | SUBTOTALS FOR EACH SECTOR | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LEVY # | RMPS | | | REPORTING | STANDARDS | | MONITORING | | | |
| | Proposed Annual ($) | Establishment Once-off ($) | Improvement Annual ($) | Audit Annual ($) | Annual ($) | Capex Once-off ($) | Opex Annual ($) | Micro Annual ($) | Phys / chem Annual ($) | Once-off ($) | Annual ($) |
| **Regional urban subtotal** | **(see note)** | **$5,252,000** | **$1,070,000** | **$408,000** | **$368,000** | **$15,815,000** | **$508,000** | **$750,000** | **$789,000** | **$21,067,000** | **$3,893,000** |
| **Metropolitan subtotal** | **(see note)** | **$59,000** | **$40,000** | **$35,000** | **$25,000** | **$0** | **$0** | **$20,000** | **$94,000** | **$59,000** | **$214,000** |
| **Rural water authorities subtotal** | **(see note)** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** |
| **Alpine resorts subtotal** | **(see note)** | **$218,000** | **$17,000** | **$14,000** | **$20,800** | **$2,500,000** | **$83,000** | **$13,000** | **$15,000** | **$2,718,000** | **$162,800** |
| **Parks Victoria subtotal** | **(see note)** | **$170,000** | **$0** | **$10,000** | **$10,000** | **$1,000,000** | **$250,000** | **$30,000** | **$30,000** | **$1,170,000** | **$330,000** |
| **STATEWIDE TOTALS:** | **$1,370,000** | **$5,699,000** | **$1,127,000** | **$467,000** | **$423,800** | **$19,315,000** | **$841,000** | **$813,000** | **$928,000** | **$25,014,000** | **$5,969,800** |

# The preliminary total in this column was estimated by DHS in 2002 as a proposed levy contribution for the operating costs of the proposed drinking water regulatory office.
The figures in the other columns were derived from the water industry consultation process in 2001 and as updated in November 2003.
Metropolitan subtotal represents Melbourne Water Corporation, Yarra Valley Water, City West Water and South East Water.
RMPS means Risk Management Plans and Systems - please refer to policy documents for further detail.
Capex means capital expenditure, Opex means operational expenditure related to the capex, Micro means microbiological monitoring, Phys / chem means physical and chemical monitoring.

Table 4 **Net present values over ten years**

| COST ITEM | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | NPV Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Costs fully attributable to the regulations** | | | | | | | | | | | | |
| Standards capex | $ | 3,863,000 | 3,863,000 | 3,863,000 | 3,863,000 | 3,863,000 | 0 | 0 | 0 | 0 | 0 | **$16,724,768** |
| Standards opex | $ | 841,000 | 841,000 | 841,000 | 841,000 | 841,000 | 841,000 | 841,000 | 841,000 | 841,000 | 841,000 | **$6,493,979** |
| Monitoring (micro) | $ | 813,000 | 813,000 | 813,000 | 813,000 | 813,000 | 813,000 | 813,000 | 813,000 | 813,000 | 813,000 | **$6,277,770** |
| Monitoring (phys/chem) | $ | 928,000 | 928,000 | 928,000 | 928,000 | 928,000 | 928,000 | 928,000 | 928,000 | 928,000 | 928,000 | **$7,165,770** |
| Reporting | $ | 423,800 | 423,800 | 423,800 | 423,800 | 423,800 | 423,800 | 423,800 | 423,800 | 423,800 | 423,800 | **$3,272,471** |
| **Sub Total** | | | | | | | | | | | | **$39,934,759** |
| **Costs partially attributable to the regulations** | | | | | | | | | | | | |
| RMPS establishment | $ | 5,699,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **$5,427,619** |
| RMPS improvement | $ | 1,127,000 | 1,127,000 | 1,127,000 | 1,127,000 | 1,127,000 | 1,127,000 | 1,127,000 | 1,127,000 | 1,127,000 | 1,127,000 | **$8,702,395** |
| RMPS audit | $ | 467,000 | 467,000 | 467,000 | 467,000 | 467,000 | 467,000 | 467,000 | 467,000 | 467,000 | 467,000 | **$3,606,050** |
| **Sub Total** | | | | | | | | | | | | **$17,736,065** |
| **Costs attributable to the primary legislation** | | | | | | | | | | | | |
| Regulatory office levy | $ | 1,370,000 | 1,370,000 | 1,370,000 | 1,370,000 | 1,370,000 | 1,370,000 | 1,370,000 | 1,370,000 | 1,370,000 | 1,370,000 | **$10,578,777** |
| **Sub Total** | | | | | | | | | | | | **$10,578,777** |
| **STATEWIDE TOTALS** | | | | | | | | | | | | **$68,249,601** |

## Notes

1. Real discount rate of 5% is based on the assumed long term cost of capital to affected parties.
2. RMPS refers to the risk management plans, assumed to be developed and implemented during year one.
3. All costs other than the levy estimates were derived from consultation with water businesses, as shown in Table 3.
4. Micro means microbiological, Phys / chem means physical and chemical (in relation to compliance monitoring).
5. Capital costs were assigned to years one to five, with operational expenditure thereafter, to provide a conservative estimate. (In reality, capital expenditure would be spread over time, according to undertakings agreed with the regulatory office.)
6. Capex means capital expenditure, Opex means operational expenditure related to the capex.

## 8. Identification and analysis of feasible alternatives

It is a basic requirement of the *Subordinate Legislation Act* 1994 that all feasible alternatives to a proposed set of regulations should be identified and analysed in benefit/cost terms. This process allows the Regulatory Impact Statement to demonstrate, through comparative policy analysis, that the proposed regulations would confer the greatest possible net benefits. Feasible alternatives are defined as those reasonably capable of achieving the underlying objectives of the regulations.

In the current context, therefore, feasible alternatives must be capable of providing a high level of assurance of the quality of drinking water in Victoria and must be consistent with the general risk management based obligations established via the *Safe Drinking Water Act* 2003. Two feasible alternatives have been identified that meet these criteria. The first involves setting a broader range of water quality parameters as standards and requiring water businesses to supply water that met these standards and to undertake appropriate monitoring against them. The second is to refrain from setting any water quality parameters as standards in regulation, thus relying entirely on the risk management aspects of the legislation to ensure good performance. These two alternatives are analysed in turn below.

### 8.1 Specification of a wider range of water quality parameters

The World Health Organization and the National Health and Medical Research Council (in Australia) each publish guidelines for acceptable drinking water quality covering a wide range of key risks and microbiological, chemical and physical properties[17]. These guidelines are based on judgements that each of the substances in question is capable of posing a risk to human health or posing an aesthetic problem if present in drinking water at or above certain levels. It is clearly possible for the regulations to adopt either of the above guideline documents in *toto* and thus create regulated standards for all of these substances.

However, such an approach can be seen on cursory review to be sub-optimal on benefit/cost grounds. In particular, the act of setting a standard for a particular substance normally creates a requirement that water suppliers undertake monitoring with respect to that substance, in order to demonstrate that the standard was being met. Given the need to take sufficient samples to achieve statistical reliability and ensure that a high level of confidence could be maintained, it is clear that the cost of such monitoring would be inordinately high when a large number of parameters is considered.

Whilst arguably feasible for water businesses supplying a large metropolitan area such as Melbourne, this level of monitoring was regarded as a very expensive exercise for most water suppliers in Victoria, given that Victoria is characterised by a large number of small discrete water supplies supplying relatively low populations across the State. As well, many of the substances in question were unlikely to be found in Victorian water supplies at levels that approached a health-related guideline value, due to geological, climatic or other factors. Thus, the benefits of conducting testing on such a scale were regarded as clearly quite small in relation to these costs.

[17] The two documents are closely related, with the NHMRC guidelines being set on the basis of a review of the 1993 WHO guidelines and their application to Australia. See "*Australian Drinking Water Guidelines"* National Health and Medical Research Council, Canberra, 1996 (updated 2001) and "*Guidelines for Drinking-Water Quality*" World Health Organization, Geneva, 1993 and 2004 (www.who.int/water_sanitation_health/dwq/en/).

For these reasons, the option of setting such a broad range of parameters as standards was rejected early in the policy development process. However, an alternative approach that was given detailed consideration was to identify a more limited range of parameters based on a review of the literature and consideration of the likelihood of such substances being historically tested for or found in Victorian water supplies, particularly at levels likely to cause a risk to health or approaching a health-related guideline value.

In a **Discussion Paper** released in 2001[18], DHS identified a set of thirty-eight key parameters, covering microbiological, physical, chemical and aesthetic aspects of water quality, that were considered appropriate for specification in regulations. This set of parameters was considered to constitute those that were of greatest relevance, or concern, in respect of the maintenance of drinking water quality in Victoria. Thus, these were substances which might be expected to be found in at least some Victorian water supplies or which had historically been monitored.

The proposed standards were distributed as follows:

- Micro-biological standards: 2
- Physical and chemical standards: 27
- Additional standards for supplies treated with alum: 1
- Additional standards for ozonated supplies: 2
- Parameters with community-based standards: 6

It should be noted that this alternative is in most respects little different from the proposed regulations, save that some of the proposed standards for aesthetic criteria were dropped. The inclusion of Regulation 10(c), providing a general requirement for water suppliers to ensure that no substance is present at levels that would harm health, means that there is, in effect, a requirement to ensure that the majority of these parameters, as well as others that were not originally considered as standards which would be specified individually in this alternative, are in any case required to be managed.

### 8.1.1 Expected costs of the alternative

In effect, the key difference between the proposed regulations and this alternative lies in the extra cost of compliance monitoring that would be required to be undertaken. This alternative is based on the notion of conducting periodic monitoring – on a monthly basis in most cases – in respect of all 38 specified parameters. The costs of this additional monitoring were estimated in an Economic Impact Analysis undertaken in 2002.

The 2002 Economic Impact Analysis provided cost estimates that were derived from the November 2001 round of consultations with Victorian water businesses. The water businesses were asked to identify the incremental costs of moving from their then current drinking water quality monitoring arrangements to those that would be required were the alternative of requiring statistically valid monitoring of 38 parameters to be implemented. The results received are summarised in Table 5 below.

[18] *Proposed Standards for Drinking Water Quality in Victoria.* Department of Human Services (Victoria), November 2001.

Table 5 **Summary of estimated incremental monitoring costs**

| Category of business | Annual incremental monitoring costs |
|---|---|
| Regional urban water authorities | $1,847,000 |
| Metropolitan businesses | $274,000 |
| Rural water authorities | $0 |
| Alpine resorts | $28,000 |
| Parks Victoria | $60,000 |
| **TOTAL** | **$2,209,000** |

Table 5 shows that the additional costs (*vis-à-vis* the baseline of current monitoring practices) were estimated to be $2,209,000 per annum for additional testing for micro-biological, physical and chemical properties. In present value terms, this additional cost is equal to $17.1 million over ten years (at a real discount rate of 5%).

By comparison, the proposed regulations would increase current monitoring costs by $13.4 million over ten years. The largest element of the $3.7 million difference between the costs of this alternative and those of the proposed regulations relates to the inclusion of a number of chemical parameters in the alternative which are absent from the proposed regulations.

### 8.1.2 Expected benefits of the alternative

The standards and monitoring proposed were intended to be used in the annual assessments of the quality of drinking water supplied to consumers, rather than as operational or risk management guidance for water suppliers or water storage managers. Water suppliers or water storage managers would in any case have been required to have regard to the full set of parameters in the drinking water guidelines and manage all pertinent risks as part of the risk management plans requirements.

Within this context, it is clear that the main benefit of the alternative, *vis-à-vis* the proposed regulations, is that they would provide a greater degree of transparency in relation to achieved water quality standards, by providing for annual reporting of performance in respect of a wider range of parameters. It is also probable that this more detailed reporting of actual water quality parameters would be associated with a greater degree of public confidence in the water supply system.

## 8.2 Setting no specific water quality parameter values

The second alternative identified is that of not using the regulatory power to set specific water quality standards requiring monitoring and reporting. Under this alternative, the water businesses would have complete discretion of the nature and extent of the water quality testing they undertook and the compositional quality of the drinking water supplied to customers, subject only to the need to conform to the obligations which the Act imposes on them, with respect to risk management plans requirements in particular and general duties to provide safe drinking water.

### 8.2.1 Expected costs of the alternative

A key cost to society of this alternative is that water would not, in effect, be required to meet any specific quality standards. This could have significant negative effects on public confidence as well as being of considerable economic concern to the tourism and food processing industries in particular.

A further key cost to society of this alternative would be that substantially less information would be available to the public and to the regulatory office in relation to actually achieved standard of drinking water. This relative lack of transparency is inconsistent with the general presumption of the Act in favour of an open and accountable process for water quality management and reporting. As a result of this lack of transparency, it is likely that public confidence in the water supply system would be negatively affected.

Secondly, there would be a lesser degree of assurance that water businesses were conducting adequate testing for appropriate quality parameters representing the quality of water supplied to customers, since water suppliers would effectively be determining for themselves what tests to undertake and at what frequencies, as well as what reporting would be undertaken.

Third, this option would reduce the degree of comparability of data received, since different water businesses would be likely to test for different parameters and in different ways, and may also choose to report the results differently. This would have a potentially negative impact on the regulator's ability to benchmark performance and to ensure the dynamic evolution of the water sector.

This alternative would also impose costs from the point of view of the drinking water regulatory office. As noted above, it is likely that monitoring effort would need to be at least as high under this alternative as under the proposed legislation. However, the lack of enforceable standards would reduce substantially the power of the water regulator to act where it believed that there were either systemic or episodic problems with drinking water quality.

This would be so to the extent that the absence of defined acceptable standards for each parameter would mean that there is no threshold below which water quality at customer taps could immediately be determined to be inadequate. Thus, while the regulator may form a view that systemic problems exist, requiring revisions in the risk management arrangements in operation, where this was disputed by a water business, this would need to be established by means other than simple reference to the threshold standards.

Thus, this alternative is likely to entail **higher regulatory costs and lower certainty** in assuring compliance over time, by comparison with the proposed legislative framework.

This alternative must also be considered likely to reduce the standards of drinking water quality actually achieved over time. In part, this outcome may derive from the enforceability issue, identified above. However, it is also arguable that a key benefit of the adoption of specific standards is that they give a clear indication to water suppliers of the matters that are considered to be of highest priority in terms of public policy. They thereby provide guidance as to the areas in which water suppliers should concentrate their efforts as part of continuous improvement strategies.

In this context, the proposal discussed above in relation to the proposed legislative package can be noted. This approach, focused on the substances most likely to be encountered and those of greatest concern, can be seen as providing such a targeting. Thus, the adoption of this alternative entails the cost of losing this opportunity to provide this level of guidance or direction to water suppliers. This is considered to be a potentially substantial cost of the alternative.

### 8.2.2. Expected benefits of the alternative

The key benefits to water suppliers of this approach would be the substantial reduction in the incremental capital and operating cost requirements in relation to the need to meet certain parameter values, where they do not already do so, as well as the reductions in compliance monitoring costs that would be implied.

As noted in Section 7, above, these costs are equivalent to $39.9 million, in present value terms over ten years. That is, $39.9 million would be spent on achieving compliance with the currently proposed values for the set of proposed standards. The extent to which these costs would be reduced under this alternative is, however, subject to uncertainty.

On one view, since there would be no specific requirements to meet certain parameter values or to monitor performance, these costs would be reduced to zero. Thus, the saving relative to the proposed regulations would be $39.9 million over ten years (in present value terms). However, this is an unsatisfactory view of the overall impact, since the general duties and risk management plan requirements contained in the Act will necessarily mean that a certain level of water quality improvement works and testing will take place regardless of the absence of specific regulated requirements.

The $39.9 million net present value, associated with the proposed regulations, represents an incremental cost over ten years – i.e. it represents capital works required specifically to achieve the proposed standards and operating costs associated with maintaining those levels and with conducting required compliance monitoring. Existing monitoring costs and capital works form the base from which such a cost figure is calculated. This, in turn, means that an assumed $39.9 million saving would see capital and monitoring costs maintained at existing levels.

In fact, the new risk management plan requirements and general duties applicable to water businesses in Victoria would be likely to lead to a greater level of expenditure in these areas than is currently the case. It is, of course, a matter of speculation as to how much additional expenditure would occur under this alternative. Indeed, there may be no net saving at all, if water businesses' own views of the requirements for acquitting these general duties and running their businesses appropriately lead to a similar or greater testing regime and program of action to improve drinking water quality.

# 9. Comparison of benefits and costs

## 9.1. Benefits and costs of the proposed regulations

Section 7, above, estimates the total costs of the new legislative framework for drinking water quality assurance as having a net present value of $68.2 million over ten years. Of this amount, a minimum of $39.9 million is regarded as being attributable to the current regulations. This is the net present value of the estimated incremental cost of meeting the proposed standards, the cost of conducting required monitoring of these parameters and the cost of the annual reporting requirements.

In addition, a proportion of the identified cost of $17.7 million associated with risk management plans can reasonably be attributed to the regulations, since the regulations are largely responsible for specifying the content of these instruments. Thus, the total costs attributable to the regulations are in the range $39.9 million - $57.6 million, in net present value terms over ten years.

This Regulatory Impact Statement has not provided a single, quantified estimate of the benefits to Victoria of the new legislative framework for drinking water quality generally, or of these proposed regulations specifically. This is chiefly because of the very great uncertainties as to the size of these benefits. This arises both from the infrequent and unpredictable nature of water contamination incidents and because of the difficulties of identifying and quantifying all relevant costs where such contamination incidents do occur.

However, indicative benefit estimates have been provided. In particular, it is noted that the total costs of the recent Sydney NSW water contamination incident may have reached as much as A$350 million. Data relating to another major contamination incident in Walkerton, Ontario, provide costings of a similar order of magnitude.

Given these data, it is clear that the new drinking water quality legislation – including these regulations – will have a significant **positive net benefit for society** if they are successful in reducing the incidence of water contamination incidents like that in Sydney by an amount equal to one occurrence per several decades.

In fact, given the above data, the probability of such an outbreak would need to be reduced by at least .02 (i.e. the risk would need to be reduced by a factor equivalent to two occurrences per one hundred years) for the new legislative framework to have benefits at least as great as the costs involved. Of course, key additional benefits would also derive from reductions in the frequency of other, less serious contamination incidents and improved confidence on the part of consumers in the quality of drinking water.

Notwithstanding the apparent uncertainties involved, it is considered highly probable that such a reduction in the probability of contamination incidents will occur in practice, since the legislation applies systemic risk assessment and control methodologies that are widely considered to be best practice in terms of the management of multiple significant risks.

It is also necessary to take into account the important **non-quantifiable benefits** that flow from the introduction of the new legislative framework. Chief among these are:

- The establishment of clear, legislated duties for water suppliers to ensure the supply of safe drinking water;
- Adoption of a legislative structure that is consistent with best practice risk management principles;
- The expected increase in consumer and food and tourism industry confidence in relation to drinking water quality; and
- Increased transparency and accountability in the delivery of drinking water services.

Given the above, it is concluded that the adoption of the proposed regulations, which form an integral part of the new legislative framework for drinking water quality, will yield benefits well in excess of the costs they impose.

## 9.2 Comparing the proposed regulations and feasible alternatives

While the above concludes that the expected benefits of the regulations exceed the estimated costs, it is also necessary to determine whether any of the feasible alternatives identified would yield greater net benefits.

### 9.2.1 Cost comparisons

As noted in Section 8.1, the option of specifying a wider range of water quality standards would have little impact on the costs in respect of capital and operating expenditures to improve water quality (against these parameter values in particular) and in respect of increased monitoring activity.

It can reasonably be assumed that such an alternative would have similar costs to the proposed regulations in respect of the remaining items, since increases in the particular areas cited would not necessarily affect the cost of acquitting the other duties identified.

On these assumptions the comparative costs of the regulations and alternatives are summarised in Table 6, below (expressed as net present values over ten years).

Table 6 **Cost comparisons between proposed regulations and identified alternatives**

| | Costs of improved standards | Costs of additional monitoring | Other costs | Total costs |
|---|---|---|---|---|
| **Proposed regulations** | $23.2 million | $13.4 million | $31.2 million | $67.8 million |
| **Alternative 1 (38 parameters)** | $23.2 million | $17.1 million | $31.2 million | $71.5 million |
| **Alternative 2 (no set parameter standards).** | (see text) | (see text) | $31.4 million | (see text) |

Table 6 presents the comparative cost data in present value terms, using a ten year time horizon. It shows that Alternative 1 would increase monitoring costs, *vis-à-vis* the proposed regulations, by $3.7 million over the ten years. The remaining cost estimates are equal to those made with respect to the proposed regulations. Thus, this alternative increases the total cost of the package by 5.5 per cent.

Table 6 does not include estimates of the costs of Alternative 2 – that of not setting any water quality parameter standards in regulation. This is because there is necessarily great uncertainty as to the effect that adopting such an option would have on other aspects of the legislative structure.

In particular, while Alternative 2 would not directly impose additional quality upgrade costs, or monitoring costs, *vis-à-vis* the base case of the former legislation, it is arguable that the effect of the general duties created in the new Act and the requirements of the risk management plans process would be such as to yield indirect cost increases.

However, notwithstanding these uncertainties, it is probable that these, less prescriptive, requirements would yield costs that are substantially lower than the incremental costs of the proposed regulations (and legislation).

### 9.2.2 Benefit comparisons

The discussion of the benefits of the new legislative structure, contained in Section 6, acknowledges the presence of considerable uncertainty and provides only indicative quantitative estimates. However, a 'break-even' approach shows that the proposed legislation will provide positive net benefits even if it achieves only small reductions in the probability of occurrence of serious contamination incidents.

In this context, the comparison of benefits between the proposed regulations and the identified alternatives must inevitably be a qualitative one, the purpose of which is to make transparent the logic underlying the choice of the proposed regulations.

The underlying logic of the *Safe Drinking Water Act* 2003 is that drinking water quality will be assured through the adoption of a four part approach, embracing risk management, water quality standards at the customer tap, disclosure obligations and community consultation. Within this context, the specification of water quality parameters essentially provides a basis for reporting of outcomes, rendering transparent the performance of the water suppliers and water storage managers, both to Government and, more particularly, to their customers.

At the same time, such specification has the disadvantage of providing elements of prescription in the regulatory framework and arguably contradicts the approach underlying the legislation of requiring suppliers to make their own judgements as to the key risks to be controlled and the appropriate means to implement this control.

The proposed regulations seek to **balance these concerns** by limiting the specification of parameters to two areas. The first is those that are considered central to water quality. Thus, microbiological parameters are those that, if exceeded, are most likely to yield acute health costs, while turbidity is a central element of perceived water quality and crucial to consumer acceptability of water supplied.

Second, the remaining parameters specified in the proposed regulations relate to by-products of different kinds of water treatment activity. Thus, these parameters are those over which water businesses have very direct control, since they would in all cases have introduced the substances in question or products that generated the substances to the drinking water.

Alternative 1 was originally proposed as the approach that would be adopted within the current legislative context. However, it was determined that this approach was less preferable because, as noted above, the cost implications of adopting such a monitoring requirement would have been larger within the context of the overall incremental costs of the new legislation without necessarily providing commensurate benefits.

Alternative 2 clearly has the potential to yield further savings in costs to water businesses and could, arguably, be seen as the logical extension of the above discussed approach favouring a full and unambiguous reliance on the risk management logic to achieve appropriate outcomes. However, it is not preferred because of the clear acute health risks associated with lack of clear definition of water quality at customer taps and risks arising from microbiological contamination and poor disinfection practices.

Given these clear acute risks, it is considered appropriate to ensure both that public confidence is supported and regulatory information is obtained by requiring periodic reporting and monitoring for this narrower set of parameters. These benefits are considered to be sufficient to offset the additional costs discussed above.

### 9.3. Conclusion

Given the above, it is concluded that the proposed regulations will yield significant net benefits, although no single quantitative estimate of these benefits can be derived. It is also concluded that these net benefits are likely to be greater than those available from either of the two feasible alternatives that have been identified and assessed.

## 10. Consultation

There have been a number of consultation stages for the Victorian drinking water quality regulatory framework since its inception in the late 1990's.

Initial stakeholder and public consultation in relation to the new legislative framework for drinking water quality took place in September and October 2000. The Department of Human Services and the Department of Natural Resources and Environment (now the Department of Sustainability and Environment) jointly released a public Consultation Paper and held open workshops around Victoria. This involved a broad range of stakeholders from various Government sectors, the water industry and the community.

The process elicited 44 written submissions, from water authorities, regulatory agencies and interested members of the public. The proposed new regulatory approach received widespread support. The proposal was further developed after careful consideration of the issues raised and detailed evaluation of policy options.

A second round of consultation took place from November 2001 to April 2002. This round was targeted at the water industry in Victoria, to establish the specific benefits and cost impact of the proposal. The majority of submissions expressed support or strong support for the framework during this stage and identified significant benefits arising from the framework.

A third consultation stage was undertaken with Government agencies during 2002. This stage was based on feedback received from water suppliers and focussed on obtaining agreement as to the cost impact of the proposals and funding mechanisms for the regulatory office.

Following passage of the *Safe Drinking Water Act* by the Parliament of Victoria in June 2003, the Department embarked on a fourth stage of consultation. For the proposed Safe Drinking Water Regulations, the Department established a consultative panel of key industry and stakeholder personnel to assist on policy matters within the legislated context. This process was undertaken during late 2003, in conjunction with the Victorian Water Industry Association. This consultative process was designed to consider as much input from stakeholders as possible regarding drafting of the proposed regulations, with a view to ensuring that the regulations are practicable, unambiguous and as consistent across Victoria as possible.

In November 2003, the Department invited the bodies to be regulated under the legislation (the water industry, alpine resorts and Parks Victoria), other consultative panel members and key Victorian Government stakeholders to comment on a draft of the drafting instructions for the proposed regulations and to update costings compared to those provided in the previous round of consultation.

**Widespread support** was expressed at this stage for the 'catchment to tap' risk based focus of the framework. No submission opposed or expressed concern with the consultative process for the regulations. This was in line with the support received during the previous (November 2001) round of water industry consultation and informal comments provided by members of the consultation panel.

During 2003/04, the Department also undertook a range of formal and informal communication activities related to implementation and development of the Safe Drinking Water regulatory framework. These activities formed part of an overall strategy developed in mid-2003 and typically involved convening workshops or presentations at key water industry conferences and seminars and publication of papers in key journals.

The results of this process are set out in the report "*Industry Draft of the Safe Drinking Water Regulations: Consultation History, Analysis of Submissions and New Cost Estimates*" (Department of Human Services (Victoria), July 2004).

The publication of this Regulatory Impact Statement and the accompanying draft of the Safe Drinking Water Regulations constitutes the next stage in this ongoing consultative process. Results from this round will be used to determine the final shape of the regulations. Further, section 17 of the Act requires the establishment of a formal process for making regulations pertaining to standards for drinking water quality that involves consulting relevant Ministers and the Treasurer. This step will take place after the public consultative round has been concluded and its results have been considered.

The intended course of action in relation to the proposed regulations will be publicly announced.

## 11. Implementation and future regulatory developments

The proposed Safe Drinking Water Regulations discussed in this Regulatory Impact Statement incorporate matters which have been deemed to require immediate attention to give effect to the policy intent of the *Safe Drinking Water Act* 2003. However, it should be noted that a number of other matters have been considered for inclusion but not adopted in the currently proposed regulations. In many cases, their exclusion at this time reflects a view that the matters involved are more appropriately dealt with through the risk management process, rather than being dealt with prescriptively via regulation.

Consideration was also given to incorporating requirements in relation to the accreditation of collectors of samples and the development of sample collection protocols, as well as the specification of standardised methodologies to be used to analyse samples of drinking water. A head of power to regulate these matters is established in section 56 (1)(b)(ii) and (iii) of the Act. These matters are considered important elements of quality assurance that would complement the accreditation of water quality analysts.

They have not been able to be incorporated in the regulations at present as they require development or completion of Australian based scientific guideline documents or codes or development of an accredited process for sample collection. As far as the Department is aware, these materials are not currently available in a usable format.

The Department anticipates that it will further pursue these matters over the early life of the regulatory framework, in order to ensure that analytical data collected is as accurate, meaningful and comparable across Victoria as possible. It is of the view that doing so would enhance the benefits to be derived from the regulatory framework. Any developments in this area will occur as part of a consultative process that engages key stakeholders in the Victorian water industry. However, it is likely that future amendments to the regulations may lead to the incorporation of these matters.

The Department also expects to monitor closely the implementation of risk management plans and also scientific developments in health-related guideline values for chemical and microbiological characteristics of drinking water. It would expect to vary the required contents of these plans or of standards for drinking water quality in future regulatory amendments if this is considered necessary, in order to ensure that risk management practices are meeting required standards and that the quality of drinking water supplied in Victoria remained satisfactory.

## 12. Statement of compliance with National Competition Policy

The National Competition Policy Agreements set out specific requirements with regard to all new legislation adopted by jurisdictions that are party to the agreements. Clause 5(1) of the Competition Principles Agreement sets out the basic principle that must be applied to both existing legislation, under the legislative review process, and to proposed legislation:

> *The guiding principle is that legislation (including Acts, enactments, Ordinances or Regulations) should not restrict competition unless it can be demonstrated that:*
>
> *(a) The benefits of the restriction to the community as a whole outweigh the costs; and*
>
> *(b) The objectives of the regulation can only be achieved by restricting competition.*

Clause 5(5) provides a specific obligation on parties to the agreement with regard to newly proposed legislation:

> *Each party will require proposals for new legislation that restricts competition to be accompanied by evidence that the restriction is consistent with the principle set out in sub-clause (1).*[19]

Therefore, all Regulatory Impact Statements must include a section providing evidence that the proposed regulatory instrument is consistent with these National Competition Policy obligations.

In respect of the proposed regulations, three restrictions on competition have been identified. These are:

- the requirement for analysts used to conduct water quality monitoring to be accredited;
- the requirement for these analysts to be employed by a person or body that is accredited by NATA to conduct analyses of water quality; and
- the requirement for risk management plan auditors to be approved by the Secretary.

These restrictions are, however, considered to be the minimum necessary to ensure the quality of the risk management plans system and of the water quality monitoring arrangements. As these are central elements of the overall legislative structure and fundamental to assuring drinking water quality, the small competitive restriction implied by a qualification and approval requirement is considered to be proportionate and to be the only means of achieving the public benefit associated with ensuring confidence in drinking water quality standards.

It should be noted that the approval/accreditation mechanisms do not include any mechanism by which appropriately qualified people could be excluded from practice in the area. Hence, no substantial negative impact on competition is considered likely to arise. Therefore, the regulations are considered to be fully compliant with the National Competition Policy.

[19] *Competition Principles Agreement*, Clause 5. 1995. See: www.ncc.gov.au

# APPENDIX

Exposure Draft for Safe Drinking Water Regulations