

Application of Australian Guidelines for Water Quality

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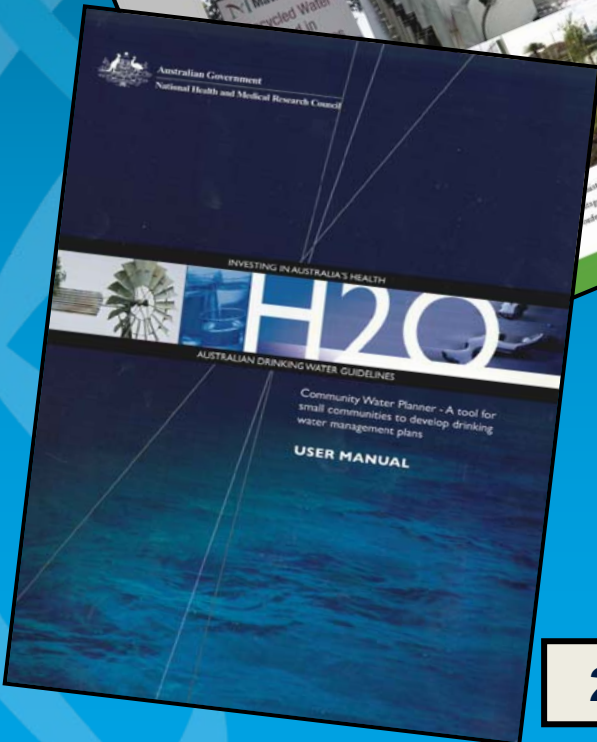
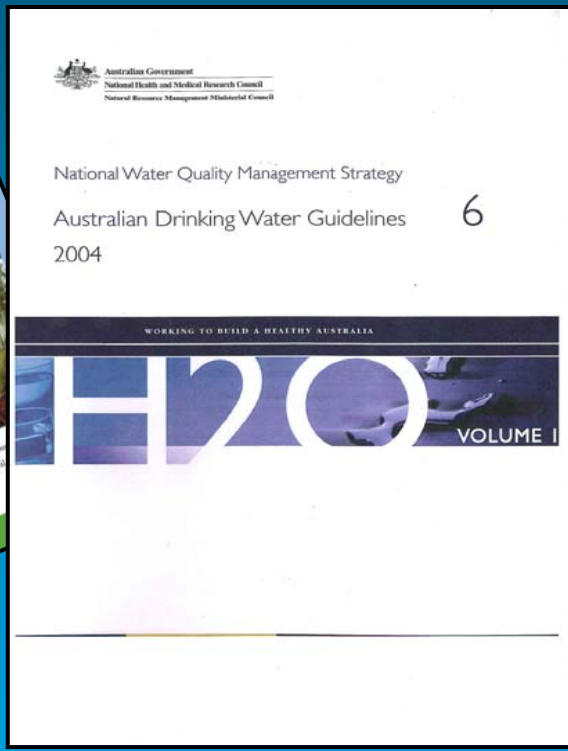
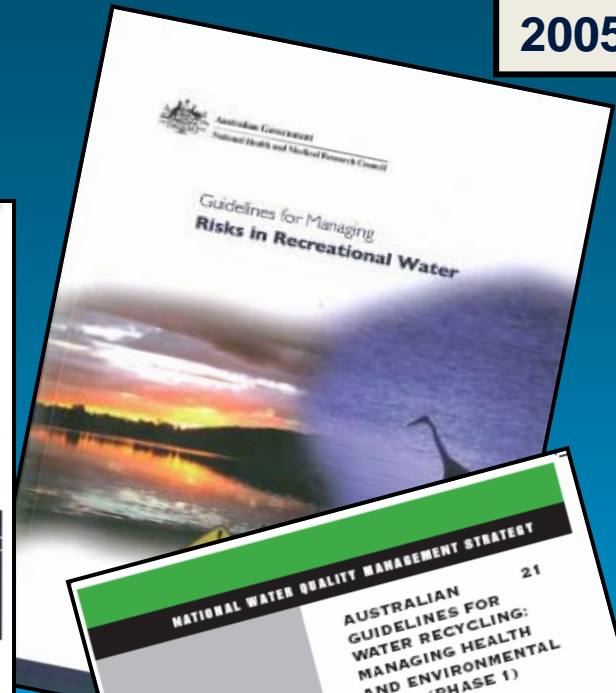
Background 1998-2008

- **Pre 1998 – strengthening focus on end-point monitoring. Guidance on system management and multiple barriers being overshadowed by “management by numbers”**
- **In 1999 Australia started developing a *Framework for Management of Drinking Water Quality* for inclusion in the *Australian Drinking Water Guidelines*.**
- **WHO had independently started development of Water Safety Plans. In 2001 we compared notes at a joint NHMRC/WHO meeting in Adelaide**
- **Following the lead from the drinking water guidelines, risk management principles have been incorporated in all water quality guidelines**

Australian Guidelines

2008

2005-8



2004

2005

2006

WHO Guidelines

2006

WHO GUIDELINES FOR THE
SAFE USE OF WASTEWATER,
EXCRETA AND GREYWATER
VOLUME I
POLICY AND REGULATORY ASPECTS

2004

Guidelines for
drinking-water quality
THIRD EDITION
Volume 1
Recommendations

2006

WHO GUIDELINES FOR THE
SAFE USE OF WASTEWATER,
EXCRETA AND GREYWATER
VOLUME IV
EXCRETA AND GREYWATER USE IN AGRICULTURE

WHO GUIDELINES FOR THE
SAFE USE OF WASTEWATER,
EXCRETA AND GREYWATER
VOLUME III
WASTEWATER AND EXCRETA USE IN AQUACULTURE

WHO GUIDELINES FOR THE
SAFE USE OF WASTEWATER,
EXCRETA AND GREYWATER
VOLUME II
WASTEWATER USE IN AGRICULTURE

Guidelines for
safe recreational water
environments
VOLUME I
COASTAL AND FRESH WATERS

2006

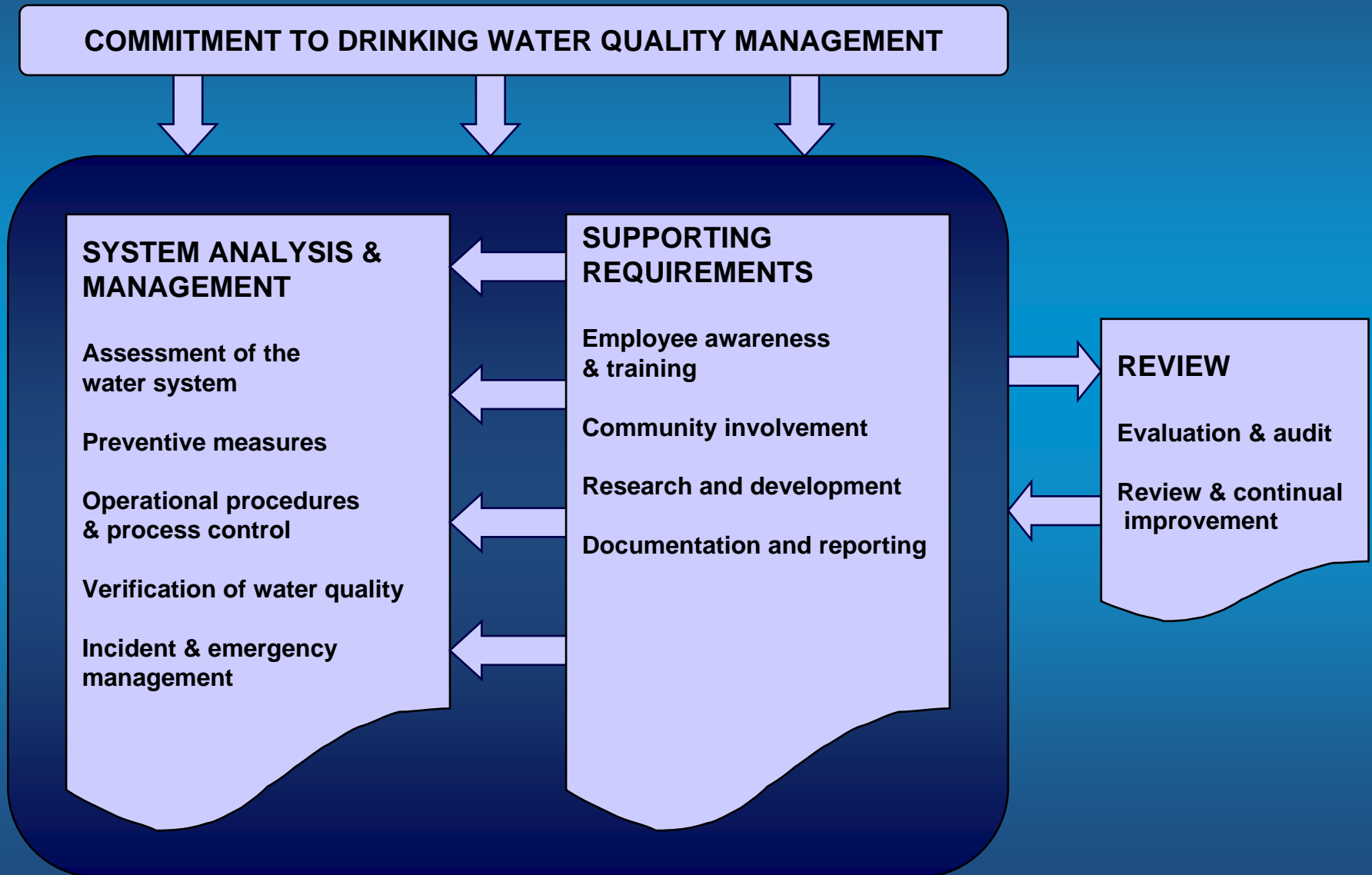
2006

2003

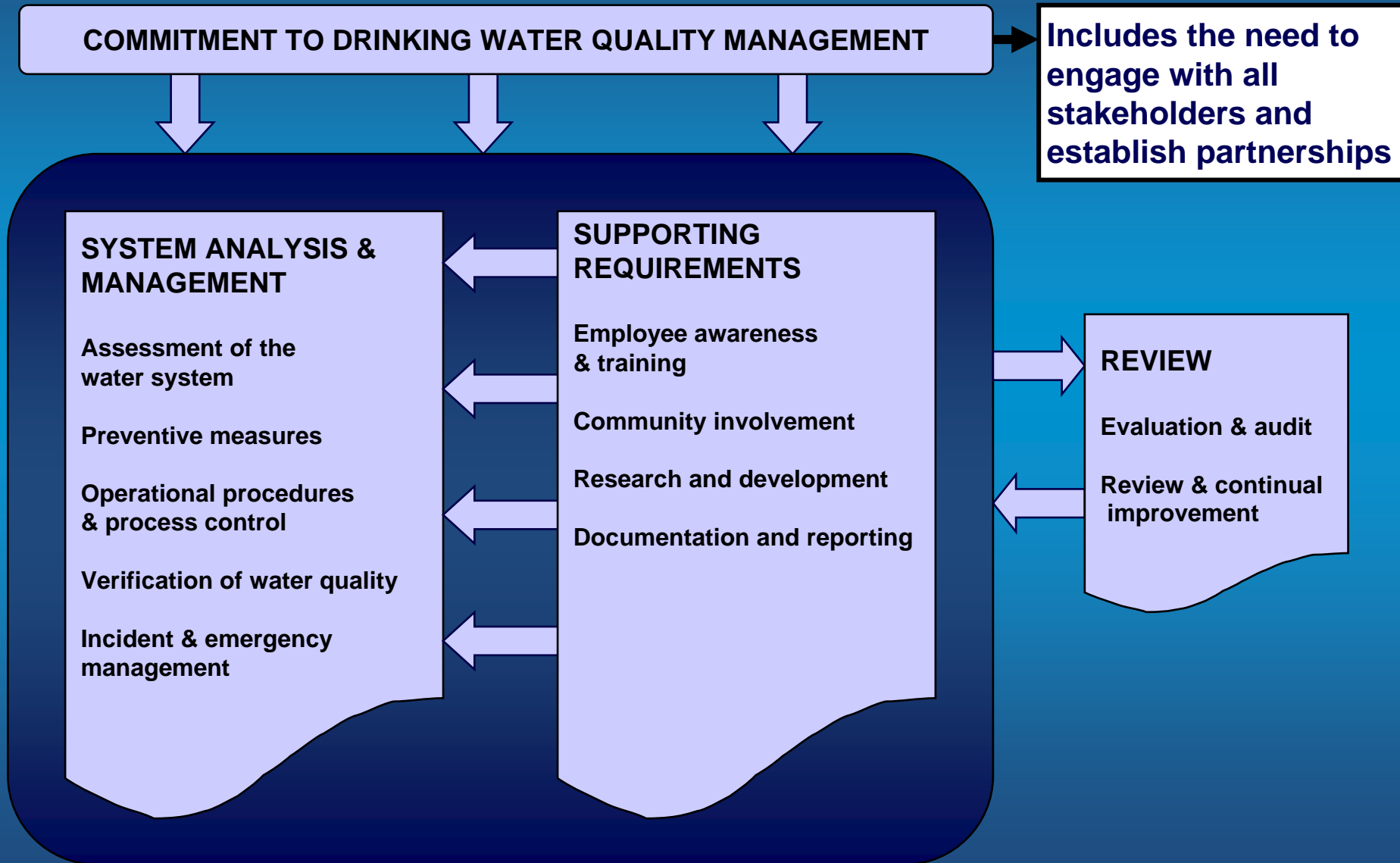
Risk management frameworks

- Focus on preventing risks from occurring.
- Aim is to ensure (as much as possible) that water is safe **before use**
- Based on understanding the important risks, designing a system that should work and then operating it so that it does work (**cost effective**)
- Reduces reliance on recycled water testing (**too little, too late**)

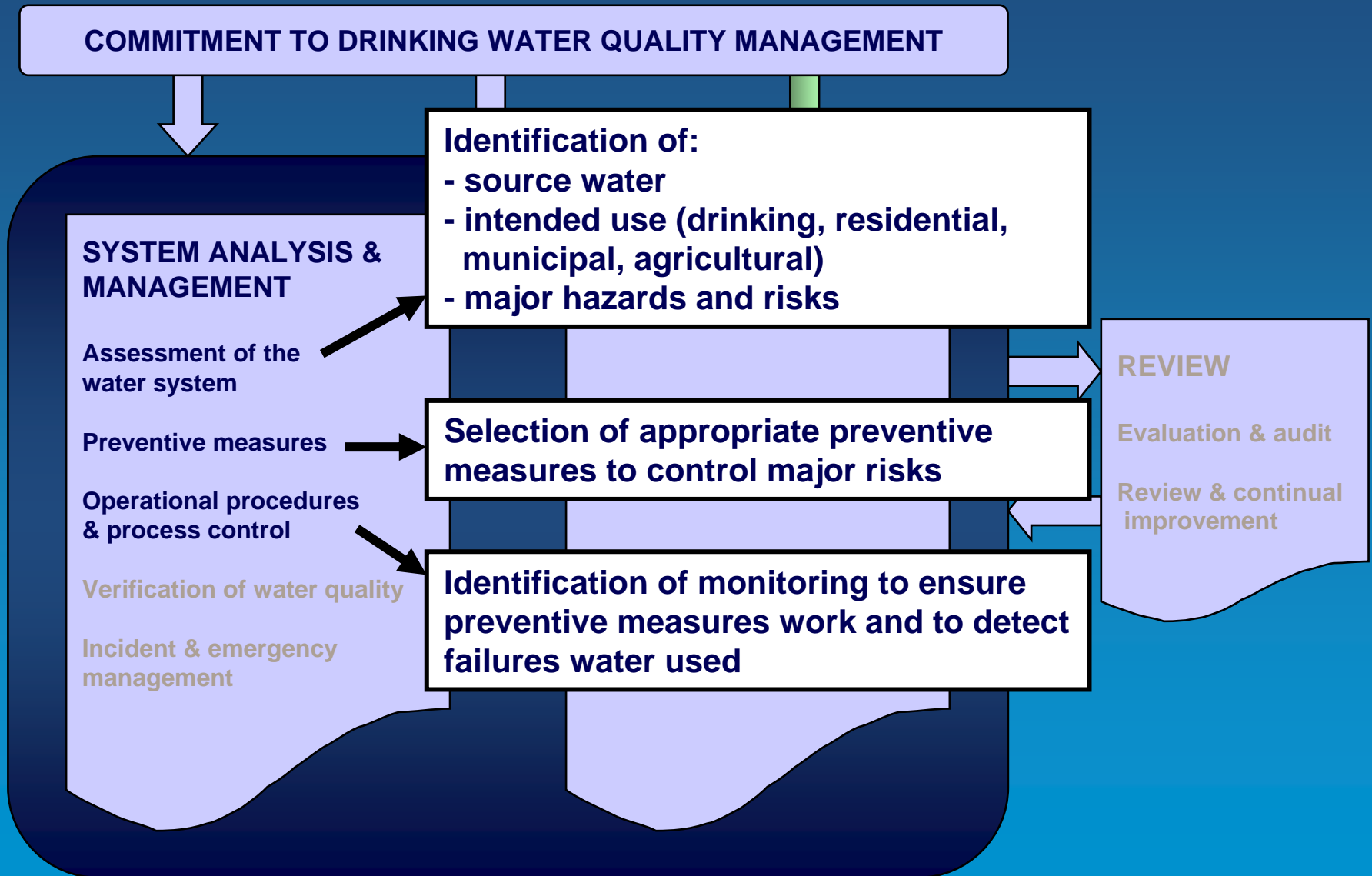
Risk Management Framework



Risk Management Framework



Risk Management Framework



Microbial Hazards

- **Micro-organisms represent the greatest risk to human health. Dangers from:**
 - enteric organisms (sewage, animal waste)
 - free-living organisms (e.g. *Legionella* and mycobacteria)
- **Sources of enteric micro-organisms:**
 - raw water
 - ingress of contamination in storage systems, pipelines and plumbing (cross-connections)
 - poor installation and repair practices
- **Sources of free-living micro-organisms:**
 - environment (very low concentrations)
 - growth in poorly designed plumbing systems (hot, warm and cold)
 - growth on inappropriate materials
 - growth in poorly maintained devices (cooling towers etc).

Chemical hazards

- **In countries such as Australia most natural surface waters do not contain high concentrations of chemical hazards (in the absence of toxic algal blooms)**
- **Ground water can contain high concentrations of naturally occurring arsenic and fluoride as well as introduced nitrates**
- **Recycled water (treated sewage) can contain higher concentrations of chemicals but for most uses (non-drinking) they do not represent a health risk**
- **Grey water can contain variable and high concentrations of household chemicals**
- **Rainwater generally OK unless close to major industry (e.g. smelters). Lead flashing can be a problem**

Sources of chemicals

- **Raw water**
- **Inappropriate materials (e.g. lead in irrigation pipework)**
- **Uncoated lead flashing in rainwater catchment systems**
- **Cross-connections and inadequate backflow**
- **Stagnant water**

Case studies (1)

- **Netherlands – outbreak of gastrointestinal illness following cross-connection of secondary untreated supply (non-drinking) with drinking water supply**
- **Australia – Cross-connections with drinking water at Rouse Hill, Mawson Lakes, Melbourne and Gold Coast sewage treatment plants**
- **Hong Kong – evidence of SARS spread from aerosols contaminated with sewage**
- **Numerous outbreaks of gastro-intestinal illness associated with cross-connection of sewage/septic systems with drinking water supplies**

Case studies (2)

- Long lengths of pipework producing low flows and stagnant water. Support growth of free living organisms such as *Legionella* and mycobacteria.
- Poor temperature control in hot and warm water systems
- Poor temperature control in cold water systems (poor insulation, inadequate gaps from hot water pipes)
- AP lands - use of irrigation piping in a drinking water system (contained lead)
- Cross-connection with boiler fluid and industrial chemical storages

Case studies (3)

- **Inappropriate connection of greywater and other alternative sources of water**
- **Inappropriate use of recycled water (deliberate or unintended):**
 - **use of residential water in swimming pools**
 - **spray irrigation of poor quality water**
- **Use of irrigation water for drinking**
- **Scalding**

Risk management - Prevention

- **Mindfulness and education to promote better understanding of risks and how they can be avoided**
- **Knowledge and understanding of Australian Standards e.g.:**
 - ***AS/NZS 3500. National plumbing and drainage code***
 - ***AS/NZS 4020. Products for use in contact with drinking water***
- **Knowledge and understanding of local or State codes of practice and guidelines e.g.**
 - **SA Water Recycled Water Plumbing Guide**
 - **SA Water Rainwater Plumbing Guide**
- **Use National Guidance**
 - **Master Plumbers Rainwater Tank Design and Installation Handbook**
 - **Master Plumbers Urban Greywater Design and Installation Handbook**

Key Issues

- **Correct installation**
- **Install appropriate backflow prevention devices**
- **Use appropriate materials**
- **Label pipe work (purple pipe etc)**
- **Label outlets (e.g. recycled water not suitable for drinking)**

Monitoring

- **In a risk management approach the focus is on operational monitoring**
- **As well as measuring performance of treatment processes (filtration, disinfection etc) this includes monitoring for:**
 - **correct installation of plumbing systems**
 - **cross-connections**
 - **unintended use of recycled water**
 - **maintenance of appropriate signage and labelling**

Summary

- **Management of water quality is based on preventive risk management approaches**
- **This includes ensuring that water distribution systems, pipe work and plumbing are installed correctly and maintained appropriately**
- **Existing standards and codes of practice need to be applied and where necessary enhanced**
- **Applying a preventive approach means that education and communication are required. Regulation while necessary generally only detects faults after the fact.**