

Vessel Inspection Program

Enviromental Health Manual

March 2012



This manual has been prepared to support the Public Health Unit's Vessel Inspection Program. Its authors are Toni Cains, Kelly-Anne Ressler, Curtis Gregory, Janice Biggs and Mark Ferson.

At the time of writing Janice Biggs was with the NSW Public Health Officer Training Program, NSW Department of Health.

Comments may be addressed to Dr Mark Ferson at mark.ferson@sesiahs.health.nsw.gov.au or by post at Public Health Unit, South Eastern Sydney Local Health District, Locked Bag 88, Randwick NSW 2031, Australia.

Preparation of the Manual involved consultation with Neil Shaw from NSW Health, environmental health, infectious disease and immunisation team members of the Public Health Unit, members of the Australian Quarantine and Inspection Service and the Australian Maritime Safety Authority, whom we wish to gratefully acknowledge for their input.

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PREFACE

Sydney prides itself on being an internationally renowned tourist attraction, and its role as a cruise ship port and destination is a vital element of this success.

Over a number of years the Public Health Unit, which holds jurisdiction over the Port of Sydney for the administration of New South Wales public health legislation, has worked to ensure the health and well-being of international and domestic travellers entering Sydney's ports.

The Public Health Unit has a multi-faceted program in relation to vessels. It maintains a cruise ship health surveillance program; is responsible for mounting, in consultation with the NSW Health Centre for Health Protection, the primary response to any public health risk pertaining to international vessels entering the Port of Sydney; and conducts an environmental health inspection program.

The aim of the environmental health inspection program – known as the **South Eastern Sydney Vessel Inspection Program** – is to ensure sanitation practices on board international ships meet local standards, reflecting the intent of the International Health Regulations. By a planned process of monitoring and response, the Program carries out preventative actions which reduce the likelihood of the introduction and spread of human disease.

The Vessel Inspection Program is generally applicable to commercial vessels entering the Port of Sydney. In practice, the focus of activities has tended toward cruise ships entering Sydney Harbour, as the size of the complement - often numbering thousands of passengers and crew - increases health risks and opportunities for spread of infectious diseases. Portions of this manual may, however, be applicable to other ships.

The number of cruise ships visiting Sydney waters each year continues to increase - during the recently completed 2010-11 cruise season, 150 ships carrying over 300,000 passengers visited Sydney,¹ almost double the figures of five years earlier.

An enormous amount of work has already taken place whereby the Public Health Unit has built partnerships with the cruise ship industry (ships' crew, medical and land-based staff and shipping agents), the Australian Quarantine and Inspection Service, Sydney Ports Corporation and the NSW Health Centre for Health Protection. We plan to continue to support the shipping industry and maintain a strong focus on health protection over the coming years to the benefit of all concerned.

Professor Mark J Ferson MBBS MPH MD FRACP FAFPHM FRSPH

Director & Medical Officer of Health

Public Health Unit

South Eastern Sydney Local Health District

¹ Sydney Ports Cruise Schedule, http://www.sydneyports.com.au/port_operations/cruising accessed 30 June 2011

INTRODUCTION

This Manual, produced by the Public Health Unit South Eastern Sydney Local Health District, on behalf of NSW Health, describes the procedure for conducting and reporting **environmental health inspections** on board vessels that berth in one of Sydney's ports.

The aims of the Manual are to provide information on:

- How a routine inspection will be conducted
- Risk factors and control measures
- Technical inspection notes

The Vessel Inspection Program consists of an environmental health inspection conducted by qualified Environmental Health Officers employed by the Public Health Unit. The general role of the Public Health Unit is to identify, prevent and minimise public health risks to the community. These risks may be infectious, chemical or radiological in nature. They may be caused by other humans, by animals and by the inanimate environment.

The aim of the Vessel Inspection Program itself is to provide:

- a consistent approach to undertaking environmental health inspections for vessels using Port of Sydney facilities;
- periodic environmental inspections to monitor compliance with relevant legislation and best practice.

Inspections under the Vessel Inspection Program are conducted in accordance with the framework established by the International Health Regulations 2005,² Australian Quarantine Act 1908³ and NSW Public Health Act 1991⁴ (soon to be replaced by the 2010 Act⁵). To

² WHO (2005) International Health Regulations, <http://www.who.int/ihr/9789241596664/en/index.html>. Accessed 30 June 2011.

³ Commonwealth Consolidated Acts, Australian Quarantine act 1908. http://www.austlii.edu.au/au/legis/cth/consol_act/qa1908131/. Accessed 30 June 2011.

⁴ Australian Consolidated Acts, Public Health Act 1991, http://www.austlii.edu.au/au/legis/nsw/consol_act/pha1991126/. Accessed 30 June 2011.

⁵ Australian Consolidated Acts, Public Health Act 2010, <http://www.legislation.nsw.gov.au/sessionalview/sessional/act/2010-127.pdf>. Accessed 30 June 2011.

allow international consistency in the conduct of inspections, the Vessel Inspection Program has drawn on the World Health Organization's *Guide to ship sanitation*⁶ and the United States Centres for Disease Control and Prevention Vessel Sanitation Program (USVSP).⁷

Environmental health has been defined as "*those aspects of human health determined by physical, biological, and social factors in the environment.*"⁸

In New South Wales, environmental health issues which are subject to state public health legislation include:

- safe drinking water supplies,
- public swimming and spa pools
- *Legionella* control,
- skin penetration procedures,
- the funeral industry and
- tobacco control.

Other environmental health issues such as noise, air and water pollution, sewage management, recreational water quality and vector control do not fall under the direct responsibility of NSW Health, but other agencies may seek advice or participation in standards development from NSW Health.

In particular it should be noted that in New South Wales, food safety is promoted and enforced by the NSW Food Authority, which may be contacted from within Australia on 1300 552 406. Ballast water management requirements are enforced by the Australian

⁶ WHO (2011) Guide to ship sanitation 3rd Edition
http://www.who.int/water_sanitation_health/publications/2011/ship_sanitation_guide/en/. Accessed 27 June 2011.

⁷ United States Centres for Disease Control and Prevention, Vessel Sanitation Program,
<http://www.cdc.gov/nceh/vsp/> accessed 27 June 2011.

⁸ The Commonwealth of Australia (1999), The National Environmental Health Strategy 1999, Canberra
[http://www.health.gov.au/internet/main/publishing.nsf/content/c642c824473e84d3ca256f190004250c/\\$file/envstrat.pdf](http://www.health.gov.au/internet/main/publishing.nsf/content/c642c824473e84d3ca256f190004250c/$file/envstrat.pdf). Accessed 27 June 2011.

Quarantine Inspection Service (AQIS).⁹ Quarantine and biosecurity at the international border are the primary responsibility of Australian Government agencies.

The Vessel Inspection Program works in conjunction with the **South Eastern Sydney Cruise Ship Health Surveillance Program**, also led by the Public Health Unit. The Vessel Health Surveillance Program is a NSW Health program established in 1998 to facilitate the accurate voluntary reporting of diseases of public health and quarantine concern, and to promote the early reporting of outbreaks to allow a timely public health response. To date the work of the surveillance program has assisted in developing preventative measures to reduce the spread of infections aboard ships.

When will an inspection be carried out?

Inspections will be carried out routinely or in the event of an outbreak or other public health issue.

Routine Inspection

Ships are selected for routine inspection from the cruise ship schedule that is publically available on the Sydney Ports website.¹⁰ A list of vessels will be collated for the season identifying time of arrival and departure and details of any previous environmental inspection. From this list the inspection program for that season will be developed.

Prior notification that an inspection is due to occur may or may not be given to either the vessels or their company representatives.

Prioritisation of an Inspection

The process of prioritising the vessels to be inspected will be based on the following criteria:

- has not been inspected by any government organisation in the previous year

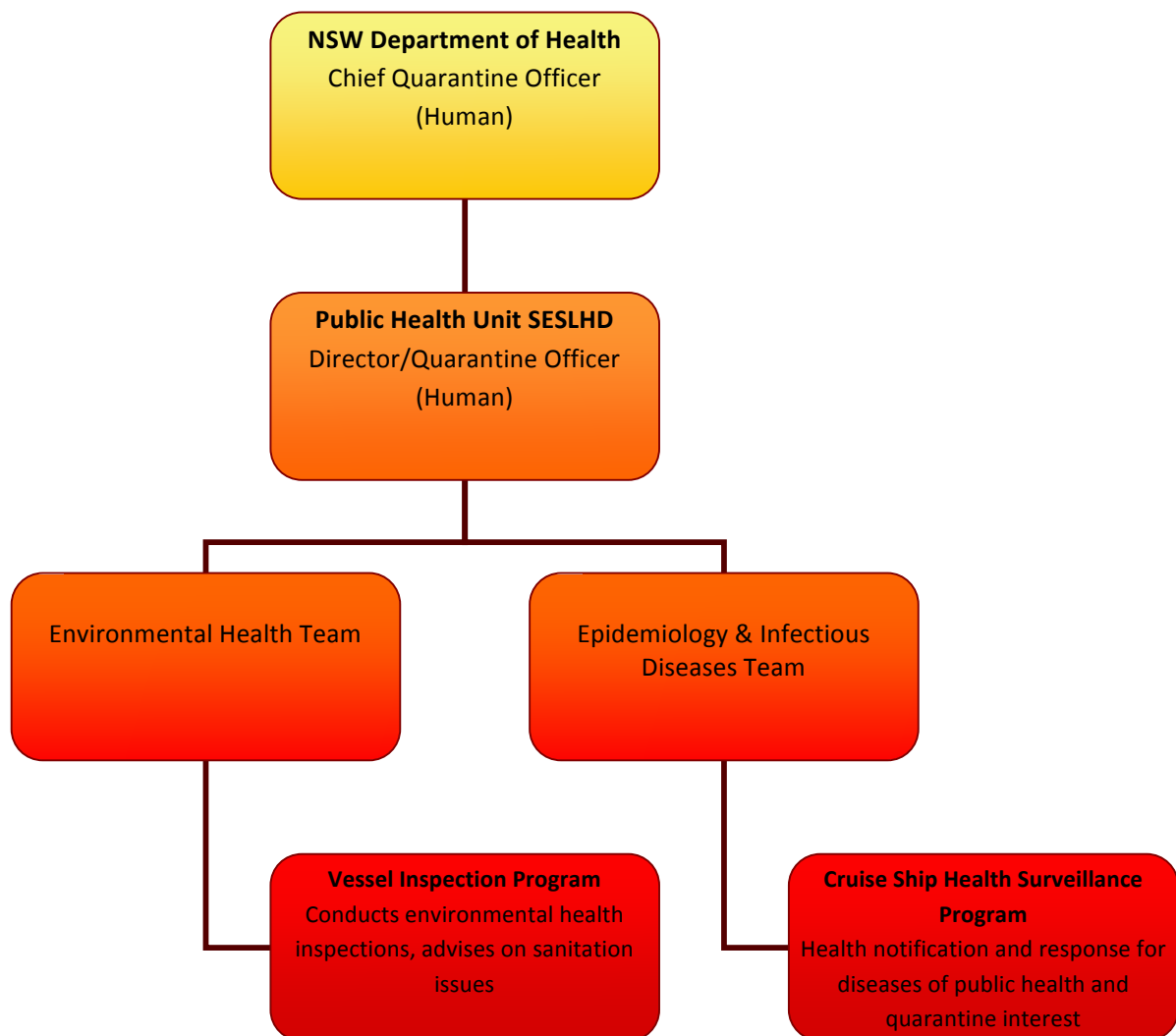
⁹ AQIS Australian Ballast Water Management Requirements
<http://www.daff.gov.au/aqis/avm/vessels/ballast/requirements> Accessed 22 September 2011.

¹⁰ Sydney Ports, Cruise Schedule, http://www.sydneyports.com.au/port_operations/cruise_schedule. Accessed 27 June 2011.

- failed score from previous inspection
- had outstanding items from a previous inspection
- had an outbreak or an elevated number of infectious disease cases reported on previous trips
- has not visited a Sydney Port previously.

When deciding on the vessels to be inspected the potential risk, as defined by the above criteria, staff availability and dates in Sydney will be considered.

Organisational arrangement



Scope of the document

The Manual aims to cover key aspects of vessel sanitation which are likely to be encountered by NSW Ministry of Health environmental health officers and their counterparts in other Australian jurisdictions. In addition, it is designed as a resource for ship's crew, port authorities and other stakeholders involved in the shipping industry. However, it is not intended to be an encyclopaedic guide. Readers are encouraged to contact the authors with suggestions for additional content.

ENVIRONMENTAL HEALTH INSPECTION

The main body of the Manual is organised into ten sections:

- 1.0 Hygiene and handwashing
- 2.0 Drinking water
- 3.0 Recreational water
- 4.0 Beauty therapy and facilities
- 5.0 Childcare facilities
- 6.0 Pest control and toxic substances
- 7.0 Waste disposal
- 8.0 Cleaning equipment and linen
- 9.0 *Legionella* control
- 10.0 Medical facilities

Food inspections will generally not be conducted by Public Health Unit officers. If an environmental health officer makes observations that raise food safety concerns, these will be communicated promptly to the NSW Food Authority. A serious concern will be communicated immediately to enable the NSW Food Authority to inspect the vessel on the same day.

An inspection will concentrate on the ten sections listed above. Each section has assessment criteria and technical inspection notes.

This manual provides a summary of the assessment criteria used in the environmental health audit tool (Appendix A). The NSW Health environmental health audit process involves inspecting, testing (where appropriate), recording findings and, if necessary, writing a statement describing why an item did not meet the required standard. The audit tool is adapted from the United States Vessel Sanitation Program, but does not include a score or weighting of an item.

The ship's liaison officer will usually be allowed to take a copy of the filled-in audit tool on the understanding that it is a draft. If the inspection raises any controversial or disputed issues, the audit tool should not be given to the ship's liaison officer without first discussing the issues with the Public Health Unit Director. In these situations, a copy will be transmitted to the ship's master by email after the officers have left the vessel.

A final report will be submitted by email directly to the ship's captain and any other designated company representative. A corrective action statement is required from the vessel master within a negotiated period of time.

1.0 HYGIENE AND HANDWASHING

Due to the importance of maintaining hygienic practices and providing accessible handwashing facilities to passengers and crew, these criteria will be applied to all general crew and passenger areas of the ship and to specific services where they exist, including beauty and personal services, childcare facilities, swimming pools and spas and medical clinics including the mortuary.

	Assessment criteria
1.1	Evidence that the crew are educated about the importance of handwashing, good hygiene and wearing clean uniforms.
1.2	Toilet and handwashing facilities are convenient and accessible.
1.3	Hand cleanser, single service hand towels, waste receptacles and signs provided.

Technical inspection notes

1.1. Evidence that crew are educated about the importance of handwashing, good hygiene and wearing clean uniforms.

While on duty, crew must practice good personal hygiene, such as wearing clean clothes, refraining from smoking and covering the face when sneezing or coughing. Crew must wash their hands on reporting to work, after each visit to the toilet, after each break and after coughing, sneezing, or handling garbage or similar sources of potential contamination of hands. Inspection will involve observation that crew are undertaking appropriate handwashing procedures.

1.2 Toilet and Handwashing Facilities.

Handwashing facilities must:

- be accessible, clean, and in good repair.
- provide hot and cold running water from a single mixing outlet. Any self-closing, slow closing, or metering faucet should be designed to provide a flow of water for at least 15 seconds without the need to reactivate the faucet.

Toilet facilities must:

- be accessible and clean.
- have a visible 'cleaning schedule' kept in a protective cover. The cleaning schedule should provide details about the last time the facilities were cleaned.
- have displayed the contact details of a domestic supervisor to call if the facilities are found to be unclean or unhygienic.

1.3 Hand cleanser, sanitary towels, waste receptacles and signs provided.

Handwashing facilities must include soap, a soap dispenser, single-service paper towels, a towel dispenser, and a waste receptacle.

Signs in multiple languages reading WASH HANDS AFTER USING TOILET must be posted over toilet handwashing facilities and on the bulkhead adjacent to the toilet door.

2.0 DRINKING WATER (POTABLE WATER)

	Assessment Criteria
2.1	Potable water (PW) chlorinated or brominated to at least 2.0 mg/L (or mg/L measured as free residual chlorine) at the time of bunkering. PW tanks solidly constructed without leakage and without double bottoms, and maintained.
2.2	PW distribution system treated to provide a free halogen residual greater than or equal to 0.2mg/L (or mg/L measured as free residual chlorine) by means of a chlorination or bromination system installed according to manufacturer's instructions or specifications.
2.3	PW system chlorine analyser and chart recording maintained operated, and calibrated. Data loggers are permitted. Acceptable evidence of potability.
2.4	PW system not subjected to contamination through cross connections to non-potable water supply or through backflow or back siphonage.
2.5	PW filling hoses, caps, and connections maintained and stored. Sample cocks provided on tanks. Tank vents and sounding tubes properly installed and maintained.
2.6	Plumbing fixtures, supply lines, drain lines, and drains installed and maintained in good repair.

Risk factors and control measures

A WHO review ¹¹ of over 100 outbreaks of food and waterborne diseases on ships found that one-fifth were attributed to a waterborne route. Past outbreaks have been associated with contaminated bunkered water, cross-connections between potable and non-potable water, improper loading procedures, poor design and construction of potable water storage tanks and inadequate disinfection.

Control strategies: involve loading the safest possible water in the first place; preventing contamination during storage; treatment to remove some forms of contamination that might have arisen; and storage and use of water in ways that prevent post treatment

¹¹ WHO (2001), Compendium, of outbreaks of foodborne and waterborne disease and Legionnaires' disease associated with ships (1970-2000), http://www.who.int/water_sanitation_health/hygiene/ships/en/shipsancomp.pdf. Accessed 27 June 2011.

contamination. It is important that a background level of chlorine of 0.2ppm is maintained in potable water.

Technical inspection notes

2.1 Potable water (PW) chlorinated or brominated to at least 2.0 mg/L (parts per million) measured as free residual chlorine) at the time of bunkering. PW tanks constructed and maintained.

Water samples obtained either from a sample cock between the bunkering disinfection and the storage tanks or from previously empty tanks into which potable water has been bunkered (including water produced on board from a distillation system) must have a free disinfection residual of at least 2.0 mg/L (measured as free residual chlorine).

Double-bottom tanks are not suitable for storage of potable water on newly constructed ships and should be used only if absolutely necessary on existing ships. If double-bottom tanks are used to store potable water on existing ships, all access covers on top of such tanks, air relief vents, and overflows must be properly protected from bilge or other contamination.

A distillation plant or other process that supplies water to the potable water system must not operate in harbour areas. A distillation plant, however, is allowed to operate and produce water in harbour areas if and only if this distilled water is not used for drinking, potable or swimming purposes or is dumped overboard as rapidly as it is produced.

Batch disinfection of bunkered water is not recommended. The approved method of disinfecting bunkered water is continuous disinfection with an automatic hypochlorinator or brominator. Batch chlorination or bromination is acceptable in the following types of emergencies:

- (a) equipment failure
- (b) contaminated system
- (c) plumbing or tank repairs

Lines carrying sewage or other non-potable liquids above or through potable water tanks are not permitted. Potable water lines under sewage or other tanks holding non-potable liquids are not permitted.

2.2 PW distribution system treated to provide a free halogen residual greater than or equal to 0.2mg/L (measured as free residual chlorine) by means of a chlorination or bromination system.

The vessel potable water distribution system must contain 0.2 mg/L free chlorine or bromine residual (measured as free residual chlorine). The free chlorine or bromine residual must not exceed 5.0mg/L (measured as free residual chlorine). This measurement shall be taken at a distant point in the distribution system.

The recommended method for disinfecting shipboard potable water is continuous disinfection with an automatic hypochlorinator or brominator that injects an amount proportional to water flow to maintain a free disinfection residual of 0.2 mg/L (measured as free residual chlorine) or more at all times throughout the vessel's potable water distribution system. This may be accomplished by means of a water meter to control the hypochlorinator or brominator or a free halogen analyser to control the amount of chlorine or bromine injected.

All water disinfection devices must be constructed and installed in accordance with manufacturer's instructions or in accordance with equivalent equipment standards recommended by manufacturers that conform to accepted engineering practice. The system must be capable of adding the amount of halogen required to maintain a free chlorine residual of 0.2 mg/L (measured as free residual chlorine) at a distant point in the distribution system. As a minimum, a backup pump must be available to replace the chlorinator pump on the distribution system if it should fail.

2.3 PW system chlorine analyser and chart recorder maintained, operated, and calibrated. Acceptable evidence of potability.

The ship must have a chlorine or bromine analyser-recorder that is installed in the potable water distribution system at a distant point where a significant water flow exists. The free disinfection residual measured by the analyser must compare within 0.2 mg/L (measured as free residual chlorine) of the actual halogen level.

The analyser and chart recorder must be properly maintained, operated and calibrated in accordance with the manufacturer's instructions.

Please note: A review of records from the ship's automatic chlorine or bromine analyser must show that the ship has maintained adequate amounts of free halogen residual in the water distribution system since the last inspection of the vessel. The review will be deemed unacceptable if the records show a free halogen residual of less than 0.2 mg/L (measured as free residual chlorine) for more than 24 consecutive hours. Charts shall be initialled and dated daily and retained for at least 12 months.

In the event of unexpected equipment failure, manual methods for disinfection and for determination of halogen residuals may be used temporarily provided that disinfection residuals are measured at least once every 8 hours. In such situations, ships must repair the malfunctioning equipment within 10 days.

Water samples will be collected during each periodic inspection and must be negative when analysed for thermotolerant coliform bacteria and total coliform bacteria by a National Association of Testing Authorities (NATA)¹² accredited laboratory.

¹² National Association of Testing Authorities, <http://www.nata.asn.au/>. Accessed 30 June 2011.
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2.4 PW system not subjected to contamination through cross connections to non-potable water supply or through backflow or backsiphonage.

The following equipment, locations, conditions and concerns should be reviewed to determine the potential for contamination of the potable water system through cross-connections to non-potable water or through backflow or back-siphonage:

- (a) freshwater supply lines to swimming pools, whirlpools, hot tubs, bathtubs and similar facilities
- (b) photography laboratory developing machines and utility sinks
- (c) beauty/barber shop spray- rinse hoses
- (d) potable water taps where hoses are connected or are likely to be connected, including hoses to tanks containing chlorine and other chemicals
- (e) garbage grinders
- (f) dishwashing and glass-washing machines
- (g) hospital and laundry equipment
- (h) air conditioning supply tanks
- (i) boiler feedwater tanks;
- (j) fire system
- (k) priming of potable water, bilge, and sanitary pumps
- (l) freshwater or saltwater ballast systems
- (m) bilge or other waste water
- (n) provision of air gaps between all potable and non-potable systems
- (o) isolation of the potable water distribution system at each deck or each loop of the system through the use of backflow preventers. This requirement will apply only to new construction
- (p) lines to divert potable water to other systems by valves or interchangeable pipe fittings (only acceptable when an air gap follows a valve)
- (q) a common compressed air system that supplies pressure to both non-potable and potable wafer pneumatic tanks; the air supply must be through a press-on type of air valve or hose. A press-on valve is one that must be held in place manually. A fixed connection of this valve is only allowed when the air supply is on a separate compressor used exclusively for pressure to potable water pneumatic tanks

- (r) any freshwater supply connected to a vacuum toilet system that must be properly protected through the use of vacuum breakers. These vacuum breakers must be located on the discharge side of the last control valve (flushing device) and at least 150mm (6") above the flood-level rim of the fixtures. Individual vacuum breakers must be provided on all commodes or fixtures that use the vacuum system and which have submerged inlets.

Potable water suction lines must be installed to prevent contamination from bilge or other waste. When potable water is supplied under pressure, the system must be protected against backflow or other contamination by vacuum breakers, backflow preventers or air gaps between the delivery point of the water and the overflow rim of the unit. Vacuum breakers or backflow preventers must be installed when air gaps are impractical or when water under pressure is required. Vacuum breaker, when used, must be installed in the supply lines on the discharge side of the last control valve at least 150mm (6") above the flood-level rim of the fixture to protect the potable water system from potential contamination.

Vacuum breakers and backflow preventers must be properly installed and maintained in good repair at all times to assure reliable operation. Air gaps must have at least twice the diameter of the delivery fixture opening. Speciality backflow preventers are required instead of vacuum breaker when a shutoff is required after the connection. They must be the functioning and under constant pressure.

When a cross-connection is discovered in the potable water distribution system lines and contamination, including non-potable water, may have entered the potable water system, the entire system must be disinfected in accordance with established procedures.

The piping of the potable water system, including the filling line, must be suitably stencilled, painted light blue or striped with 150mm (6") light blue bands or a light blue stripe at fittings on each side of partitions, decks and bulkheads and at intervals not to exceed 4.6m (15 feet) in all spaces, except where the decor would be marred by such markings.

All salt-water taps, except for fire hydrants, must be removed from the hospital. Only potable water is to be used for deck washing in these areas.

2.5 PW filling hoses, caps and connections maintained and stored. Sample cocks provided on tanks. Tank vents and sounding tubes properly installed and maintained.

Potable water hoses must be flushed before the filling line is attached. Hoses must be drained after each use and stowed with end caps on reels or racks in special locker marked "POTABLE WATER HOSE AND FITTINGS STORAGE" in letters at least 12mm (½"). Lockers must be closed, self-draining, smooth, non-toxic, corrosion-resistant, easily cleanable, fixed 0.5 m (18") above the deck, and used for no other purpose. Hoses and fittings must be maintained in good repair.

Potable water hoses must be handled with care to prevent contamination by dragging ends on the ground, pier, deck surfaces or by dropping the hose into the harbour.

A hose that has become contaminated must be thoroughly flushed and disinfected. All fittings and other appurtenances used in connection with the loading of potable water must be handled and stored in a sanitary manner.

The potable water tank vent or combined vent and overflow must terminate with the open end pointed downward at least 0.5 m (18") above the deck, and it must be screened with No. 16 mesh or finer corrosion-resistant wire cloth to protect potable water from potential contamination.

Any device for determining the depth of water in the potable water tanks must be constructed and maintained so as to prevent contaminated substances or liquids from entering the tanks. Manual sounding of potable water tanks is discouraged and should only be performed when absolutely necessary.

The potable water filling line should begin either horizontally or in a gooseneck position pointing downwards, at a point at least 0.5 m (18") above the top of the tank or of the deck

that the line penetrates. The filling line must have a screw cap or plug fastened by a chain to an adjacent bulkhead or surface in such a manner that the cap or plug will not touch the deck when hanging free.

Each filling line must be painted light blue and clearly marked "POTABLE WATER FILLING" in letters at least 12mm (½") high, stamped on a non-corrosive label plate or the equivalent and located at or near the point of hose connection.

Non-potable freshwater, if used, must be bunkered through separate piping using separate and different fittings. This water must flow through a completely different piping system and be identified with a different colour.

Sample cocks shall be installed on all potable water tanks. If this is impractical because of tank location or inaccessibility, access for sampling that tank must be provided. All access covers on top of potable water tanks, air relief vents, and overflows must be properly protected from bilge or other contamination.

2.6 Plumbing fixtures, supply lines, drain lines and drains installed and maintained in good repair.

Water supply lines and fixtures must be free from leaks and properly installed.

Wastewater from equipment and sinks must be properly drained to prevent pooling or leaking of water on the deck.

Individual air gaps must be placed in the drain lines from water bath sterilisers, hospital water stills, autoclaves and other hospital equipment that may be subject to sub-atmospheric pressure.

3.0 RECREATIONAL WATER: Swimming Pools and Spa Pools

	Assessment Criteria
3.1	Swimming pools, spas and similar facilities maintained, disinfected and operated.
3.2	Chemical testing being undertaken using a colorimetric pool kit; chemical test kits provided and in good working order.
3.3	Spa pools temperatures limited to <38 degrees Celsius at all times.
3.4	Crew knowledge of chemical testing and action required following a chemical failure.
3.5	Pool/spa logs kept on a daily basis and available for inspection.
3.6	Evidence of lifesaving training for suitable crew.

Risk factors and control measures

Infections are caused by the transmission of certain pathogenic microorganisms. It is common for transmission in swimming pools and spas to occur when pathogens are introduced into the water by cross-contamination from bathers.

Faecal contamination in a pool is the most serious risk to health. *Cryptosporidium* is the parasite responsible for cryptosporidiosis, a diarrhoeal illness in humans. Contaminated public swimming pools have been related to several outbreaks of cryptosporidiosis worldwide.¹³ *Cryptosporidium* oocysts can pass out in the faeces into pool water where they can survive for a long time. Oocysts are resistant to standard levels of bromine and chlorine and faecal contamination of the water requires decontamination procedures to be carried out.

Actions that can be taken to minimise the risk of faecal contamination in the pool include

- Swimmers should be actively encouraged to shower prior to using the pool.

¹³ NSW Health (1999) Protocol for minimising the risk of cryptosporidium contamination in public swimming pools and spa pools, <http://www.health.nsw.gov.au/pubs/2004/pdf/cryptopools.pdf>. Accessed 27 June 2011. Public Health Unit, South Eastern Sydney Local Health District
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- People who have had a diarrhoeal illness in the previous 2 weeks should be advised not to swim in pool or spa.
- Non toilet-trained infants should wear swimmers with waterproof tight-fitting pants over them.

Please note: All vessels with swimming or spa pools should have developed risk protocols for managing contamination: faecal incidents, and vomit and blood both within the water and on the pool surface. Examples of protocols in use in NSW can be found at the NSW Health website.¹⁴

Spa pool folliculitis, also known as ‘hot tub folliculitis’ or ‘pseudomonas folliculitis’, is a skin condition that arises hours to a few days after bathing in inadequately disinfected warm water, such as a spa pool or swimming pool. The result is an eruption of scattered small red itchy or tender bumps, some of which are pustular. They mainly occur in areas that were covered by the swimming costume. The condition may be associated with earache, sore throat, nausea and vomiting, headache and/or mild fever.

It is usual for human pathogens to survive (and in the case of bacteria, to multiply) in pools that are unclean, warm, aerated and have too little disinfectant, too much stabiliser and pools where the pH is too high. A combination of these situations can easily lead to transmission of infection.

Technical inspection notes

3.1 Swimming pools, spas, and similar facilities maintained and operated.

Flow-through water supply systems for swimming pools must be used only at sea. Before arriving in port the flow-through system must be shut off and a recirculating water supply system using only potable water shall be used with appropriate filtering and with adequate bromination and chlorination. Disinfection for a flow-through system converted to re-

¹⁴ NSW Health Swimming and spa pools, http://www.health.nsw.gov.au/PublicHealth/environment/water/water_spa.asp. Accessed 27 June 2011.
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circulation must be initiated before the ship reaches port to achieve adequate levels of disinfection in the water. If this is not possible the pool must be drained before the ship reaches port and it must remain empty whilst in port.

Disinfection is a process which kills pathogens, but generally not their cyst forms. The aim of disinfection is to reduce the transmission of infections. It is not an instantaneous process but takes time. The higher the concentration of disinfectant the more rapidly killing of pathogens occurs. At the minimum recommended concentrations of chlorine and bromine, the kill time for common bacterial and viral pathogens is about one minute or less.

Most pathogens are easily controlled by disinfection but *Cryptosporidium* oocysts and *Giardia* cysts, which are types of spores, are resistant to disinfectants. Their transmission needs to be controlled by preventing cysts entering into the pool or spa.

Disinfectant above the recommended minimum concentrations must be present in the pool water at all times. Disinfection must be provided by a disinfectant which leaves an effective residual in the pool that is not harmful to swimmers.

Chlorine and bromine based disinfectants are the only satisfactory pool and spa disinfectants. They also oxidise and destroy some organic chemicals which may enter the pool. These disinfectants provide a readily measurable residual in the pool water. Each disinfectant has its advantages and disadvantages and pool operators should consider any disinfectant or disinfectant system carefully before use.

Re-circulation and disinfection systems used with swimming pools and whirlpools must be operated and maintained in good repair in accordance with the manufacturer's specifications, recommendations and standards. Filter pressure gauges and valves must be replaced when they are defective. Filters must be backwashed and filter material must be changed periodically.

Table 1: Chemical Requirements for Chlorinated Public Swimming Pools¹⁵

Parameter	Situation	Concentration
Free Available Chlorine ⁽¹⁾ (DPD No 1)	Outdoor Pool	Min 1.0 mg/L
	Outdoor Pool + Cyanuric Acid	Min 3.0 mg/L
	Indoor Pool < 26°C	Min 1.5 mg/L
	Indoor Pool ≥ 26°C	Min 2.0 mg/L
	Spa Pool	Min 2.0 mg/L
	Any pool where pH > 7.6	Raise min by 1.0 mg/L
	Any indoor pool (not spa pool) using mainstream ozonation ⁽²⁾	Lower min by 0.5 mg
Oxidation Reduction Potential (ORP)	ORP automation	See note (4)
Combined Chlorine ⁽³⁾	Any pool	Max 1.0 mg/L
Total Chlorine (DPD No 1 + No 3)	Any pool	Max 10.0 mg/L
pH	Any pool	Range 7.0 to 7.8 Optimum = 7.5 Optimum range 7.4 to 7.6
Total Alkalinity	Any pool	80 to 200 mg/L
Cyanuric Acid	For use in outdoor pool only. Not for use in spa pools.	≤ 50 mg/L (Optimum 30 mg/L)
(1) Free Available Chlorine concentration should be increased when high bather loads are anticipated to ensure that concentrations are never less than the minimum. Super-chlorination should only be carried out when the pool is closed.		
(2) Residual excess ozone is to be quenched in an activated carbon filter bed before the circulated water is returned to the pool. The contact time between the pool water and the ozone shall be at least 2 minutes at an ozone concentration of 1 mg/L where injected before filtration, and at least 0.8 mg/L where injected after filtration. Where ozone is generated at the rate of less than 2mg/hour quenching shall not required where the ozone is introduced into the circulation system by a venturi and completely dissolved in the pool water.		
(3) Some oxidants may interfere with reagents used to measure combined chlorines. Interference must be demonstrated by the pool operator to allow exemption from the combined chlorine maximum.		
(4) Where Oxidation Reduction Potential (ORP) measuring equipment or automatic dosing equipment is installed, the ORP shall be set to the equivalence of the minimum free chlorine concentration and shall be not less than 720mV.		

15 NSW Health (2010) Draft – Guidelines for Disinfecting Public Swimming Pools and Spa Pools, http://www.health.nsw.gov.au/resources/publichealth/environment/water/pdf/guidelines_swimming_pool_2010.pdf. Accessed 27 June 2011.

Table 2: Chemical Requirements for Brominated Public Swimming Pools¹⁶

Parameter	Situation	Concentration
Free Available Bromine + Monobromamine (DPD No 1)	Outdoor Pool	Min 2.25 mg/L
	Indoor Pool < 26°C	Min 3.5 mg/L
	Indoor Pool ≥ 26°	Min 4.5 mg/L
	Spa Pool	Min 4.5 mg/L
Total Bromine (DPD No 1 + No 3)	Any Pool	Max 9.0 mg/L
pH	Any pool	7.0 to 8.0
Sodium Bromide (NaBr)	Bromine Bank System	Max 9.0 mg/L
Sodium Bromide (NaBr)	Ozone / Br System	Max 15 mg/L
Total Alkalinity	Any pool	80 to 200 mg/L
Di-methylhydantoin	Any pool	Max 200 mg/L
Cyanuric Acid	Any pool	None – no benefit
1. Free Available Bromine concentration should be increased when high bather loads are anticipated to ensure that values are never less than the minimum. Super-chlorination should only be carried out when the pool is closed.		
2. Ozone quenching is not required in the Ozone / Bromide system. In other systems residual excess ozone is to be quenched in an activated carbon filter bed before the circulated water is returned to the pool. The contact time between the pool water and the ozone shall be at least 2 minutes at an ozone concentration of 1 mg/L where injected before filtration, and at least 0.8 mg/L where injected after filtration. Where ozone is generated at the rate of less than 2mg/hour quenching shall not be required where the ozone is introduced into the circulation system by a venturi and completely dissolved in the pool water.		
3 Where Oxidation Reduction Potential (ORP) measuring equipment or automatic dosing equipment is installed, the ORP shall be set to the equivalence of the minimum free bromine (DPD #1) concentration and shall be not less than 700mV.		

Disinfection Factors

- Increasing pH decreases disinfection power so that above pH 7.8 chlorination is ineffective.
- Stabiliser (cyanurate) can be used in outdoor pools but should not exceed 50mg/L as disinfection becomes increasingly less effective and chlorine levels should be increased if stabiliser is used. Stabiliser is not suitable for use with bromination.
- Pools must be equipped with a circulation system and filters capable of producing clean, clear water. Filtered water is easier to disinfect, reduces contaminants and produces less by-

¹⁶ NSW Health (2010) Draft – Guidelines for Disinfecting Public Swimming Pools and Spa Pools, http://www.health.nsw.gov.au/PublicHealth/environment/water/water_spa.asp Accessed 27 June 2011.

products. Circulation systems must be active whilst the pool or spa is open and for at least one hour before and after the pool is open.

3.2 Chemical testing being undertaken using a colorimetric pool kit; chemical test kits provided and in good working order.

Chemical testing must be carried out using colorimetric technology and recorded every four hours. The pool kit should contain an operating manual and should be serviced in accordance with the manufacturer's instructions. Immediate adjustments must be made where there are problems detected with the pool or spa disinfection. Test kits and the methodology used to test pool water parameters shall be in accordance with Table 3. Test strips and 1-in-3 or 1-in-4 test kits are not suitable. Kits with plastic test tubes for testing for chlorine, bromine and pH are not suitable. Test kits should not be exposed to direct sunlight. Testing frequency shall be performed in accordance with Table 3. All test results shall be kept in a log book, sheet, or as a database, and be readily available for immediate inspection by an environmental health officer.

Table 3: Test kits and methodology¹⁷

Water Quality Parameter	Test Kit / Methodology
Chlorine / Bromine	Colorimetric method based on DPD reagents capable of measurement within the recommended disinfectant range.
Ozone	Colorimetric method based on DPD reagents.
Hydrogen Peroxide	Colorimetric method based on potassium iodide reagent under acidic conditions and capable of measuring in 10 mg/L increments within the range of 0 - 100 mg/L. Any electronic meter.
pH	pH meter . Colorimetric method.
Total Alkalinity	Colorimetric method.
Cyanuric Acid	Colorimetric based method within 0-200 mg/L range.
1. All equipment needs to be checked and calibrated in accordance with the manufacturer's specification and maintenance manuals.	
2. DPD reagents colour reduction occurs when free chlorine concentration is high and will give a false 'low' reading. Follow the manufacturer's manual and dilute prior to testing.	

¹⁷ NSW Health (2010) Draft – Guidelines for Disinfecting Public Swimming Pools and Spa Pools, http://www.health.nsw.gov.au/PublicHealth/environment/water/water_spa.asp Accessed 27 June 2011.
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3.3 Spa Pools temperatures limited to < 38°C at all times.

Spa pools also include whirlpools, whirlpool spas, heated spas, hot tubs or Jacuzzis. Where spa pools are heated the temperature must never exceed 38°C. Warmer temperatures favour bacterial growth such as *Legionella* in filter media, which may be transmitted by aerosols in spa pools. *Pseudomonas aeruginosa* survival and growth is enhanced at pool temperatures exceeding 26°C and this fact is reflected in the chemical criteria. Spa pool heat warning: Bathing for longer than 20 minutes may cause heat illness. Parents of children under the age of 6 years, persons with medical conditions and pregnant women should seek medical advice before using a heated spa pool.

3.4 Staff knowledge of chemical testing and action required following a chemical failure.

Chemical testing is an important method to ensure the quality of the water and therefore the staff member responsible for the testing must have either qualifications or experience to undertake work. Officers will always assess this person's knowledge during an inspection.

3.5 Pool/spa logs kept on a daily basis and available for inspection.

A log sheet or register should be used to record the results of every test performed at a swimming pool, spa pool or pool complex. The keeping of records is a professional activity and can be used to demonstrate competency in pool operations. Log books containing all of the log sheets should be maintained in a register for assessment of any technical issues and problems that may arise. Log sheets tend to be individual for each premises and location.

Where automated in-line tests are recorded electronically, these should be downloaded monthly and kept with any other records. It is also possible to represent the data graphically, which may add further meaning to the results. One person should be responsible for pool testing and recording of results each working shift and the log sheet should bear their name.

A sample log sheet in use in NSW is included in Appendix B and is also available on the NSW Health swimming pools and spa pool website.¹⁸

3.6 Evidence of lifesaving training for suitable crew.

It is required that crew have suitable qualifications for life saving, and that a trained lifesaver is on duty at all times when the pools are open to the public.

¹⁸ NSW Health, http://www.health.nsw.gov.au/PublicHealth/environment/water/water_spa.asp Accessed 27 June 2011.

4.0 BEAUTY THERAPY AND ASSOCIATED FACILITIES

	Assessment criteria
4.1	A hand basin with hot and cold running water, soap and single use towels or other suitable hand drying equipment.
4.2	Contact surfaces of equipment and utensils clean.
4.3	Single use of needles and correct disposal of sharps.
4.4	Proper storage, handling of clean/soiled equipment and utensils.
4.5	Single-use articles properly stored, dispensed.

Risk factors and control measures

When procedures involving penetration of the skin are not managed correctly, there is the possibility that they can transmit blood-borne infections (e.g. HIV or hepatitis B, C) between clients or between staff and clients. The risk of transmitting an infection can be minimised by ensuring that infection control techniques, which includes aseptic procedures, are practised correctly and that effective sterilisation of equipment occurs. It is also paramount that the premises are maintained in a hygienic manner. Skin penetration procedures undertaken on cruise ships include acupuncture, waxing, manicures and pedicures (involving the cutting of cuticles). Staff should wear single-use gloves for all skin penetration procedures.

Technical inspection notes

4.1 Hand basin.

A hand basin with hot and cold running water, soap and single use towels or other suitable hand drying equipment should be available for staff in close proximity to where the procedure is being undertaken.

4.2 Contact surfaces of equipment and utensils clean.

The procedure area must be maintained in a clean and hygienic condition. A neutral detergent should be used for general cleaning.

4.3 Single use of needles and correct disposal of sharps.

All used sharps are to be placed into a clearly labelled, puncture resistant sharps container which must be kept as close as possible to the area where the sharps are used. The sharps container should be wall mounted to avoid accidental access by children or others.¹⁹

4.4 Proper storage, handling of clean/soiled equipment and utensils.

All towels used for clients should be clean and changed between clients. Lubricants, creams or gels must be dispensed into separate containers at the start of each procedure.

All equipment used by hairdressers should be cleaned between uses, including combs, brushes, rollers, streaking caps, clippers, and scissors. It is not recommended to use manual clippers with non-detachable blades as they can not be easily cleaned. Equipment should not be soaked in solutions of disinfectant unless specified by the manufacturer's instructions. Cleaning the equipment in warm water and detergent and allowing it to air dry should be sufficient.

Foot spas have been associated with the spread of disease and therefore the following is required:²⁰

Foot spas need to be cleaned thoroughly to prevent the growth and spread of disease causing micro-organisms. To prevent the spread of infectious diseases, a single-use disposable foot spa liner can be used, otherwise the foot spa should be cleaned and disinfected between each client and at the end of the day according to the following directions.

After each client

- Drain the water from the foot spa

¹⁹ NSW Health (2000) Guidelines in skin penetration,
http://www.health.nsw.gov.au/resources/publichealth/environment/general/guidelines_skin_pen.asp
Accessed 27 June 2011.

²⁰ NSW Health (2011) Cleaning and disinfection of foot spas,
http://www.health.nsw.gov.au/factsheets/environmental/cleaning_foot_spa.html Accessed 30 June 2011.

- Clean the surfaces of the foot spa with a suitable cleaning agent, warm or hot water and cloth and/or scrubbing brush, then rinse
- Disinfect by spraying the foot spa with a hospital grade disinfectant (re-circulating 'air-jet' spas need to be disinfected by circulating clean water and disinfectant according to the manufacturer's instructions)
- After disinfection, wipe the foot spa until dry using a clean lint free cloth

At the end of the day

- Remove the foot spa components (inlet jets, filter screen) using gloves and thoroughly clean 'scrub' the foot spa and components with a brush, warm or hot water and a suitable cleaning agent
- Immerse the screen in a hospital grade disinfectant solution or a 10% bleach solution (1 part bleach to 9 parts water) for at least 10 minutes
- Rinse the foot spa and components with clean water and re-assemble
- Re-fill with clean water and disinfectant - for re-circulating 'air-jet' spas the disinfectant solution must be circulating for the required contact time, or for at least 10 minutes. A long contact time is more likely to kill bacteria and other disease causing microorganisms
- After disinfecting - drain, rinse and air dry
- Store the foot spa in a clean, dry and dust free environment

All reusable equipment which penetrates the skin (e.g. cuticle cutters) must be washed with warm soapy water and then sterilised between clients. Sterilisation should be undertaken using approved benchtop steriliser.

4.5 Single-use articles properly stored, dispensed.

Wax must be single use only and disposed of immediately after use. A hand basin with hot and cold running water, soap and towels should be located as close as possible to the procedure.

Disposable razors, used at the ship's barber/hairdressers must be disposed of into a sharps container.

5.0 CHILDCARE FACILITIES

	Assessment Criteria
5.1	Contact surfaces are kept clean, in particular nappy areas are kept clean and free from clutter.
5.2	Hand washing signs are situated above change tables and in the toilets.
5.3	Sickness records are kept of children & staff.
5.4	Easy-to-read signs in public areas notifying the public that sick children will be excluded from the centre.
5.5	Only washable toys are used by the centre.
5.6	Evidence of infectious disease/infection control policies and procedures.

Risk factors and control measures

Many vessels have childcare facilities which cater for the occasional care of children and babies. Infections can be easily transmitted at childcare facilities due to a large number of children within an enclosed area. Although it is not possible to prevent the spread of all infections and illnesses within centres, some can be prevented.²¹

Technical inspection notes

Each centre must have an infection control policy which covers the following points:

5.1 Contact surfaces are kept clean, in particular nappy areas are kept clean and free from clutter.

A neutral detergent should be used for general cleaning of surfaces. The nappy change table must be impervious, non-absorbent, non-toxic, smooth, durable and easy to clean. Prior to each time a nappy is changed a clean piece of paper should cover the change table. Staff must wear gloves to change nappies. After each nappy change the table should be washed with detergent and warm water. All used nappies must be disposed of into a hands free

²¹ NHMRC (2006) Staying healthy in child care 4th Edition,
<http://www.nhmrc.gov.au/publications/synopses/ch43syn.htm> Accessed 27 June 2011.

lidded lined waste bin that is used only for discarding nappies. A handwashing station should be located as close as possible to allow parents and crew to wash their hands.

5.2 Hand washing signs are situated above change tables and in the toilets.

Infections can be spread by people who show no signs of illness. Handwashing is the most effective way of controlling infection. Both staff and children can transmit infections in child care centres.

It is therefore important that staff wash their hands before: arriving at the centre, handling food, eating and after; changing a nappy, going to the toilet, cleaning up faeces or vomit, wiping a nose.

Children's hands should be washed when they arrive at the centre and before leaving, before eating, after having their nappy changed, after going to the toilet, after playing outside and before leaving the centre.

In accordance with WHO,²² it is useful to encourage hygienic behaviour by passengers and crew by placing a sign above hand washing facilities in bathrooms in the child care centre advising users to "WASH HANDS AFTER USING TOILET AND CHANGING NAPPIES".

5.3 Sickness records are kept of children & staff.

A record of illness must be kept as a confidential document in the childcare centre for completion by the childcare centre crew. The record should include as a minimum criteria: name, age, cabin number, symptoms, onset date and time and any comments relating to notification and treatment. In the event of a suspected outbreak, advice regarding management should be sought promptly from the local public health authority.

²² WHO (2011) Guide to ship sanitation 3rd Edition,
http://www.who.int/water_sanitation_health/publications/2011/ship_sanitation_guide/en/ Accessed 27 June 2011.

5.4 Easy-to-read signs in public areas notifying the public that sick children will be excluded from the centre.

Excluding sick children is a method of limiting the spread of infection in the centre. The centre should have a written policy that clearly states the centre's exclusion criteria. Recommended minimum exclusion periods for infectious diseases can be found in the NHMRC document *Staying Healthy in Child Care*.²³

5.5 Only washable toys are used by the Centre.

Only washable toys should be used in the centres. All toys should be washed in hot water and detergent and dried on a daily basis. Books should be inspected for visible dirt and soiling and regularly wiped with a clean cloth. If a child brings their own toys to the facility then only that child should play with them or otherwise children should be discouraged from bringing their own toys.

²³ NHMRC (2006) *Staying healthy in child care* 4th Edition,
<http://www.nhmrc.gov.au/publications/synopses/ch43syn.htm> Accessed 27 June 2011.
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6.0 PEST CONTROL & TOXIC SUBSTANCES

	Assessment criteria
6.1	No presence of insects and rodents; outer openings protected; approved pesticide application.
6.2	Integrated Pest Management Plan.
6.3	Toxic items stored, labelled, and used properly.

Risk factors and control measures

Ports receive and manage goods and people from all over the world, increasing the risk of introducing vectors from any part of their host country or any other port in the world.

Ships crew should be given adequate training in the safe handling and storage of chemicals, spill management techniques and personal protective equipment. Further, crew should be provided with personal protective equipment.

Technical inspection notes

6.1 No presence of insects and rodents; outer openings protected; approved pesticide application.

Spaces where food and drink is stored, handled, prepared, or served must be maintained to prevent rodent and insect infestation. Non-toxic glue traps and bait stations may be located in food storage and preparation areas, but they must be located so as not to contaminate food and must be checked and changed frequently.

A pest control operator (licensed by the WorkCover Authority in NSW) may need to be engaged on entry to port to assess and control pest activities on the vessel. Any pesticide applications should be under the direction of a licensed pest control operator. Pesticide application is prohibited in food preparation or storage areas when food is being prepared or is exposed. Application is prohibited to crockery, cutlery and food preparation equipment and cupboards.

6.2 Integrated Pest Management Plan.

Vessels must be able to produce a tailored integrated pest management plan that documents the use of pesticides, insecticides and other means undertaken to eliminate the presence of pests and rodents.

6.2 Toxic items stored, labelled, and used properly.

Toxic items should be stored and used in accordance with the Australian Maritime Safety Authority Code of Safe Working Practice for Australian Seafarers,²⁴ in particular;

Toxic and other hazardous substances and products should be used and stored in such a way that users and others are safeguarded against accidents, injuries or particular discomfort. The ship should keep a register of hazardous substances on board.

There should be readily accessible to all users a Material Safety Data Sheet (MSDS), containing sufficient information to determine the degree of the danger posed by the substances. Seafarers should be familiar with the content of the MSDS before using the chemical and ensure that all appropriate precautions are taken.

If possible, the substance should be stored in the original packaging or in another correspondingly labelled packaging that cannot give rise to confusion. Such substances must be stored in a locked, well-ventilated room.

Chemicals should always be handled with extreme care, protection should be worn and the manufacturer's instructions closely followed. Particular attention should be paid to protecting eyes. Some cleaning agents, such as caustic soda and bleach, are chemicals and may burn the skin.

A chemical from an unlabelled container should never be used.

²⁴ Commonwealth of Australia Australian Maritime Safety Authority (1999) The code of safe working practice for Australian seafarers, http://www.amsa.gov.au/Shipping_Safety/Codes_Manuals_and_Reports/Code_of_Safe_Working_Practice_for_seafarers/ Accessed 27 June 2011.

Exposure to certain substances such as mineral oils, natural solvents and chemicals, including domestic cleaning agents and detergents, may cause dermatitis. Suitable gloves should be worn when using such substances and the owner should provide suitable barrier creams that may help to protect the skin.

The Material Safety Data Sheet should be consulted for accidents involving chemicals. All persons required to use hazardous substances need to be trained in safe use, including the use and maintenance of personal protective equipment.

7.0 DISPOSAL OF WASTE

	Assessment criteria
7.1	Waste management plan.
7.2	Clinical waste stored in appropriate yellow or red bags and not overfilled. Sharps stored in approved sharps containers.
7.3	Putrescibles waste stored in tightly covered bins.
7.4	Waste storage area not accessible to the public and has rigid impervious flooring. Clean up facilities, spill kits, appropriate drainage and bunding provided.

Technical Inspection notes

Unsafe management and disposal of ship's wastes can readily lead to adverse health consequences as humans can become exposed directly with waste that is not being managed in a safe manner. Waste streams on ships include black water, grey water, garbage, ballast water, effluent from oil/waste separators, cooling water, boiler and steam generator blow down, medical waste, industrial waste water and hazardous waste (WHO Guidelines 2007 direct quote).

Waste Classification

In NSW the statutory body with specific powers under environmental protection legislation is the Office of Environment & Heritage.²⁵ Classifying wastes into groups that pose similar risks to the environment and human health facilitates their management and appropriate disposal. Wastes can be classified into special waste (includes clinical waste), liquid waste, hazardous waste, restricted solid waste, general solid waste (putrescibles) and general solid waste (non-putrescible).

7.1 Waste management plan

²⁵ NSW Government Office of Environment and Heritage, Classification of waste.
<http://www.environment.nsw.gov.au/waste/classification.htm> Accessed 16 September 2011.

Vessels must be able to produce a tailored waste management plan that covers clinical, hazardous, liquid and solid waste. There should be a specific management plan for food preparation areas. Consideration should be given to how waste is transported around the ship to minimise incidental exposure and contamination of the environment.

7.2. Clinical and sharps waste

Clinical and related waste refers to:

- Clinical waste – any waste resulting from medical, nursing, dental, pharmaceutical, skin penetration or other related activity including human tissue, bulk body fluids or blood, visibly stained body fluids, materials or equipment and laboratory specimens or cultures. The waste can be infectious or non-infectious. Infectious waste is liquid or solid waste that contains pathogens. Non-infectious healthcare waste includes disposable healthcare supplies.
- Pharmaceutical – waste that consists of pharmaceutical or other chemical substances and includes expired or discarded pharmaceuticals
- Sharps waste – any waste collected from designated sharps waste containers and refers to needles, syringes or surgical instruments and items that are designed for the purpose of cutting, piercing or penetrating the skin and that have the potential to cause injury or infection
- Chemical waste – includes mercury, cyanide, azide and formalin

Infectious waste can be safely stored or sterilised. Clinical waste should be stored in appropriate yellow or red bags and should not be overfilled. Sharps should be collected in plastic approved sharps containers²⁶ and retained on board for disposal on shore.

7.3 Putrescible waste.

²⁶ NSW Health (2000) Guidelines in skin penetration,
http://www.health.nsw.gov.au/resources/publichealth/environment/general/guidelines_skin_pen.asp
Accessed 27 June 2011.

Putrescible waste includes disposable nappies, incontinence pads and sanitary napkins and food waste.

Dry refuse can be stored in tightly covered bins, or in closed compartments protected against the weather and the entry of rodents, flies and cockroaches. The containers should be thoroughly cleaned after emptying to discourage harbourage of rodents and vermin.

Waste bags must be secured and preferably stored in lockable large bins and should not be placed directly on the garbage room floor. Crew should ensure that when transporting food waste that the bags are tightly closed so as to not drip liquid waste on the floor.

Waste storage areas should be designed so waste containers are stored up off the floor with clearance to allow for pest control and ease of cleaning.

7.4 Waste storage area.

Garbage rooms must not be accessible to the public, have a lockable door and rigid impervious flooring. Clean up facilities, spill kits, appropriate drainage and bunding should be provided. Dry refuse should be stored in tightly covered bins, or in closed compartments. The containers should be thoroughly cleaned after emptying to discourage harbourage of rodents and vermin.

The garbage and refuse storage room must be constructed of easily cleanable, impervious, washable materials, and should be large enough to store and process garbage and refuse. Floors must be kept clean at all times. A suitable wash sink should be provided with hot and cold running water and the cleaning equipment should be maintained in good condition or replaced as needed.

The garbage and refuse room should be mechanically ventilated to the outdoors so the odour from the waste does not affect passengers. The room should not harbour vermin or rodents.

8.0 Cleaning equipment and linen

	Assessment criteria
8.1	Premises free of unnecessary articles; cleaning equipment stored; only authorised personnel permitted.
8.2	Clean and soiled linen in proper storage areas.

Technical Inspection notes

8.1 Premises free of unnecessary articles; cleaning equipment stored; only authorised personnel permitted.

Lockers, cabinets, or under sink shelves in as many areas as necessary should be provided.

Lockers or cupboards for housekeeping supplies should be labelled "*CLEANING SUPPLIES ONLY.*"

8.2 Clean and soiled linen in proper storage areas.

Although the risk of disease transmission from soiled linen is negligible, it is important that all linen is stored in the following manner:

- In a clean dry place that prevents contamination by aerosols, dust , moisture and vermin
- On clean shelves
- Separately from used linen
- In a manner that allows stock rotation
- Linen bags should not be overfilled and should be emptied when $\frac{3}{4}$ full

Linen should be washed at a temperature above 70°C

9.0 LEGIONELLA CONTROL

	Assessment criteria
9.1	Up to date controls are in place to reduce <i>Legionella</i> , this includes a <i>Legionella</i> risk management plan.

Risk factors and control measures

Legionnaires' disease is a sometimes life-threatening, infection of the lungs (pneumonia) caused by bacteria of the *Legionella* family. Infection occurs when a person breaths in *Legionella* bacteria from an environmental source. It is NOT spread from person to person. Typically, the illness is characterised by abrupt onset of high fever, non-productive cough, chills, headache and myalgia (muscle pain), and mental confusion. In reported outbreaks, a substantial proportion of cases of Legionnaires' disease have diarrhoea and abdominal pain. The disease which has an incubation period (the time between infection and onset of symptoms) of 2 to 10 days is usually associated with a low attack rate (percentage of the population affected) up to 5%, but a high mortality rate (death rate) of 15 – 20% in hospitalised cases.²⁷

Although there are many different species of *Legionella* bacteria, the two that most commonly cause disease in NSW are *Legionella pneumophila* and *Legionella longbeachae*.²⁸ The former is commonly associated with contaminated cooling towers and other water sources, and the latter with potting mixes. However, ships are considered high-risk environments for the proliferation of *Legionella pneumophila* for several reasons including²⁹

- bunkering of untreated, or inadequately treated water
- complex water storage and distribution systems that could provide greater opportunity for contamination

²⁷ NSW Health (2004). NSW Code of Practice for the control of Legionnaires' disease, 2nd Edition, http://www.health.nsw.gov.au/pubs/2004/pdf/legionnaires_disease.pdf Accessed 27 June 2011.

²⁸ NSW Health (2008) Legionnaires disease factsheet, <http://www.health.nsw.gov.au/factsheets/infectious/legionnaires.html> accessed 27 June 2011.

²⁹ WHO (2011) Guide to ship sanitation 3rd Edition, http://www.who.int/water_sanitation_health/publications/2011/ship_sanitation_guide/en/ Accessed 27 June 2011.

- varying cold water temperatures, especially in tropical areas and
- long term storage and possible stagnation in pipes

Legionella pneumophila can grow to high numbers in warm stagnant water and can be aerosolised through showers and other plumbing fixtures. Many cases of Legionnaires' disease have been related to the use of whirlpool spas.³⁰

Technical inspection notes

9.1 Up to date controls are in place to reduce *Legionella*, this includes a *Legionella* risk management plan.

The most important control measure is to have a thorough risk management plan for the control of *Legionella*. The plan must include details of periodic inspection and sampling if required of the water, maintenance of systems including the cleaning of shower roses, disinfection of systems, temperature controls and the use of preventative multiple barriers in all systems. The WHO Guidelines on *Legionella* and prevention of legionellosis can be used to prepare an appropriate plan.³¹

Control methods include:

- Maintaining temperatures either well above or well below levels that are optimum for *Legionella* growth
- Maintaining biocides with reliable, well-designed and properly maintained dosing systems
- Reducing the opportunity for aerosol generation and inhalation

As it is impractical to keep the temperature of water either well above or well below levels that are optimum for *Legionella* growth in spas and hot tubs, additional management measures are required. This includes completely draining and thoroughly cleaning all

³⁰ WHO (2001), Compendium, of outbreaks of foodborne and waterborne disease and Legionnaires' disease associated with ships (1970-2000),

http://www.who.int/water_sanitation_health/hygiene/ships/en/shipsancomp.pdf accessed 27 June 2011.

³¹ WHO (2007), *Legionella* and the prevention of legionellosis,

http://www.who.int/water_sanitation_health/emerging/legionella.pdf, Accessed 4 November 2011.

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surfaces and pipe works on a regular basis. EHOs will request to inspect a copy of the *Legionella* risk management plan on all inspections.

10.0 MEDICAL FACILITIES

	Assessment Criteria
10.1	Evidence of sterilisation guidelines, which meet relevant Australian standards.
10.2	Evidence of a policy for the management of spills.
10.3	Evidence of an Infection Control Policy.
10.4	Vaccine storage in accordance with Australian vaccine storage guidelines.
10.5	Mortuary facilities.
10.6	Pre-arrival health reporting; Medical logs are consistent with QPAR.

Technical inspection notes

10.1 Evidence of sterilisation guidelines, which meet relevant Australian standards.

Any reusable instrument or equipment used in an invasive procedure must be sterilised before and after use. All packaged and wrapped sterile instruments and equipment must be transported, stored and handled in a manner that maintains the integrity of packs and prevents contamination from any source. The manufacturer's instructions for effective and safe use of the steriliser must be followed. Documentation must be maintained for all reprocessing of reusable instruments and equipment and for the steriliser.

Autoclaves must be loaded correctly ensuring that any baskets or trays allow a free passage of steam, minimise condensation on equipment and can be readily removable. Autoclaves should be fitted with physical monitors so these requirements can be checked.

Correctly packaging equipment will permit aseptic removal from the steriliser and will ensure its sterility once removed from the steriliser. Equipment and packing material should be dry when removed from an autoclave. The packaging must still be in tact at the end of processing to ensure the equipment is sterile.

An autoclave should be tested, serviced regularly and calibrated at least once a year by a qualified service technician. Biological indicators (bacterial spores) should be used to check

the sterilising power of the unit. A number of calibrated bacterial spore tests are available commercially for this purpose.

Sterilisation depends on the following factors:

- temperature - the correct temperature shall be maintained for the specified time
- cleanliness - the equipment must be clean to enable sterilisation
- circulation - the chamber must be designed to allow steam to circulate around the equipment

Relevant Australian Standards for sterilisation³²

- AS/NZS 4187: Cleaning, Disinfecting and Sterilizing Reusable Medical and Surgical Instruments and Equipment, and Maintenance of Associated Environments in HealthCare Facilities
- AS/NZS 4815: Office-based healthcare facilities. Reprocessing of reusable medical and surgical instruments and equipment, and maintenance of the associated environment
- AS 2182: Sterilizer Steam Benchtop
- NSW Health, Health Procurement, Guidelines for Storage and Handling of Pre-Sterilized Consumables
- AS 2487: Dry heat sterilizers

Environmental Cleaning

Deposits of dust, soil and microbes on surfaces are a potential source of healthcare associated infection. The physical removal of micro-organisms and soil by wiping or scrubbing is probably as important as any antimicrobial effect of the cleaning agent.

Cleaning should be performed on a routine basis and should follow a logical order from clean to dirty. Frequently touched surfaces, including computer keyboards, handrails, door

³² NSW Health (2007) Infection control policy PD2007_036.
http://www.health.nsw.gov.au/policies/pd/2007/pdf/PD2007_036.pdf. Accessed 27 June 2011.
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knobs, tap handles and chairs in the patient waiting room, should be the focus of routine cleaning.

10.2 Evidence of a policy for the management of spills.

The medical facilities must be kept clean and vessels should have a written policy for the management of blood and body spills in accordance with NSW Health infection control policy PD2007_036.³³

10.3 Evidence of an Infection Control Policy.

All healthcare facilities must have a written infection control policy to promote and facilitate the goal of infection prevention and control. The Australian Guidelines for the Prevention and Control of Infection in Healthcare (2010)³⁴ have been developed by the NHMRC and should be used as a minimum standard in Australia.

Any infection control policy must cover standard precautions including hand hygiene, personal protective equipment, handling and disposal of sharps, environmental controls, reprocessing or sterilisation of reusable equipment, respiratory hygiene and cough etiquette, aseptic non-touch technique and appropriate waste handling.

10.4 Vaccine storage in accordance with Australian vaccine storage guidelines.

Vaccines are fragile biological substances requiring storage at 2 – 8 degrees Celsius. Freezing may rapidly inactivate some vaccines, whilst warming may be associated with a decline in the vaccine's potency. Purpose-built vaccine refrigerators are recommended. The vaccine refrigerator requires daily monitoring and each day personnel should record the minimum and maximum temperatures, preferably on a specially designed form. Thermometers can be either built in or free standing and they must be capable of showing daily minimum and maximum temperatures, within +/- 1 degree accuracy. Thermometers should be digital and be able to be reset.

³³ NSW Health (2007) Infection control policy PD2007_036,
http://www.health.nsw.gov.au/policies/pd/2007/pdf/PD2007_036.pdf. Accessed 27 June 2011.

³⁴ NHMRC (2010) Australian Guidelines for the Prevention and Control of Infection in Healthcare (2010),
<http://www.nhmrc.gov.au/publications/synopses/cd33syn.htm> Accessed 4 November 2011.

Written protocols are required to be developed and followed in the event of a breach in the cold chain.

Based upon the Department for Health and Aging *National Vaccine Storage Guidelines 'Strive for Five Guidelines'*.³⁵ The checklist for vaccine storage consists of the following:

1. Reliable and stable refrigerator with adequate capacity
2. Accurate and reliable temperature monitoring equipment
3. Written processes for monitoring and recording temperatures
4. Temperature probe is placed appropriately
5. Education and information for everyone handling vaccines (ensure this includes new staff)
6. Maintenance schedule for temperature monitoring equipment, checking the accuracy of the thermometer and changing the batteries
7. Written process for dealing properly with a cold chain breach (includes identification, response procedures, documentation and recording, prevention of occurrence)
8. Written process for ordering and rotating stock
9. Written process for receiving vaccines
10. Written process for managing power failure (e.g. having an alternative storage such as an Esky with packed ice etc)

10.5 Mortuary facilities.

Cruise ships should have mortuary facilities that are refrigerated and marked clearly as a mortuary. Bodies should be placed into a body bag made of low density polyethylene film of not less than 150 micrometres in thickness and not less than 2.4 metres in length and 1 metre in width.³⁶ All cruise ships should maintain a minimum of two body bags at any time. Refrigerated body facilities should be maximum 5°C.

³⁵ Commonwealth of Australia (2005) Strive for five National vaccine storage guidelines, [http://www.health.gov.au/internet/immunise/publishing.nsf/content/DF94731AD8CBF34ECA2575BD001C8129/\\$File/strive-4-five.pdf](http://www.health.gov.au/internet/immunise/publishing.nsf/content/DF94731AD8CBF34ECA2575BD001C8129/$File/strive-4-five.pdf) . Accessed 16 September 2011.

³⁶ NSW Consolidated Regulations. PUBLIC HEALTH (DISPOSAL OF BODIES) REGULATION 2002 - REG 13, http://www.austlii.edu.au/au/legis/nsw/consol_reg/phobr2002371/s13.html Accessed 27 June 2011.
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10.6 Pre-arrival health reporting.

Under section 27A of the *Quarantine Act 1908*, masters of vessels (other than aircraft) are required to report prescribed information on the Quarantine Pre-Arrival Report (QPAR) for vessels 96–12 hours before the estimated time of arrival at an Australian port. The QPAR provides important information to AQIS so that a quarantine risk assessment of the vessel can be conducted prior to arrival. If the information changes, after it is given, an update of the changes must be provided again as soon as possible³⁷.

Environmental health inspection will request the vessel to provide officers with a copy of the following 3 forms:

1. Quarantine Prearrival Report (QPAR)
2. Quarantine Prearrival Form for Cruise and Naval Vessels Entering Subsequent Ports of call
3. AQIS Gastrointestinal illness form

The health sections on these forms must be completed by the appropriate ship's officers in accordance with the Quarantine Act, and must be consistent with the medical logs. The vessel's gastrointestinal surveillance log and other medical logs will be reviewed and the illness rates checked against those reported in the QPAR. Where there are any discrepancies are identified, an explanation will be sought and the ship's officers will be reminded of their responsibility to notify all cases of illness before arrival in Australian waters.

In addition, the Quarantine Act 1908 requires the master of a vessel to immediately notify a Quarantine Officer if a person onboard displays a prescribed symptom;³⁸ or a prescribed or infectious disease breaks out onboard the vessel prior to arrival and for the duration of time in Australian waters.

³⁷ Australian Quarantine and Inspection Service, <http://www.daff.gov.au/aqis/avm/vessels/guidelines-over25#4>. Accessed 30 June 2011.

³⁸ Australian Quarantine and Inspection Service, Reporting an Illness, http://www.daff.gov.au/data/assets/pdf_file/0010/111988/reportinganillness.pdf. Accessed 30 June 2011.
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APPENDIX A: ENVIRONMENTAL INSPECTION AUDIT TOOL

Public Health Unit
South Eastern Sydney Local Health District

INTERNATIONAL VESSEL INSPECTION REPORT COVER SHEET

Vessel Name:	Cruise Line:															
Inspection Date:	Inspecting officers:															
Captain's Name:	Captain's email:															
Other crew members present during inspection: <table><thead><tr><th>Name</th><th>Position/Rank</th><th>Contact details as required</th></tr></thead><tbody><tr><td colspan="3"> </td></tr><tr><td colspan="3"> </td></tr><tr><td colspan="3"> </td></tr><tr><td colspan="3"> </td></tr></tbody></table>		Name	Position/Rank	Contact details as required												
Name	Position/Rank	Contact details as required														
Number of passengers:	Number of crew:															
Port before Sydney:	Next Port:															
Is this a routine inspection or part of outbreak investigation:																
Corrective action statement required: Y / N																
Name of person notified of inspection result:																
Date of notification of inspection result:																
Details of referral to other agencies: (NSWFA, AQIS, other)																

	Assessment criteria	Actions required
HYGIENE AND HANDWASHING		
1.1	Evidence that the crew are educated about the importance of handwashing, good hygiene and wearing clean uniforms. COMMENTS	
1.2	Toilet and hand washing facilities are convenient and accessible. COMMENTS	
1.3	Hand cleanser, single service hand towels, waste receptacles and signs provided. COMMENTS	
DRINKING WATER (POTABLE WATER)		
2.1	Potable water (PW) chlorinated or brominated to at least 2.0 mg/L (or mg/L measured as free residual chlorine) at the time of bunkering. PW tanks constructed and maintained. COMMENTS	
2.2	PW distribution system treated to provide a free halogen residual greater than or equal to 0.2mg/L (or mg/L measured as free residual chlorine) by means of an approved chlorination or bromination system. COMMENTS	
2.3	PW system chlorine analyser and chart recording maintained operated, and calibrated. Acceptable evidence of potability. COMMENTS	
2.4	PW system not subjected to contamination through cross connections to non-potable water supply or through backflow or back-siphonage. COMMENTS	

2.5	PW filling hoses, caps, and connections maintained and stored. Sample cocks provided on tanks. Tank vents and sounding tubes properly installed and maintained. COMMENTS	
2.6	Plumbing fixtures, supply lines, drain lines, and drains installed and maintained in good repair. COMMENTS	
RECREATIONAL WATER: Swimming Pools and Spa Pools		
3.1	Swimming pools, spas, and similar facilities maintained, disinfected and operated. COMMENTS	
3.2	Chemical testing of pools is observed, and being undertaken using a colorimetric pool kit; chemical test kits provided and in good working order. COMMENTS	
3.3	Spa pools temperatures limited to <38 degrees Celsius at all times. COMMENTS	
3.4	Crew knowledge of chemical testing and action required following a chemical failure. COMMENTS	
3.5	Pool/spa logs kept on a daily basis and available for inspection. COMMENTS	
3.6	Evidence of lifesaving training for suitable crew. COMMENTS	

BEAUTY THERAPY AND ASSOCIATED FACILITIES		
4.1	A hand basin with hot and cold running water, soap and single use towels or other suitable hand drying equipment. COMMENTS	
4.2	Contact surfaces of equipment and utensils clean. COMMENTS	
4.3	Single use of needles and correct disposal of sharps. COMMENTS	
4.4	Proper storage, handling of clean/soiled equipment and utensils. COMMENTS	
4.5	Single-use articles properly stored, dispensed. COMMENTS	
CHILDCARE FACILITIES		
5.1	Contact surfaces are kept clean, in particular nappy areas are kept clean and free from clutter. COMMENTS	
5.2	Hand washing signs are situated above change tables and in the toilets. COMMENTS	
5.3	Sickness records are kept of children & crew. COMMENTS	

5.4	Easy-to-read signs in public areas notifying the public that sick children will be excluded from the centre. COMMENTS	
5.5	Only washable toys are used by the centre. COMMENTS	
5.6	Evidence of infectious disease/infection control policies and procedures. COMMENTS	
PEST CONTROL & TOXIC SUBSTANCES		
6.1	No presence of insects and rodents; outer openings protected; approved pesticide application. COMMENTS	
6.2	Integrated Pest Management Plan. COMMENTS	
6.3	Toxic items stored, labelled, and used properly. COMMENTS	
DISPOSAL OF WASTE		
7.1	Waste management plan. COMMENTS	
7.2	Clinical waste stored in appropriate yellow or red bags and not overfilled. Sharps stored in approved sharps containers. COMMENTS	
7.3	Putrescibles waste stored in tightly covered bins. COMMENTS	

7.4	Waste storage area not accessible to the public and has rigid impervious flooring. Clean up facilities, spill kits, appropriate drainage and bunding provided. COMMENTS	
CLEANING EQUIPMENT AND LINEN		
8.1	Premises free of unnecessary articles; cleaning equipment stored; only authorised personnel permitted. COMMENTS	
8.2	Clean and soiled linen in proper, separated storage areas. COMMENTS	
LEGIONELLA CONTROL		
9.1	Up to date controls are in place to reduce <i>Legionella</i> , this includes a <i>Legionella</i> risk management plan. COMMENTS	
MEDICAL FACILITIES		
10.1	Evidence of sterilisation guidelines, which meet relevant Australian standards. COMMENTS	
10.2	Evidence of a policy for the management of spills. COMMENTS	
10.3	Evidence of an Infection Control Policy. COMMENTS	
10.4	Vaccine storage in accordance with Australian vaccine storage	

	guidelines. COMMENTS	
10.5	Mortuary facilities. COMMENTS	
10.6	<p>Pre-arrival health reporting; Medical logs are consistent with QPAR.</p> <p>AQIS DOCUMENTS PROVIDED:</p> <p>1. AQIS - Quarantine Pre-arrival Report for Vessels (Pratique)</p> <p>2. Additional Quarantine Pre-arrival Report for Cruise Liners and Navy Vessels - Berthing Details</p> <p>3. AQIS Passenger Vessel Gastro-intestinal Illness</p> <p>Are these documents consistent with illness recorded in the ship's medical logs?</p> <p>COMMENTS</p>	<p>Y / N</p> <p>Y / N</p> <p>Y / N</p> <p>Y / N</p>

APPENDIX B: SAMPLE LOG SHEET FOR SWIMMING AND SPA POOLS

This sheet should be modified to suit the type of pool

<Insert name of centre> <Insert name of pool>

Date _____

Pool Water Testing

			<Insert Dept of Health Guideline range for this pool>	<Insert Dept of Health Guideline range for this pool>	Break point should be achieved at the first test of the day	pH range 7.2-7.6	Total Alkalinity range 80-200mg/L	Calcium hardness mg/L	Incidents/Corrective actions taken	Name of tester	Signature of tester
Time testing Due	Time testing conducted	Temp °C	Oxidation-reduction potential (ORP) mV or Free chlorine mg/L DPD tablets No.1 (F)	Total Chlorine mg/L DPD tablets Nos. 1+3 (T) (b)	Combined Chlorine mg/L Total-Free (T) - (F)	pH	Total Alkalinity	Calcium hardness			
6 am											
9 am											
12 pm											
3 pm											
6 pm											
9 pm											
Daily Average											

Cyanurate acid concentration (Mondays only) _____ Date _____

Combined chlorine should not exceed 1.0 mg/L

Water Balance

Using the water balance chart on reverse, calculate the Langelier Saturation Index (LSI). The ideal LSI is 0.2 and the range is -0.5 to 0.5.

$LSI = pH + TF + CF + AF - 12.1$
where:
TF = Temperature factor
CF = Calcium Hardness factor
AF = Alkalinity Factor

$\frac{\text{pH}}{\text{pH}} + \frac{\text{TF}}{\text{TF}} + \frac{\text{CF}}{\text{CF}} + \frac{\text{AF}}{\text{AF}} - 12.1 = \frac{\text{LSI}}{\text{LSI}}$ Calculated by (initial) _____

Daily Maintenance Log

Detail what was undertaken and at what time of the day.

Maintenance area	Maintenance undertaken	Time of maintenance	Signature

Review by manager

Data and corrective action to be reviewed by facility manager daily

Further action required or taken or other comments	Name of manager	Signature of manager	Date

Water Balance Chart

Temperature (C°)	Temperature Factor	Calcium (Hardness)	Calcium Hardness Factor	Total Alkalinity	Alkalinity Factor
0	0.0	5	0.3	5	0.7
3	0.1	25	1.0	25	1.4
8	0.2	50	1.3	50	1.7
12	0.3	75	1.5	75	1.9
16	0.4	100	1.6	100	2.0
19	0.5	150	1.8	150	2.2
24	0.6	200	1.9	200	2.3
29	0.7	300	2.1	300	2.5
34	0.8	400	2.2	400	2.6
40	0.9	800	2.5	800	2.9
53	1.0	1000	2.6	1000	3.0

Notes for modifying this log sheet for your pool

- Ⓢ To obtain an electronic version of this sheet, contact Kelly on 9382 8333.
- Ⓢ Use a separate sheet for each pool for each day.
- Ⓢ Print on different coloured paper for each different pool.
- Ⓢ Change the Health Department guideline levels so they are appropriate for the type of pool. This depends on whether the pool is indoor or outdoor, the temperature and the type of disinfection used. See the NSW Health Swimming Pool Guidelines.
- Ⓢ If used for a bromine pool, the breakpoint is not really important, and DPD 1 measures free bromine plus monobromamine.
- Ⓢ If used for an ozone pool, insert a space to record when a check is done and the results, also note that chlorine guidelines need to be adjusted if the ozone system is not working.
- Ⓢ If an automatic controller is used, and the results are input, then there needs to be a place to enter a manual reading to compare with the automatic.



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