Amoeba Response Protocol

Safe Drinking Water which has the Trust of Consumers

Environmental Health Directorate
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Amoeba Response Protocol

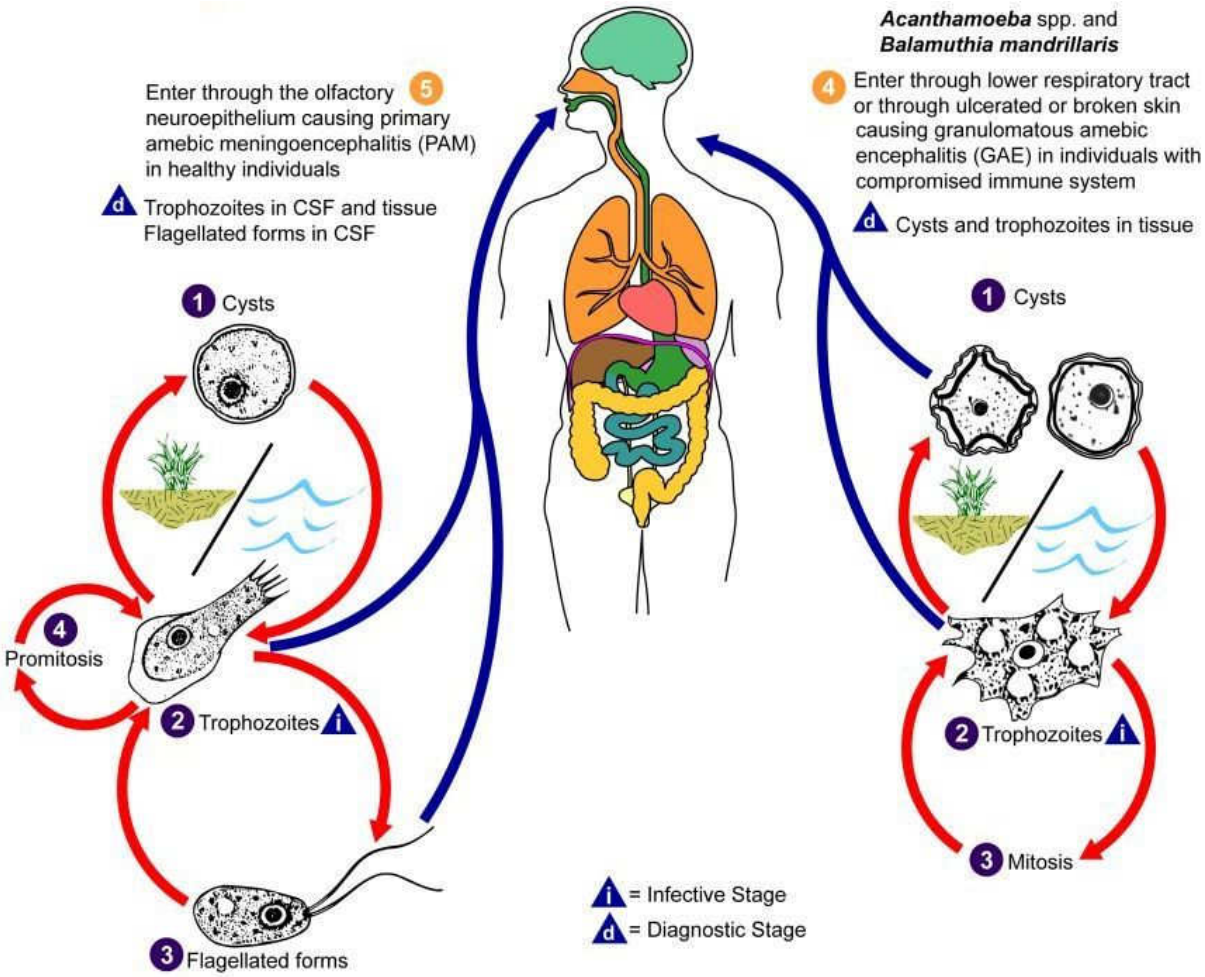
1.0 Background

Naegleria fowleri is a free-living amoeboflagellate in soil and aquatic habitats. *Naegleria* infection (amoebic meningitis) is acquired by exposure of the olfactory mucosa high in the nasal passages to contaminated water, most commonly by diving or swimming in fresh water, or inadequately maintained spas, tubs or swimming pools.

There have been four recorded cases of amoebic meningitis in Western Australia to 1985. There have been no further cases since this disease became a notifiable disease in May 1985. The infection is fatal in virtually all cases, but can be prevented by adequate disinfection of water to which people may be exposed and through public education.

This protocol has been developed by the Department of Health in consultation with the Water Corporation and PathWest to assist with the management of thermophilic amoebae and positively identified *Naegleria fowleri* from reticulated water supplies.

2.0 Mode of Transmission



Graphic courtesy of University of South Carolina School of Medicine [Figure 25E from http://pathmicro.med.sc.edu/parasitology/blood-proto.htm]

3.0 Protocol for Drinking Water Providers

3.1 Australian Drinking Water Guidelines

The "*Australian Drinking Water Guidelines*", published by the National Health and Medical Research Council, provides an authoritative reference on what defines safe, good quality water, how it can be achieved and how it can be assured. The Guidelines state:

"Two groups of free-living amoebae, *Naegleria* and *Acanthamoeba*, have been responsible for human infections in Australia. Infection is opportunistic and generally results from contact during recreational bathing, or domestic uses of water other than drinking. Public water supplies can contaminate swimming pools. The occurrence of these organisms is unrelated to faecal contamination and their ecology in aquatic environments is more complex than that of enteric protozoa."

"Cerebral infection by *Naegleria fowleri* is strictly waterborne and although rare is usually fatal. Since these amoebae are able to colonise piped water supplies, disinfection at the water source may not adequately control them unless the disinfectant pervades the whole distribution system."

"*Acanthamoeba* species cause both cerebral and corneal disease. An environmental source of infection has rarely been identified with certainty."

As free-living environmental organisms, *Naegleria* are not associated with faecal contamination and can be detected in the absence of *Escherichia coli*. Whilst only *Naegleria fowleri* has caused amoebic meningitis, other species of thermophilic *Naegleria* may indicate the potential presence of *N. fowleri*.

Detection of any thermophilic *Naegleria* in drinking water should therefore initiate corrective actions while speciation is undertaken to determine if *N. fowleri* is present. A detection of thermophilic *Naegleria* is likely to indicate that preventive measures and barriers have failed.

Naegleria are most likely to enter a water supply system at the source or at breaks in the sealed system such as open reservoirs and tanks. Under favourable conditions, they can proliferate in pipework and tanks. Under unfavourable condition, *Naegleria* can encyst and when in this state are more resistant to disinfection, readily surviving in tank sediments and pipe biofilm. Unless chlorine residual is continuous, decystation to the active trophozoite form will remain a threat.

Free chlorine or chloramine residual at 0.5 mg/L or higher will control *Naegleria fowleri*, provided the disinfectant residual persists throughout the water supply system at all times.

More detailed information can be found in the *Acanthamoeba* and *Naegleria fowleri* fact sheets of the "Australian Drinking Water Guidelines".

More information about amoebic meningitis can be found in the Department's publication "Amoebic Meningitis Environmental Health Guide", available from:

www.public.health.wa.gov.au/cproot_download/2404/2/Amoebic_Meningitis.pdf

3.2 Sampling Frequencies

Routine monitoring for thermophilic amoebae (the most significant of which is *Naegleria fowleri)* is required during the months of the year when water temperatures within the distribution system are likely to exceed 20º C.

Drinking water providers are expected to establish and monitor temperature profiles of water within the distribution system to determine the months of the year when the water temperature is likely to exceed 20º C. During these periods amoeba samples should be taken from the distribution system at the same time and place as bacteriological samples, unless an alternative frequency has been agreed with the Department.

Greater sampling frequency may be necessary where bacteriological problems are detected or when hazardous events have occurred that may increase the risk of thermophilic amoebae being present in drinking water (the term 'hazardous event' is defined and explained in section 3.2 of the "Australian Drinking Water Guidelines").

Analysis must be performed by a laboratory that is National Association of Testing Authorities, Australia (NATA) accredited for testing for free living protozoa and the results must be issued on a NATA endorsed report. Water samplers are reminded to ensure that water temperature is recorded with each sample.

3.3 Reporting Protocol

Drinking water providers must notify the Department of Health in accordance with the following table:

Reporting Event	Report Due	Report to
Any thermophilic *Naegleria* tolerant to 42ºC (including repeats)	**Immediate notification by fax, phone and/or electronic mail to:** **DWAlert@health.wa.gov.au**	**Director Environmental Health** **Telephone: 08 9388 4999** **Facsimile: 08 9388 4907** **(if not available during working hours to the Emergency Duty Officer 08 9328 0553)**

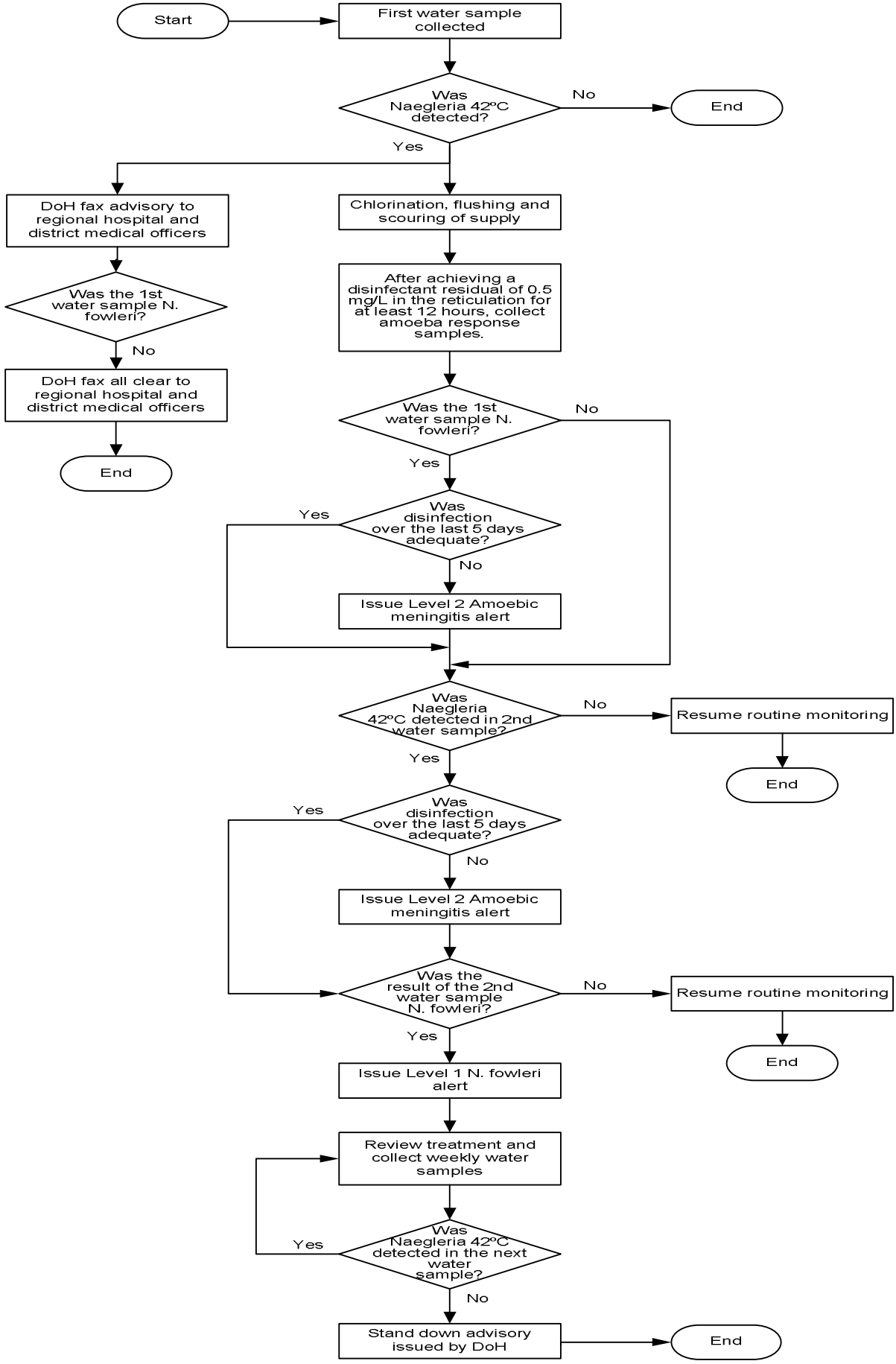
For additional information please refer to the reporting protocols set out in your Memorandum of Understanding for Drinking Water.

Further response shall be in accordance with the response flowchart set out in section 3.4. The alerts and advisories referenced in the flow chart are explained in more detail in section 3.5.

The text of the all clear advisory notices, which are to be issued by the Department to regional hospitals, District Medical Officers or affected communities, will be developed considering the circumstances of the event.

Please note that for remote community water supplies managed by the Department of Housing under the Remote Areas Essential Services Program, a separate notification procedure applies in the case of thermophilic *Naegleria* detections. These procedures involve pictograms and a cascading series of notifications by facsimile and telephone to community leaders, local clinics and the Department of Health.

3.4 Amoeba Protocol Response Flowchart



3.5 Drinking Water Advisory Notices and Public Alerts

3.5.1 Advisory to Regional Hospitals and District Medical Officers

The Department of Health will circulate, by facsimile or email, an advisory notice to regional hospitals and District Medical Officers based on this template:

TO ALL DOCTORS IN THE _____ AREA

Dear Doctor

DETECTION OF *NAEGLERIA* IN WATER RETICULATION

I write to advise you that the (*Drinking Water Provider*) have detected an as yet unspeciated *Naegleria* in the scheme drinking water system of (*Locality*).

The (*Drinking Water Provider*) has increased disinfection processes and it is unlikely that repeat samples will detect further colonisation. It is also unlikely that this will turn out to be a pathogenic *N. fowleri*.

Although it is unlikely that any human illness will result from this colonisation I am writing to suggest a high index of suspicion if clinically presumptive cases are brought to your attention in the near future.

The symptoms of primary amoebic meningoencephalitis (PAM or amoebic meningitis) usually develop three to seven days after infection and include:

- Severe and persistent headache
- Sore throat
- Nausea
- Vomiting
- High fever
- Somnolence.

Neck stiffness is a characteristic sign. Recent anosmia or olfactory hallucinations, if present, are strongly suggestive. The cerebrospinal fluid is aseptic on lumbar puncture, and the amoebae may be mistaken for macrophages. Heroic treatment with intravenous and intrathecal amphotericin B and miconazole in conjunction with oral rifampicin is indicated for this usually fatal condition.

The disease is urgently notifiable by facsimile to the Department of Health on (08) 9388 4848.

Further general information is available on the Department of Health's environmental health website:

www.public.health.wa.gov.au/cproot_download/2404/2/Amoebic_Meningitis.pdf

or from local government environmental health staff, or by contacting the Department of Health's Environmental Health Directorate on (08) 9388 4999.

Yours faithfully

3.5.2 Level 2 Amoebic Meningitis Alert

To be issued either:

(a) jointly by the Department of Health and the Drinking Water Provider (refer to the MOU Binding protocols for a list of responsible officers) following JACP meeting if single positive detection of *Naegleria fowleri* and disinfection over the last five days (prior to sampling) is not adequate.
OR

(b) by the Department of Health in the event of two consecutive detections of thermophilic *Naegleria* (where the first was not a *Naegleria fowleri*) and disinfection over the last five days (prior to sampling) is not adequate.

This alert will be circulated to the community and surrounding areas, the relevant local Government authority and the Environmental Health Hazards Unit of the Department's Environmental Health Directorate.

Members of the (*Named*) community and surrounding areas are warned that the recent sustained hot weather and elevated water temperatures have increased the chance of infection from amoebae in water around and within the home. If water containing amoebae goes up the nose, it may lead to the rare but fatal illness amoebic meningitis.

As a general precaution, the following advice is provided to prevent water that may contain amoebae going up the nose:

- **DO NOT** allow water to go up your nose or sniff water into your nose when bathing, showering or washing your face.
- **DO NOT** jump into or duck dive in bathing water – walk or lower yourself in.
- **DO NOT** allow children to play unsupervised with hoses or sprinklers as they may accidentally squirt water up their nose.
- **DO** run bath and shower taps for a few minutes to flush out the pipes.
- **DO** swim in and play with safe water only. Stay out of dirty pools, waterholes, dams, incorrectly chlorinated swimming pools, spas etc.
- **DO** keep your swimming pool adequately disinfected before and during use. Chlorine is the most effective way to continually disinfect water.
- **DO** keep wading pools clean by emptying, scrubbing and allowing them to dry in the sun after each use.
- If you need to top up the water in your swimming pool with scheme water, **DO** place the hose directly into the skimmer box and ensure that the filter is running. **DO NOT** top up by placing the hose in the body of the pool.

Further advice for operators of aquatic facilities can be found in the Department's publication "*Code of Practice for the Design, Operation, Management and Maintenance of Aquatic Facilities*", available from:

www.public.health.wa.gov.au/3/914/2/code_of_practice.pm

General advice about keeping your swimming pool healthy is available from:

www.public.health.wa.gov.au/2/641/2/aquatic_facilities.pm

3.5.3 Level 1 *Naegleria fowleri* Alert

To be issued jointly by the Department of Health and the Drinking Water Provider (refer to the MOU Binding protocols for a list of responsible officers) following JACP meeting, if *Naegleria fowleri* is detected in the second water sample (regardless of whether the thermophilic *Naegleria* detected in the first sample was *Naegleria fowleri* or not).

This alert will be circulated to the community and surrounding areas, the relevant local Government authority and the Environmental Health Hazards Unit of the Department's Environmental Health Directorate. The method of distribution (eg media release, letter drop, word of mouth) will be decided at the JACP meeting.

Members of the (*Named*) community are advised that there have recently been detections of the amoeba *Naegleria fowleri* in the "*specific locality*" drinking water supply. Amoebae can occur when there are periods of sustained hot weather (where water temperatures range between 28 ^{o}C and 40 ^{o}C) and lowered levels of chlorine in the water.

Water is safe to drink from the reticulated supply.

All actions are being undertaken by the "Water Service Provider" to maintain an adequate chlorine residual and due to this action the risk to the community is considered to be small. However, as *Naegleria fowleri* can cause the rare but fatal illness amoebic meningitis (if water containing this amoeba goes up the nose), this alert has been issued.

To prevent infection, do not allow water that may contain amoebae to go up the nose.

- **DO NOT** allow water to go up your nose or sniff water into your nose when bathing, showering or washing your face.
- **DO NOT** jump into or duck dive in bathing water – walk or lower yourself in.
- **DO NOT** allow children to play unsupervised with hoses or sprinklers as they may accidentally squirt water up their nose.
- **DO** run bath and shower taps for a few minutes to flush out the pipes.
- **DO** swim in and play with safe water only. Stay out of dirty pools, waterholes, dams, incorrectly chlorinated swimming pools, spas etc.
- **DO** keep your swimming pool adequately disinfected before and during use. Chlorine is the most effective way to continually disinfect water.
- **DO** keep wading pools clean by emptying, scrubbing and allowing them to dry in the sun after each use.
- If you need to top up the water in your swimming pool with scheme water, **DO** place the hose directly into the skimmer box and ensure that the filter is running. **DO NOT** top up by placing the hose in the body of the pool.

Please make sure your next door neighbours know about this alert.
Further updates will be issued as results of water samples become available.

Further advice for operators of aquatic facilities can be found in the Department's publication "*Code of Practice for the Design, Operation, Management and Maintenance of Aquatic Facilities*", available from:

www.public.health.wa.gov.au/3/914/2/code_of_practice.pm

General advice about keeping your swimming pool healthy is available from:
www.public.health.wa.gov.au/2/641/2/aquatic_facilities.pm

4.0 Swimming Pool Media Statement

4.1 Amoebic Meningitis Alert for Swimming Pools – Media release

The Environmental Health Branch of the Department of Health will issue a routine summer alert for swimming pool owners. This alert is usually issued statewide in December of each year.

The alert will be based on the following template:

> Swimming pool owners need to ensure their pools are adequately maintained to prevent amoebic meningitis, following the onset of hot weather.
>
> The Director of Environmental Health said swimming pool owners in both country and metropolitan areas should take note of this alert.
>
> "Sustained hot weather means some pool temperatures will reach and exceed 26 degrees Celsius, creating ideal conditions for amoebae to develop" the Director said. "If water containing amoebae goes up the nose, it can lead to the deadly illness amoebic meningitis. Swimming pool owners are advised to ensure their facilities are kept clean, free of dirt and leaves, and properly chlorinated. They should test the water in their swimming pools at least twice a day. Where stabiliser is not used, the water should contain at least two milligrams per litre of chlorine, and three milligrams of chlorine per litre where stabiliser is used. As well, the pH should be kept between 7.2 and 7.6.
>
> People are also advised not to swim in suspect water such as dirty pools, water holes and dams. It is also important to keep 'splasher' or wading pools clean by emptying, scrubbing and allowing them to dry in the sun after every use."
>
> In particular, swimming pool owners and operators of aquatic facilities north of Geraldton are reminded to be constantly alert to the risk of amoebic meningitis from October to April, as water temperatures are always high during these months.

The alert will also link to further advice for operators of aquatic facilities in the Department's publication "*Code of Practice for the Design, Operation, Management and Maintenance of Aquatic Facilities*", available from:

www.public.health.wa.gov.au/3/914/2/code_of_practice.pm

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