



DB ECOsystems

COST EFFECTIVE ENVIRONMENTAL SOLUTIONS

DB ECOsystems Ltd., 35 BO'NESS RD, GRANGEMOUTH, FK3 8AN, SCOTLAND.

TEL: (01324) 472919 FAX: (01324) 474002

Email: mailroom@dbecosystems.com WEBSITE www.dbecosystems.com

REGISTERED OFFICE OF DB ECOsystems Ltd., 35 BO'NESS ROAD, GRANGEMOUTH FK3 8AN REGISTERED IN SCOTLAND NO SC211262

HOSPITAL DISINFECTION

Using **AEROS®**
And **Huwa-San®**

Introduction

Hospitals have a legal requirement to manage their water and air, including Prevention and Control of Legionella. Many hospitals do not conform to these requirements, either on the grounds of cost or the difficulty in dealing with the disruption caused by these requirements.

The lack of attention to water and air treatment is fundamental for any building, let alone a hospital where high numbers of patients with a low immunity may lead to unnecessary deaths due to minor infections transmitted by the water or air system.

When the clinical benefits of reduced infections and shorter turn-around times are considered, the financial and clinical benefits of a well-managed water and air system are evident.

The DB ECOsystems products, Huwa-San® and AEROS® which are based on silver hydrogen peroxide, have been tested over a number of years to ensure they work to control Legionella, MRSA and numerous other problems. For a full set of test results, please contact DB ECOsystems directly.

Water Management

Huwa-San® will easily deal with any bacterial problem. Huwa-San® will destroy any free-living bacteria in the water at any stage, and a small residual treatment will provide further biocidal protection from organisms such as Legionella, Giardia, Cryptosporidium and coliforms through to the tap. A detailed paper on Huwa-San® is available from the company on request.

Air Management

Based on our powerful biocidal treatment, the AEROS® air management programs successfully combat dangerous infections such as Legionnaires Disease, Norovirus, MRSA and other airborne pathogens. From cooling towers, to ventilation ductwork and air conditioning systems, AEROS® will provide a complete solution to any air handling systems. We can also supply fogging systems to deal with emergency outbreaks of Norovirus and other infectious viruses.

General Hygiene

Person to person spread is increasingly being recognised as a significant source of infection in hospitals, be it from nursing staff or infected equipment. Through the use of AEROS® these problems can easily be managed to combat these infections in a user friendly way.

GENERAL HYGIENE

AEROS® Systems for Prevention & Control MRSA, E. Coli and Other Infections

The increasing number of reported cases of person to person transmission of infection via hospital staff has led to an increasing awareness of the need for effective solutions to hand and surface sanitation in all medical – not just surgical – environments.

AEROS® has been tested against most persistent problem bacteria such as E.coli. By eliminating the opportunity for infection, either on hard surfaces, personal contact or surgical instruments, the best possible patient care can be achieved.

BACKGROUND

AEROS® is based on silver stabilised hydrogen peroxide. A powerful biocide, AEROS® has a number of advantageous properties outlined below:

- ☞ The antimicrobial activity of AEROS® is extremely broad spectrum. It is highly effective against gram negative and gram positive, aerobic and anaerobic, spore forming and non-spore forming pathogenic and saprophytic bacteria. This includes bacterial spores, one of the most resistant forms of microbial life to disinfection.
- ☞ AEROS® is also effective against moulds and yeasts - both categorized as fungi. It is exceedingly active against acid tolerant bacteria, such as E. Coli. This broad spectrum also includes organisms such as algae and protozoa, including Cryptosporidium, Microsporidium and Giardia lamblia.
- ☞ AEROS® has been tested as a disinfectant for use in hospitals.
- ☞ It is already well proven as an effective disinfectant with good results against challenge organisms like MycobacteriaTB. The efficacy of AEROS® has been evaluated in standard and suspension tests against test bacteria and viruses. A list of these challenge tests is available on request.
- ☞ AEROS® is an ideal substitute for chlorine or bromine based materials and would prove cost efficient when compared with diisocyanurates.
- ☞ At dilute concentrations AEROS® is a good skin disinfectant.
- ☞ The benefits of AEROS® in Hospitals come from the product's remarkable stability.
- ☞ It is user friendly, with no taste or smell
- ☞ It is compatible with common construction materials, and has a positive effect on the environment.

LEGIONNAIRES DISEASE

Huwa-San® Prevention & Control of Legionnaires Disease in Potable Water

Legionella pneumophila has been around for a number of years, and certainly well before the first documented case in 1976. Worldwide, only a few cases per year and per country are reported, however prospective clinical studies indicate that Legionella is responsible for between 20 and 30% of all cases of pneumonia diagnosed each year. Legionella is not only a risk with cooling towers, there are also a number of significant risks present in other parts of the water system, such as showers and spray taps to air conditioning and humidification systems.

Legionella can easily enter the potable water system through the incoming mains or borehole water. Legionella will then proliferate in the biofilm of storage tanks or pipework, from where it will break out into the rest of the water distribution system such as hot water calorifiers, where bacteria can often be isolated at the base of the unit (where many nutrients are found at temperatures between 20°C and 45°C). Legionella will multiply by using the organic nutrients supplied by other bacteria, biofilm and protozoa found in aquatic systems. A typical example is the Amoeba, a free-living protozoan that engulfs and subsequently digests bacteria. However as Legionella have acquired the ability to inactivate the amoeba's lethal digestive process, they can multiply within the amoebae, using their new host as a source of nutrients. The amoebae will furthermore protect the Legionella from harmful external factors such as biocides and raised temperatures. The amoebae will eventually rupture, releasing large numbers of Legionella in a virulent form, which under aerosol form can easily enter the human lung system to cause Legionellosis. Testing for the presence of amoebae within a water system may also be of equal importance to testing for the presence of Legionella.

Control Measures

There are few who would deny that there are substantial financial pressures on the budgets of every hospital – making it difficult to spend money on Legionella control? The quality of water delivered from public or private water supplies is often inconsistent and therefore cannot be guaranteed. Legionella can and will develop in any water system that is not adequately protected. The increased awareness of Legionnaires Disease as a public health issue, has led to closer examination of such water systems by many local, regional and national authorities.

For instance in the United Kingdom, previous guidance from the HSE and Environmental Health officials recommended that a building should be shut down for chlorination of the water system once or twice a year, and that high water temperatures above 60 °C should be used in hot water systems in order to combat the risk of Legionnaires Disease. In practice these regulations have proved to be completely uneconomic and wholly inadequate to the task of preventing Legionnaires Disease. Besides often requiring the installation of expensive mixer valves to prevent scalding accidents, cases of Legionnaires Disease have occurred even when these procedures have been followed to the letter. Recent reports by BISRIA, the building services institute, and revisions of HSE guidelines have caused a reappraisal of current treatments in the United Kingdom.

Huwa-San® Legionella Control Treatments

The first stage in controlling Legionella requires good water management and disinfection. Of importance is: reducing any excess tank capacity, removal of dead ends within the water distribution

system, thorough cleaning and disinfection of tanks and the removal of biofilm from the whole water distribution system are the first essentials in any program. After carrying out a site assessment, identify any high-risk areas for action.

A Huwa-San® water treatment system is then installed into the water tanks or line, which doses a very small amount of Huwa-San® into the system to kill any bacteria present including Legionella. Huwa-San® has proven its ability not only to eliminate Legionella but also to completely eliminate the two main sources of infection within the water - biofilm and amoebae. Huwa-San® will also destroy Cryptosporidium that causes outbreaks of gastro intestinal infection that can be lethal to patients with a low immunity system. Ice and food washing and cooking water are also kept free of the contamination that has been shown to be responsible for some hospital related infections.

By continuously¹ dosing low levels of Huwa-San® into the water line, significant savings can be achieved by lowering hot water temperatures, and eliminating the need for manual cleaning of showerheads and mixer valves. Huwa-San® will also remove the biofilm from heat exchange surfaces, and consequently heat transfer efficiency will be significantly improved. Biofilm will be removed from pipes and nozzles improving circulation rates and reducing blockages. These savings alone can often pay for the cost of treatment, and its associated clinical benefits.

The reduction in water temperatures not only reduces costs but also reduces the dangers of scalding which is a serious risk in many hospitals and care centres.

In all situations in which Huwa-San® has been used against Legionella, it has proven effective. Huwa-San® controls Legionella in both the hot and cold water systems. Control in the hot water system was maintained even when temperatures were reduced to 50°C at the boiler outlet.

Corrosion coupons that were installed in the hot and cold water system have never shown any evidence of corrosion. In use, Huwa-San® is tolerant to pH and temperature variations. Also of importance is that microorganisms cannot develop resistance to Huwa-San®. It has a very wide spectrum of activity ensuring that any potential infections other than Legionella will also be kept under control. Complete copies of the test work and protocols are available on request.

Summary of Benefits

1. Eliminates disruptive costs
2. Controls Legionella infections
3. Reduce secondary infections
4. Protect patients with low immunity
5. By providing an alternative to thermal disinfection of hot water systems microbial control can be maintained even at low temperatures whereby high temperatures can be reduced to prevent scalding accidents.
6. Does not increase corrosion in tanks and pipes.
7. Improved heat exchange efficiency
8. Reduces pump friction and blockages of pipes and nozzles.
9. Maintains clean conditions in ice-making, vending machines and similar units.
10. Improved water quality with the elimination of unpleasant chlorine smells and irritations particularly in showers and therapeutic baths.
11. Replacing thermal disinfection of hot water systems with Huwa-San® can reduce the necessity to install expensive mixer valves.
12. Reduced requirement for manual disinfection of showerheads.
13. Reduced risk of infections when flushing of "Dead Legs" is overlooked. However it is highly recommended that these be eliminated or isolated from the main water distribution system.

¹ In some countries (continuous) dosing in drinking water may not be allowed, or only under certain circumstances. Please check local regulations.

CRYPTOSPORIDIUM

Huwa-San® for Prevention & Control of Cryptosporidiosis

Cryptosporidium parvum is a single-celled protozoan parasite, transmitted through the ingestion of oocysts that are excreted in the faeces of infected humans or animals. Since 1976, *Cryptosporidium* has been recognised as a human pathogen, although prior to 1982 the disease - called "cryptosporidiosis" - was rarely reported, and mostly in people with a low immune system. The occurrence of several municipal waterborne outbreaks of cryptosporidiosis, including a 1993 outbreak in Milwaukee that affected more than 400,000 people, has served to focus increasing attention and concern on this organism.

The mode of transmission for *Cryptosporidium* is through the faecal-oral route. Anything that comes into contact with contaminated faecal material, and then ends up in someone's mouth, may cause an infection. Outbreaks have been associated with public water supplies (since the oocysts survive chlorination) and contaminated food. Person to person spread, particularly in households and nurseries and infection through swimming pools have also been reported. Recent studies indicate that *Cryptosporidium* oocysts are present in 65 to 97 percent of surface waters (rivers, lakes and streams) tested throughout the United States. It is estimated that approximately 7% of the diarrhoeal cases in the United States are caused by cryptosporidiosis.

When ingested, oocysts pass through the stomach and into the small intestine. There, they split open and release sporozoites, which invade the lining of the gastrointestinal tract, hampering its natural ability to absorb water and nutrients. After oocysts are ingested, the infection's incubation period typically varies from two to 12 days. Disease symptoms include diarrhoea, abdominal cramps, nausea, occasional vomiting, headaches and low-grade fevers.

The disease usually lasts 10 to 14 days, but can linger off and on up to 30 days and can persist for extended periods. In patients with a low immune system, for example AIDS and chemotherapy patients, the disease can be chronic and life threatening (secondary infections). The current infectious dose (ID50) in healthy people is approximately 150 oocysts. The ID50 for patients with a low immunity system is believed to be approximately 35 to 50 oocysts. In this respect, the prevention of cryptosporidiosis is of vital importance in any treatment regime designed for hospitals.

Control Measures

Cryptosporidium oocysts are highly resistant to chlorine, the most commonly used water disinfectant in the world. Due to their small size (4 to 5 microns), they are also difficult to remove through filtration. Only by using very fine filters and/or more powerful biocides than chlorine, can the risk of *cryptosporidium* contamination be controlled.

The current practice for eliminating *Cryptosporidium* from drinking water is by boiling the water for one minute to kill any oocysts in the water. Another advantage is that boiling will also kill any other micro organisms that may be present. After boiling, the water is cooled prior to consumption – whereby a risk of re-infection is present. To completely eliminate all possibilities of exposure from drinking water, this boiled water should for example be used to wash vegetables, reconstitute concentrated juices, make ice cubes and to rinse one's mouth after tooth brushing. This system is impractical and hugely expensive.

Using Huwa-San® in water treatments eliminates the risk of Cryptosporidium infection by destroying the oocysts in the water system, before they get the chance to infect drinking water. Huwa-San® is a powerful biocide, and is several times more effective than chlorine.

BACKGROUND

Huwa-San® is based on silver stabilised hydrogen peroxide. A powerful biocide, Huwa-San® has a number of advantageous properties outlined below:

- ☞ The antimicrobial activity of Huwa-San® is extremely broad spectrum. It is highly effective against gram negative and gram positive, aerobic and anaerobic, spore forming and non spore forming pathogenic and saprophytic bacteria. This includes bacterial spores, one of the most resistant forms of microbial life to disinfection.
- ☞ Huwa-San® is an ideal substitute for chlorine or bromine based materials and would prove cost efficient when compared with diisocyanurates.
- ☞ The benefits of Huwa-San® in Hospitals come from the product's remarkable stability,
- ☞ It is compatible with common construction materials, and has a positive effect on the environment.
- ☞ Huwa-San® will not impart taste or taint or smell to water or any substrate to which it is applied.