

## WHO Collaborating Centre for Health Promoting Water Management and Risk Communication



Institute for Hygiene and Public Health

University of Bonn

Director: Prof. M. Exner



### Topic of the 2<sup>nd</sup> WaMRI-Newsletter

#### Legionella in technical systems

Legionnaires' disease is a classic example for the fact that an ecological milieu for pathogens which do not constitute a danger for human beings in their natural environment is created by means of technical facilities.

The development of new technologies is usually associated with improvements in the quality of life but it may also create new problems. With the extended use of water in large technical systems, like warm-water plumbing systems, air conditioning systems, hot whirlpools, cooling towers etc. the risk of *Legionella* infection increased distinctively in the last decades (McDade 2002).

In natural environments, *Legionella* spp. occur in very low or even undetectable concentrations (=1cfu/ml in groundwater), because of the low replication rates at temperatures below 25°C. Therefore, only small concentrations of *Legionella* spp. are introduced into sources of drinking-water from surface-water, soil and subsoil (WHO 2002, ASHRAE 2000). However, the concentration of *Legionella* spp. may notably increase in artificial water systems due to the microbial ecosystem in which they are both nourished and protected from physical removal and disinfectants. In addition, certain plumbing materials may improve the proliferation of *Legionella* spp. and other micro-organisms (ASHRAE 2000).

*Legionellae* colonize water distribution systems at temperatures between 20°C and 50°C. Stagnation and formation of biofilms that contain protozoa and feature a heightened iron content promote legionella colonization at temperatures of 25°C and above. *Legionellae* are iron-dependent and water in installation systems often contains high amounts of iron due to corrosion of pipes. The larger the surface available for bacterial growth in a water system, the more likely is a colonization by *Legionellae*.

Whirlpools are very common now and are used in leisure complexes, hotels and increasingly in private homes. Hot tubs, whirlpools and associated equipment create an ideal habitat for the proliferation of *Legionella* and other bacteria. The water is warm, nutrient-containing and aerob. Aerosols occur as a result of water perfusion and are inhaled by people using it or passing by.

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Cooling towers are provided in air conditioning systems as a means of ejecting heat collected from air-conditioned space, and for removing heat generated in many industrial processes. Inhalation of droplets generated by mechanical devices is one common mode of legionella transmission. High concentrations of *Legionellae* can be isolated from water sediments and slimes in cooling water systems.

Figure 1 shows the most common transmission routes.

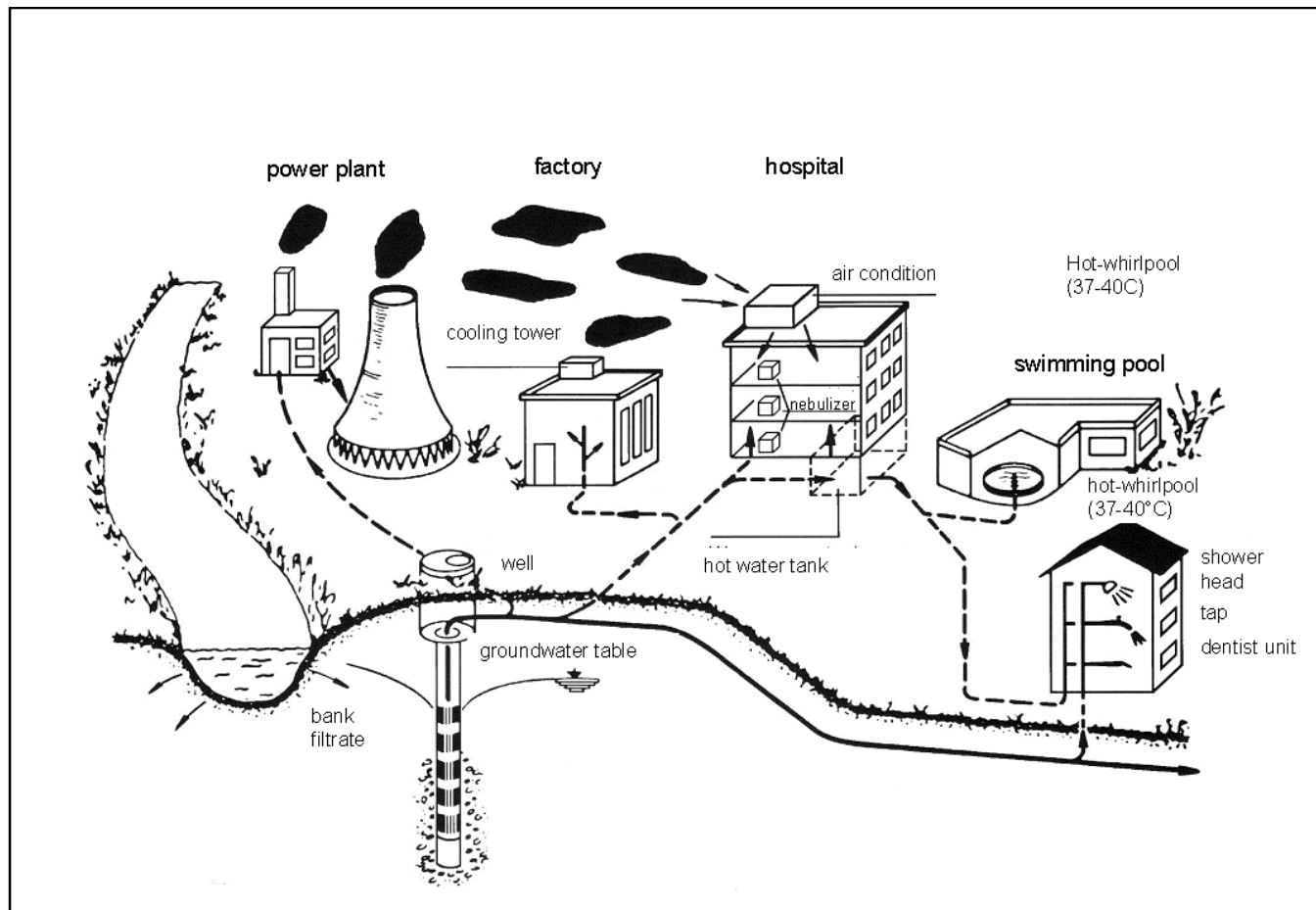


Figure 1: Pathways of Legionella transmission (Exner & Schulze-Röbbecke 1987)

*Legionella pneumophila* was first detected in the year 1976, when a notable outbreak of pneumonia occurred during a meeting of US Army veterans in a hotel in Philadelphia/USA. Among the 4,400 attendees, a total of 221 persons contracted pneumonia and 34 died. *Legionella* species can cause two different types of disease: the Legionnaires' disease which is a pneumonia and the Pontiac fever, a milder, flu-like form of disease.

There are more than 30 species in the Legionnellaceae family of which *Legionella pneumophila* is responsible for about 90 percent of infection. Legionella are gram-negative aerobic non-spore forming bacteria. Legionnaires' disease is characterized by anorexia, malaise, headache and rapidly raising fever. Cough, abdominal pain and diarrhoea often occur. The incubation period is between 2-10 days, mostly 5-6 days. Pontiac fever is a flu-like Legionellosis without pneumonic illness (Chin 2000).

The frequency of legionella infections world wide is not known exactly. It must be assumed that the estimated number of unreported cases is considerable, as on one hand pneumonia is often not clarified diagnostically at all or only insufficiently and on the other hand a lot of diagnosed legionellosis are not notified or published.

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## References

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- McDade, J. (2002): Legionnaires' disease 25 years later: lessons learned. In : Legionella, Marre, R. et al., Washington, ASM Press.
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- WHO (2002): Microbial agents in drinking water. Guidelines for Drinking Water Quality, WHO, Genf.
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## A compilation of large Legionella outbreaks since 1999

Since the first reported outbreak in 1976 numerous sporadic legionella infections and outbreaks have occurred. Infections can be travel associated, community acquired and hospital acquired. Four major community outbreaks around the world have occurred in the past three years, the most recent in England.

### The Netherlands, 1999:

In 1999, in the Netherlands, an epidemic of Legionnaires' disease affected many visitors of a flower show. To identify the source of the outbreak, an environmental investigation was performed in combination with a case-control study among the visitors and a serological cohort study among the exhibitors to measure exposure to possible sources.

The flower show had attracted 77,061 visitors. 188 people were affected with Legionnaires' disease. 163 were hospitalized and 34 required mechanical ventilation. 17 persons with confirmed and 4 with probable Legionnaires' disease died.

All cultures from both the municipal and the exhibition building water supply system were negative. Two whirlpool spas in halls 3 and 4 of the exhibition and a sprinkler installation in hall 8 were cultured positive for *Legionella pneumophila*. One of three genotypes found in the environment, in both whirlpools spas, was identical to the isolates from 28 (out of 29) culture positive patients. Odds ratio's for pausing at the whirlpool spa in hall 3 were 2.6 (CI: 1.1-6.6) based on data from drawings of exhibition stands and 5.8 (CI: 1.5-22.9) based on data from a floorplan. Geometric mean IgM and IgG titers were significantly increased ( $p=0.0002$ ) among exhibitors in hall 3 but not in hall 4. The proximity of the exhibitors' stand to the whirlpool spa in hall 3 was associated with an increase in antibody titer, whereas there was no such relation to the other whirlpool spa.

The outbreak demonstrated that whirlpool spas may be an important health hazard if disinfection fails.

## Reference

J.W. den Boer, E.P.F. Yzerman, J. Schellekens, K.D. Lettinga, H. Boshuizen, J. Van Steenberg, A. Bosman, S. Van den Hof, H. Van Vliet, M.F. Peeters, R.J. Van Ketel, P. Speelman, J. Kool, M. AE Conyn-Van Spaendonck (2002): A large outbreak of Legionnaires' disease at a flower show , the netherlands, 1999. *Emerging Infectious Diseases*, 8, 1: 37-43.

[http://www.eurosurv.org/2001/pfp/010712\\_pfp.htm](http://www.eurosurv.org/2001/pfp/010712_pfp.htm)

## Australia, 2000

An initial cluster of four cases of Legionnaires' disease was identified on 27 April 2000. All had attended the Melbourne Aquarium. Immediate sampling and disinfection of the cooling tower water occurred. Surveillance for cases was enhanced through alerts to hospitals, general practitioners and the media. Over subsequent weeks many thousands of calls were received on the *Legionella* hotline, and many thousands of urinary antigen tests were performed at the Victorian Infectious Diseases Reference Laboratory.

To date all cases have occurred in persons who visited the Aquarium between 11 and 25 April. This covered most of the school holidays and the Easter weekend, during which tens of thousands of people visited the aquarium, including numerous interstate and overseas visitors.

During this period the aquarium had approximately 83,500 visitors and innumerable passersby. As of 15 June there were 107 confirmed cases in visitors, resulting in a crude attack rate of 0.13 per cent. However, many visitors were children, who are considered to be at extremely low risk of infection (with documented cases of legionnaires' disease in children being rare), which would increase the attack rate in the 'at risk' population.

Two visitors died of Legionnaires' disease, and another two deaths are possibly linked. Water sampling confirmed the presence of *Legionella pneumophila* serogroup 1 in the air conditioner cooling towers of the aquarium. The Department of Human Services had conducted a case-control study to determine the risks of infection. The Victorian Workcover Authority and the State Coroner conducted separate investigations.

In addition, two cases unrelated to the Melbourne Aquarium (two persons who lived in Cobram) were notified. Notifications from small regional towns are relatively uncommon, so two cases were considered highly unusual. There was no clear link between the two cases. As it is feasible that drift from any cooling tower in the town could have spread several hundred metres, the Department's Hume regional office commenced inspection and sampling of all cooling towers in Cobram. Active surveillance was initiated through the regional hospitals and local medical practitioners. A total of six cases had been notified, all of whom have subsequently recovered.

Cooling towers were identified, sampled and slug dosed with biocide at eight premises around town. Subsequently, a cooling tower at a dairy factory was found to be positive for *Legionella pneumophila* serogroup 1.

## Reference:

Victorian Infectious Disease Bulletin, Vol3, Issue2, August 2000

[http://www.dhs.vic.gov.au/phd/vidb/downloads/back\\_issues/vidbv3i2.pdf](http://www.dhs.vic.gov.au/phd/vidb/downloads/back_issues/vidbv3i2.pdf)

## **Spain, June/July 2001:**

Between the end of June and the first few days of July a very large and explosive outbreak of legionnaires' disease occurred in Murcia, a Spanish city of 360 000 people. As of 18 July a total of 745 cases of pneumonia had been diagnosed, of which 315 have been confirmed as legionnaires' disease by detection of legionella antigen in urine. Dates of onset of illness of confirmed cases ranged from 26th June to 16th July, with a peak on 5th to 6th July.

From 6th July the incidence declined rapidly. One death has been reported in a case in which legionella pneumophila serogroup 1 has been isolated. A total of 12 cases were admitted to intensive care units. 76% of cases were male, and about two thirds of cases were aged over 50 years.

Nearly 70% of all cases lived in a small area to the north and northwest of the city centre. Preliminary information from patient interviews indicated that the other cases had visited the city centre in the last week of June or the first few days of July.

The likely source of infection for the outbreak was a cooling tower in the city centre

### **Reference:**

Cano Portero R, Joseph C. Community outbreak of legionnaires' disease in Murcia, Spain. *Eurosurveillance Weekly* 2001; 5: 010712.  
(<http://www.eurosurv.org/2001/010712.html>)

Update on the outbreak of legionnaires' disease in Murcia.  
[http://home.iprimus.com.au/matgreen/legionella\\_spain9a.html](http://home.iprimus.com.au/matgreen/legionella_spain9a.html)

## **UK, July 2002**

On 30 July 2002 a sporadic case of legionnaires' disease in a patient from Barrow-in-Furness, Cumbria/ England was notified to the local consultant in communicable disease control. In the following days further 4 cases and 20 potential cases of legionnaires' disease came to light. On 7 August there were 70 cases of legionnaires' disease which had been confirmed by urinary antigen detection.

It rapidly became apparent that the only common factor linking the cases was having visited the centre of the town. Representatives from the local environmental health department reported that they had become aware of potential problems with the air conditioning unit at Forum 28, a council-owned building in the centre of Barrow, and had already closed down the plant.

On 13 August 2002, the outbreak control team was aware of 116 confirmed cases of legionnaires' disease that fitted the standard case definition for the outbreak of legionnaires' disease in Barrow-in-Furness. There had been three deaths among confirmed cases, giving a case-fatality rate of 2.7%, which is considerably lower than observed in previous outbreaks.

A national cascade to general practitioners had been carried out and details about the outbreak were posted on Cumbria and Lancashire Health Protection Unit's website at <[www.healthprotection.org.uk](http://www.healthprotection.org.uk)>. This has revealed ten cases from other parts of the country with a connection to Barrow-in-Furness.

There has been considerable success in recovering microbiological evidence (both positive and negative) in support of the hypothesis that the outbreak source was the air-conditioning plant at the council-owned leisure centre. The suspected plant was heavily colonised with *Legionella pneumophila* serogroup 1, MAB 2 (Benidorm). Samples taken from other plants in the area failed to show *legionella spp.* There has also been a remarkable rate of recovery of viable specimens from patients. In the first three specimens to grow legionella, the bacteria are indistinguishable from those demonstrated in the air conditioning plant.

#### References:

PHLS. Outbreak of legionnaires' disease in Barrow-in-Furness. *Commun Dis Rep CDR Wkly* [serial online] 2002, **12** (32): news. Available at

<<http://www.phls.org.uk/publications/cdr/archive02/News/news3202.html>>

PHLS. Outbreak of legionnaires' disease in Barrow-in-Furness – update. *Commun Dis Rep CDR Wkly* [serial online] 2002, **12** (33): news. Available at

<<http://www.phls.org.uk/publications/cdr/archive02/News/news3302.html>>

#### PHLS in London hosts a WHO Legionella Meeting:

The WHO programmes on Water, Sanitation and Health (WSH) and Communicable Disease Surveillance and Response (CDS) had organized an expert meeting on the prevention and control of legionnaires' disease. The meeting was hosted by the Public Health Laboratory Service (PHLS) in London/UK from 18-20 June 2002. About 20 experts from all over the world participated in the meeting.

In preparation of the meeting a first review had been prepared by the WHO Collaborating Centre for Water Management and Risk Communication, Institute for Hygiene and Public Health of the University of Bonn. This first draft was the principle issue for discussion at the expert meeting in London.

The objectives of the meeting were to:

- 1.to examine the evidence based risk assessment and risk management approaches to the prevention and control of Legionnaires' disease in all settings;
- 2.to undertake a comprehensive assessment and critical review of the draft review; and
- 3.to develop agreed draft texts for inclusion into the WHO *Guidelines on drinking quality*, with direct inputs to the WHO *Guidelines on safe recreational water environments* and the WHO *Guide to Ship Sanitation*.

As follow-up action after the meeting the participants agreed to revise the chapters on the background that the document will provide a state of the art review on legionella and the prevention on legionellosis.

Currently, the chapters of the draft review are revised by different experts. The final document is intended for publication in the near future.

## Recent projects of the WHO CC

### **E-learning module Medical Geography**

The development of an e-learning module for medical geography is on the way. This module is being designed for students and professionals who want to get more experience in this field of work. The module is envisaged for the integration into a master programme or the like.

The course will include the basics of medical geography. The main application areas will be demonstrated by using special aspects, like environmental, social and political aspects of medical geography. One basic point will be the benefit of geographical investigations in the field of water hygiene. Not only the use of Geographical Information Systems (GIS), but also disease mapping and the application of descriptive and analytical statistical methods will be on the programme.

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### **Nutrient cycling in the Mekong Delta**

#### **Components: drinking water supply and sanitation, economic evaluation and social acceptance (SANSED)**

The WHO CC will participate in an interdisciplinary research project in Vietnam. It is founded by the German Ministry for Education and Research.

Co-ordinated by the Institute of Plant Nutrition, University of Bonn, several University institutes will work together with the University of Can Tho, Vietnam.

The project activities include technical assistance and training of local researchers in Vietnam and generating a manual for future use. Aims of the project are to close nutrient cycles avoiding loss of fertilisers, to reduce health risks for the population and to provide assistance for further development of water management systems in similar countries.

The WHO CC will analyse substrates used for fertilisation, sewage water and drinking water for their pathogenic potential. Testing will cover several bacteria and worm eggs. Additionally, interviews with the local population will be carried out to get information about the current health status, especially with regard to waterborne diseases. Start of the project in Vietnam will be March 2003.

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## Special events related to water and health

2002

### **Heterotrophic Plate Count Measurement in Drinking Water Safety Management 24- 25 April 2002, Geneva, Switzerland**

A group of microbiology and public health experts including regulatory and medical expertise was convened in Geneva, Switzerland, to consider the utility of Heterotrophic Plate Count (HPC) measurements in addressing drinking water quality and safety. The group was convened following the NSF International/WHO Symposium on HPC Bacteria in Drinking Water Public Health Implications?.

### **International Symposium on Waterborne Pathogens 22-25 September 2002, Lisbon, Portugal**

Microbiological waterborne disease remains a significant concern for the worldwide water community. Whether it's investigating an emerging pathogen or developing a new control strategy, the challenges facing water supply professionals, public health professionals, or regulators are daunting .

The third in a series of symposia addressing waterborne pathogens, this event provided a comprehensive forum for the exchange of up-to-the-minute information and cutting-edge ideas relating to this critical public health issue. Special areas of concern included sources of pathogens; detection methods; outbreak investigations; new water and wastewater treatment technologies; and public health effects, treatment and communications.

The symposium consisted of three days of papers on a variety of subject areas related to waterborne pathogens.

For more information, see: [www.awwa.org/conferences/iswp](http://www.awwa.org/conferences/iswp)

or [www.lwahq.org.uk/template.cfm?name=iswp](http://www.lwahq.org.uk/template.cfm?name=iswp)

### **Aquatech 2002 International Trade Event of Water Technology and Water Management 1 - 4 October 2002, Amsterdam, Netherlands**

Aquatech 2002 is the place for you to meet water professionals from all over the world who wish to keep abreast of all the latest developments in the water market. Aquatech, the international trade event of water technology and water management, will as always provide the best possible surroundings in which to make new contacts and renew existing ones.

Amsterdam RAI

P.O. Box 77777

1070 MS AMSTERDAM

Netherlands

Tel.: +31 (0)20 549 12 12

<http://www.environmental-center.com/events/aquatech2002/aquatech2002.htm>



**Drinking Water Source Assessment & Protection (DWSAP)  
in Groundwater & Surface Water  
3- 4 October 2002, Livermore, California USA**

**Description:** Drinking Water Source Assessment and Protection (DWSAP) is California's answer to federal mandates for wellhead protection and source water assessment. It is one of many pillars for sustainable development and protection of water resources in California. Today, through the implementation of programs such as DWSAP, professionals, executives, and employees of diverse background and in a wide variety of private, non-profit, and government responsibilities at the local, state, and federal level are directly or indirectly involved in the management and assessment of groundwater and surface water. Yet, many find themselves lacking the multidisciplinary background, expertise, or means to meet the technical and regulatory challenges related to water and drinking water resources management. The amount of technical information available is often overwhelming. This Course will review the fundamental principles of groundwater and watershed hydrology, water quality, and water contamination. It will provide an overview of the most common tools for measuring, monitoring, and assessing groundwater and surface water resources, particularly with respect to California's DWSAP program. The Course is specifically geared towards an audience that is involved in the management and assessment of water resources. Course attendees, who may have some experience with, but no formal training in hydrology or related engineering or science fields, will benefit from the basic Course goal to provide a good understanding of the topics as listed below. The Course will be taught by experienced instructors with a broad, in-depth knowledge of California groundwater and watershed hydrology and of California's Drinking Water Source Assessment and Protection Program. Participants will be given a set of booklets that address the Course topics and accompany the lectures.

**Venue:** Hilton Garden Inn Livermore, 2801 Constitution Drive, Livermore, California USA

**Technical Field:** Soil & Groundwater

**Contact:** Kathy Snelson **Phone/Fax:** Tel: 916-446-3626; Fax: 916-442-0382

**E-mail:** executive\_director@grac.org

**Web:** <http://www.grac.org/dwsap.html>

## **2<sup>nd</sup> Meeting of the Working Group on Water and Health 28- 29 October 2002, Budapest, Hungary**

In the framework of major international activities such as the Environment for Europe Conference and the 4<sup>th</sup> Ministerial Conference on Environment and Health (2004), the meeting reviewed the interim implementation of the “London Protocol of the convention on the protection and use of transboundary watercourses and international lakes” and prepared the 2<sup>nd</sup> Meeting of the Signatories and the 1<sup>st</sup> Meeting of the Parties scheduled for 2004, in particular by:

- preparing documents on compliance;
- comparing environmental health information systems maintained by different countries and international organizations;
- reviewing reporting practices and define a State of the Art report on water-related diseases;
- developing indicators which can conceivably be used to monitor progress under the Protocol.

The work of the relevant WHO Collaborating Centre networks were presented and optimization options discussed.

Participants also provided guidance on the priorities to be taken on board by exploring emerging topics such as water supply management in the case of interrupted supplies, persistent organic pollutants, outbreaks of legionellosis, and others.

## **WABOLU Fortbildungstagung für Fachleute 5- 8 November 2002, Berlin**

### **English summary:**

This congress discusses the main aspects of the new drinking water supply structures and their embedding in German policy and quality management. It will also give a survey of the working field of the two German WHO Collaborating Centres which are concerned with Water Hygiene, Water Management and Risk Communication.

Die Schwerpunkte der diesjährigen Fortbildungsveranstaltung für Wasserfachleute liegen auf den Auswirkungen der neuen Trinkwasserversorgung und deren Einbettung in das Spannungsfeld von Trinkwasserpoltik, Qualitätsmanagement und Vorsorgeplanung. Dabei wird Ihnen auch ein Überblick zu den Aufgaben und Arbeiten der Trinkwasser- und Badewasserkommission sowie der beiden deutschen mit Trinkwasser befassten Kooperationszentren des WHO zum Wassermanagement und zur Risikokommunikation gegeben. Nach den einzelnen Referaten ist jeweils ein eigener Diskussionsblock vorgesehen.

Die Fortbildungstagung zeichnet dadurch die engen Zusammenhänge aus den praktischen Erfordernissen, den gesetzlichen Anforderungen, den theoretisch- wissenschaftlichen Erkenntnissen, den technischen Regelwerken und die Einbindung in internationale Zielsetzungen auf. Es sollen den Entscheidungsträgern und Verantwortlichen in öffentlichen Institutionen, Wasserversorgungsunternehmen und Wirtschaftsunternehmen der Zugang zu aktuellen Entwicklungen eröffnet und Entscheidungshilfen für das Management aufgezeigt werden.

Der Verein für Wasser-, Boden- und Lufthygiene e.V. entspricht mit seinem diesjährigen Programm in besonderem Maße auch den Forderungen, die in den Diskussionen der vergangenen Jahre von Teilnehmern vorgebracht wurden. Mit der Unterstützung des Umweltbundesamtes konnte im Jubiläumsjahr des Vereins wieder renommierte Referentinnen und Referenten gewonnen werden.

**AQUATERRA - 5th International Exhibition and Conference:  
Everything for Clean Water and Healthy Environment  
12- 15 November 2002, St.Petersburg, Russia**

**Description:** RESTEC Exhibition Company invites you to visit and participate in the International Specialized Exhibition and Conference AQUATERRA in St.Petersburg, Russia. The AQUATERRA exhibition provides an opportunity to demonstrate newest energy and resource saving machinery and technologies, equipment and instruments, materials and reactants, a wide range of services used in the sphere of construction and operation of industrial and residential facilities, large investment projects in the sphere of rational nature management, ecology and protection of water resources in Russia and the CIS. Within The Exhibition The Show-Contest "AQUATERRA Award" will be organized.

Admission fee: USD 456

**Venue:** Mikhailovsky Manege, 2 Manezhnaya Square, St.Petersburg, Russia

**Technical Field:** Water Resources Energy Saving Wastewater Treatment Renewable Energy Soil & Groundwater

**Type of Event:** Trade Show

**Contact:** Natalia Raspopina, General Sales Manager **Phone/Fax:** Tel: +7-812-320-6363 (ext.7286); Fax: +7-812-235-4677

**E-mail:** info@restec.ru **Web:** <http://www.restec.ru/aquaterra>

**International Conference: From Conflict to Co-Operation: Challenges and  
Opportunities in Water Resources Management  
20- 22 November 2002, Delft, Netherlands**

The conference will be held at the UNESCO-IHE Institute for Water Education, in Delft, Netherlands, to reflect on the results of the World Summit on Sustainable Development (WSSD) and to introduce the first results of PCCP: Water for Peace. The PC->CP conference is organized in collaboration with UNESCO, IHP, WWAP, GREEN CROSS INTERNATIONAL, MOST and IHE.

UNESCO and Green Cross International are contributing to UNESCO's World Water Assessment Programme (WWAP) with their joint programme "From Potential Conflict to Co-operation Potential: Water for Peace" (PC->CP: Water for Peace), which strives to examine and foster the potential for shared water resources to become a catalyst for regional peace and development through dialogue, co-operation and participative management of transboundary river basins.

For the Conference Brochure with attached Registration Form (PDF) go to:  
[http://www.ihe.nl/downloads/pccp/delft\\_third\\_circular.pdf](http://www.ihe.nl/downloads/pccp/delft_third_circular.pdf)

For more details on WWAP and PC->CP: Water for Peace please connect to:  
<http://www.unesco.org/water/wwap/pccp>  
and  
<http://www.greencrossinternational.net>

**IWA Conference: Sustainability in the water sector**  
**25- 26 November 2002, Venice, Italy**

This conference...

Will profile:

- innovation and excellence in sustainable water solutions from across the globe via case studies and posters
- strategic debate on the concept of sustainability in the water sector and technical challenges
- IWA`s strategic programme linked with key invited speakers presenting major themes

Will enhance:

- IWA`s strategic programme and leadership for sustainability in the water sector
- global initiatives presented at the Stockholm Water Conference, the World Summit (Johannesburg) and the Global Water Forum (Kyoto 2003) by focussing the role of the water professional in water service

Will involve:

- members of IWA`s Strategic Council
- Programme Committee for the sustainability programme
- invited speakers and leaders in sustainable water and river basin management and sustainability

Will present major themes:

facing the water scarcity dilemma via sustainable utilities management  
national policy and practical approaches in sustainable river basin management  
building a mandate for change (and budgets) with stakeholders and partners  
practical urban water management approaches and selecting the best pathway  
sustainability theory and what it means in the context of the water sector

For more information, see: <http://www.iwahq.org.uk/template.cfm?name=sustainability2002>

**International Conference on Soil and Groundwater Contamination  
and Cleanup in Arid Countries  
20- 23 January 2003, Sultanate of Oman**

**Description:** Sultan Qaboos University, College of Agriculture. First announcement and call for papers. Anthropogenic impacts on the quality of water and soil systems, such as over abstraction, secondary salinization, sea water intrusion, contamination from landfills, waste repositories and leaky containers, etc. increasingly cause daunting problems for water supply and agricultural practices, especially in arid and semi-arid zones with little potential for natural precipitation-induced attenuation. The Conference will include oral presentations, posters, panel discussions and software-product exhibits TOPICS The conference covers a wide range of topics addressing key environmental issues including: Sea water encroachment and its mitigation in coastal aquifers. Combating contamination of geosphere in petroleum industry. Vadose zone salinization - assesment, modeling and reclamation Integration of physical models, field studies and experimental techniques. Leakage from lagoons and evaporation ponds - natural attenuation versus geotechnical solutions. Pore-scale phenomena, multiphase flows and NAPL Sources. Computer packages and analytical models as predictive tools. Remediation technologies and protocols Management and decision making in conservation and remediation as components of soil and groundwater sustainability. Soil and groundwater vulnerability assesment. First Call for Papers February 2002 Condensed paper by September 1, 2002. Notification on acceptance by September 15, 2002. Preliminary Program by September 20, 2002

**Venue:** Sultan Qaboos University, P.O. Box 50 Muscat 123 - Sultanate of Oman

**Technical Field:** Soil & Groundwater

**Type of Event:** Conferences

**Contact:** Dr. Anvar Kacimov **Phone/Fax:** Tel: +(968) 515-223

**E-mail:** anvar@squ.edu.om **Web:** <http://www.squ.edu.om/>

**Water & Wastewater Europe 2003  
4- 6 March 2003, Nice, France**

**Description:** Exhibition - Companies from around the world will be on the exhibition floor, primed to present their products and services including: Pumps, Valves, Desalination Equipment, Water Treatment Plants, UV Disinfection, Filtration Systems Engineering, Drilling and more... Conference - Increase your knowledge and learn from industry experts at Water & Wastewater Europe. This high level conference held over two and a half days will feature more than 40 technical and strategic papers on Desalination, Water Re-use, Water Quality, Sludge Treatment, Privatisation, Finance and Legislation.

**Venue:** Acropolis Congress Hall, Nice, France

**Technical Field:** Wastewater Treatment Water Resources Soil & Groundwater

**Type of Event:** Trade Show

**Contact:** Charlotte Gliddon-Bush **Phone/Fax:** Tel: +44 (0) 1992 656 634;  
Fax: +44 (0) 1992 656 704

**E-mail:** charlottteg@pennwll.com **Web:** <http://www.wweurope.com>

## **Events related to other environmental health aspects**

### **11<sup>th</sup> WHO European Intercomparison Workshop on Air Quality Monitoring 12-17 May 2002, Langen, Germany**

The WHO Collaborating Centre for Air Quality Management and Air Pollution Control at the German Federal Environmental Agency (UBA), Berlin, continues to support international programs of air quality assurance and control by conducting Intercomparison Workshops on Air Quality Monitoring for the WHO European Region. The 11<sup>th</sup> workshop was organized by the WHO Collaborating Centre in cooperation with the UBA Pilotstation and took place at the sample air manifold of the German National Reference Laboratory from May 12<sup>th</sup> to 17<sup>th</sup> 2002 in Langen. The workshop addressed laboratories responsible for air quality measurements and quality assurance and control procedures in national and international ambient air quality monitoring networks. The intercomparison measurements related to nitrogen oxides, sulphur dioxide, and ozone (NO, NO<sub>2</sub>, SO<sub>2</sub> and O<sub>3</sub>), and included automated, semi-automated and manual methods. Each participating laboratory carried out in situ calibrations of its analyser(s) with its national calibration method. The workshop brought together 21 experts from Albania, Bulgaria, Croatia, Czech Republic, Estonia, Lithuania, Romania, Russian Federation, Slovenia and Uzbekistan, Six of the participating laboratories belong to the environmental and four to the health-related sector. The publication of the results is foreseen in one of the next WHO Air Hygiene Report issues.

### **16th International Congress of Biometeorology 28 October- 1 November 2002, Kansas City, Missouri, USA**

Hosted by the International Society of Biometeorology.

For information, see: [www.mcc.missouri.edu/icb2002](http://www.mcc.missouri.edu/icb2002)

### **EuroBionet2002 Conference on Urban Air Pollution, Bioindication and Environmental Awareness 5- 6 November 2002, Stuttgart, Germany**

EuroBionet is a network of local governments and research institutes from 12 cities and regions in 8 member states of the European Union. The project is backed by the LIFE Environment Programme of the European Commission and coordinated by the University of Hohenheim, Stuttgart.

For information, see: [www.eurobionet.com](http://www.eurobionet.com)

**Urban Transport 2003**  
**10-12 March 2003, Crete, Greece**

The 9<sup>th</sup> International Conference on Urban Transport and the Environment in the 21<sup>st</sup> Century is organized by the Wessex Institute of Technology, UK.

Urban Transport 2003 is a major annual event in the urban transport calendar with papers on both transport and the inter-related environmental issues which are of so much concern in our cities. Broad topic areas include urban transport systems, traffic control, accessibility and mobility, control and simulation, finance, air quality and noise, social issues and safety. The conference series has always attracted a wide international spread of delegates and is well established as a premier annual event. It first started in Southampton, UK (1995), continuing in Barcelona Spain (1996), Acquasparta, Italy (1997), Lisbon, Portugal (1998), Rhodes, Greece (1999), Cambridge, UK (2000), Lemnos, Greece (2001) and Seville, Spain (2002).

For information, see: <http://www.wessex.ac.uk/conferences/2003/urban03/index.html>

**Environmental Health Risk 2003**  
**2<sup>nd</sup> International Conference on the Impact of Environmental Factors on Health**  
**17-19 September 2003, Catania, Italy**

Environmental Health Risk 2003 is the second international conference on the impact of environmental factors on health, the first of which was held at the University of Cardiff, UK in 2001.

Health problems related to the environment are becoming a source of major concern all over the world. The health of the population depends upon good environmental quality including air, water, soil, food and other factors.

The aim of a healthy society is to establish effective measures, which can eliminate or considerably reduce hazardous factors from the human environment and minimize the associated health risks.

The ability to achieve these objectives is in great part dependent on the ability to apply suitable experimental, modelling and interpretive techniques, which will allow a balanced assessment of the risks involved. The interrelation between environmental risk and health is often complex and can involve a variety of social, occupational and lifestyle factors that emphasizes the importance of considering an interdisciplinary approach. The conference will provide a forum for the dissemination and exchange of information on the impacts of environmental factors on health, their interpretation and risk assessment.

The conference will be held at La Perla Ionica Hotel in Acireale, just outside of Catania. The hotel is situated on the sea front and is surrounded by beautiful gardens. La Perla Ionica is fully equipped with both leisure and conference facilities.

For information, see: <http://www.wessex.ac.uk/conferences/2003/healthrisk03/index.html>

## New books and articles

- Principles of risk assessment of food and drinking water related to human health. ILSI Europe Concise Monograph Series 2001.
- Marre, R.; Kwaik, A.Y.; Bartlett, C.; Cianciotto, N.P.; Fields, B.S.; Frosch, M.; Hacker, J.; Lück, P.C. (2002)(Eds.): Legionella.ASM Press, Washington, DC.
- European Guidelines for Control and Prevention of Travel Associated Legionnaires' Disease [http://www.ewgli.org/public\\_info/publicinfo\\_europeanguideline\\_download.asp](http://www.ewgli.org/public_info/publicinfo_europeanguideline_download.asp)
- WHO (2002):Guidelines for drinking-water quality (second edition). Adendum: microbiological agents in drinking water. Geneva.
- Yu,V.L.(2002):Legionella surveillance: political and social implications--a little knowledge is a dangerous thing. J Infect Dis 185 (2):259-261.
- Wagenvoort, J. H.; Sijstermanns, M.L.H.(2002):Bekämpfung von Legionella pneumophila durch Spülung der Kaltwasserleitungen mit heißem Wasser. Hyg. + Med. 27 (4):127-130.
- Lück, P. C.; Helbig, J.H.; Schuppler,M.(2002):Epidemiology and Laboratory Diagnosis of Legionella Infections. J Lab Med 26 (2/3):174-182.
- Benin, A. L.; Benson, R. F.; Arnold, K. E.; Fiore, A. E.; Cook, P. G.; Williams, L. K.; Fields, B.; Besser, R. E.(2002): An outbreak of travel-associated Legionnaires disease and Pontiac fever: the need for enhanced surveillance of travel-associated legionellosis in the United States. J Infect Dis 185 (2):237-242.
- Yu, V.L.(2001):Legionnaires' disease: seek and ye shall find. Cleve Clin J Med 68 (4):318-322.

## Links

- Publications of the CDR weekly: <http://www.phls.org.uk/publications/cdr/index.html>
- Eurosurveillance Weekly <http://www.eurosurv.org>
- update on the outbreak of legionnaire´s disease in Murcia [http://www.iprimus.com.au/matgreen/legionella\\_spain9a.html](http://www.iprimus.com.au/matgreen/legionella_spain9a.html)
- Cumbria and Lancashire Health Protection Unit <http://www.healthprotection.org.uk>
- general informations about Legionella <http://www.legionella.org>
- The European Working Group for Legionella Infections <http://www.ewgli.org>

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