

# F Drinking Water Research

- **The Inspectorate’s involvement in Drinking Water Research programmes.**
- **Summaries completed research studies.**
- **Gives brief details of ongoing research projects.**

## General

The Inspectorate manages the Water Directorate’s (WD) Water Distribution, Conservation and Quality (WDCQ) research programme.

The WDCQ programme assists Defra and the Welsh Assembly Government to formulate policy on the quality and regulation of water supplies.

The programme also enables the Inspectorate to make an input to international drinking water issues.

The WD research programme is a component of the Defra Environment Protection Group (EPG) research programme.

## Information on WDCQ Research

Enquiries should be addressed to DWI Enquiries, 2/A2 Ashdown House, 123 Victoria Street, London SW1E 6DE.

Executive summaries of the WDCQ research reports and earlier Department of the Environment and DETR drinking water research reports are posted on the Foundation for Water Research web site ([www.fwr.org](http://www.fwr.org)) with details of how to obtain copies of research reports.

General enquiries about the EPG programme should be directed to: Ken Nulty, Defra, Zone 4/C2, Ashdown House, 123 Victoria Street, London SW1E 6DE.

As part of the Departmental evaluation of its use of science, each Directorate is producing its Science Strategy. The strategy for WDCQ has been posted on the Defra website ([www.defra.gov.uk](http://www.defra.gov.uk)).

### Completed Research Projects

| Area of Research       | Project Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Contractor                    |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <i>Cryptosporidium</i> | <p><b>West Cumbria epidemiological study.</b></p> <p>This study was commissioned in 1995 and investigated whether installation of filtration in an unfiltered supply affected the reported incidence of cryptosporidiosis. The study also assessed whether installation of filtration caused a change in the sero-prevalence status of the population. The results showed a significant decrease in the level of cryptosporidiosis after installation of filtration, even after allowing for the effect of foot and mouth disease on cattle numbers in the catchment. The sero-prevalence data did not reveal a significant difference in sero-prevalence, or relative intensity of antibody responses, between the different areas.</p> | West Cumbria Health Authority |

## Completed Research Projects (continued)

| Area of Research                        | Project Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Contractor                            |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
|                                         | <p><b>Enhanced surveillance of <i>Cryptosporidium</i> in the UK.</b></p> <p>This study commenced in 2000 and investigated the epidemiology of sporadic cryptosporidiosis in two regions of the UK during the implementation of the <i>Cryptosporidium</i> regulations. The factors strongly associated with illness were reported as: travel outside the UK; contact with infected persons; and physical contact with cattle. The results did not show drinking water to be an important risk factor for cryptosporidiosis.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | PHLS                                  |
| Water Supply within Consumers' Premises | <p><b>Review of benefits and disbenefits of drinking water storage within premises.</b></p> <p>Storage within premises is a UK tradition. In most of Europe all taps within premises are supplied at mains pressure. This project reviewed operational, cost, and water quality aspects of maintaining a requirement for storage. It recommended that for new or renovated water systems all supplies to the cold water taps in domestic premises should be supplied directly at mains pressure from the water company distribution network.</p> <p><b>Assessment of the effect of in-house treatment devices on the quality of public water supplies.</b></p> <p>The project investigated the effect of running a range of jug filters beyond the cartridge's recommended life, and the effect of the use of filters on dissolution of metals in a range of kettles and cooking utensils. It found no evidence of adverse effects on microbial water quality even when tested under conditions simulating abuse. Kettles with nickel-plated elements initially released significant concentrations of nickel, more so when the water had been jug-filtered. The amount dissolved decreased with prolonged kettle use, but concentrations in the boiled water still exceeded the regulatory standard with some kettles after a month's use, irrespective of whether the water had been jug-filtered.</p> | Binnie, Black & Veatch<br><br>WRc-NSF |
| Materials testing and approval          | <p><b>Exposure to chloropropanol isomers via polyamines.</b></p> <p>LGC have developed a direct GCMS technique for the analysis of chloropropanol isomers in an ethyl acetate extract. The limits of detection are 0.02 µg/l for 1,3-DCP and 2,3-DCP. The study was not able to provide exposure data to chloropropanol isomers via drinking water because no waterworks were found to be using polyamine flocculants during the study period.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | LGC (Teddington)                      |

### Completed Research Projects (continued)

| Area of Research  | Project Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Contractor                           |
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|                   | <p><b>Reliability of test methods for metallic products.</b></p> <p>An inter-laboratory study involving three laboratories assessed the performance of the 2001 revision to BS 7766 "Assessment of the potential for metallic materials to affect adversely the quality of water intended for human consumption". The results showed that, despite making a number of changes to the test protocol, no significant improvement in the inter-laboratory performance has been achieved.</p> | WRc-NSF                              |
| Oestrogens        | <p><b>Consolidation of two analytical methods.</b></p> <p>This project consolidated two similar methods for the routine analysis of three oestrogens in drinking water using gas chromatography and mass spectrometry. The potential use of an alternative method using liquid chromatography and mass spectrometry was also investigated.</p>                                                                                                                                            | Laboratory of the Government Chemist |
| Research planning | <p><b>Organisation of Research Conference.</b></p> <p>The objective of the Conference was to identify the medium to long-term questions that might impact on research needs. The Conference identified a number of issues that have been incorporated in the WDCQ Science Strategy. (See information on WDCQ research above.)</p>                                                                                                                                                         | WTi                                  |

### Current Research

| Area of Research       | Brief Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Contractor                                                      |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <i>Cryptosporidium</i> | <p><b>Molecular finger-printing of <i>Cryptosporidium</i> oocysts isolated during regulatory monitoring.</b></p> <p>This project aims to develop methods for the extraction of DNA from oocysts detected in regulatory monitoring for <i>Cryptosporidium</i> so that it can then be used for speciation of the isolates. The ability to speciate oocysts will be a valuable aid to understanding the sources and transmission of <i>Cryptosporidium</i> and in the investigation of cases of disease.</p> | Scottish Parasite Diagnostic Laboratory                         |
|                        | <p><b>Investigation of <i>Cryptosporidium</i> clinical isolates and analysis with epidemiological data.</b></p> <p>This study seeks to improve the discrimination of gene probe based molecular fingerprinting system, which had been developed under an earlier contract with SCIEH. Collection of human and animal isolates has been completed and investigation of potential sub-typing techniques is underway.</p>                                                                                    | Scottish Centre for Infection and Environmental Health and PHLS |

## Current Research (continued)

| Area of Research                  | Brief Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Contractor                                                             |
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|                                   | <p><b>Effectiveness of UV treatment for <i>Cryptosporidium</i> in drinking water.</b></p> <p>Inter-laboratory trials are being organised to test the robustness of published cell culture techniques. A treatment study on the effectiveness of UV against <i>Cryptosporidium</i> has been conducted and a workshop on the requirements for UV equipment and design of trials for demonstrating inactivation of pathogens was held in March 2002.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | UK Water Industry Research Ltd                                         |
| Other Health risks and monitoring | <p><b>Enumeration of <i>Giardia</i> in drinking water.</b></p> <p>This study is investigating the feasibility of concurrently detecting and identifying <i>Giardia</i> cysts during regulatory monitoring for <i>Cryptosporidium</i>.</p> <p><b>Further studies on the incidence of <i>Mycobacterium Avium Complex (MAC)</i> and <i>Helicobacter</i> organisms in water supplies</b></p> <p>This study is investigating whether biofilms in water supply systems, including household systems, might provide a source of exposure to MAC organisms or <i>Helicobacter pylori</i>. Culture methods have been developed for both bacteria and survey work is underway.</p> <p><b>A study of sources of drinking water and Crohn's disease</b></p> <p>It has been suggested that Crohn's disease could be associated with exposure to <i>Mycobacterium avium var paratuberculosis</i> (MAP) and that exposure to MAP might occur via drinking water. Although research reported in Drinking Water 2001 failed to detect MAP in water supplies, this case-control epidemiological study based around newly diagnosed cases of Crohn's disease examines whether there is any demonstrable link with sources of drinking water.</p> <p><b>Support for review of WHO guidelines for drinking water.</b></p> <p>The contractor has provided reports on the proposal for reviews of current WHO guideline values for drinking water. Reports have also been provided on the toxicity of silver, nickel and asbestos.</p> | Severn Trent Laboratories<br><br>PHLS<br><br>University of East Anglia |
| Materials testing and approval    | <p><b>Provision of expert advice for European research and standardisation activities.</b></p> <p>Support has been provided in the development of the regulatory approach to a European system for positive lists for polymeric drinking water construction products. During 2002 this has included the use of conversion factors to relate test conditions to consumer exposure conditions and the reduced assessment approach for low-risk uses of construction products.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | WRc-NSF                                                                |

**Current Research (continued)**

| Area of Research | Brief Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Contractor                            |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
|                  | <p><b>Development of test methods for the European Acceptance Scheme.</b></p> <p>Test methods have been developed for ability to support microbial growth using ATP measurements (2) cytotoxic using suppression of RNA synthesis (3) screening for unsuspected organic contaminants using GCMS general survey. In addition, the affects of high concentrations of disinfectants on construction products were studied and a report on the potential application of genotoxicity testing was prepared.</p> | WRc-NSF and The Water Quality Centre. |
| Water treatment  | <p><b>Monitoring the integrity of low-pressure membrane processes for drinking water treatment.</b></p> <p>This joint Defra/American Water Works Association Research Foundation project examines existing and innovative methods for monitoring membrane integrity in low-pressure systems. Following a literature review, full-scale testing of existing and innovative monitoring techniques is in hand at six membrane plants in the US and Europe.</p>                                                | Carollo Engineers                     |