



World Health Organization  
Sustainable Development and  
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WHO/SDE/WSH/02.8  
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# Evaluation of the H<sub>2</sub>S method for detection of fecal contamination of drinking-water



**Protection of the Human Environment**  
**Water, Sanitation and Health**

Geneva, 2002



WHO/SDE/WSH/02.08  
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**Water, Sanitation and Health  
Department of Protection and the Human Environment  
World Health Organization  
Geneva**

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# **Evaluation of the H<sub>2</sub>S Method for Detection of Fecal Contamination of Drinking Water**

**Prepared by**

**Mark D. Sobsey and Frederic K. Pfaender  
Department of Environmental Sciences and  
Engineering, School of Public Health  
University of North Carolina, Chapel Hill, NC 27599**



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## FOREWORD

Around 2.2 million die of basic hygiene related diseases, like diarrhoea, every year. The great majority are children in developing countries. Interventions in hygiene, sanitation and water supply make proven contributors to controlling this disease burden. For decades, universal access to safe water and sanitation has been promoted as an essential step in reducing this preventable disease burden

Nevertheless the target of “universal access” to improved water sources and basic sanitation remains elusive. The “Millenium Declaration” established the lesser but still ambitious goal of halving the proportion of people without access to safe water by 2015.

The provision of drinking water of acceptable microbiological quality and low infectious disease risk requires a number of essential elements within a Water Safety Plan. Within any water safety plan emphasis is placed on controlling and detecting fecal contamination of drinking water and its sources. Traditionally, this measure of fecal contamination has been a bacterium or group of bacteria considered indicative of fecal contamination. The measurement of such indicator bacteria of fecal contamination requires trained analysts, media and other supporting materials and facilities available only in a microbiology laboratory or the use of a water microbiology field analysis kit.

Lack of access to laboratories or field analysis kits is an obstacle to the provision of microbiologically safe drinking water to many communities and people worldwide. In an effort to overcome this problem, a number of alternative indicators and tests to detect fecal contamination of drinking water have been proposed and developed. Some of these proposed fecal indicators and their tests are simple, low cost and do not require a microbiology laboratory or bacteriological field test kit. Some of these simple, low cost fecal indicator tests have come into use in actual drinking water supply practice. Prominent among these is the so-called hydrogen sulfide or H<sub>2</sub>S test, which is intended to detect or quantify hydrogen sulfide-producing bacteria, considered to be associated with fecal contamination.

The purpose of this report is to review the basis of the hydrogen sulfide test as a measure of fecal contamination of drinking water and the available scientific and empirical evidence for and against the test as a valid, useful and reliable measure of fecal contamination and drinking water quality. The report addresses the fundamental microbiological considerations of the test, including its chemical and biochemical basis, what organisms it detects and how it detects and quantifies them and the reported experiences with its practical application to assessing water quality.

In developing this report many sources of data and supporting information were generously provided by developers and users of the test and others who also have attempted to modify, improve, validate and apply it. We are grateful to these many individual and organizations for their assistance. In particular, we gratefully thank the following for providing reports and other supporting information:

Rajiv Gandhi National Drinking Water Mission, Ministry of Rural Development,  
Department of Drinking Water Supply, Government of India  
UNICEF, New Delhi

Ms. Bettina Genthe, Division of Water Environment and Forestry, CSIR,  
Stellenbosch, South Africa

This report has been prepared as part of a programme of activity towards the updating of WHO's Guidelines for Drinking-water Quality. Following a process of development and review it is released in draft form.

This document represents "work in progress" and further information concerning the H<sub>2</sub>S test and experience with its application would be welcome. Such information should be forwarded to:

Dr Jamie Bartram  
Coordinator  
Water, Sanitation and Health Programme  
World Health Organization  
20 avenue Appia  
1211 Geneva 27  
Switzerland

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