Letters

Dear Editor,

I noticed in Vol.21 No.3, under 'Waterpoints' there appeared a brief description of the H_2S water quality test by Arun Kumar Mudgal (UNICEF, India) followed by comments made by Guy Howard (WEDC). As a user of the test, I disagree with 'Guy's conclusion that this is a 'test of debatable value'.

First, there appears to be some misunderstanding over how the test is used. It is based on the detection of H_2S-producing organisms normally associated with polluted water. Although some of these may occur naturally, they are not found in water that has been treated, nor in rainwater, and have not as yet been shown to be common in groundwater. Mark Sobsy's experiments showing that it is possible to obtain a false positive were laboratory simulations using soil isolates taken from the geothermal region of Kanchatka, Russia. Of these, 25 per cent of 16 isolates produced a positive using a commercially available H_2S test. However, this was a simulation and may not represent the 'real world environment'.

On the other hand, both false positives, and more disturbingly, false negatives, using the generally accepted coliform indicator (whereby filtered bacteria are incubated on agar and the number of colonies counted) have been reported in the literature.

Secondly, the MPN method can be used to estimate the density of H_2S producers (the test is done in a 5-tube 'most-probable number' analysis at different dilutions to estimate the density of hydrogen-sulphide producing organisms). Also, the time it takes for a reaction to occur can indicate concentrations of bacteria, especially useful for determining relative risk when comparing various water sources. In addition, the H_2S test is an excellent educational tool to demonstrate the effects of household filtration and disinfection, how water becomes contaminated, why and when to clean a rainwater cistern or household water storage container, the importance of sanitary protection, to show how hands are contaminated and the importance of using soap, and to help identify sources of pollution along streams, rivers or sea shores. In my view, this test assists rather than 'detracts attention away from the process of putting right the source of the contamination'. For large community water systems, a positive test would indicate follow-up by conventional methods. Finally, there is no bacterial indicator organism for parasitic worm eggs, so in this respect the H_2S test is no worse than the alternatives.

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Disclaimer: The views expressed are those of the author and not of WHO.

Dear Editor,

It is good to see 'Waterpoints' has provoked some debate about water quality. Before I respond to Don Sharp's points, I would suggest that readers interested in this subject read the report by Mark Sobsey: www.who.int/water_sanitation_health/watonline8.htm

Experiments reduce the uncertainty around test results. Don implies that laboratory experiments on H_2S tests should not be relied upon to confirm methods. As a scientist I find this somewhat perplexing. The purpose of testing hypotheses (in this case that non-faecal organisms can cause a false positive in the H_2S strip) under controlled conditions is to reduce uncertainty about the result obtained.

The organisms causing false positives are common in the real world. Don is incorrect to state that organisms that cause a false positive with the H_2S strip have not been shown to occur commonly in groundwater. Sulphate-reducing bacteria associated with microbially induced corrosion of rising mains are common in groundwater and small water supplies are noted to be of particular risk. Sulphate-reducing bacteria are also commonly found within biofilms in treated piped water systems. The one type of supply where it is unlikely that such organisms would be found is rainwater, suggesting that this test may have some application in this setting.

False positives are important. I disagree with Don's implication that false positives are less important than false negatives. If testing results in action, then in resource-poor environments false positives divert resources to controlling water quality and away from improving hygiene or sanitation where greater benefits to health can be obtained.

All indicators have weaknesses, but E.coli *remains the best available.* I agree that no indicator bacteria are effective for all viruses and protozoa, and indeed probably not all bacteria. However, a recent review by WHO and OECD of the use of indicator organisms concluded that *E.coli* remains the best available indicator, although with significant weaknesses. This is supported by other recent research in New Zealand and the USA.

We need better risk management and less emphasis on testing water. End-product testing of microbial indicators is often too little too late and too unreliable, and this is precisely why WHO in its revised *Guidelines for Drinking-Water Quality* (which have been on the web for consultation since March 2003) advocate a move away from relying on indicator bacteria as the sole means of determining microbial safety. The new guidelines place an emphasis on development of risk management or water safety plans that emphasize good operational practice and process control (see Technical Brief No.50 in this issue). This uses a similar approach to that used in the food industry through Hazard Analysis and Critical Control Points (HACCP), which have been shown to be effective in improving safety. To reduce risk requires water supplies to be managed properly, and our efforts are best placed in helping communities develop the skills to undertake such roles.

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