Chlorine Disinfection: Essential to Global Sustainable Development Goals

For more than a century, the chlorination of drinking water has helped provide communities around the world with a safe, reliable water supply that has advanced public health and saved countless lives. It will continue to do so for many decades to come as an economic, proven and trusted means of water disinfection.

The Sustainable Cities and Water and Sanitation goals should recognize and encompass the value of water disinfection, and specifically chlorine disinfection, as a best practice to help provide safe water now and in the future.

The Value of Chlorine Disinfection

Disinfection is the critical step in drinking water treatment that destroys waterborne pathogens. Chlorine-based disinfectants are efficacious against a wide variety of disease-causing bacteria, viruses, parasites and parasitic worms. Cholera, for example, is a serious intestinal disease spread primarily through fecally-contaminated water or food, especially in regions lacking water treatment facilities. Chlorine disinfection destroys the causal bacterium, *Vibrio cholerae*.

The first use of water chlorination occurred in 1898 in Maidstone, England to address a typhoid fever epidemic. Following the first continuous use of chlorine in municipal drinking water in North America in Jersey City, New Jersey in 1908, typhoid fever rates declined dramatically. By 1941, the US Public Health Service estimated that 85 percent of US drinking water supplies were chlorinated and the national death rate from typhoid fever was lower than one in 100,000, signalling the virtual conquest of typhoid fever in North America (McGuire, 2013[1]). In 1997, *Life* magazine called the filtration of drinking water and the use of chlorine "probably the most significant public health advance of the millennium."[2]

Typhoid fever, however, is not eradicated; outbreaks still occur, principally in developing nations where water treatment is often lacking.

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[11] McGuire, M.J. (2012). The Chlorine Revolution: Water Disinfection and the Fight to Save Lives, American Water Works Association.

[2] Life Magazine, (Fall, 1997, Special Issue). Top 100 discoveries/events of the millennium.

According to a 2012 joint report[3] by UNICEF and the United Nations, worldwide 783 million people lack access to safe drinking water, raising their risk of contracting waterborne disease. Children are most vulnerable to waterborne pathogens. A 2012 UNICEF report[4] notes that globally over 800,000 children under the age of five died from diarrhoeal disease in 2010. An analysis of interventions (Table. 3.6 of the report, p. 16) demonstrates that addressing point-of- use water quality and sanitation leads to some of the greatest reductions in child diarrhoea morbidity (29 and 34 percent, respectively).

There have been many other advances in primary water treatment technologies in recent decades, including the *in situ* generation of chlorine and an array of alternative technologies involving ozone, UV radiation and microfiltration. Yet, chlorination remains the most affordable disinfectant option, an important consideration for developing nations. Furthermore, it remains the dominant and necessary process for secondary treatment – the protection of treated water during its transfer through water lines to the end user. Only chlorine-based disinfectants provide a residual level of protection from microbial re-contamination. The chlorine residual level, maintained at very low parts per million levels, is monitored routinely in pipelines and storage vessels to track water quality over time and to assess the integrity of pipes and storage tanks.

Wastewater disinfection is also an important sanitary measure that helps prevent exposure to germs *via* the fecal-oral route. Chlorination is a significant tool in the wastewater "disinfection toolbox." Furthermore, as the global demand for useful water (*e.g.*, irrigation, process, cooling and potable applications) grows with world population, wastewater reuse—including chlorination technology—will be increasingly necessary. Wastewater reuse is noted in The Future We Want (paragraph 109) as one of several "actions to better address the needs of rural communities" through "appropriate and affordable technologies."

Water Chlorination is Integral to Sustainable Development

Water and sanitation are central to each of the three dimensions of sustainable development (*The Future We Want*, paragraph 119). Water disinfection and particularly

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[3] UNICEF and the United Nations (2012), Progress on Drinking Water and Sanitation, 2012 Update, online: http://www.unicef.org/media/files/JMPreport2012.pdfm, accessed 10-31-13.

[4] UNICEF (2012), Pneumonia and diarrhoea: Tackling the deadliest diseases for the world's poorest children, online: http://www.unicef.org/media/files/UNICEF_P_D_complete_0604.pdf, accessed 10-31-13.

chlorination, an efficacious and cost-effective technology that has helped achieve historic public health gains, should clearly be a component part of the Sustainable Development goals.

The World Chlorine Council (WCC) is a global network representing the chlorine and chlorinated products industries. It brings together national and regional trade associations, along with their member companies, to improve awareness of the benefits of chlorine chemistry, foster the practice and understanding of responsible stewardship and anticipate and respond to relevant health, environmental and public policy issues.

For further information on the role of chlorination in the provision of safe water supplies please contact Mary Ostrowski (Washington, DC; Mary_Ostrowski@americanchemistry.com), Marleen Pauwels (Brussels; mpa@cefic.be) or Martim Penna (Sao Paulo; mpenna@abiclor.com.br).