

Operation of the beach water quality monitoring programme

(Opening)

Hong Kong is surrounded by the sea and has many beautiful beaches. Some of the beaches are very close to urban areas, while others are in sparsely populated locations. No matter where they are, each of them has its own unique fascinating scenery. Every summer, public beaches are enjoyed by many for swimming and leisure.

Since its establishment in 1986, the Hong Kong Environmental Protection Department (EPD for short) has been responsible for monitoring the water quality of Hong Kong's beaches, and for developing Water Quality Objectives for the protection of swimmers. The EPD has a comprehensive beach water quality monitoring programme that is based on scientific research findings. It aims to ensure that gazetted beaches in Hong Kong are capable to achieve the statutory water quality standards. Over the years, the beach water quality monitoring programme has undergone further refinements in line with the latest technological developments. These updates include continuous improvement in sampling, testing and other methodologies, in order to more fully safeguard the health of swimmers.

(Beach water sampling and field measurements)

The EPD monitors all forty-plus gazetted beaches and a few non-gazetted beaches located in different areas of Hong Kong: Hong Kong Island South, Sai Kung, Tsuen Wan, Tuen Mun, Tai Po and the outlying islands. The water quality of open beaches is monitored at least three times per month. EPD's staff conduct field measurements, such as temperature and dissolved oxygen, notes the environmental conditions at beaches (for example, weather changes and the number of swimmers), and record any unusual observations (for example, red tide and oil film). Subsequently, staff enter the information into handheld devices on site and transfer the data into the EPD's database for further analysis.

In addition, field staff use sterilized and labelled bottles to collect seawater samples at designated locations at the beaches. These samples are collected at one metre depth and 0.3 metre below the surface. Water samples are delivered to the laboratory for testing within six hours after collection. During transportation, samples are stored at about four degrees Celsius in sealed ice bags or an ice-box to ensure the bacterial content of the water samples is not affected by heat or light.

(Sampling from streams or drains)

The EPD inspects not only the water at the swimming area, but also at streams and storm

drains adjacent to the beach. Since streams and drains may carry pollutants into the swimming area, field staff also collect water samples from these areas to assess the pollution levels. This information facilitates fast tracking of pollution sources whenever there is a sudden deterioration of beach water quality.

(Laboratory testing of water samples)

After collecting water samples at the beaches, staff deliver them to the environmental microbiology laboratory for testing of *E. coli*. The levels of *E. coli* in beach water samples are used by the EPD to assess whether a beach meets the water quality objective.

To conduct *E. coli* tests, bacteria in sea water are initially filtered with sterilized membrane-filters. In the filtration process, the analyst places a sterilised membrane-filter onto the filter apparatus connected to a vacuumed system, and then pours the well-mixed water sample into the filter funnel. The bacteria in the water sample are slowly collected on the membrane. The analyst then places the membrane with bacteria in a special culture medium for incubation. Incubation of the bacteria takes 18 to 24 hours, and the temperature should be maintained at 44.5 degrees Celsius. During incubation, individual *E. coli* colonies on the membrane gradually form unique blue-green spots visible to the naked eye. The number of bacteria per hundred milliliters can then be calculated based on the dilution of the sample. Analysts verify the bacterial colonies from time to time to ensure the accuracy of identification. Biochemical tests and advanced test equipment are used to confirm the species of the bacteria. Currently, the EPD grades beach water quality based on the five most recently recorded *E. coli* counts.

To facilitate the public to readily comprehend the latest beach water quality conditions, the EPD has established a simple and easy to understand dual beach rating system, which consists of "annual ranking" and "weekly gradings". Both ratings are based on *E. coli* levels in beach waters, and rate beaches into four categories, namely "Good", "Fair", "Poor", and "Very Poor". The "annual ranking" reflects the beaches' water quality conditions throughout the bathing season, and the "weekly grading" represents the most recent beach water quality conditions. The EPD disseminates the latest beach water quality data through the daily updated beach water quality information webpage, weekly press releases, the beach grading hotline and LCSD's notice board. The EPD also publishes an annual report on beach water quality. The report summarizes the beach water quality trends and highlights the bacterial levels of individual beaches and their compliance status in meeting the water objective (that is beach water should not exceed 180 *E. coli* counts per one hundred milliliters). Beaches meeting the water quality objective for swimming are rated as "Good" or "Fair" under the annual ranking system.

In addition, the levels of enterococci in seawater are determined as recommended by the World Health Organization's guidelines for reference purposes.

(Ending)

The EPD has been providing beach water quality data to all relevant departments since the beach water quality monitoring programme began in 1986 so as to facilitate joint efforts to improve the water quality of beaches in Hong Kong. Enforcement actions are taken to curb pollution sources. Priority has also been accorded to the expansion and improvement of sewage networks and enhancement of sewage treatment facilities at beach hinterlands.

The water quality of all gazetted beaches has complied with the water quality objective since the 2010 bathing season. The public can feel at ease swimming at all open beaches.