Beach Water Quality of Hong Kong in 2002

Introduction

The purpose of this paper is to brief Members on the water quality of gazetted beaches in Hong Kong in 2002 and the Government’s recommendation on closure of beaches along the Tsuen Wan coast.

Background

2. The Environmental Protection Department (EPD) has implemented a monitoring programme to assess the water quality of 41 gazetted beaches in Hong Kong.

3. The beach water quality is assessed through a ranking system which links the water quality of a beach with swimming-associated health risks as measured by the *E. coli* level. According to this system, beaches are ranked as “Good”, “Fair”, “Poor” or “Very Poor” in accordance with the *E. coli* level. Beaches with annual geometric mean *E. coli* levels below 25 per 100mL are ranked “Good”, between 25 and 180 per 100mL, “Fair”, and those between 181 and 610 per 100mL, “Poor”. Only those in the ranks of “Good” and “Fair” meet the Water Quality Objective (WQO) for bathing water. Beaches ranked “Very Poor” (*E. coli* level exceeding 610 per 100mL which corresponds to a swimming-associated illness rate of more than 15 cases per 1,000 swimmers) are generally considered not suitable for swimming, and therefore beach closure is recommended to safeguard the health of swimmers.

Beach Water Quality in 2002

4. The water quality of 33 out of 41 (i.e. 80.5%) gazetted beaches met the WQO for bathing water in 2002. Among the 41 gazetted beaches, 23 are ranked “Good”, ten “Fair”, two “Poor” and six “Very Poor” (Figure 1). The number of “Good” water quality beaches has increased by two to 23, which is more than half (56.1%) of the gazetted beaches in Hong Kong. Apart from the beaches in the Tsuen
Wan District, most beaches had similar water quality in 2002 as in 2001. All the six beaches of “Very Poor” water quality are located in the Tsuen Wan District. Three of them have been closed to the public for many years.

5. The two beaches where water quality improved from “Fair” to “Good” are Shek O and Big Wave Bay. Both are on the eastern side of the Hong Kong Island and have benefited from the great improvement in water quality in the Tathong Channel and Eastern Harbour achieved after the full commissioning of the Harbour Area Treatment Scheme (HATS) Stage I at the end of 2001. Screened sewage from Chai Wan and Tseung Kwan O Preliminary Treatment Works, which was previously discharged into the Tathong Channel has been diverted to the tunnel network of HATS and conveyed to the Stonecutters Island Sewage Treatment Works (SCISTW) for chemical treatment and disposal in the general area of the Victoria Harbour western anchorage.

6. Beaches with more fluctuating water quality are found in the Tsuen Wan District. Six of the eight beaches there had “Very Poor” water quality in 2002. In addition to the three (Approach, Ting Kau and Anglers’), which have been closed since the mid 1990s because of their very poor water quality, three more beaches (Casam, Lido and Gemini) in Tsuen Wan had “Very Poor” water quality and would be recommended for closure in 2003. The two “Poor” water quality beaches are Tung Wan on Ma Wan and Hoi Mei Wan. Apart from the potential pollution sources in the unsewered hinterland and the polluted Sham Tseng Nullah, the very poor water quality of the Tsuen Wan beaches is also related to the high bacterial level in the marine water off the Tsuen Wan coast.

7. Between 1997 and 2001 there was an improving trend in the water quality of the Tsuen Wan beaches, brought about largely by the implementation of the HATS High Priority sewerage programme, which included the partial commissioning of the SCISTW in 1997, to treat 25% of the HATS Stage 1 flows. However this improving trend was reversed in 2002.

8. With the full commissioning of the deep tunnel network of the HATS Stage I at the end of 2001, sewage generated from Kowloon and the northeastern area of Hong Kong Island, in addition to that from Tsuen Wan, is now transferred to the SCISTW for treatment. As a result, the amount of treated effluent discharged to the area of the Victoria Harbour western anchorage through the interim outfall approximately quadrupled between 2001 and 2002. While the SCISTW provides a good level of organic removal, it can remove only about 50% of the bacteria. Hence, although it has brought about widespread and substantial improvement in water quality in terms of total inorganic nitrogen (TIN), dissolved oxygen (DO), ammonia, and bacterial levels in most parts of the Harbour, elevation in bacterial level has been observed in the western part of the Harbour (see Figures 2 to 5). The effect of the elevated bacterial concentrations has spread as far as the Tsuen Wan beaches, bringing
about the observed deterioration there. In absolute terms the deterioration at the beaches is not huge, being generally of the order of a few hundred counts of bacteria per 100 ml. But because they already suffer from poor water quality due to the local pollution source at Tsuen Wan, it has proved sufficient to push several into the “very poor” rank. This raises the question of whether the beaches should be closed for swimming.

9. A new sewage treatment works is being constructed at Sham Tseng and new sewers are being laid, with a view to connecting up the unsewered developments and removing the local pollution sources. The sewage treatment works is scheduled to be completed around the end of 2003 but the sewerage along the coastline will only be completed around the end of 2005, at the earliest, for connection with individual properties. Thus our best estimate is that major reductions in the local pollution sources are unlikely to take place until the end of 2006 at the earliest. Furthermore, this sewerage work alone is unlikely to completely restore the beach water quality without completion also of the remaining stages of HATS.

10. In view of the rather lengthy time required to bring about improvement in local water quality, we intend to recommend in the interests of safeguarding the health of swimmers, closure of Lido, Casam, Hoi Mei Wan, and Gemini, in addition to the three beaches (i.e. Approach, Ting Kau and Anglers’) already closed. Closure of Hoi Mei Wan, which is of “Poor” water quality in 2002, is also recommended as it is subject to similar sources of pollution as the other six beaches along the Tsuen Wan coast.

Conclusion

11. In 2002, the water quality of most beaches was similar to that in 2001. The commissioning of HATS Stage I brought about improvement in water quality of the Harbour, particularly Shek O and Big Wave Bay the grading of which has been improved from ‘Fair’ to ‘Good’.

12. The declining trend of E. coli level recorded between 1997 and 2001 at the Tsuen Wan beaches has been reversed in 2002. Since all the planned works and the remaining stages of HATS will take some years to complete, in order to safeguard the health of swimmers, Lido, Casam, Hoi Mei Wan and Gemini are recommended to be closed in the coming bathing season in addition to the three already closed beaches (viz. Approach, Ting Kau and Anglers’).

Environmental Protection Department
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Figure 1  Annual ranking of gazetted beaches in 2002

Geometric mean E. coli count per 100mL
Figure 2  Map showing improvement / deterioration in TIN at 17 marine monitoring stations between 2001 and 2002
Figure 3  Map showing improvement / deterioration in dissolved oxygen (DO) at 17 marine monitoring stations between 2001 and 2002

VM1 : HATS station (11)
VM7 : Non-HATS station (6)
Figure 4  Map showing improvement / deterioration in NH₄ at 17 marine monitoring stations between 2001 and 2002
Figure 5  Map showing improvement / deterioration in *E. coli* level at 17 marine monitoring stations between 2001 and 2002