

ACQWS Paper No. 5

Raw Water Quality Monitoring in Hong Kong

Preamble

The two main sources of raw water in Hong Kong are the supply of Dongjiang water from Guangdong, and rainfall collected from catchments and stored in local reservoirs. The supply of Dongjiang water meets about 80% of Hong Kong's demand. In view of an increasing concern about the raw water quality, this paper describes the raw water monitoring strategy adopted by the Water Supplies Department (WSD).

Monitoring of the Dongjiang water from Guangdong

2. According to the agreement drawn up between the Guangdong and Hong Kong authorities in December 1989, "all water supplies to Hong Kong will meet the water quality standard of Guangdong Province currently in force and will not be inferior to the Class II water quality standard stipulated in the Environmental Quality Standard for Surface Water GB 3838-83 published by the People's Republic of China in 1983". On completion of the closed conduit in 2003, "the Guangdong authorities will strive to elevate the quality of the water supplied to Hong Kong to the Type II water quality standard of the Environmental Quality Standard for Surface Water GB3838-88".

3. The quality of Dongjiang water within the Guangdong Province is the responsibility of the Guangdong authorities. It is closely monitored by WSD on entering Hong Kong at reception points at Muk Wu Pumping Stations at the border and again at all treatment works receiving the raw water. The Muk Wu Pumping Stations are manned round the clock by operational staff who have

been trained to conduct hourly tests for manganese and ammonia levels in the Dongjiang water received. Laboratory tests are also performed daily, including Sundays and public holidays. Ammonia and manganese are selected for monitoring because their levels in the raw water are useful reference for dosing of treatment chemicals. On detection of any significant change in ammonia or manganese levels in Dongjiang water quality, an alert will be given by the duty officer of the Muk Wu Pumping Stations to downstream water treatment works to ensure a timely response to the anticipated change in raw water quality. On-line monitors have also been installed to provide continuous information on ammonia and manganese levels.

4. The quality of Dongjiang water is further monitored by laboratory tests at treatment works on a daily basis. The sampling and testing frequencies of individual parameters vary from 4-monthly to three times per day, and if necessary as frequently as hourly. A summary of raw water sampling and testing frequency at treatment works is at the Appendix.

5. In the rare event of unsatisfactory Dongjiang water quality, WSD will immediately liaise with the Guangdong authorities initially by telephone to alert them of the situation to take remedial measures, which may include reduction of the supply of Dongjiang water to Hong Kong. Under such circumstances, arrangement will be made to switch the raw water source for the treatment works from Dongjiang water to local water sources.

6. WSD maintains close monitoring of the long term quality trend of Dongjiang water through routine monitoring at all treatment works receiving Dongjiang water for all major Dongjiang water quality indicators including ammoniacal nitrogen, manganese, fluoride, dissolved oxygen, heavy metals and pesticides.

7. There is close liaison between the Guangdong and Hong Kong

authorities on matters relating to the quality of Dongjiang water, including weekly and monthly exchanges of data on water quality and frequent discussions via facsimile and telephone. In addition to a high level Annual Business Meeting between Guangdong and Hong Kong at which all matters concerning the water supply from the Dongjiang are discussed, there is an Operation and Management Technical Sub-Group which meets no less than twice per year to discuss and resolve supply and quality matters of mutual concern.

Monitoring of the raw water quality in local catchments

8. Rain water collected in Hong Kong's catchment area and stored in reservoirs meets about 20% of the total demand. This source is monitored in comprehensive programmes for assessing the raw water quality, and checking on the effectiveness of pollution control measures. The monitoring programme for raw water quality includes river surveys and sampling at intakes, catchwaters, reservoirs, pumping stations as well as suspected pollution point sources in catchment areas. Physical, chemical, bacteriological, biological and radiological analysis are conducted on samples. Chemical analyses cover a wide scope of quality parameters including nutrients, trace organics, pesticides and heavy metals.

9. Sampling and testing may be as frequently as daily at strategic points or generally weekly, monthly, or quarterly at other locations as appropriate depending on factors such as operational requirements and past records and the significance of the individual test. The sampling and testing frequency will be stepped up on detection of pollution evidence and remedial measures will be taken to rectify the situation as soon as possible. In major reservoirs such as Plover Cove, High Island and Tai Lam Chung, regular limnological surveys are also conducted in order to assess the stability of the water quality and how well the ecological balance is maintained.

Treatment of Raw Water

10. All raw water is delivered to water treatment works where it is treated to comply chemically and bacteriologically with the World Health Organisation (WHO) Guidelines for Drinking-water Quality (1993) before being supplied to consumers.

Advice Sought

11. Members' views on the subject are sought.

Water Supplies Department

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Sampling & Testing Frequency at Treatment Works Laboratory (Raw and Final Water)					
	Raw			Final	
Parameter	Unmanned Lab	Manned Lab		Unmanned Lab	Manned Lab
pH	1/w	2/d		1/w	6/d
Temperature	1/w	1/d		1/w	2/d
Colour	1/w	1/d		1/w	6/d
Turbidity	1/w	2/d		1/w	6/d
Conductivity	1/w	1/d		1/w	1/d
Ammoniacal-N	1/w	2/d		1/m	1/m
Albuminoid-N	1/m	1/m		1/m	1/m
Nitrite-N	1/m	1/m		1/m	1/m
Nitrate-N	1/m	1/m		1/m	1/m
Oxygen absorbed value	1/m	1/m		1/m	1/m
Dissolved oxygen	1/m	1/w		-	-
Chlorine (free)	-	-		1/w	2/d
Chlorine (total)	-	-		1/m	1/m
Total hardness	1/w	1/w		1/w	1/w
Total alkalinity	1/m	1/m		1/m	1/m
Calcium hardness	1/m	1/m		1/m	1/m
Chloride	1/w	1/w		1/w	1/w
Sulphate	1/m	1/m		1/m	1/m
Phosphate (ortho)	1/m	1/m		1/m	1/m
Fluoride	1/w	1/d		1/w	2/d
Iron	1/w	1/d		1/w	1/d
Manganese	1/w	2/d		1/w	2/d
Aluminium	1/w	1/d		1/w	2/d
Silica	1/m	1/m		1/m	1/m
Cyanide	1/q	1/q		1/q	1/q
Coliform	1/w	1/w		1/w	1/w
E. Coli	1/w	1/w		1/w	1/w
APC	1/w	1/w		1/w	1/w
Remarks: (1) frequency specified as follows: (/d) per day; (/w) per week; (/m) per month; (/q) per quarter.					