

**Advisory Committee on the Quality of Water Supplies
Report No. 3 – Flow Test at Taiyuan Pumping Station
(27 December 2001)**

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INTRODUCTION

1. The Dongjiang water for supply to Hong Kong is at present delivered by successive pumping from the river uphill via a natural watercourse to Shenzhen Reservoir and then to Hong Kong. As the natural watercourse collects also surface runoff and wastewater discharges from the townships on both sides, the water is constantly polluted. A closed aqueduct system is being constructed to bypass the pollution sources. The work will be completed in two stages. The first stage of the project (the northern section) is scheduled for completion by the end of 2002, and the whole project is expected to complete by late 2003. By then, the natural watercourse will not carry any Dongjiang water, but only the surface runoff and the wastewater discharged into it. Such polluted water will then run down Shima River and join the main river course of Dongjiang at a point some 350m downstream of Taiyuan Pumping Station which draws water for supply to Hong Kong.

2. There have been some public concerns in Hong Kong that the water of inferior quality from Shima River could be sucked into the Taiyuan Pumping Station intake. In this connection, a simple flow test was carried out by some members of the Advisory Committee on the Quality of Water Supplies (ACQWS) during the visit to Taiyuan Pumping Station on 12 September 2001. From the observations on site, the ACQWS members expressed that they could not see the possibility for the water discharged from Shima River to be sucked into the Taiyuan Pumping Station intake at that moment. The relevant record of the flow test extracted from ACQWS Report No. 2 – Visit to Dongjiang Water Supply (12-13 September 2001) is attached in **Annex 1** for ease of reference.

3. Nevertheless, it was noted that the flow test was not carried out under the most critical condition. Mr KU Chi Chung, Assistant Director/Supply and Distribution (2), Water Supplies Department (WSD), pointed out that the most critical flow condition would occur in December just before the resumption of Dongjiang water supply to Hong Kong in January each year. At that time, the flow from Shima River would be increased significantly due to the annual river flushing operation, the flow in Dongjiang would be low and Taiyuan Pumping Station could be operated at a high rate. It was therefore suggested to carry out another flow test in December 2001 under such extreme conditions. The Guangdong Authority welcomed members of ACQWS and WSD to carry out such a flow test as suggested.

PARTICIPANTS AND ITINERARY

4. In early December, the Guangdong Authority advised that the flow test would best be carried out on 27 December 2001 as the most critical condition could be arranged on that day according to the schedule of flushing Shima River. Some ACQWS members had expressed interest to witness the test. However, due to unforeseeable commitments and health reasons, they were eventually unable to join the visit. Four representatives from WSD as listed in **Annex 2**, led by Mr. Ku, participated in the flow test. The record of itinerary was detailed in **Annex 3**.

OBSERVATION AND FLOW TEST

5. At the confluence of Shima River and Dongjiang, it was observed that the water from Shima River had a light brown colour, distinctly different from the colour of the Dongjiang water. After joining Dongjiang the water from Shima River was clearly carried downstream together with the main water body of Dongjiang (**Photos 1 to 3**).

6. A flow test was carried out near the intake of Taiyuan Pumping Station at about 17:00 hrs. To create the most critical test condition, the Guangdong side operated the pumps at Taiyuan Pumping Station to extract the water from Dongjiang at a rate of about 80 cubic metres per second. Floating plastic balls were placed at various locations in Dongjiang around the pumping station intake. The flow directions of the floats were as shown in **Figure 1** and **Photo 3** and were observed as follows:

- i. Upstream of the intake near the centre of Dongjiang main river course, some blue balls were dropped and they all flowed rapidly downstream.
- ii. Upstream side of the intake near the bank, some green balls were dropped and all of them flowed into the intake.
- iii. At the mid-point of the intake opening in Dongjiang, some red balls were dropped and some of them flowed into the intake while the rest flowed downstream.
- iv. Downstream side of the intake near the bank, some yellow balls were dropped and all of them flowed downstream.

7. Based on the above observations, the high pumping rate at Taiyuan Pumping

Station clearly drew the water from Dongjiang just upstream and near the side of the intake. The pumping station did not draw any river water just downstream of the intake. The brownish water from Shima River flowed in the downstream direction of Dongjiang once it joined Dongjiang at the confluence. Some of the above observations were video taped. The video record is kept by the Secretariat of the ACQWS. Members are welcomed to contact the Secretariat for viewing.

8. **Figure 2** shows the recorded water levels of Dongjiang at Taiyuan Pumping Station on 27.12.2001. The variation pattern coincided generally with the tidal pattern. At the time of the flow test (14:00hrs to 17:00 hrs), the water levels were around 0.8m to 1.1m below the highest level. Since the sea is about 100km away and the confluence of Shima River and Dongjiang is only 350m apart, the difference of the tidal effects over the section from the confluence point to the pumping station intake should not be significant enough to reverse the flow of the massive Dongjiang water.

SUPPLEMENTARY INFORMATION

9. As advised by the Guangdong side, the catchment area of Shima River is about 800-900 square kilometres whereas the catchment area of Dongjiang upstream of Taiyuan Pumping Station is over 20,000 square kilometres in total or over 10,000 square kilometres if excluding that of Xinfengjiang. Therefore the flow masses of Shima River and Dongjiang differ significantly and the discharge from Shima River cannot have enough momentum to push the Dongjiang water mass upstream.

CONCLUSION

10. It is physically not possible for the water discharged from Shima River to reach a point some 350m upstream along Dongjiang and to be sucked into the intake of Taiyuan Pumping Station.
