



Drinking water quality in the city of Karachi

M. Fazal Karim Malick, Dr Waseem Akhtar and Mrs Seema Jilani, Pakistan

THE SUPPLY OF water in the metropolitan city of Karachi (of Population about 14 million) is the responsibility of Karachi Water & Sewerage Board (KWSB). At present, Karachi gets near 380 MOD Water from mainly two sources namely Indus (280 MGD) and Hub reservoir (100 MOD). Four Treatment plants known as Gharo Filter Plant, Pipri Filter plant, North East Karachi (N.E.K) filter plant and COD filter plant for Indus raw Water and one treatment plant in Hub Filter Plant for Hub raw Water are located in the different parts of the city to treat the raw water. The treated water is distributed to the city via main distribution lines and passed on to the consumers through the branched lines, travelling a distance of about 3000 km of pipe lines (Fahim, 1998). The main objective of this study is to assess the fate of the quality of the water as it transports from the treatment plant to the consumer sites.

Methodology

During the study (August and September of 1996) forty samples were taken from supply lines of different locations of the city originated from Indus River and Hub sources. Physical and chemical parameters such as pH, turbidity, EC, TDS and residual chlorine were analyzed from the samples. Coliform and Fecal Coliform test, were also performed to check the microbiological quality of the water. Locations from where the samples were taken, were selected to achieve the following objectives.

- Raw Water Quality before treatment.
- Quality of the treated water.
- Deterioration of treated water quality as it is transported from treatment plants to consumer sites at different locations shown in Figure 1.

All the samples were grab samples taken at different times. Standard methods were followed in collecting, handling and analysing samples for the above mentioned parameters (APHA, 1989). The details of the study are cited elsewhere (Malick, 1997).

Results and discussion

The details of the analysis results of waste samples collected from the distribution lines originating from Indus and Hub sources are presented in Tables 1, 2 and 3. Four samples of raw water from Indus Water sources located at Dhabeji, Pipri, North East Karachi (N.E.K), and COD filter plant and one sample from Hub Canal pumping station were taken. Six samples were also collected from the corresponding filter plants after the treatment. Results show that the

treated Water from the treatment plants meets WHO standard in terms of pH, turbidity, TDS, residual chlorine, coliform counts and fecal coliform, though raw water from both sources were contaminated with pathogens.

In all, twenty nine water samples were collected from different location of water distribution network originating from Indus (16 samples) and Hub (13 samples) sources. This network covers the entire area of Karachi as shown in Figure 1. Out of twenty Nine samples, nine samples, taken from "Hydrants", representing water quality in the main distribution lines whereas the remaining twenty samples were from the supply lines branched from the main distribution lines feeding directly to individual consumer and stand posts. Results from the analysis indicated that almost all the samples were contaminated with the coliform bacteria, Samples from hydrants were free from fecal coliform but the samples from the branched lines had fecal coliform with varying concentration. As expected it was observed that the residual chlorine in almost all the samples were absent.

The presence of coliform (and not fecal coliform) in the samples from hydrants indicates that the principle source of contaminants in the main distribution lines may be due to the inclusion of soil through leaks/cracks. However, in the samples of the branched lines, the presence of fecal coliform confirms the seepage of sewage water into the supply lines because of the poor sanitation conditions prevailing in the city. It should be noted that the samples taken from low income areas, mainly Katchiabadies, such as Landhi, Korangi, Kemari, Mauripur, Agra Taj, Orangi, Baldia Town ship were found to be highly contaminated with sewage as the samples had high concentration of fecal coliform. This was expected because those areas are known to have poor sanitation conditions.

The chemical quality of the Water Supply with respect to the tested parameters (pH, turbidity, TDS) did not seem to be deteriorated as it is distributed in the city. Except in two places in Kemari and Maripur, the total dissolved solids (TDS) concentration in the water samples did not alter significantly during the distribution from the original value present in the treated water from the treatment plant. In the samples taken from Kemari and Maripur area, the TDS was significantly increased from the original values of treated water, perhaps due to seepage of brackish water of sea or groundwater.

Interviews and discussions with a number of residents in the various locations where the samples were collected reveals that the residents are very much concerned of the

quality and the quantity of the water supplied. Majority of the consumers try to improve the quality of the supplied water by boiling it or adding sulphur, potassium permagnate or alum in the storage tank.

Conclusion

The present study makes the following conclusions:

- At treatment plant, the water quality supplied to the city meets WHO standard.
- The presence of coliform bacteria (not fecal coliform) in the main distribution lines indicates that as the supplied water is transported in the main lines, it gets contaminated with the surrounding soil through leaks/cracks.
- The presence of focal coliform in the water of branched lines feeding to consumers and standposts, confirm the seepage of sewage into lines making unfit for drinking purpose.
- The overall conclusions of the present study is that the quality of water supplied to the city is not fit for drinking purpose as per WHO standards. However this conclusion is based on the very limited samples (only forty) taken during the study at one time basis. All year around periodic monitoring of the water quality in the different part of the city would certainly reveal a better picture of the fate of the water quality as it is distributed around the city. The Karachi Water and Sewerage

Board should take into consideration this suggestion seriously and act immediately to rectify the situation.

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- M. FAZAL KARIM, Post-Graduate Student, presently associated with Karachi Development Authority, Karachi.
- DR WASEEM AKHTAR, Supervisor and Associate Professor, Institute of Environmental Engineering, NED University of Engineering and Technology, Karachi.
- MRS SEEMA JILANI, Assistant Professor of the Institute.

Table 1. Summary results of water supply lines from Indus Souce via Gharo, Pipri and N.E.K. filter plant (August – September 1998)

**Table 2. Summary of water from Indus source through COD filter plant
(September, 1996)**

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**Table 3. Summary of results of water supply line from hub water source
(September 1996)**

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