

**DEVELOPMENT OF COMMUNITY BASED
ARSENIC & IRON REMOVAL UNIT FOR RURAL WATER SUPPLY SYSTEM**

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Development of Community Based
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Executive Summary

Widespread arsenic contamination and presence of high concentration of iron in groundwater are major water quality problems in Bangladesh, where water supply is heavily dependent on groundwater. Although a few household arsenic removal units have been developed and tested in the field, little attempt has been made in the developing community type arsenic-iron removal unit.

The present study focused on development of a community based Arsenic-Iron Removal Unit (AIRU) adopting the technique of adsorption and co-precipitation of arsenic onto the flocs of ferric hydroxide, making use of the naturally occurring iron of groundwater. In order to simulate the field conditions in Bangladesh, in addition to laboratory model tests, five treatment units were constructed and their performance was monitored in different water quality conditions of the country. The AIRU, which is attached to a tube well, has mainly two chambers, down-flow flocculator and up-flow roughing filter. The flocculation and roughing filtration processes in the AIRU were accomplished through the use of coarse media gravel beds.

The operation and maintenance of the developed AIRU are simpler and more users friendly in comparison to the previously developed community based water treatment units. The reduction of flow of treated water for the AIRU was not significant in comparison to the tube well water flow (initially 82% and after six weeks of operation 63%). The clogging and maintenance requirement of the AIRU was not frequent and the cleaning procedures were simple. Cleaning was performed without removing the coarse media gravel beds from the AIRU and the chance of external bacterial contamination was almost negligible.

The AIRU was constructed by local mason using locally available materials. Raw water with arsenic concentration up to 200ppb and the iron-arsenic concentration ratio ≥ 30 (by weight) was treated with the AIRU satisfying Bangladesh Standards (50ppb As) without using any chemicals. For arsenic concentration above 200ppb and iron-arsenic concentration ratio < 30 , intermittent dosing of an oxidizing agent (bleaching powder) was required. Use of sorptive media (Read-F), in addition to AIRU, eliminated the use of oxidizing agent and this would increase the active life of Read-F media significantly.

Iron removal efficiency of 90% was achieved through the AIRU for the face velocity less than $0.5 \text{ m}^3/\text{m}^2\text{-hr}$ and the removal efficiency was a function of raw water iron concentration and it increased with the passage of time. Number of beneficiaries and water consumption was increased by about 10 folds after the installation of the AIRU.