6th Report on Arsenic Removal Plant

Part-A: Physical Aspects of the *Arsenic Removal Plants* (ARP) installed in 4 different Blocks of North 24-parganas, West Bengal *(March-April 2004)*

Part-B: Follow-up study (during *May2004*)of the 20 ARPs with both Physical and Chemical Aspects, which were found functioning well on *March-April 2004* (Part-A)

July 2004

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Even the God of Wealth (Kuber) would not waste his money on ARPs as we are doing in West Bengal

1. Preface

During last four years we had published the following five reports on the usefulness of Arsenic Removal Plants (ARPs) installed in the arsenic affected areas of West Bengal.

Report-1: **Performance of Arsenic Removal Plant for Treating Ground Water with Community Participation, June 2000**

Report-2: **Fate of Three Crore-Rupee Arsenic Removal Plants in Murshidabad, June 2001**

Report-3: **Efficiency of 259 Arsenic Treatment Plants Installed in Ten Blocks of the District, North 24-Parganas-West Bengal, January 2003**

Report-4: **Follow–up Study of Arsenic Treatment Plants in Murshidabad, March 2003**

Report-5: **Usefulness of Arsenic Removal Plants: A case study in Kolsur Gram Panchayet of Deganga Block in North 24-Parganas, West Bengal, India, December, 2003**

(All these reports are available from SOES on payment)

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3. Summary of the 6th Report:

This is the 6th report in this context. The report has been divided in two parts.

(1) Part-A:

Physical aspects of the Arsenic Removal Plants installed in 4 different Blocks of North 24-Parganas, West Bengal (March-April-2004)

(2) Part-B:

Follow-up study (during May 2004) of the 20 ARPs with both physical and chemical aspects, which were found functioning well during March-April 2004 (Part A)

3.1. Part-A:

Physical aspects of the Arsenic Removal Plants installed in 4 different Blocks of North 24-Parganas, West Bengal (March-April-2004)

Overall summary of the ARPs installed in 4 different Blocks (Hasnabad, Gaighata, Basirhat-1 and Habra-1) in North 24 Parganas, West Bengal with respect to its physical aspects.

Total number of treatment plants installed (PT-143, IE-29, BEC-3, AIIHPH-3, RPM-2, AE-2)	182
Total number of treatment plants in defunct conditions (PT-51, IE-7, AIIHPH-3, RPM-2)	63 (34.6%)
Number of plants producing water but villagers were not drink the water because of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-53, IE-14)	67 (36.8%)
Number of plants producing water and villagers were occasionally drinking the water. They complained time to time yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-24, IE-6, BEC-1, AE-1)	32 (17.6%)
Plants were functioning with out any complaints during our survey and villagers were drinking the water (PT-15, IE-2, BEC-2, AE-1)	20 (11%)

*PT- Pal Trockner, IE- Ion Exchange, BEC- Bengal Engineering College, AE- Anir Engineering

So out of total 182 ARPs in 4 Blocks (Hasnabad, Gaighata, Basirhat-1 and Habra-1), 162 (89%) ARPs were not useful

3.2. Part- B:

Follow-up study (during May 2004) of the 20 ARPs with both physical and chemical aspects, which were found functioning well during March-April 2004 (Part A)

20 Arsenic Removal Plants (ARPs) were short-listed from 182 APRs in 4 different Blocks of North 24-Parganas according to there performances and those found functioning well according to the villagers (during survey period March –April 2004) were surveyed again after 30-45 days, to know its overall efficiency (physical and chemical aspect).

Overall summary of the 20 Sort-listed ARPs out of total 182 ARPs from 4 different Blocks of North 24 Parganas district, with respect to Arsenic and Iron concentration

Total number of ARPs examined for arsenic and Iron	20
Total number of ARPs where filtered water could not be collected as the plants were found to be defunct	4 (20%)
Number of ARPs out of 16 in working condition where arsenic concentration in raw water was less than 10μg/l	1 (6.25%)
Number of ARPs out of 16 in working condition where arsenic concentration in raw water was above 50μg/l	15 (93.8%)
Number of ARPs out of 15 unable to remove arsenic from raw water after treatment less than 10μg/l (WHO recommended value of arsenic in drinking water)	14 (93.4%)
Number of ARPs out of 15 unable to remove arsenic from raw water after treatment less than 50μg/l (Indian standard value of arsenic in drinking water)	8 (53.3%)
Number of ARPs out of 15 unable to remove arsenic from raw water after treatment less than 10μg/l (WHO recommended value of arsenic in drinking water)	1 (6.6%)
Number of ARPs out of 15 able to remove arsenic from raw water after treatment less than 50μg/l (Indian standard value of arsenic in drinking water)	7 (46.7%)

3.2. Part- B: Overall summary of the 20 Sort-listed ARPs	
Number of ARPs out of 18 analyzed for iron where iron concentration in raw water was above 300μg/l (WHO recommended value and Indian standard value of iron in drinking water)	18 (100%)
Number of ARPs out of 16* unable to remove iron from raw water after treatment less than 300μg/l (WHO recommended value and Indian standard value of iron in drinking water)	14 (87.5%)

*Of the total 20 Sort-listed ARPs, 4 ARPs were found to be in defunct state of which we could collect 2 raw water samples but there filtered water could not be collected, as the ARPs were defunct.

So out of 20 Short-listed ARPs, 15[@] ARPs found in working condition of which 8 (53.3%) APRs were not useful in removing arsenic (according to Indian value of arsenic in drinking water) and 14 (93.3%) ARPs were not useful in removing arsenic (according to WHO recommended value of arsenic in drinking water) and out of 16 ARPs, 14 (87.5%) were not useful to remove iron from raw water (according to Indian Standard value and WHO recommended value of iron in drinking water).

[@] 16 ARPs were found in working condition but in 1 ARP arsenic concentration in raw water was less than 10 μg/l (WHO recommended value of arsenic in drinking water) so the ARP was not taken into account.

Combining Report A and Report B, it appears that most of the ARPs installed in 4 blocks of North 24 Parganas have failed to provide arsenic and iron safe water. There are no quality control and quality assurance of these ARPs.

5. Situation of the Arsenic Removal Plants, installed in 4 individual Blocks of North 24 Parganas, West Bengal during March – April 2004

5.1. Hasnabad Block

5.1(a). Situation at a glance of the Arsenic Removal Plants, installed in Hasnabad Block in North 24 Parganas, West Bengal during March – April 2004

Total number of ARPs installed (PT-43)	43
Total number of ARPs in defunct conditions (PT-19)	19 (44.2%)
Number of ARPs producing water but villagers do not drink the water because of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-15)	15 (34.9%)
Number of ARPs producing water and villagers occasionally drinks the water. They complained occasional yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-4)	4 (9.3%)
ARPs functioning with out any complaints and villagers drink the water (PT-5)	5 (11.6%)

So out of total 43 ARPs, 38 ARPs (88.4%) are not useful

5.2. Gobordanga Municipality, Habra-1 Block

5.2(a). Situation at a glance of the Arsenic Removal Plants, installed in Gobordanga Municipality, Habra-1 Block in North 24 Parganas, West Bengal during March – April 2004

Total number of ARPs installed (PT-36, BEC-1)	37
Total number of ARPs in defunct conditions (PT-8)	8 (21.6%)
Number of ARPs producing water but villagers do not drink the water because of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-16)	16 (43.2%)
Number of ARPs producing water and villagers occasionally drink the water but complaints of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-9, BEC-1)	10 (27%)
ARPs functioning with out any complaints and villagers drink the water (PT-3)	3 (8.1%)

So out of total 37 ARPs, 34 ARPs (91.9%) are not useful

5.3. Basirhat-1 Block

5.3(a). Situation at a glance of the Arsenic Removal Plants, installed in Basirhat-1 Block in North 24 Parganas, West Bengal during March – April 2004

Total number of treatment plants installed (PT-50, IE-29, BEC-1)	80
Total number of treatment plants in defunct conditions (PT-19, IE-7)	26 (32.5%)
Number of plants producing water but villagers do not drink the water because of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-18, IE-14)	32 (40%)
Number of plants producing water and villagers occasionally drink the water but complaints of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-10, IE-6)	16 (20%)
Plants functioning with out any complaints and villagers drink the water (PT-3, IE-2, BEC-1)	6 (7.5%)

So out of total 80 plants, 74 plants (92.5%) are not useful

5.4. Gaighata Block

5.4(a). Situation at a glance of the Arsenic Removal Plants, installed in Gaighata Block in North 24 Parganas, West Bengal during March – April 2004

Total number of ARPs installed (PT-14, AIIHPH-3, RPM-2, AE-2, BEC-1)	22
Total number of ARPs in defunct conditions (PT-5, AIIHPH-3, RPM-2)	10 (45.5%)
Number of ARPs producing water but villagers do not drink the water because of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (PT-5)	5 (22.7%)
Number of ARPs producing water and villagers occasionally drink the water but complaints of yellow-red coloration/ bad odor/ water spattering / sand gushing problems (AE-1)	1(4.5%)
ARPs functioning with out any complaints and villagers drink the water (PT-4, AE-1, BEC-1)	6 (27.3%)

So out of total 22 plants, 16 plants (72.7%) are not useful

7. A few Comments about Arsenic Removal Plant (ARP)

a) Initially after the installation, many ARPs produce good quality water but in course of time water quality deteriorates.

b) Filtered water smells bad in many cases.

c) Some of the ARPs are not user friendly. Villagers may face difficulties to collect water from these plants.

d) Every now and then ARPs get defunct.

e) Some villagers do not use ARP water as they are not sure whether the ARP could remove arsenic or not.

f) Many villagers are using the treated water for washing their hands and legs, washing their clothes, utensils, taking bath and few even tied their cow with the plant. (See Photographs of Plants B33, B47, B66, B67, G6 under Photographs of Misused ARPs)

g) Villagers prefer drinking from supply water rather than from an ARP. So many of the ARPs remain unused (See photograph of Plant G2 under Photographs of Misused ARPs)

h) Villagers can examine the water only in terms of its color and smell and obviously not in terms of arsenic and iron concentration. For this reason many people still drinking arsenic contaminated water even though they drink filtered water (see our earlier reports on ARPs)

i) Some of the treatment plants are pressure pump. From our long experience we know that these pumps may suffer from sand gushing when installed in alluvial sediment.

j) Proper maintenance and regular back washing could improve the performance level of the plants.

k) Villagers consider water as a cheap commodity. The proverb “as cheap as water” is what they believe. They also believe Government will look after water supply, and villagers themselves have no responsibilities in this matter. This attitude has to be changed.

l) **Our opinions: (a) most of the treatment plants may perform better if they are maintained, being back-washed regularly and properly (b) arsenic and iron concentration in filtered water to be measured after a regular interval (c) there is a need to increase villager’s awareness and their participation to run ARPs successfully.**

8. Conclusion

The study shows that though the treatment plants were installed for supplying safe water with respect to arsenic and iron to the people in the rural villages, the endeavor fails to succeed because of many reasons such as (i) Technological limitation of the plants and plants are not properly serviced and maintained (ii) Lack of peoples participation (iii) Lack of awareness of people (iv) Lack of education (v) village politics (vi) Poor socio-economic condition and many more.

Finally,

"In village predominant India and Bangladesh even a highly successful technology may not succeed in rural areas unless there is an honest will of the politicians, it fits the rural circumstances and is well accepted by the rural mass. Development of such technology is only possible when a combination is made between bureaucrats, technocrats and villagers with proper village level participation."

"Water - the elixir of life, keep it free from dishonesty and politics."

9. Persons Involved in this Study

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Photographs of a few defunct tubewells out of many