

PROJECT HIGHLIGHT

Treatment System for Muddy Irrwaddy River Water



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effluent treatment facilities.**

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Treatment engineers triumph over muddy Irrawaddy

Water engineers are used to dealing with difficult problems, but as if clarifying the muddy waters of the Irrawaddy were not enough, a Hong Kong team had to endure civil disturbances in Burma while building a water treatment plant

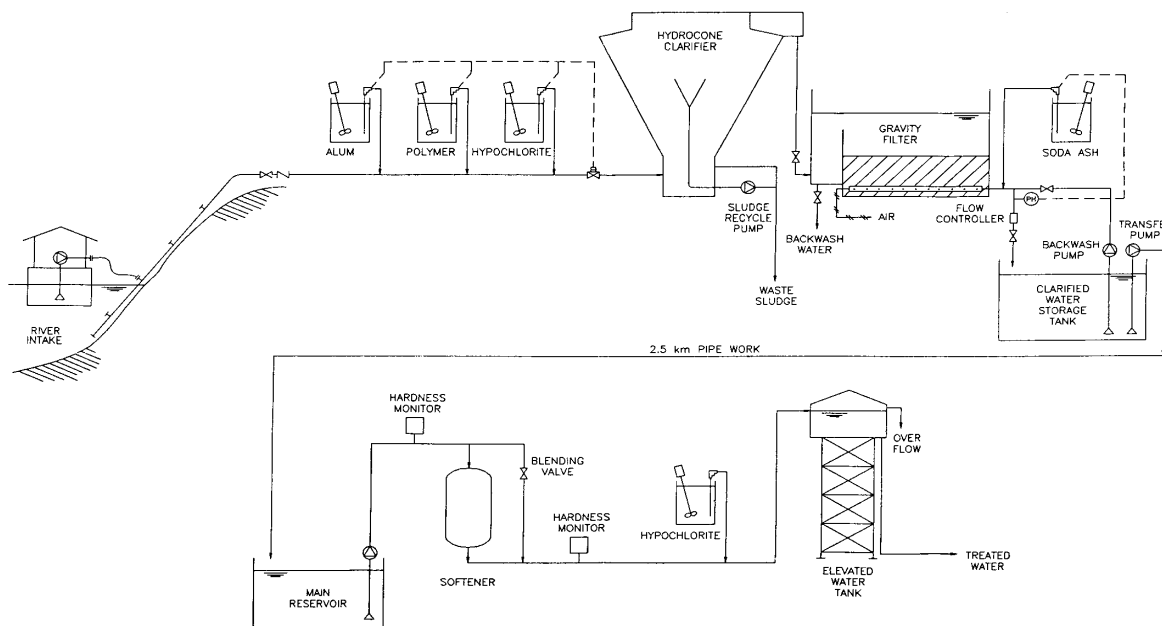
The fertile soil of SE Asia is irrigated by countless, meandering rivers. They are naturally the sources of water supply, both domestic and industrial, for the population living along their banks. However, it is usually impossible to use the water directly due to high turbidity, excessive hardness and mineral content, and contamination with sanitary and industrial wastes.

The Irrawaddy river in Burma is a typical example. A textile finishing plant project, located in Shwedaung, alongside the Irrawaddy, was to be constructed by the Textile Industries Corporation (TIC), an agency under the government of Burma, financed by the World Bank. A water intake and treatment system was included in the project of draw water from the Irrawaddy and treat it for process use drinking and boiler feed purposes. The capacity of the treatment system was to be 190m³/hr, expandable to 285m³ per hour. The quantity of the treated water was to conform to WHO Drinking Water Standards. It also had to comply with the recommendations of the Textile Research Council on water quality of textile processing.

In addition to the generally undesirable characteristics pointed out earlier, the Irrawaddy river posed other challenges that had to be overcome. First, the seasonal variation between low and high water levels

in the Irrawaddy is exceedingly large (approximately 15m). Second, the water intake, if it was to be stationary, could not be fixed near the shore while remaining submerged. Third, since the Irrawaddy is a particularly muddy river, the water being drawn near the bottom would carry large amounts of silt, making the treatment system unnecessarily costly. Fourth, the water flow velocity during heavy rainfalls is extremely high, and any intake structure supplied had to withstand the rapid flows. Finally, the quality of the raw water fluctuates considerably, therefore the treatment system had to be designed to cope with the changes.

The Tootal Group of U.K. was appointed by the TIC as the project manager and consultant for the entire complex and they were responsible for the basic technical specifications for the water treatment system, evaluation of the tenders and appointment of the project supervisors. From among seven bidders, Hydrex Asia Limited was chosen to undertake the design and supply of the entire system – from the intake to the final elevated storage tank, including all piping and electrical work construction and installation supervision, training of TIC staff in Hong Kong and at site, and commissioning and testing of the plant.



The process selected by Hydrex is illustrated in Fig.1. The system can be divided into three main segments: river intake, the raw water treatment at the river site, and treatment at the factory site 2.5km away, each with its own control centre. The river intake, which is the starting point of the systems, is designed to overcome the many problems enumerated above. It is basically a floating, barge-like structure, with pumps installed inside and connected to a large diameter, flexible delivery pipe. Suction valves and strainer projected from the pumps, reach down into the river to draw water without ever touching the bottom. Since the entire assembly floats on the rivers, only the relatively clearer water below the surface of the river is being drawn. This feature eliminated the need for a preliminary sedimentation tank, which is normally required for removal of excessive suspended solids in a muddy river. The water can thus be fed directly into the clarifier without having to pass through any intermediate tanks. A special anchoring

system is provided to prevent the intake structure from drifting or hitting the river bank. In addition, a series of pontoons were supplied to support the access bridge and the piping from the intake structure to the shore.

Hypochlorite dosing

At the river site treatment plant, chemicals are fed into the raw water pipeline before the water enters the clarifiers. Alum and Polyelectrolyte and introduced by an automatic proportioning device to promote coagulation and flocculation. Hypochlorite is added at this stage to prevent fungal and bacterial growth within the pipelines and the clarifiers.

Hydrex proprietary design Hydrocone clarifiers are used as the heart of the system for coagulation and clarification. The Hydrocones are hydraulically operated, cone- shaped, with upflow, solids contact, sludge blanket type reactor- clarifiers.

Clarification is achieved by forcing the water to flow upward in an expanding spiral path through a blanket of previously formed precipitates. Mixing, coagulation, flocculation, settling and clarification are thus combined within a single treatment unit. There are no moving parts, mechanical agitation or sludge scraping, hence energy and operating expenditures are minimal. It also eliminates the maintenance problems normally associated with conventional mechanical clarifiers and can be easily operated and maintained by semi-skilled labour. The thick sludge blanket in the clarifier acts as a filter and traps nearly all the suspended solids present in the incoming water. The sludge is discharge from the unit and the clear supernatant is collected at the top of the Hydrocone clarifier and directed to the gravity filters.

The clarified water is filtered by means of two automatic rapid gravity sand filters of reinforced concrete construction. They are equipped the Hydrex underdrain system with nozzles and air scouring. When excessive sludge build-up is detected by the loss-of-head gauges in the filters, backwashing will be initiated. An automatic flow controller is installed on the outlet of each filter to maintain a constant flow rate



The 7m tall Hydrocone clarifiers that operate in parallel.



Looking down from the Hydrocones onto the riverside plant room, the gravity sand filters and the filtered water storage tanks.



Clean, clear water in the filtered water tank



The fully automatic water softeners, 2m in diameter with resin regeneration equipment at the factory, plus the local crew.

through each unit, regardless of the varying pressure loss across the filter bed. After pH adjustment, the filtered water is directed into a storage tank and is then pumped to a 1200m³ reservoir located at the factory site about 2.5km away (via a large diameter ductile iron pipe).

The major treatment system at the factory site is a 190m³/hr automatic softening system with a blending device and hypochlorinator. Hardness monitors are provided at the softener outlets and after the blending device in order to control the hardness within the limits for various uses. The treated water is then delivered into a 280m³ capacity elevated tank, 20m above ground level, for dyeing and finishing operations. The backwashing, brine regeneration and rinsing of the resin beds in the softeners are carried out automatically.

The remoteness of Shwedaung from any major town, the need to evacuate Hydrex personnel from the site during pro-democratic demonstrations, and the scarcity of tools and supplies in Burma made the undertaking of the project an unique challenge for Hydrex.

The system was finally completed to the total satisfaction of TIC after the return of Hydrex supervisory staff to the site. A team of specialists from TIC and Tootal (UK) witnessed the testing and performance of the equipment and the system during a three-day run and accepted the entire plant as fully complying with the specification. They were particularly impressed with the Hydrocone clarifiers' ability to turn the Irrawaddy muddy water into a clean and clear water.

FOR FURTHER INFORMATION

A full range of water and wastewater treatment systems and equipment are available from Hydrex. For further information, please contact us or our authorized agent.

Authorized Agent:

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