

Al Bakir Freshwater Treatment Plant

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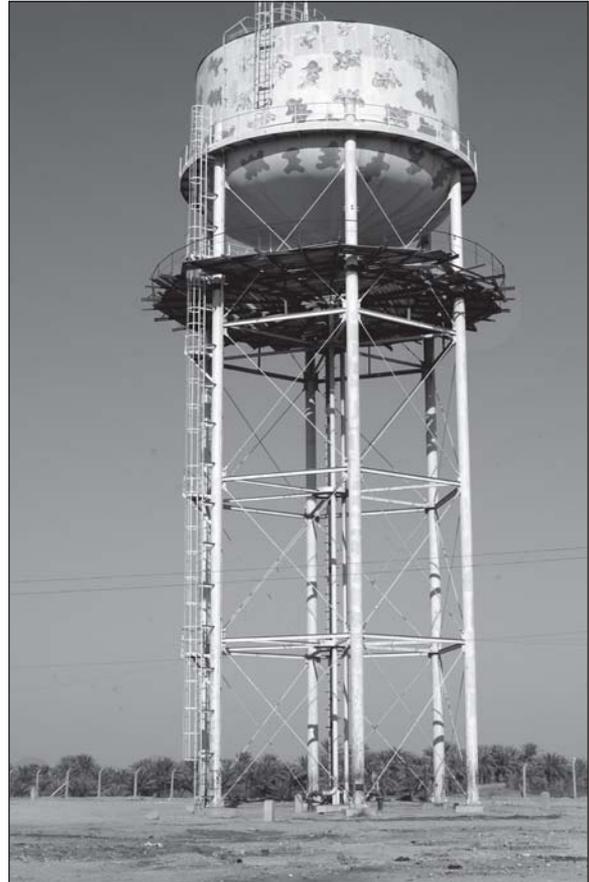
The Al Bakir freshwater treatment plant is part of the Balad Air Base complex, which was built in the 1970s and 1980s as part of Saddam Hussein's military buildup. It is located on the banks of the Tigris River about two kilometers from the base perimeter. A Yugoslavian company under contract to the Iraqi government designed and built the plant, with most of the construction being completed by Yugoslavian workers. The plant was built to provide potable and irrigation water to the base and the nearby village.

In May 2004, members of the 86th Engineer Team (Dive) inspected the Al Bakir freshwater intake lines, designed to draw their water from the neighboring river. The team found only one of the four intakes exposed, and the other three buried beneath a 15-foot mound of sediment. The team proposed five courses of action to keep the intakes clear of sediment. But no action was taken at the time, and the final water intake became clogged by 2005. As a result, a temporary aboveground pumping station was installed by the Iraqis.

Existing Situation

The 411th Engineer Brigade construction management section (CMS) first visited the Al Bakir freshwater treatment plant in September 2006. The plant was operational, but its cisterns were being filled by the cobbled-together system of pipes and worn-out pumps that were set on the ground, exposed to the elements and vehicular and foot traffic. This system was in poor condition, leaked badly, and required that all water be pumped into the cisterns before it could be processed through the rest of the system. Water could not be pumped directly to the clarifiers for processing. The pumps used to get water from the chlorinated water tanks to the water net were undersized and worn, providing only a portion of the water needed in the peak summer months, when temperatures frequently exceed 120 degrees. The generator that powered the water plant was worn-out, and there was no backup generator to pick up the load if the first generator failed or was down for maintenance. The gravity lines that fed the two large cisterns were nonoperational.

The managers at the Al Bakir freshwater treatment plant had decided that the only way to keep the plant operational was to pump water into the cisterns, so two much-worn pumps had been installed at the Tigris River. These pumps effectively bypassed the gravity feed lines that had become completely unusable. The remaining parts of the plant were worn but still serviceable. Raw water from the cistern was being pumped to



Al Bakir water tower

the clarifiers, then to the sand filters, then injected with chlorine, stored in tanks for 24 hours, and finally pumped to the village of Al Bakir for consumption. The pumps installed at all stages of the process were badly worn but continued to operate. A 250,000-gallon water tower was not operational, which added further to the strain on the system's pumps. The Iraqi national power supply was sporadic, lasting four hours a day at most. The plant provided 250,000 gallons of potable water and 150,000 gallons of irrigation water to Al Bakir and its 5,000 residents daily. When fully operational, the plant was capable of providing more than 650,000 gallons of potable water and 500,000 gallons of irrigation water daily.

Scope of Project

To adequately upgrade the Al Bakir freshwater treatment plant, a design incorporating the jury-rigged system the Al Bakir engineers had built was deemed the most



Pump station for treated water at Al Bakir

practical and versatile solution. The original gravity feed system to the cisterns was considered unsalvageable and was abandoned due to the almost constant maintenance required to keep it free from sedimentation from the high silt content of the Tigris River. Several innovations not found in the original system, but added on the temporary Iraqi system, were incorporated into the new permanent design. These innovations included separate lines to deliver water directly to the clarifiers, bypassing the cisterns and smaller intake lines that could be pulled and repaired if damaged or blocked by sedimentation.

Since a functional water tower was deemed critical for the system to function properly and not put undue wear on the pumps in the water system, the nonoperational water tower would have to be repaired.

The 411th Engineer Brigade would work in cooperation with the Iraqi engineers responsible for keeping the Al Bakir plant running. It was understood from the start that this project would be designed and built by Iraqis. The 411th would provide engineer expertise and an independent government estimate once the project was ready to move forward. As part of working with the Iraqi engineers, the 411th prepared its own designs, engineering calculations, and construction drawings and specifications to facilitate an accurate independent government estimate to apply for a Commander's Emergency Relief Program (CERP) funding packet.

Conclusion

The project received CERP funding, and the contract was executed at a cost below the original estimate. An extensive knowledge of what the project required and

an excellent working relationship between the 411th Engineer Brigade CMS engineers and the Al Bakir engineers helped the project proceed smoothly, and it was completed in April 2007 without any significant problems. Al Bakir now has a reliable source of water from the ancient Tigris River for its freshwater treatment plant and the potential to provide water to neighboring villages. 

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