

FINAL REPORT

EMERGENCY REHABILITATION OF KARAMA WATER TREATMENT PLANT – LINE I



1. Programme/Project Number

- ATLAS Project Number: UNDG 66870, UNDP Iraq 46959
- ATLAS Award Number: UNDG 54870, UNDP Iraq 41253
- Cluster No. E3-04

2. Programme/Project Location

- Region(s): Central Iraq
- Governorate(s): Baghdad Governorate, Baghdad City
- District(s): Al Karkh District, including Khadimiya area, Al Oteifya area and adjacent areas

3. Programme/Project Timeline/Duration

- Overall Duration: 37 months: October 2005-December 2008
- Original Duration : 15 months: October 2005-January 2007
- Programme/ Project Extensions: 2008 until 21 November 2009

4. Background

The problem of the water and sanitation in Iraq is appalling at the moment; over the past two decades the water and sanitation sector in Iraq experienced a steady but devastating decline. The potable water systems suffered from sanctions and embargoes imposed since August 1990 and the shortage in the chemicals supply required for water treatment. A major sector deterioration contributor was the damage of the physical infrastructure caused by the three most recent consecutive wars, which caused severe drop in the offered service levels. It is worth noting that post war vandalism resulted in more damage compared to 13 years of embargo and wars.

The theoretical drop in the access rate to safe potable water summed to some 3 % only in the time span between 1991 and 2002 (from 95 % to 92 % coverage level), or from 330 liters per capita per day (l/c/d) to 218 l/c/d. However, this overall average figure is quite misleading given the fact that the majority of the population never gained access to such a large water consumption rate, especially those living by the end of the leaking and damaged water distribution system. This prominent unsafe water and unhygienic practices situation led to an alarming escalation in water-borne diseases, thus contributing to a fast growing problem of malnutrition, morbidity and mortality of infants as reflected by the “Under Five Mortality Rates”.

Of particular importance is the City of Baghdad where a considerable portion of the country’s population is concentrated and where water supply service levels have dropped significantly. In this context, UNDP is addressing the current project, which upon completion would:

1. Restore the production of Karama WTP-Line I by 10MGD.
2. Increase the access rates to safe potable water to some 750,000 capita residing the Karkh side of Baghdad City.
3. Increase reliability, efficiency and long term operation of Karama Water Treatment Plant.
4. Water Quality monitoring and testing laboratory of the plant capable of conducting daily, weekly and monthly tests according to international testing standard procedures.

The full rehabilitation of Al Karama Water Treatment Plant Line I and the partial rehabilitation of Line II and Line III have improved the supplied water quantity by 40 per cent. The completion of this work brings the total plant output back to the pre 1990 capacity with an increased production of Line I by 10 Million Gallons per Day (MGD). Water quality has improved by 75 per cent and 300 per cent related to the turbidity (solid content of water) and the chlorine content in the treated water, respectively. The result of this rehabilitation project is that approximately 1,000,000 inhabitants residing on the Karkh side of Baghdad now have improved access, both quantitatively and qualitatively, to potable water supply services.

UNDP has implemented the first ever chlorination system that conforms to the mandatory health and safety requirements in Iraq. Given its commitment to fostering sustainable development, the water treatment plant operation and maintenance (O&M) staff, Baghdad Water Authority (BWA) and the Mayoralty of Baghdad (MoB) staff have received

comprehensive training on O&M covering a diverse range of activities that would allow long-term trouble-free operation of the various systems.

5. Outcomes and Outputs

Outcome 1: Increase production of Karama Water Treatment Plant in Baghdad by 10MGD.

Status: Fully achieved with additional rehabilitation work implemented: The project contributed to the rehabilitation, installation and the upgrading of the water sector facilities in the City of Baghdad through rehabilitation of Al-Karama Water Treatment Facility including the full rehabilitation of Line I and partial rehabilitation of Lines II and III.

Quantitatively, approximately 1 million persons inhabiting the peripheries of Baghdad City gained access to safe potable water through the increase in the overall production capacity of Al-Karama Water Treatment Facility by some 10 MGD (40 per cent) and the improvement in the quality of the water:

Output 1.1: Production increased by additional 10 MGD of potable water- enough to reach the 1,000,000 or so residents on the Karkh side of Baghdad, specifically Kadhimiya area and a few quarters in Rasafa

- Procurement of materials and labor for rehabilitation and renovation of Karama Water Treatment Plant Line I by 10 MGD. This included complete rehabilitation of the entire line works including civil and electro-mechanical works on the raw water pumping station, alum dosing facility, chlorine dosing facility (pre and post chlorination), flocculation tanks, sedimentation tanks, intermediate storage tanks, complete sand filtration facility, treated water pumping station, electrical power supply system (i.e. power distribution network, switchgears, transformers, etc), and several overhead cranes.
- Activities were expanded to include the partial rehabilitation of Lines II and III of the treatment plant covering various aspects including upgrading the electrical power supply system (power distribution network, switchgears, transformers, site illumination, etc), construction of a chlorine building, rehabilitating several mechanical systems (sedimentation tanks, overhead cranes, pumps, etc).
- Completion of the physical rehabilitation works and implementation activities including the full rehabilitation of Line I with materials procured and labor contracted.
- Completion of the final testing and commissioning on 20 November 2008.
- Issuance of the Certificate of Substantial Completion December 2008.

Outcome 2: Increase reliability and long term operation of Karama Water Treatment Plant.

Status: Achieved beyond initial scope of intervention: All project scope of work including construction, equipment and supplies were completed. In addition, the capacity building/training programme was conducted that included the plant operators and technical staff, enhancing operational sustainability and reliability:

Output 2.1: The reliability and long-term operation of the whole of Karama Water Treatment Plant is improved by 40 per cent

- Procurement of sand filter media for operation for one year.
- Capacity strengthening of staff of the water treatment plant, Baghdad Water Authority and Mayoralty of Baghdad Operations and Management.
- Partial rehabilitation of Lines II and III of the treatment plant covering various aspects including upgrading the electrical power supply system (power distribution network, switchgears, transformers, site illumination, etc), construction of chlorine building, rehabilitating several mechanical systems (sedimentation tanks, overhead cranes, pumps, etc).

Output 2.2: The staff of Mayoralty of Baghdad, Baghdad Water Authority and Karama Water Treatment Plant has the capacity to manage the potable water system.

- One hundred twenty (120) man/woman days of Operations and Management training delivered for the Karama Water Treatment Plant, Baghdad Water Authority and Mayoralty of Baghdad Operations and Management staff.
- Another development partner provided a series of training courses which contributed to achieving the indicator target.
- A decision was made by the Steering Committee not to duplicate this training scope of work.

Outcome 3: Water quality monitoring and testing laboratory of the plant capable of conducting daily, weekly and monthly tests according to international testing standard procedures.

Status: Partially achieved because it was addressed by another development partner with the indicator target met: The water quality and testing laboratory was rehabilitated by another development partner meeting the goals of the project. The Steering Committee decided that this activity would be duplication; therefore, this component was not implemented.

Water quality monitoring and conducting periodic tests according to international testing standards have been improved through delivering 120 man/woman-days of

training on water testing techniques in addition to operation and maintenance for the Karama Water Treatment Plant staff:

Output 3.1: A functioning water testing laboratory

- This output was addressed by another development partner with the indicator target met.
- A decision was made by the Steering Committee not to duplicate the scope of work.

Output 3.2: Staff trained in water testing techniques

- Capacity training for technicians from Al Karama Water Treatment Plant and the Water Department of Baghdad Water Authority : Four (4) Technicians trained on Instrumentation, Two (2) Technicians trained on Recording and Documentation, Two (2) Technicians trained on Safe Handling of Chemicals and Sixteen (16) Technicians trained on Laboratory Equipment Use and Statistical Analysis.

6. Beneficiaries

- Key Beneficiaries “stakeholders”: Baghdad Water Authority (BWA) and Mayoralty of Baghdad (MoB)
- Direct Beneficiaries: Approximately 1,000,000 inhabitants residing on the Karkh side of Baghdad directly benefit through access to improved quantities and quality of potable water supply services.
- Indirect Beneficiaries: Staff and technicians at the Mayoralty of Baghdad, Baghdad Water Authority and Karama Water Treatment Plant as well as the national contractors and local consultant. In addition, Project implementation had indirectly resulted in i) generating commercial activity and employment opportunities for local consultant and national contractors through the entered services and works contracts and, ii) capacity building of the relevant Baghdad Water Authority and Mayoralty of Baghdad staff that will result in improving their employment terms, conditions and future opportunities.

7. Project Development

a. Implementation Arrangements for the Consultancy Services

Following a competitive bidding process and a relatively long award process, UNDP awarded the contract to Messrs. “Al-Ula Engineering” for providing the required scope of consultancy services. The scope of the consultancy services was divided into four phases as follows:

- Phase I: Assessment and Diagnosis.

- Phase II: Preliminary Designs, Cost Estimates, Detailed Designs and Bidding Documents.
- Phase III: Pre-Construction Services.
- Phase IV: Supervision of Works.

The original Contract value totaled US\$ 321,900. Due to reasons beyond the control of both parties, ACP approved a contract amendment, Amendment No.1, for the subject contract totaling US\$ 49,715 for which a contract was signed by both parties.

A Contract amendment, Amendment No.2, was signed in September 2008 to cover the extended contract period until 31 October 2008 to carry out the services under phase IV ‘Supervision of Works’ all of which is beyond the consulting firm’s control; the required extension in Al Ula contract is foreseen at 2 months in order to concur the project substantial completion date. Al Ula Contract was further extended for two months (31 December 2008) to allow the performance of additional services under the construction supervision, Amendment No.3. This amendment created a contract price increase valued at US\$3,000 and the remaining value of the additional services was charged against the Contingency amount (20,000) in order to cover the remaining period of the contract and to concur the project substantial completion date.

b. Implementation Arrangements for the Consultancy Services

Following a competitive bidding process, UNDP awarded a contract to Messrs. “Power Engineering World Co.” for implementing the required scope of construction and contracting works. As such Purchase Order No. IRQ10-P/AM194/07 was issued with a total contract value of \$ 2,310,707.15 including a contingency amount of US\$ 250,000. Contract amendment No.1 was signed on 24th June 2008 to reflect the additional works and part of the bid optional items which were drawn from the abovementioned contingency amount and as per the variation order; bearing in mind that the entire contingency amount less US\$3,604.43 have been exhausted in additional work items primarily due to increase quantities implemented with no change in the unit rates (acquired through competitive process) as per the awarded contract context.

c. Financial Arrangements

The signed contract with Messrs. “Al-Ula Engineering” in conjunction with the required scope totaled US\$ 321,900. According to the terms of payment, the company payments are affected upon approval of each Phase deliverables during Phases I, II and III. During Phase IV, the company payments are affected on monthly basis. Payment of the final invoice had effected by UNDP after the satisfactory submittal of the Process Evaluation Report.

The awarded contract to Messrs. “Power Engineering World Co.” was signed on October 2, 2007 with a value totaled US\$ 2,310,707.15. The site was handed over to the Contractor on November 10, 2007 and according to the contract stipulations, the substant completion is due in 10 months following the contract effective date. Following to the Contract Amendment, the contract works was extended for another one month to be within 11 months.

The Contractor submitted invoices for payment on monthly basis, based on progress of work. To support its payments, the Contractor submitted an overall progress report depicting progress to submission date and incremental progress together with a full file of progress photographs representing overall, incremental, etc progress.

As agreed with the steering committee at implementation contest, UNDP had only affected payments after receipt of the certificate of payment issued by the Engineer (i.e UNDP's Consultant and BWA), approving the invoice amount. Payment of the final invoice had effected by UNDP after issuance of the Certificate of Substantial Completion by the Engineer.

The Engineer has issued the Certificate of Substantial Completion and Handing Over on 20 December 2008 which have been received and approved by UNDP.

Additionally, the Contractor has submitted a renewed performance security; certified Check No. 019841 valued US\$231,070 covering the performance bond for the abovementioned project, to the Procurement Unit on 21 January 2009.

Finally, the Engineer has issued the Certificate of Final Completion on 4th February 2010 and approved by UNDP accordingly.

d. Management Arrangements

Given the unstable security situation, UNDP cannot have any of its staff permanently on site. Furthermore, site visits are only granted to UNDP staff if the security situation allows.

Besides regular reporting to UNDP's project manager, the national consulting firm carried out, among others, the: technical oversight, construction monitoring and supervision, progress control and related procedures, quality control and related procedures, certification of quantities and the certification of payment certificates.

Furthermore and as it was agreed during the kick off meeting, the beneficiary (i.e. BWA) had endorsed the quantities against which the Contractor claims payment as a secondary measure of assurance. In addition to their endorsement on the substantial completion, handing over and final completion.

With the above-mentioned deliverables in conjunction with progress photographs, UNDP's project manager has a firm grip on all project related activities.

e. Verification of Payment Certificates

Of particular importance to all UNDP, offshore managed project is the verification process of any payment certificates. In this respect and within the context of the current project, the following precautionary verification measures were pursued:

- The project manager received a narrative report from the National Consulting Firm in support for each invoice for payment.

- The implemented quantities of works have been checked, verified and certified by the National Consulting Firm together with the counterparts (i.e. BWA) in terms of quality and quantity and as per the contract specifications.
- The project manager received a certification report from the national consulting firm supporting the contractor's invoice.
- The project manager has been in close contact with the counterparts through telecommunications and e-correspondences. The counterparts confirmed that the works for which payments are claimed have been satisfactorily implemented.
- The project manager received photographic illustrations of the works.
- The project manager received and approved the Certificate of Substantial Completion issued by the Engineer.

The project manager has furthermore safeguarded the entire project by having a performance bond totaling 10% of the contract works value in place as a mean of last resort, which have been released in February 2010 and only after the receipt of the Certificate of Final Completion.

In this context, the project manager hereby certifies that to the best of his knowledge and verification capacity he has satisfied himself that all works under the subject payment certificate have been implemented in the quoted quantities and up to the bid document specifications.

8. Key constraints

The following key constraints and delays have been faced during the project implementation:

- Security situation impacted on: Conducting meetings with counterparts, carrying out site visits and verification activities due to limited movement; Reluctance of consultants to engage within a high risk environment. (Delay estimated at 2 months)
- Impact of continuous change of Baghdad Water Authority Director Generals: Impact included familiarizing three (3) new Director Generals with the project, objectives, activities...etc, Loss of communications during the change periods and loss of interest by Director Generals waiting for change of position. (Delay estimated at 18 months)
- Increasing UNDP's scope of work to include rehabilitation of portions of Lines II and III of the treatment plant. (Delay estimated at 2 months)

9. Lessons Learned

The following lessons learned have been recorded during the implementation of the Project that would facilitate the design and implementation of future projects:

- The assessment study and situation analysis should be followed directly by the commencement of the project in order to prevent further deterioration of conditions. This

makes the assessment more reliable and reflects more accurately the actual situation on-the-ground.

- Increase the contingency amount in future contracts to be able to cover additional works that may be revealed only later in the course of implementation.
- Detailed project scope development should be fully identified at early stages to prevent difficulties such as budget limitations and variation orders.
- Maintain a consistent and continuous reporting system to counterparts to avoid loss of formal communications.
- Teleconferencing, VC...etc for communications in the remote management situation is a very helpful set of tools to build partnerships, skills and monitor the situation.
- Maintain close relations with counterparts to be on top of issues as they emerge.
- Maintain close contacts with local business associates to forecast and predict forthcoming events and changes.