

AL WATHBA
WATER TREATMENT PLANT
BAGHDAD, IRAQ

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Al Wathba Water Treatment Plant in Baghdad, Iraq

Synopsis

Introduction. This report was previously provided on a limited distribution basis only in Iraq to representatives of the Gulf Region Division of the U.S. Army Corps of Engineers and the Project and Contracting Office. In accordance with the revised policy of the Office of the Special Inspector General for Iraq Reconstruction, all project assessment reports are being issued publicly.

This project assessment was initiated as part of our continuing assessments of selected sector reconstruction activities for electricity, oil, and public works and water. The overall objectives were to determine whether selected sector reconstruction contractors complied with the terms of their contracts or task orders and to evaluate the effectiveness of the monitoring and controls exercised by administrative quality assurance and contract officers. This project assessment was conducted in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer and an auditor.

Project Assessment Objectives. The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results will be consistent with original objectives;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design; and
4. The contractor's quality control plan and the U.S. Government's Quality Assurance program were adequate.

Conclusions. This project assessment determined that:

1. The renovation of the Al Wathba Water Treatment Plant will meet the stated objective of improving the living conditions of citizens living in Baghdad by increasing the quantity of potable water available to them, if design specifications are met.
2. The design package was complete and sufficiently specific to construct the required buildings and complete the rehabilitation activities of the Al Wathba Water Treatment Plant.
3. The rehabilitation work on the clarifier and settling tanks, the chemical building construction, the administration/laboratory building construction, and pressure building construction meet a substantial portion of the standards of the design. However, the collapse of the train 1 effluent weir wall, poor concrete finishing of the chemical building floor, and corrective actions taken during the interrupted concrete pour are all areas of concern.

4. The contractor's quality control plan and the U.S. Government's quality assurance program for this project needed improvement and could be directly linked to insufficient quality control at the Al Wathba Water Treatment Plant. No Government quality assurance testing had been performed and no future Government quality assurance testing was planned. In addition, the U.S. Government project engineer, with knowledge of construction progress and the quality of work performed at the project site, was not approving invoices for work claimed by the contractor.

Assessment Comment. Additionally, the assessment disclosed that information relating to Al Wathba Water Treatment Plant in the Project and Contracting Office database needed to be updated. The Project and Contracting Office data showed the projected total estimated cost as \$4.7 million. Review of the contract files found that the actual total cost should be revised substantially higher. The revised cost estimate for the Al Wathba Water Treatment Plant was approximately \$11.2 million.

Recommendations and Management Comments. We discussed the results of this project assessment with the Deputy Director, Project and Contracting Office and U.S. Army Corps of Engineers' officials on 5 July 2005. Management concurred with our conclusions. Formal management comments were not requested. Formal recommendations to address the issues identified in this project assessment will be included in a summary report.

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Introduction

Objective of the Project Assessment

The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results will be consistent with original objectives;
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4. The contractor's quality control plan and the U.S. Government's quality assurance program were adequate.

Background

Contract, Task Order, and Costs

The Al Wathba Water Treatment Plant (WTP) rehabilitation project is being completed under Task Order 0009 of Contract W914NS-04-D-008. Contract W914NS-04-D-008, dated 23 March 2004, is an indefinite delivery/indefinite quantity contract with a \$600 million ceiling. The contract was made between the Coalition Provisional Authority and FluorAMEC, Limited Liability Company (LLC). Task Order 0009 is a design/build, cost-plus, award fee type task order for the refurbishment of the Al Wathba WTP and a second water treatment plant, the Al Wahda WTP. Both plants are located in Baghdad, Iraq.

Task Order 0009 initially was un-definitized and FluorAMEC, LLC was directed by a notice to proceed, dated 26 June 2004, to perform a technical assessment and 30% design at Al Wathba WTP and Al Wahda WTP. FluorAMEC, LLC was subsequently directed to prepare a detailed cost proposal for the rehabilitation of both plants. The Project and Contracting Office (PCO) provided a notice to proceed, dated 15 September 2004, to begin rehabilitation work. The task order was definitized on 8 January 2005. Definitization was based on the FluorAMEC, LLC, proposal and an independent government estimate.

The initial un-definitized total contract price for both projects was \$13,609,053, but increased to \$14,929,370 after the contract was definitized. Correspondence from FluorAMEC, LLC to the PCO, dated 30 May 2005, disclosed that the projects had a \$3.4 million "cost to complete" increase pending.

Although contracting actions include both projects under a single task order, this assessment addresses only the Al Wathba WTP portion of Task Order 0009.

Project Objective

The 26 June 2004 Statement of Work (SOW) provides that: “The overall objective of this task order is to increase the quantity of potable water available to citizens living in Baghdad by rehabilitation of the two existing water treatment plants, thereby improving their living conditions.”

Description of the Facility

The description of the facility is based on information from the initial Scope of Work and the FluorAMEC, LLC’s, technical study. The Al Wathba WTP is an existing water treatment plant in Baghdad, Iraq. The plant’s purpose is to pump water from the Tigris River, treat the water to potable standards, and then pump pressurized water to the local distribution system where it is utilized by residences and businesses. The facility was initially constructed in 1934 and expanded in 1964 and 1976. Due to substantial deterioration, the plant requires extensive rehabilitation.

Current operations at the facility include pumping water from the Tigris River and treating the water through three parallel treatment trains. Treatment train 1, which was constructed in 1934, consists of a clarifier, an alum feed to the clarifier tank, a settling tank, pressure filtration, chlorination, and high lift pumps to the distribution system. Treatment train 2, which was constructed in 1964, consists of alum feed to clarifier flash mix tanks, a clarifier, a settling tank, rapid sand gravity filtration, chlorination, and high lift pumps to the distribution system. Train 3, which was constructed in 1976, is a gravity filtration system similar to treatment train 2. The initial Scope of Work identified train 3 as being fully operational. Therefore, train 3 was not addressed in this assessment.

Scope of Work of the Task Order

The PCO contract file shows that the definitized SOW for the rehabilitation of the Al Wathba WTP project included the following major components of work:

- Design and construction of a chemical building.
- Design and construction of an administration building.
- Design and construction of a pressure filter building.
- Renovation of train 1 & 2 clarifier and settling tanks.
- Renovation of two sludge pits.
- Procurement and installation of pressure filters with all associated pipes, pumps, and instrumentation (shared system for train 1 & 2).
- Procurement and installation of a new chlorination system (shared system for train 1 & 2).
- Procurement and installation of new alum tanks and dosing pumps.
- Procurement and installation of electrical, mechanical, and monitoring/control equipment.
- Procurement and installation of raw water pumps.

Reported Project Work Completed, In-Process, and Pending

The reported status of work at the project prior to the site visit was determined through discussions with the U.S. Government Quality Assurance Representative and the Project Engineer, and the FluorAMEC, LLC Project Manager, as well as a review of the PCO contract file.

Project site work completed:

- Renovation of train 1 & 2 clarifier and settling tanks.
- Construction of the chemical building.

Project site work in Progress:

- Construction of the administration building.
- Construction of the pressure filters building.

Project site work not yet underway:

- Renovation of two sludge pits.
- Installation of pressure filters with all associated pipes, pumps, and instrumentation.
- Installation of the new chlorination system.
- Installation of new alum tanks and dosing pumps.
- Installation of electrical, mechanical, and monitoring/control equipment.
- Installation of raw water pumps.

Site Assessment

On 11 June 2005, we performed an on-site assessment at the Al Wathba WTP. The site assessment included an interview with the Iraqi Plant Manager, FluorAMEC, LLC Project Manager, FluorAMEC, LLC quality control representative, and the U.S. Government Quality Assurance Representative, as well as an assessment of the facility. The assessment covered work completed and work-in-progress. Pending work was not evaluated during the site assessment.

Work Completed

Completed work included the rehabilitation of the clarifiers and settling tanks, and construction of the chemical building.

Train 1 clarifier tank

The SOW required the clarifier tank to be drained, cleaned, repaired, and painted. Discussions with the Iraqi Plant Manager and review of the quality assurance (QA) documentation disclosed that the clarifier tank work was not completed as required in the SOW. The quality of work performed at train 1 clarifier tank (Site Photo 1) could not be determined visually because the tanks were filled with water and in operation. During the site assessment, the Iraqi Plant Manager said that the clarifier tank was drained and cleaned, but not repaired (sealed). He said he believed the clarifier tank would continue to leak if the repairs were not completed. The

FluorAMEC, LLC Project Manager confirmed that the clarifier tank was cleaned but not sealed because of plant operational shutdown issues and stated that the sealing of the cracks was no longer planned as part of this project.



Site Photo 1: Train 1 clarifier tank

Train 1 settling tank

The SOW required the settling tank to be drained, cleaned, repaired, and painted. Visual observations (Site Photo 2) and review of the QA documentation found that the clarifier tank work was not completed as required in the SOW. Although it appears that the clarifier tank was drained, cleaned, and painted as required, the effluent weir wall collapsed during tank re-filling operations, rendering the tank unusable until repaired (Site Photo 3). The failure of the tank can be directly attributed to work performed under this task order. Several rows of bottom drain holes were filled in during repair procedures resulting in an increased hydraulic load on the effluent weir wall, which contributed to its collapse. Filling in the bottom drain holes was not in the Scope of Work and it is unclear why they were filled in during the repair.



Site Photo 2: Train 1 settling tank – drained



Site Photo 3: Train 1 settling tank showing collapsed effluent weir wall

Train 2 clarifier and settling tanks

The SOW required the clarifier and settling tanks to be drained, cleaned, repaired, and painted. The QA documentation and site assessment disclosed that the clarifier and settling tanks (Site Photo 4) had been drained, cleaned, repaired, and painted. The quality of work performed could not be determined, however, because the tanks were filled with water and in operation. During the site assessment, the Iraqi Plant Manager said he was satisfied with the rehabilitation of the train 2 clarifier and settling tanks.



**Site Photo 4: Train 2 clarifier tank (foreground)
& settling tank (background)**

Chemical building

The original SOW called for an 18.3 meter (m) by 9.2 meter new chemical building to house the new alum system equipment and storage for a 10-day supply of alum. The site assessment disclosed that the construction of the chemical building (Site Photo 5) had been completed. The concrete floor of the building was observed to have a rough uneven surface which may be attributed to the concrete setting up before finishing could be completed. The building appeared to be constructed properly and to meet task order requirements; however, the quality of the concrete could not be verified.



Site Photo 5: Chemical building – new construction

Work In Progress

Administration/laboratory building

The original SOW called for a new administration building for office and laboratory space. Our site assessment determined that construction was almost complete (Site Photos 6 & 7). Construction, mechanical, and electrical tasks had been completed, with only minor cosmetic work remaining. Final work required to complete the building was being accomplished at the time of our site visit. The building appeared to be constructed properly and to meet task order specifications.



Site Photo 6: Admin/Lab building – new construction



Site Photo 7: Admin/Lab building – interior lab room

Pressure filters building

The original SOW called for the construction of a pressure filter building to house the new pressure filters and all associated valves, pumps, and instrumentation. Our site assessment determined that the construction (Site Photos 8 & 9) was approximately 25% complete. The foundation footers and interior concrete pad were in place and the forming activities for the walls of the wet well and dry well were in progress. The form work appeared to be consistent with the task order design.

There are concerns regarding the quality of the interior concrete pad of the wet well section. Review of the QA documentation and discussions with the Government QAR identified problems during the placement of the concrete in the wet well section. This concrete pour on 31 May 2005 was interrupted due to equipment failure and the concrete setting before the pour could continue (Site Photo 10, which was provided by the Government QAR). This interruption could cause bonding problems between the old and new concrete, which would decrease the strength of the concrete.

The contractor said he followed the procedures in contract specification “FA 000 215 033000: Specification for cast-in-place concrete,” which calls for the use of a bonding agent between the old and new concrete. The Government QAR said the contractor did not use a bonding agent or follow specification FA 000 215 033000. A copy of the contractor construction deficiency log and daily quality control reports were requested to determine actual events, but they had not yet been provided at the time of this report.

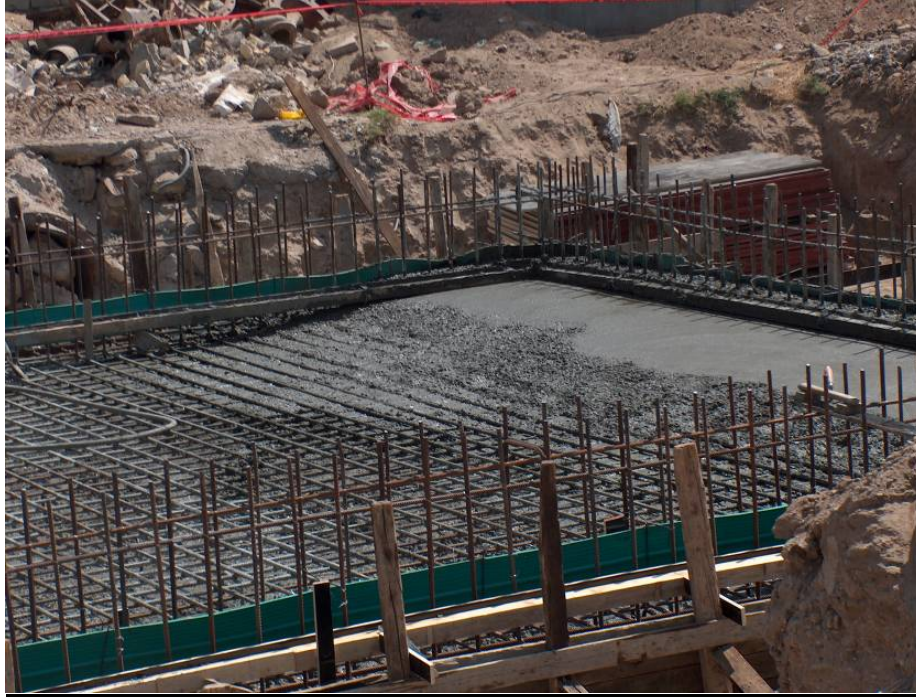
The contractor recommended taking core samples and testing to determine if the floor is within specifications. Relying on the Government QA reports and in the absence of information to the contrary, it would be prudent to obtain a core sample to determine if the concrete is within specifications.



**Site Photo 8: Filter building concrete form and re-bar placement
(Wet well foreground – dry well background)**



**Site Photo 9: Filter building concrete form and re-bar placement
(Wet well foreground – dry well background)**



Site Photo 10: Filter building, interrupted concrete pour, dated 31 May 2005
(Provided by the Government QAR)

Work Pending

The pending tasks are the renovation of sludge pits and installation of new pressure filters, a new chlorination system, new alum tanks and dosing pumps, and electrical, mechanical, and monitoring/control equipment. These systems were not physically on-site during the site assessment and therefore could not be evaluated.

Conclusions

Reviews of contract documentation, the design package, and quality assurance documentation, as well as interviews of key project personnel and the site visit led to the following conclusions for each of the stated Project Assessment objectives.

1. Determine whether project results will be consistent with original objectives.

The overall objective of this task order was to increase the quantity of potable water available to citizens living in Baghdad by rehabilitation of the Al Wathba WTP, thereby improving their living conditions. The renovation of the Al Wathba WTP will meet the stated objective of improving the living conditions of citizens living in Baghdad by increasing the quantity of potable water available to them, if design specifications are met.

2. Determine whether project components were adequately designed prior to construction or installation.

The design package was complete and sufficiently specific to construct the required buildings and complete the rehabilitation activities of the Al Wathba WTP.

3. Determine whether construction or rehabilitation met the standards of the design.

The rehabilitation work on the clarifier and settling tanks, the chemical building construction, the administration/laboratory building construction, and pressure building construction meet a substantial portion of the standards of the design. However, the collapse of the train 1 effluent weir wall, poor concrete finishing of the chemical building floor, and corrective actions taken during the interrupted concrete pour are all areas of concern.

4. Determine whether the contractor's quality control plan and the Government quality assurance program were adequate.

The contractor's quality control plan and the U.S. Government's quality assurance program for this project needed improvement and could be directly linked to insufficient quality control at the Al Wathba WTP. No Government quality assurance testing had been performed and no future Government quality assurance testing was planned. In addition, the U.S. Government project engineer, with knowledge of construction progress and the quality of work performed at the project site, was not approving invoices for work claimed by the contractor.

Assessment Comment. Additionally, the assessment disclosed that information relating to Al Wathba WTP in the PCO database needed to be updated. PCO data showed projected total estimated cost as \$4.7 million. Review of the contract files found that the actual total cost should be revised substantially higher. Revised cost estimates for the Al Wathba WTP were approximately \$11.2 million.

Recommendations and Management Comments. We discussed the results of this project assessment with the Deputy Director, Project and Contracting Office and U.S. Army Corps of Engineers' officials on 5 July 2005. Formal management comments were not requested. Management concurred with our conclusions. Formal recommendations to address the issues identified in this project assessment will be included in a summary report.

Appendix A. Scope and Methodology

We performed this project assessment from June through July 2005 in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer, an auditor, and a special agent.

In performing this Project Assessment we:

- Reviewed contract documentation, to include the Independent Government Estimate, Scope of Work, Contract, and contract modifications;
- Reviewed the design package (drawings and specifications), Quality Assurance Plan, Quality Control Plan, and quality control and assurance reports;
- Interviewed the Contracting Officer, Project Manager, Project Engineer, quality control/assurance representatives, and Iraqi Al Wathba Plant Manager; and
- Conducted an on-site assessment of the Al Wathba Water Treatment Plant.

Appendix B. Acronyms

LLC	Limited Liability Company
PCO	Project and Contracting Office
QA	Quality Assurance
QAR	Quality Assurance Representative
SIGIR	Special Inspector General for Iraq Reconstruction
SOW	Statement of Work
WTP	Water Treatment Plant

Appendix C. Assessment Team Members

The Office of the Assistant Inspector General for Inspections, Office of the Special Inspector General for Iraq Reconstruction, prepared this report. The principal staff members who contributed to the report include:

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