

AL FATAH RIVER CROSSING
TIE-INS
AL FATAH, IRAQ

SIGIR PA-05-012
MARCH 15, 2006

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 15 MAR 2006		2. REPORT TYPE		3. DATES COVERED 00-00-2006 to 00-00-2006	
4. TITLE AND SUBTITLE Al Fatah River Crossing Tie-Ins Al Fatah, Iraq				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Office of the Special Inspector General for IRAQ Reconstruction,400 Army Navy Drive,Arlington,VA,22202-4704				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Special Inspector General for Iraq Reconstruction

SIGIR PA-05-012

March 15, 2006

Al Fatah River Crossing Tie-Ins at Al Fatah, 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 an engineer and an auditor.

Project Assessment Objective. 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;
4. Contractor's Quality Control plan and the U.S. Government's Quality Assurance program were adequate; and
5. Project sustainability and operational effectiveness were addressed.

Conclusions. The assessment determined that:

1. The completed project should meet and be consistent with original task order objectives if current construction procedures are continued. Specifically, the "Tie-In" (manifold) project is a key element of an overall objective to restore the operations of the Iraq oil infrastructure following the destruction of crude oil pipelines that crossed the Tigris River at Al Fatah during hostilities in 2003. As a result, the tie-in manifolds on both sides of the Tigris River should effectively connect the pipeline from the Kirkuk oil fields to the Iraq-to-Turkey Pipeline.
2. The design package was completed and approved prior to construction and appears specific enough to construct the project. Specifically, a crude oil tie-in manifold was designed for each side of the river. The manifolds were designed to tie in new 40-inch, 32-inch, 30-inch, 26-inch, and 20-inch crude oil pipelines that will cross the river to existing distribution pipelines. As a result, a tie-in manifold on each side of the Tigris River should effectively connect the existing pipelines and provide flexibility for operational contingencies.

3. The construction of the tie-in manifolds should meet the standards of the design. We observed that Quality Management personnel and construction supervisors were engaged daily in activities to ensure construction quality. As a result, construction conformity will very likely adhere to contract specifications and the project will effectively link the existing pipelines. Therefore, the pipeline operations at Al Fatah of the Iraq oil infrastructure that were destroyed during 2003 hostilities should be re-established.
4. Overall, the contractor's quality control plan and the U.S. Government's quality assurance program were adequate. For example, procedures in place ensured that potential construction deficiencies were detected, evaluated, and properly corrected, when necessary. In addition, the contractor's daily quality control reports and the U.S. Government's Quality Assurance Representative's reports were sufficiently complete, accurate, and timely. As a result, Quality Management documentation was accurate and timely when compared to the project's observed completion percentage and conformity to construction requirements.
5. Sustainability was adequately addressed in the contract's Scope of Work and should result in an operational pipeline. As-built drawings of the pipeline and manifold system, a recommended list of spare parts, and standard operating procedures will be provided to the Ministry of Oil and the Northern Oil Company upon completion.

Assessment Comment. However, operational effectiveness of the project would be improved by connecting the 40-inch Iraq-to-Turkey Pipeline at the Kirkuk (east) manifold to the terminus of the new 40-inch pipeline coming from the Kirkuk oil fields. Such work was not included in the original Scope of Work. Accordingly, the assessment team recommended modification of the project design to improve operational effectiveness.

A plan to implement the recommendation was initiated by the U.S. Army Corps of Engineers during the timeframe of the assessment. Specifically, the U.S. Army Corps of Engineers advised that piping material, equipment, and skilled labor were on the site and that the modification could be completed with negligible impact on the project's schedule and budget. It is estimated that the change could increase pipeline carrying capacity by as much as 50 percent, with a corresponding increase in revenue to the Iraqi government.

Recommendations and Management Comments. We discussed the results of our assessment with the appropriate Project and Contracting Office and U.S. Army Corps of Engineers officials who verbally concurred with our conclusions. This report does not contain any negative findings; therefore, management comments were not required.

Table of Contents

Synopsis	i
Introduction	
Objective of the Project Assessment	1
Pre-Site Assessment Background	1
Contract, Task Order, and Costs	1
Project Objective	2
Description of Existing Conditions (Pre-construction)	2
Scope of Work of the Task Order	3
Current Project Design and Specifications	4
Reported Project Work Completed and Pending	5
Site Assessment	
Work Completed	6
Work in Progress	6
Work Pending	8
Project Quality Management	10
Project Sustainability and Operational Effectiveness	
Project Sustainability	13
Operational Effectiveness	13
Conclusions	14
Recommendations and Management Comments	15
Appendixes	
A. Scope and Methodology	16
B. Acronyms	17
C. Assessment Team Members	18

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;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design;
4. Contractor's quality control plan and the U.S. Government's quality assurance program were adequate; and
5. Sustainability and operational effectiveness were addressed.

Pre-Site Assessment Background

Contract, Task Order, and Costs

The Al Fatah¹ River Crossing Tie-Ins (manifold) project will be completed under Contract W9126G-04-D-0002. Contract W9126G-04-D-0002 is an Indefinite Delivery Indefinite Quantity cost reimbursable award fee contract for the repair and continuity of operations of the Iraqi oil infrastructure. The estimated not-to-exceed amount is \$800 million for the life of the contract, with a guaranteed minimum of \$500,000. The contract was issued by the Project and Contracting Office (PCO) to the Parsons Iraq Joint Venture (PIJV).

Task Order (TO) 0014, dated 19 November 2004, was issued to the PIJV, with a not-to-exceed amount of \$3,000,000, which included costs associated with completing the Tigris Pipeline River Crossing project and the Kirkuk Irrigation Canal Crossing #1 project. The initial TO's scope of work (SOW) was undefined and intended to be accomplished in three phases. The first phase was to perform survey and investigative work so that a project plan and an initial cost estimate could be developed. The second phase was intended to produce the basic engineering design and the last phase was the detailed design, construction, and commissioning of the projects.

There have been eight modifications to the initial contract.

- Modification 01, dated 5 January 2005, increased funding to \$7,500,000.
- Modification 02, dated 25 January 2005, increased total funding to \$10,250,000.

¹ Due to the various spellings for cities in Iraq, and in an effort to achieve standardization in SIGIR reports, Al Fathah and Al Fatha, as noted in project documentation will henceforth be referred to as Al Fatah.

- Modification 03, dated 22 February 2005, increased funding to \$11,450,000 and added six horizontal directional drilling pipeline tie-ins, the Riyadh Canal Crossing #2, and the Zegeton Canal Crossing #3 projects.
- Modification 04, dated 2 March 2005, reflected administrative changes to the contract. No additional funding was added at that time.
- Modification 05, dated 9 March 2005, definitized Contract Line Item Number (CLIN) 0002 and increased funding by \$987,890, which increased total funding to \$12,437,890 from \$11,450,000.
- Modification 06, dated 9 June 2005, definitized CLINs 0001, 0003, 0004, 0005, 0006, and 0007 and increased funding by \$45,717,035, which raised the total to \$58,154,925 from \$12,437,890.
- Modification 07, dated 12 July 2005, definitized CLIN 0003 as a result of negotiations and increased funding by \$4,056,757, which raised the total to \$62,211,682 from \$58,154,925.
- Modification 08, dated 12 July 2005, corrected information relating to CLIN 0004 on Modification 07. No additional funding was added at that time.

TO 0014 projects collectively include all remaining segments for the completion of the new 40-inch crude oil pipeline from the Kirkuk oil fields to the Iraq-to-Turkey Pipeline (ITP). Modification 6 definitized CLIN 0005 Al Fatah River Crossing Tie-Ins. This assessment specifically addresses the PCO project identification number 19604, which is the Al Fatah River Crossing Tie-Ins project, budgeted at \$8,156,284.

Project Objective

The Project Scope and Status Reports (PSSR) identified the general objective of TO 0014 as the restoration and enhancement of all remaining sections of the new 40-inch crude oil pipeline from the Kirkuk oil fields to the ITP. The completion of the 50 kilometers of pipeline and Tigris River Crossing is considered essential for increased production and transport of crude oil from the Kirkuk oil fields. The Kirkuk oil fields provide all crude oil for the Baiji Refinery, 40 to 45 percent of the crude oil for the Daura Refinery and the export of crude oil through the ITP. This is a critical project as it allows the potential revenue of up to \$7 million dollars per day in crude oil export.

Specifically, the objective of this project was to design and construct two crude oil manifold systems, one to be located on each side of the Tigris River at the Al Fatah River Crossing. The manifolds will tie in the new 40-inch, 32-inch, 30-inch, 26-inch, and 20-inch crude oil pipelines that will cross the river to existing distribution pipelines. The manifold will give the Northern Oil Company (NOC) the capacity and flexibility it needs for crude oil distribution operations and pipeline maintenance in the area.

Description of Existing Conditions (Pre-construction)

Observations by the assessment team and geological studies disclosed that this project is located approximately 250 kilometers north-north-west of Baghdad, Iraq, at an existing crossing point of the Tigris River. The location and the geologic break (left lateral fault) in the mountain ridge line made this an obvious location for crossing the

Tigris River and traversing the mountain range. The Tigris River cuts through the mountain range at this location due to the fault. This location is critical since it is the most convenient route to connect the Kirkuk oil and natural gas fields to the population centers and the ITP. Due to the geology and location at the Tigris River, this area has many old oil and natural gas pipelines that are not identified on any known drawings.

The PSSRs stated that in a previous project, Kellogg, Brown, and Root (KBR) installed six small pipelines under the Tigris River using horizontal directional drilling. These six small pipelines are part of the fifteen pipelines that will carry crude oil, natural gas, and refined products across the Tigris River to the main distribution system. The pipe that was purchased by KBR was left on-site and has a Fusion Bonded Epoxy coating. Some of this pipe will be used for construction of the pipelines and the manifold systems.

The PSSRs also showed the approximate locations of the two manifolds. The Kirkuk Manifold is anticipated to be located on a hill on the east side of the river. There had previously been a pump skid in this location, and removal of some concrete foundations will be required. The subcontractor was responsible for verifying the exact location of the manifold during the survey and detail design phase.

The Baiji Manifold is anticipated to be located near the Cathodic Protection building and the existing manifold on the west side of the river. The area is cleared and relatively flat. The subcontractor was responsible for verifying the exact location of the manifold during the survey and detail design phase.

Scope of Work of the Task Order

The SOW in the Phase II PSSR for the Al Fatah River Crossing Tie-Ins includes the following:

- Excavate Manifold Locations
- Fabricate Two Crude Oil Manifolds
- Construct Concrete Vaults
- Commission Manifolds

A crude oil manifold will be fabricated and installed on each side of the Tigris River. The manifold will tie in the 40-inch, 32-inch, 30-inch, 26-inch, and 20-inch crude oil pipelines that cross the river to existing pipelines. The manifold will be underground, in a concrete vault as per the drawings included in the design specifications section. Currently, nine pipelines will be installed under the Tigris River as part of the separate Al Fatah River Crossing project. Four spare pipelines will not be tied into any manifold, but will be capped for future use.

Current Project Design and Specifications

A review of the contract file disclosed that the initial TO's SOW was undefined and intended to be accomplished in three phases. The first phase was to perform survey and investigative work so that a project plan and an initial cost estimate could be developed. The second phase was intended to produce the basic engineering design and the last phase was the detailed design, construction, and commissioning of the projects. The assessment team reviewed the Phase II PSSR design and specifications. Included with the pipeline river crossing design was the tie-in design both upstream and downstream of the manifolds. The manifold will consist of API, ANSI 600#, flanged end ball valves. The general design for this has been completed and drawings are included in Appendix F of the PSSR. Pipeline specifications have been developed and issued as part of the design package. The PSSR procedures require 100 percent Quality Control (QC) tests on welds, a pipeline pressure test of the welded pipeline, and testing of the corrosion control coating to ensure integrity of the pipeline and coating. The following is a partial list of the appropriate specifications that will be utilized during fabrication and construction of the manifolds.

- General Pipeline Construction Specification (GEN-SPC-PL-0000-0002) included in Appendix H of the PSSR
- General Pipeline Welding, Testing and Inspection Specification (GEN-SPC-PL-0000-0005) included in Appendix I of the PSSR
- General Pipeline Specification for Cathodic Protection of Pipe (GEN-SPC-PL-0000-0004) included in Appendix K of the PSSR

Figure 1 is the pipeline schematic showing general layout of the manifolds and pipelines.

Project site work reported completed:

- No significant work elements were completed prior to the site visit.

Project site work reported in progress:

- Excavate manifold locations.

Project site work reported pending:

- Fabricate two crude oil manifolds.
- Construct concrete vaults.
- Commission manifolds.

Site Assessment

We performed an on-site assessment of the Al Fatah River Crossing Tie-Ins project from 26 to 29 September 2005. During the time on-site, the assessment team reviewed selected project documentation provided by various government and contractor personnel. The assessment team discussed the project status and processes used to manage construction and ensure QC with the key USACE, PIJV, and the subcontractor (A&L Underground managers). The assessment team observed the project's overall progress and numerous sub-tasks as they were being performed by contractor personnel. The assessment covered work in progress and work pending.

Work completed:

None.

Under the Al Fatah River Pipeline Crossing project, which has been reported separately, the river site survey and investigative work were completed prior to the assessment team's arrival and the location for the pipeline project was selected. The nine pipelines were strung on the east side of the Tigris River and welding was complete on the nine pipelines. The determination of pipeline and crossing locations established the general locations for manifold fabrication.

Work in progress:

Excavate Manifold Locations

The PSSR required that locations for the two new manifold systems be finalized, and excavation for the manifold vaults be completed. The manifolds will be in reinforced concrete vaults, one on the east side of the river (Kirkuk manifold) and one on the west side (Baiji manifold). Site Photo 1 shows the Al Fatah River Crossing, with east side to the right of the photo and the west side to the left of the photo. The design dimensions for the Kirkuk Manifold Vault are 18 meters (m) long, 6 meters wide. The surface of the vault is to be approximately 4.5 meters above the lower surface of the pipelines after pipeline placement. During the site visit, the assessment team verified that the excavation of the Kirkuk Manifold was nearly complete. Site

Photo 2 shows the excavation of the Kirkuk Manifold site. The excavation appears consistent with design requirements.



Site Photo 1: Al Fatah Tigris River Crossing



Site Photo 2: Excavation of Kirkuk (east side) Manifold Site

The design dimensions for the Baiji Manifold Vault are 19 m long and 5.2 m wide. The surface of the vault is to be approximately 4.5 m above the lower surface of the pipelines after pipeline placement. During the site visit, the assessment team verified that the excavation of the Baiji Manifold site was nearly complete. Site Photo 3 shows the excavation of the Baiji Manifold site. The pipelines shown in Site Photo 3

are existing pipelines that were not part of this project. The excavation appears consistent with design requirements.



Site Photo 3: Excavation of Baiji (west side) manifold site

Work pending:

Fabricate Two Manifolds

The PSSR required that the Kirkuk and Baiji Manifolds be field fabricated and consist of a combination of pipes and valves. All pipeline welds, including the manifolds, require 100 percent radiograph examination, in addition to corrosion control testing. The completed manifolds will be installed in concrete vaults and connected to the existing pipelines on one side and the Al Fatah River crossing to pipelines on the other. The valves and fittings, which were located near Kirkuk, had to be transported to the Al Fatah site. The PIJV transported the valves and fittings for the manifold to the river site. The subcontractor was responsible for offloading, storing, and staging the valves and fittings. Site Photo 4 shows the pipeline valves which will be used for the manifold construction. Site Photo 5 shows the pipelines which will be connected to the Baiji Manifold.

The assessment team observed, during site visit, that valves and fittings had been transported to the Al Fatah site. The fabrication of the manifold system had not been started; therefore, the manifolds were not assessed.



Site Photo 4: Pipeline Valves to be used for Manifold Construction



Site Photo 5: Pipelines to be connected to the Baiji Manifold

Construct Concrete Vaults

The PSSR required the construction of two reinforced concrete vaults to house the Kirkuk and Baiji Manifold systems. The design dimensions for the Kirkuk Manifold

Vault are 18 m long and 6 m wide. The surface of the vault is to be approximately 4.5 m above the lower surface of the pipelines after pipeline placement. The design dimensions for the Baiji Manifold Vault are 19 m long and 5.2 m wide. The surface of the vault is to be approximately 4.5 m above the lower surface of the pipelines after pipeline placement. At the time of our site visit, construction of the concrete vaults had not been started; therefore, the assessment team did not assess the manifold.

Commission Manifolds

Commissioning of the manifolds will be conducted after construction of the concrete vaults, fabrication of the two manifold systems, and connecting the manifolds to existing pipelines. The assessment team did not evaluate the commissioning of the manifolds.

Project Quality Management

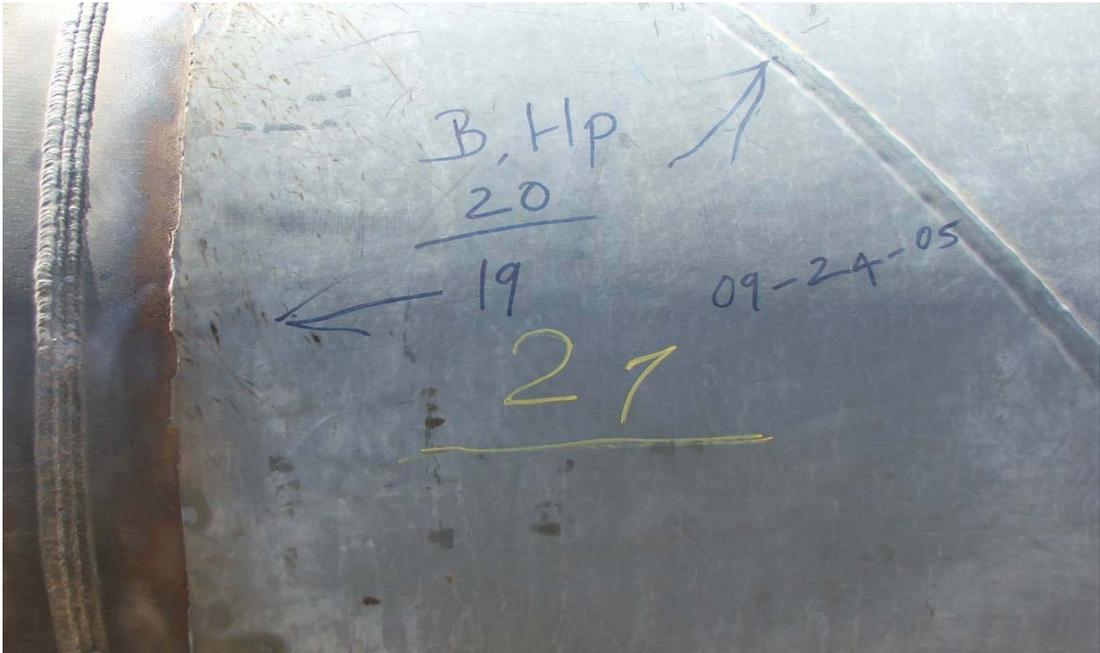
The Contractor's Quality Control (CQC) plan and the U.S. Government's Quality Assurance (QA) program were adequate and sufficiently detailed. For example, key procedures to detect, evaluate, correct, and track deficiencies were in place and effective. In addition, the contractor's daily QC reports and the U.S. Government Quality Assurance Representative (QAR) reports were sufficiently complete, accurate, and timely. Most importantly, overall implementation of the CQC plan and QA program were effective. For example, testing construction conformity, on-site testing of welder applicants, on-site presence of supervisors and QC/QA personnel, and contractor/government teamwork resulted in an effective QM program.

The Al Fatah River Crossing Tie-Ins project will be completed by the same contractor and same QC Team as the Al Fatah River Crossing project. The Al Fatah River Crossing project, which was assessed under a separate project report, demonstrated excellent adherence to QC. This should continue throughout the Al Fatah River Crossing Tie-Ins project. For illustrations of QC procedures used during the Al Fatah River Crossing project, see Site Photos 6 and 7.

- **Construction Conformity:** The Phase II PSSR specified that all welds "(100 percent)" must be radiographed (X-rayed) to ensure adequate pipe strength and seal. As a result, injury risk to personnel working around the pipe following commissioning will be decreased, while product loss via leaking will be avoided. Site Photo 6 shows a radiography process that produces a filmstrip unique to each weld. Site Photo 7 shows a properly marked pipe weld. Specifically, the welders that performed the work are identified by number (19/20) and the weld is dated "(9-24-05)" and numbered "(27)". This information is necessary in tracking welder performance and weld quality.



Site Photo 6: Radiography (x-ray) Test In Progress on 40"Pipe Weld



Site Photo 7: Visually Acceptable and Properly Marked Weld Waiting for Radiograph Test

- **Welder Testing:** The USACE Project Engineer and the contractor's QC Inspector stated that all welder applicants are field tested to determine whether they possess the skills required. During our on-site inspection, we witnessed an Iraqi welder applicant being tested which was observed by the contractor's

welding inspector and a Government Construction Representative. Welders must complete visual, radiographic, and strength tests to be certified and hired by the contractor. Standards are strict and retests are not allowed.

- **Supervisor Field Presence:** The assessment team observed that line level construction supervisors were on-site 100 percent of the time, while QC and QA personnel were on site frequently enough to effectively perform their duties. In addition, contractor and government personnel shared a local communications (walky-talky) net. Accordingly, events that needed the attention of a supervisor or the QM team were known to all. Site Photo 9 shows contractor managers and a U.S. Government Construction Representative discussing whether a leak in an unknown pipe or soil contamination caused the smell of liquefied petroleum gas.



Site Photo 9: Government Construction Representative and Contractor Supervisors Assessing the Source of a Liquid Petroleum Gas Smell

- **Teamwork:** During the site visit, the assessment team observed that key contractor and government managers conducted an end of business day meeting to discuss the day's accomplishments and problems. Site Photo 10 shows contractor and government managers conducting an end of day meeting. Present at the meeting were the senior on-site manager for the contractor and subcontractor, the subcontractor's construction superintendents and welding supervisor, the prime contractor's logistics, security, and safety managers, and the U.S Government's Resident Engineer and two Construction Representatives. Each meeting included a report of the number of welds completed, tested, and accepted. The QM program was more effective because of these meetings.



Site Photo 10: Participants listen to the Welding Supervisor's Daily Report

Project Sustainability and Operational Effectiveness

Sustainability

A review of the contract file and specification submittals and discussions with PIJV project managers disclosed that the U.S. Government does not plan to maintain or operate the pipelines and manifolds after commissioning. The pipelines and manifolds will be turned over to the Iraqi Ministry of Oil (MoO) and the NOC after commissioning. As built drawings of the pipeline and manifold system, a recommended list of spare parts and standard operating procedures will be provided to the MoO and the NOC upon completion.

Operational Effectiveness

Pipelines are a reliable and cost effective method of transporting large volumes of fuel to consumers. Three separate Iraq Relief and Reconstruction Fund projects are underway to construct canal crossings between the Tigris River projects and the Kirkuk oil fields to connect those crossings to the 40-inch crude oil pipeline installed in a previous project. This complete crude oil pipeline system is anticipated to provide a new pipeline capacity from the Kirkuk oil fields to the ITP for refinement and export. The manifolds will provide operational flexibility for the NOC and the MoO.

Operational effectiveness was addressed in the design and management of this project. The contract and specifications are specific on quality requirements that must be met. Quality management is apparent in the workmanship of this project. If current practices continue the final pipeline should be fully functional and meet the objective of this project.

Conclusions

Based upon the field work performed during this assessment, we reached the following conclusions for assessment objectives 1, 2, 3, 4, and 5. Appendix A provides details pertaining to Scope and Methodology.

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

The completed project should meet and be consistent with original task order objectives, if current construction procedures are continued. Specifically, the “Tie-In” project is a key element of an overall objective to re-establish the operations of the Iraq oil infrastructure following the destruction of crude oil pipelines that crossed the Tigris River at Al Fatah during hostilities in 2003. This will occur because the project was adequately planned and designed. In addition, it is very likely that the project will be completed and constructed in accordance with contract specifications. As a result, a tie-in manifold on each side of the Tigris River will effectively connect the pipeline from the Kirkuk oil fields to the ITP.

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

The design package was completed and approved prior to construction and appears specific enough to construct the project. Specifically, a crude oil manifold was designed for each side of the river. The manifolds were designed to tie in new 40 inch, 32-inch, 30-inch, 26-inch, and 20-inch crude oil pipelines that will cross the river to existing distribution pipelines. This occurred because the project was effectively planned and designed in accordance with contract’s SOW requirements. As a result, a tie-in manifold on each side of the Tigris River should effectively connect the existing pipelines and provide flexibility for operational contingencies.

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

The construction of the tie-in manifolds should meet the standards of the design because QM practices and line level construction supervision were determined to be effective. The assessment team observed that QM personnel and construction supervisors were engaged daily in activities to ensure construction quality. As a result, construction conformity should adhere to contract specifications and the project will effectively link the existing pipelines.

4. Determine whether the Contractor’s quality control plan and the Government quality assurance program were adequate.

Overall, the CQC plan and the U.S. Government's QA program were adequate. For example, procedures in place ensured that potential construction deficiencies were detected, evaluated, and properly corrected, when necessary. In addition, the

contractor's daily QC reports and the U.S. Government's QAR's reports were sufficiently complete, accurate, and timely. This occurred because the government and contractor adequately planned and implemented an effective QM program. Key to the program's effectiveness was the CQC plan that adequately addressed critical QC elements, such as construction conformity testing, deficiency detection and correction, staffing, and definable features of work. As a result, QM documentation was accurate and timely when compared to the project's observed completion percentage and conformity to construction requirements.

5. Determine if project sustainability and operational effectiveness were addressed.

Sustainability was adequately addressed in the contract's SOW and should result in an operational pipeline. As built drawings of the pipeline and manifold system, a recommended list of spare parts, and standard operating procedures will be provided to the MoO and the NOC, upon completion.

Assessment Comment

However, operational effectiveness of the project would be improved by connecting the 40-inch ITP at the Kirkuk manifold to the terminus of the new 40-inch pipeline coming from the Kirkuk oil fields, which were not included in the original SOW. Connecting the manifold to the new 40-inch Kirkuk pipeline would be a cost efficient approach to substantially increase oil revenue due to enhanced manifold flexibility and increased crude oil flow capacity. As the result of the engineering team's assessment work, the SIGIR recommended a modification to the project design that would, at minimal cost, substantially increase the overall carrying capacity of the crude oil pipeline system.

A plan to implement the recommendation was initiated by the USACE during the timeframe of the assessment. Specifically, the USACE advised that piping material, equipment, and skilled labor were on the site and that the modification could be completed with negligible impact on the project schedule and budget. It is estimated that the change could increase pipeline carrying capacity by as much as 50 percent, with a corresponding increase in revenue to the Iraqi government.

Recommendations and Management Comments

We discussed the results of our assessment with the appropriate PCO and USACE officials who concurred verbally with our conclusions and recommendation. This report does not contain any negative findings; therefore, management comments were not required.

Appendix A. Scope and Methodology

We performed this project assessment in September and October 2005, in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included an engineer and an auditor.

In performing this Project Assessment we:

- Reviewed contract documentation, including the Independent Government Estimate, Scope of Work, Contract, and contract modifications;
- Reviewed the design package (drawings and specifications), Quality Assurance Plan, Quality Control Plan, contractor's daily Quality Control reports, and Quality Assurance Representative reports;
- Interviewed the U.S. Army Corps of Engineers Project Engineer, and Quality Assurance Representative, and the contractor's Project Manager, Quality Control Manager and other operational personnel on-site; and
- Conducted an on-site assessment of the Al Fatah River Crossing Tie-Ins and documented results.

Appendix B. Acronyms

CLIN	Contract Line Item Number
CQC	Contractor Quality Control
ITP	Iraq-to-Turkey Pipeline
KBR	Kellogg, Brown, and Root
m	Meters
MoO	Ministry of Oil
NOC	Northern Oil Company
PIJV	Parsons Iraq Joint Venture
PCO	Project and Contracting Office
PSSR	Project Scope and Status Report
QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
QM	Quality Management
SOW	Scope of Work
SIGIR	Special Inspector General for Iraq Reconstruction
TO	Task Order
USACE	U.S. Army Corps of Engineers

Appendix C. Project 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 were:

Randall Nida

Lloyd Wilson