

HAMDAN SUBSTATION  
BASRAH, IRAQ

**SIGIR PA-05-006**  
**MARCH 10, 2006**

# Report Documentation Page

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# Special Inspector General for Iraq Reconstruction

SIGIR PA-05-006

March 10, 2006

## Hamdan Substation in Basrah, 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 were complying 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;
4. The 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. As a result, the substation should convert high voltage transmission electricity to low voltage distribution electricity. Therefore, the original objective of the task order to improve the reliability of the existing power distribution system should be met.
2. The design package appears to be complete and specific enough to construct the electrical substation, and install and commission all associated equipment. As a result, the substation should convert high voltage transmission electricity to low voltage distribution electricity and improve the reliability of the existing power distribution system.
3. The construction of the substation facilities and the installation of the equipment appear to meet the standards of the design. As a result, the substation should convert high voltage transmission electricity to low voltage distribution electricity and improve the reliability of the existing power distribution system. In addition,

all construction and equipment installation was completed at a high level of workmanship.

4. Overall, the contractor's quality control plan and the U.S. Government's quality assurance program were adequate. As a result, Quality Management documentation was accurate and timely when compared to the project's observed percent complete and conformity to construction requirements.
5. Sustainability coverage under the current contract appears adequate for the operation of the electrical substation. The contract included training of substation employees to operate the plant, operational and maintenance manuals for the substation systems, and spare parts for maintenance operations.

The facility, however, cannot operate until high voltage feeder lines to the facility and distribution lines to end users from the facility are installed. While an Iraq Relief and Reconstruction Fund funded project is underway to complete the high voltage feeder connection to the substation, we could not identify any plans to install distribution lines from the facility to the residences/end users. As a result, the value and benefit of the substation will not be realized until an end user distribution system is connected. We recommend that the management agencies determine whether or when an end user distribution system will be connected. Management comments pertaining to this recommendation are requested.

**Recommendation.** The Director, Project and Contracting Office (PCO), should ensure an end user distribution system will be connected.

**Management Comments.** The Director, Project and Contracting Office, agreed with our conclusions and recommendation and provided the following comments:

“The responsibility of the design-build contractor is to perform a complete commissioning of the Hamdan Substation. It is anticipated that the design-build contractor will complete the commissioning and officially turn over the Substation to the Ministry of Electricity by October 15, 2005. The Project and Contracting Office has coordinated completion of the Substation with the Ministry of Electricity on a prioritized basis. The Ministry of Electricity assumed responsibility for connection of the Substation to the end user distribution system. The primary reason for the delay in connection is that the Substation’s power source, Basrah Center 132 volt Substation, does not have the capacity to handle the fully loaded substations (Al Hakamia, Al Kaffat, and Al Seraji) located in Basrah. The Ministry of Electricity expects to complete a new Basrah Center 132 kilovolt Substation by November 2005. Once completed, the Substation will have its 33k kilovolt feeders re-routed to the Substation. This step will enable the Ministry of Electricity to fully connect the Substation of the grid. The Substation will begin receiving outgoing 11 kilovolt feeders near the end of the 2005.”

**Evaluation of Management Comments.** Management comments addressed the issues raised in the report. However, management should determine the date the Ministry of Electricity plans to connect the substation to the grid and subsequently monitor the implementation of the plan, to ensure follow through by the Ministry of Electricity and ultimately the effectiveness of the Iraq Relief and Reconstruction Fund monies spent to build the substation.

# Table of Contents

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|   |    |
|---|----|
| <b>Synopsis</b>   | i  |
| <b>Introduction</b>   |    |
| Objective of the Project Assessment                         | 1  |
| Pre-Site Assessment Background                              | 1  |
| Contract, Task Order and Costs                              | 1  |
| Project Objective   | 2  |
| Description of Facility (Preconstruction)                   | 2  |
| Scope of Work of the Task Order                             | 3  |
| Current Project Design and Specifications                   | 3  |
| Reported Project Work Completed and Pending                 | 4  |
| <b>Site Assessment</b>                                      |    |
| Work Completed  | 4  |
| Work in Progress  | 11 |
| Work Pending  | 11 |
| <b>Project Quality Management</b>                           | 11 |
| <b>Project Sustainability and Operational Effectiveness</b> |    |
| Project Sustainability                                      | 12 |
| Operational Effectiveness                                   | 12 |
| <b>Conclusions</b>  | 12 |
| <b>Recommendation</b>                                       | 14 |
| <b>Management Comments</b>                                  | 14 |
| <b>Evaluation of Management Comments</b>                    | 14 |
| <b>Appendixes</b>   |    |
| A. Scope and Methodology                                    | 15 |
| B. Acronyms   | 16 |
| C. Assessment Team Members                                  | 17 |

# Introduction

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## 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. The 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 Hamdan Substation project will be completed under Task Order 0002/ED017 of Contract W914NS-04-D-0011. Contract W914NS-04-D-0011, dated 12 March 2004, was an Indefinite Delivery Indefinite Quantity contract with a \$500 million ceiling. The contract was made between the Coalition Provisional Authority and Perini Corporation, Framingham, Massachusetts. Task Order 0002/ED017 was a design/build, cost-plus award fee, task order for the site assessment, design, procurement, construction, and commissioning of an electrical distribution network in the Governorate of Basrah, Iraq.

Task Order 0002/ED017 initially was un-definitized and the Perini Corporation was directed by a notice to proceed, dated 1 May 2004, to perform a site assessment for the Basrah electrical substations and distribution networks. Perini Corporation was subsequently directed to prepare a detailed cost proposal for the construction of five electrical substations in the Governorate of Basrah. PCO provided a notice to proceed, dated 18 October 2004, to begin construction work. The task order was definitized on 18 October 2004. Definitization was based on the Perini Corporation proposal and an Independent Government Estimate.

The initial un-definitized Task Order 0002/ED017 was issued 1 May 2004, with a maximum obligation amount of \$17,168,205 and a maximum not-to-exceed amount of \$2,000,000 in order to accomplish the site assessment, provide a site assessment report, and deliver a rough order of magnitude cost report for work identified in the site assessment. However, there are currently eight modifications to the initial contract.

- Modification # 01 was issued 8 May 2004, to reflect administrative changes of the contract. No additional funding was added at this time.

- Modification #02 was issued 6 June 2004 to extend the performance period for the site assessment. No additional funding was added at this time.
- Modification #03 was issued 07 June 2004 to increase the contract amount of the task order from \$17,168,205 to \$36,143,589.
- Modification #04 was issued 15 June 2004 to change the performance completion date for the assessment report and proposal. No additional funding was added at this time.
- Modification #05 was issued 23 June 2004 to change the scope of work. No additional funding was added at this time.
- Modification #06 was issued 3 August 04 to change the scope of work. No additional funding was added at this time.
- Modification #07 was issued 18 October 2004 to incorporate the final negotiated scope of work, definitize the contract amount, and establish a delivery schedule for construction. The contract amount was reduced from \$36,143,589 to \$23,748,675.
- Modification #08 was issued 11 June 2005 to increase the contract amount from \$23,748,675 to \$28,809,476.

Although final contracting action included construction of the Al Hakamia substation, the Shut Al Arab substation, the Al Seraji substation the Al Kaffat substation, the Hamdan substation, and assessments of the electrical feeder distribution system under Task Order 0002/ED017, this assessment addresses only the Hamdan substation project. The cost for completion of the Hamdan substation is listed in Modification #08 at \$5,000,933.

### **Project Objective**

The 19 April 2004, Scope of Work provides that: “The overall objective of this task order is to improve the reliability of the distribution system including 33/11 kV substations; 33 kV and 11 kV lines; 11 kV-230 Volt (V)/400V distribution transformers and 230V/400V service conductors and associated equipment. The initial phase is to conduct a site assessment of the existing system and determine its condition. Based on the site assessment and coordination with the Sector Program Management Office the Contractor will rehabilitate or construct new components for the distribution network including substations, required overhead and underground 11 kV distribution line, 11 kV-230V/400V distribution transformers, and 230V/400V service conductors, and distribution system components”. The specific objectives for the Hamdan substation project are to provide the required transformers, switchgear, relays, disconnect switches, battery system, communications equipment, offices, buildings, restrooms, parking lots, site security, and all associated equipment required for a functional substation. The substation will be used to convert high voltage transmission electricity to low voltage distribution electricity.

### **Description of the Facility (Pre-construction)**

The description of the facility (pre-construction) is based on information from the initial Scope of Work, the Perini Corporation site assessment, and the substation feeder contract file. The site selected for construction was an open area with no existing structures. The site is located approximately 6 kilometers from an existing 33 kV (kilovolt) power supply at the Bab Al Zubeer 132/33/11 kV substation. The

substation site is located in a predominately rural/residential area approximately 8 km southeast from the center of Basrah. Topography of the site is generally level in grade.

### **Scope of Work of the Task Order**

The initial Statement of Work (SOW) for the project, dated 23 June 2004, stated the specific objectives for the Hamdan substation project were to provide the required transformers, switchgears relays, disconnect switches, battery system, communications equipment, offices, buildings, restrooms, parking lots, site security, and all associated equipment required for a functional substation. Based on the Perini Corporation site assessment and the definitized scope of work, the major tasks for the construction of the Hamdan substation project included:

- Construct substation building
- Construct perimeter fencing, gates, exterior lighting and guardhouse
- Furnish and install (1) 33 kV switchgear
- Furnish and install (1) 11 kV switchgear
- Furnish and install (2) 33 to 11 kV transformers
- Furnish and install (2) 11 to 0.4 kV auxiliary transformers
- Furnish and install grounding system
- Complete commissioning of substation

### **Current Project Design and Specifications**

The contract and SOW includes requirements for project design and specification submittals and approvals. The SOW required submission of 30%, 60%, and 90% design drawings and specifications for review to the Sector Program Contracting Office Contractor and approval by the contracting officer. Requirements for all construction and rehabilitation works included the use of the applicable International Electro-technical Commission (IEC) and British Standards used by the Iraqi Ministry of Electricity. Required design drawing and specifications included:

- Plot plan for the substations and associated feeders
- One-line diagrams including protective devices
- Substation yard steel structural support shop drawings
- Substation civil and site drainage drawings
- Substation yard and building foundation drawings
- Main transformer foundation and fire wall drawings
- Substation building architectural and structural drawings
- Substation building equipment layout
- Substation grounding grid drawings
- Substation raceway layout drawings
- Substation building plumbing, electrical, fire protection, and HVAC drawings
- Underground feeder plan and sections
- Cable schedule
- Three-line diagrams
- DC schematic diagrams
- Circuit breakers, re-closers, line switchers, line sectionalizes, and switchgear control and relaying wiring and connection drawings
- Protection relay settings and coordination studies
- Load flow and short circuit calculations
- Catalog cuts of major equipment items

Electronic and hard copies of the design and specifications were reviewed by the assessment team. Thirty percent and sixty percent design drawings and specifications were submitted by Perini Corporation and reviewed with comments by PCO. Ninety percent design drawings and specifications were submitted by Perini Corporation and approved by PCO on 28 May 2005. All required design drawings and specifications appear to be complete and consistent with the requirements of the contract.

### **Reported Project Work Completed 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 Perini Corporation Project Manager, as well as a review of the PCO contract file.

#### Project site work reported completed:

- Construct substation building
  - Construct perimeter fencing, gates, exterior lighting and guardhouse
  - Furnish and install (1) 33 kV switchgear
  - Furnish and install (1) 11 kV switchgear
  - Furnish and install (2) 33 to 11 kV transformers
  - Furnish and install (2) 11 to 0.4 kV auxiliary transformers
- Furnish and install grounding system

#### Project site work reported underway:

- No significant work was reported to be currently underway.

#### Project site work pending:

- Complete commissioning.

## **Site Assessment**

On July 29 and 30, 2005, we performed an on-site assessment at the Hamdan substation. The site visit included an interview with the Perini Corporation Project Manager and Quality Control Manager, as well as an assessment of the facility. Site work was being accomplished by Perini Corporation at the time of the visit. The assessment covered work completed. Work in progress and work pending were not evaluated during this assessment.

### **Work Completed**

Work completed included the construction of the substation switch gear facility, guardhouse, fencing and exterior lighting, and installation of two 33kV to 11 kV transformers, two auxiliary transformers, a neutral grounding system, a 11 kV switchgear, and a 33 kV switch gear. The installation of substation electrical equipment was completed prior to site assessment. High voltage power to the facility was not connected at the time of the visit; therefore, operation of the systems could not be assessed.

### Construct substation building

The contract and approved design included new construction of a substation building to house the 33 kilowatt (kW) switchgear, 11 kW switchgear, and associated monitoring and control equipment. Requirements included office space, bathroom facility, HVAC systems, fire alarm, internal lighting, and septic system. The 90% design drawings required a 22.280 meter (m) (73.1 feet (ft)) by 8.720 m (28.6 ft) building with a reinforced concrete slab foundation, below grade electrical cable trays, exterior block walls with exterior stucco and interior gypsum, and a reinforced concrete flat roof. Site photo 1 shows the exterior view of the substation building. The on-site assessment verified the construction of the facility was complete. In addition, the construction appeared to be consistent with the contract and design requirements.



**Site Photo 1: Substation building exterior view**

### Construct perimeter fencing, gates, exterior lighting and guardhouse

The contract and approved design included the new construction of a perimeter fence with entrance gates, guardhouse, and exterior lighting. The 90% design drawings required a perimeter fence on reinforced concrete footings, block construction with exterior stucco and paint. Two iron entry/exit gates were included in the perimeter fence design. The 90% design drawings required a 4.220 m (13.8 ft) by 7.220 m (23.7 ft) guardhouse building with reinforced concrete slab foundation, exterior block walls with exterior stucco and interior gypsum, and a reinforced concrete flat roof. The 90% design drawings required that exterior light poles be installed on reinforced concrete foundation.

Site photo 2 shows the exterior fence, guard house (center of photo) and entry/exit gate (right of guard house). The on-site assessment verified the construction of guard house, exterior fence, and exterior lighting was completed and the construction appeared to be consistent with the contract and design requirements.



**Site Photo 2: Exterior fence, guard house, and gate**

**Furnish and install one 33 kV switchgear**

The contract and design required the purchase of a 33 kV switch gear and installation of the switch gear into the newly constructed substation building. The 90% design and associated specifications required a seven bay switchboard rating of 36 kV, 1250 Ampere (A) and 25 kiloAmpere (kA) x 3 seconds.

The on-site assessment verified the installation of the seven bay 33 kV switchgear. The associated factory nameplate lists the company as ABB, Board Type of UNIGEAR /82, rated voltage at 50 Hz and 36 kV, rated Busbar current as 1250 kA, short time current of 25 kA x 3 seconds. The units are listed as to standard IEC 82271-200. The serial number of this unit is 1VC1-8604001045-40000/2005. The equipment and installation appeared to be consistent with the contract, design, and specifications. Site photo 3 shows the 33 kV switchgear located inside the substation building.



**Site Photo 3: 33 kV Switchgear**

**Furnish and install one 11 kV switchgear**

The contract and design required the purchase of an 11 kV switchgear and installation of the switch gear into the newly constructed substation building. The 90% design and associated specifications required a 22 bay unit with switchboard rating of 12 kV, 2000 A, and 31.5 kA x 3 seconds.

The on-site assessment verified the installation of the 11 kV switchgear. The associated factory nameplate lists the company as ABB, Board Type at UNISAFE, rated voltage at 50 Hz and 12 KV, rated Busbar current as 2000 A, and rated short time current of 31.5 kA x 3 seconds. This unit is listed as to standard IEC 62271-200. The serial number of this unit is 1VC1-8604001045-90000/2005.

The 11 kV switchgear equipment and installation appeared to be consistent with the contract, design, and specifications. Site photo 4 shows the 11 kV switchgear located inside the substation building.



**Site Photo 4: 11 kV switchgear**

**Furnish and install two 33 to 11 kV transformers**

The contract required two 33 kV to 11 kV transformers and installation of concrete pads, fire walls, and the transformers onto the pads. The 90% design and associated specifications required two transformers with on-load tap changers, with rated power of 31,500 kiloVolt Ampere (kVA) and rated voltage of 33 (+5,-7) x 1.5% / 11.5 kV be installed.

The onsite assessment verified the installation of two 33 kV to 11kV transformers on concrete pads with firewalls between the two transformers. The associated factory nameplates list the transformers as outdoor three phase transformers with on-load TAP changer – type UBBL 200/400 13 Pos. – constant flux regulation. The listed ratings are: frequency 50 hertz (Hz), rated power 31500 kVA, rated voltage 33 (+5,-7)x1.5%/11.5 kV, and current 551.1/1581.4 A. The serial numbers are 1LIT00899F and 1LIT00899E. The on-load tap changer nameplate lists the company name as ABB Power Technologies AB, type UBBRT 200/400, and serial numbers 1ZSC 8672 613 and 1ZSC 8672 618.

The equipment and installation appeared to be consistent with the contract, design, and specifications. Site photo 5 shows one of the two 33kV to 11 kV transformers.



**Site Photo 5: 33 to 11 kV transformer**

**Furnish and install two 11 to 0.4 k auxiliary transformers**

The contract and design required the purchase and installation of two 11 kV to 0.4 kV auxiliary transformers. The 90% design and associated specifications required the two transformers to be rated at 250 kV.

The on site assessment verified the installation of two 11 kV to 0.4 kV transformers on concrete pads. The associated factory nameplate lists the transformers as three phase Newton Poggibonsi 250 kV, 50 Hz unit. Nominal Voltage for primary is listed at 11 +/- 2x2.5% kV and for secondary is listed at 0.41 kV. Nominal Current is listed at 13.1 A for the primary and 352 A for the secondary. Transformer serial numbers for the two units are 14763 and 14764.

Site photo 6 shows the two installed 11 kV to 0.4 kV auxiliary transformers. The equipment and installation appeared to be consistent with the contract, design, and specifications.



**Site Photo 6: 11 to 0.4 kV auxiliary transformers**

#### **Furnish and install grounding system**

The contract and design required the purchase of two neutral grounding units and installation of the units. The 90% design and associated specifications required a neutral earthing resistor of 300 A rated current for 30 seconds rated time.

The on-site assessment verified the installation of two grounding units. The associated factory nameplates list the grounding units as Telema S.P.A. Neutral Grounding Resistors 041245. Specifications are OHMIC value at 20 C of 21.1 OHM +/- 10%, current 300 A for 30 seconds, 15 A continuous duty, voltage 11.5 / square route (3) kW, insulation voltage of 12 kV, and a frequency of 50 Hz. Serial numbers for the two units are R 041245-1E and R 041245-1F.

Site photo 7 shows one of the two installed neutral grounding units. The equipment and installation appeared to be consistent with the contract, design, and specifications.



**Site Photo 7: Grounding system**

### **Work in Progress**

There is no work in progress.

### **Work Pending**

Reviews of the initial Scope of Work, the Perini Corporation site assessment, and the substation feeder contract file disclosed that high voltage feeder lines are required to supply electricity from the local electrical transmission grid to the substation. The Hamdan substation is located approximately 6 kilometers from an existing 33 kV power supply at the Bab Al Zubeer 132/33/11 kV substation. A separate Iraq Relief and Reconstruction (IRRF) funded project is currently underway to install the feeder lines. The PCO project, identification number 8990, to install the 33 kV feeders was scheduled to be completed by 29 October 05. Commissioning of the substation is scheduled to be completed after the high voltage feeder lines are completed.

Commissioning of the substation was not evaluated as part of this assessment.

## **Project Quality Management**

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, if necessary in a timely manner. In addition, the contractor's daily quality control reports and the government's quality assurance representative's reports were sufficiently complete, accurate, and timely. Furthermore, contractor daily quality control reports and QAR reports included project specific or detailed photographs that reinforced the narrative information provided in reports.

## **Project Sustainability and Operational Effectiveness**

### **Sustainability**

Reviews of the contract file and specification submittals, and discussions with Perini Corporation project managers disclosed that the U.S. Government does not plan to maintain or operate the facility after commissioning and U.S. Government funding is not available for operation or maintenance post turnover. The Hamdan substation will be turned over to the Iraqi Ministry of Electricity after commissioning. Operation and maintenance manuals, spare parts, and on-site training of Ministry of Electricity substation operators were included in the contract. Representatives from Perini Corporation stated they feel the Iraqi Electrical Ministry operators are educated, knowledgeable, and able to maintain and operate the substation. In addition, the Iraqi Electrical Ministry operators attended a two-week factory training program in Italy earlier this summer for training on the major component of the substation. Perini Corporation representatives stated that the training was comprehensive enough for operators who perform first echelon maintenance activities.

### **Operational Effectiveness**

A review of the 33 kV feeder line contract file and discussions with PCO Electrical Sector representatives disclosed that the Hamdan substation does not have 33 kV feeders supplying electricity to the substation and does not have a distribution system to transmit the electricity to the end users. A separate IRRF funded project is underway to install the 33 kV feeder lines. The PCO Project (identification number 8990) to install the 33 kV feeders was scheduled to be completed by 29 October 2005. Currently, there is no IRRF listed project to complete the distribution system in order to transmit the electricity to the end users.

## **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 will meet and be consistent with original task order objectives. Specifically, the required transformers, switchgear, relays, disconnect switches, battery system, communications equipment, offices, switchgear building, guardhouse, security fence, restrooms, parking lots and other associated equipment required for a functional substation were properly constructed or installed. This occurred because the project was effectively planned, designed, and constructed. As a result, the substation should be able to convert high voltage transmission electricity to low voltage distribution electricity. Therefore, the original objective of the task order to improve the reliability of the existing power distribution system will be met. Corrective action and management comments pertaining to this positive finding are not required.

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

The design package appears to be complete and sufficiently specific to construct the electrical substation, and install and commission all associated equipment. This occurred because the project was effectively planned and designed in accordance with contract Statement of Work requirements. As a result, the substation should convert high voltage transmission electricity to low voltage distribution electricity and improve the reliability of the existing power distribution system. Corrective action and management comments pertaining to this positive finding are not required.

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

The construction of the substation facilities and the installation of the equipment appear to meet the standards of the design. This occurred because the project and construction managers effectively monitored or supervised construction and equipment installation. As a result, the substation should be able to convert high voltage transmission electricity to low voltage distribution electricity and improve the reliability of the existing power distribution system. In addition, the construction and equipment installation was completed at a high level of workmanship. Corrective action and management comments pertaining to this positive finding are not required.

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

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. In addition, the contractor's daily quality control reports and the Government's Quality Assurance Representative's reports were sufficiently complete, accurate, and timely. This occurred because the government and contractor adequately planned and implemented an effective Quality Management program. Key to the program's effectiveness was the Contractor's Quality Control (CQC) plan that adequately addressed quality control elements including testing, identifying deficiencies, staffing and definable features of work. As a result, Quality Management documentation was accurate and timely when compared to the project's observed percent complete and conformity to construction requirements. Corrective action and management comments pertaining to this positive finding are not required.

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

Sustainability was addressed in the contract and should result in an operational substation. The contract included training of substation employees to operate the plant, operational and maintenance manuals for the substation systems, and spare parts for maintenance operations.

Operational effectiveness is an area that needs to be addressed. While an IRRF funded project is underway to complete the high voltage feeder connection to the substation, we could not identify any plans to install distribution lines from the facility to the residences/end users. The value and benefit of the substation will not be realized until such an end user distribution system is connected.

## **Recommendation**

The Director, Project Contracting Office, should ensure an end user distribution system will be connected.

## **Management Comments**

The Director, Project and Contracting Office, agreed with our conclusions and recommendation and provided the following comments.

“The responsibility of the design-build contractor is to perform a complete commissioning of the Hamdan Substation. It is anticipated that the design-build contractor will complete the commissioning and officially turn over the Substation to the Ministry of Electricity by October 15, 2005. The Project and Contracting Office has coordinated completion of the Substation with the Ministry of Electricity on a prioritized basis. The Ministry of Electricity assumed responsibility for connection of the Substation to the end user distribution system. The primary reason for the delay in connection is that the Substation’s power source, Basrah Center 132k volt Substation, does not have the capacity to handle the fully loaded substations (Al Hakamia, Al Kaffat, and Al Seraji) located in Basrah. The Ministry of Electricity expects to complete a new Basrah Center 132 kilovolt Substation by November 2005. Once completed, the Substation will have its 33 kilovolt feeders re-routed to the Substation. This step will enable the Ministry of Electricity to fully connect the Substation to the grid. The Substation will begin receiving outgoing 11 kilovolt feeders near the end of the 2005.”

## **Evaluation of Management Comments**

Management comments addressed the issues raised in the report. However, management should determine the date the Ministry of Electricity plans to connect the substation to the grid and subsequently monitor the implementation of the plan, to ensure follow through by the Ministry of Electricity and ultimately the effectiveness of the Iraq Relief and Reconstruction Fund monies spent to build the substation.

## **Appendix A. Scope and Methodology**

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We performed this project assessment from July through September 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 and auditor.

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, contractor's daily QC reports, and QAR reports;
- Interviewed the Project Manager, Project Engineer, Quality Assurance Representative, and the contractor's quality control manager and on-site staff; and
- Conducted an on-site assessment and documented results at the Hamdan Electric Substation.

**Limiting Factor.** Due to the high security threat, we were limited to two trips with an on-site time limit of 15 minutes.

## **Appendix B. Acronyms**

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|       |   |
|-------|---|
| A     | Ampere  |
| CQC   | Contractor Quality Control                        |
| ft    | Feet  |
| kA    | kiloampere  |
| kV    | kilovolt  |
| kVA   | kilovolt Ampere                                   |
| kW    | kilowatt  |
| IEC   | International Electro-technical Commission        |
| IRRF  | Iraq Relief and Reconstruction Fund               |
| m     | Meter   |
| MoE   | Ministry of Electricity                           |
| PCO   | Project and Contracting Office                    |
| QA    | Quality Assurance                                 |
| QAR   | Quality Assurance Representative                  |
| SIGIR | Special Inspector General for Iraq Reconstruction |
| SOW   | Statement of Work                                 |
| V     | Volt  |

## **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 include:

Michael Stanka, P.E.

Lloyd Wilson