

QUDAS POWER PLANT TURBINE
RESTORATION PROJECT AND QUDAS
POWER PLANT EXPANSION PROJECT
BAGHDAD, IRAQ

PROJECT AND SUSTAINMENT
ASSESSMENT

SIGIR PA-07-101
SIGIR PA-07-104
OCTOBER 19, 2007

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 19 OCT 2007		2. REPORT TYPE		3. DATES COVERED 00-00-2007 to 00-00-2007	
4. TITLE AND SUBTITLE Qudas Power Plant Turbine Restoration Project and Qudas Power Plant Expansion Project Baghdad, Iraq. Project and Sustainment Assessment				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				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 Same as Report (SAR)	18. NUMBER OF PAGES 19	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

October 19, 2007

MEMORANDUM FOR COMMANDING GENERAL, MULTI-NATIONAL FORCES-
IRAQ,
COMMANDER, JOINT CONTRACTING COMMAND-
IRAQ/AFGHANISTAN
COMMANDER, GULF REGION DIVISION, U.S. ARMY
CORPS OF ENGINEERS
DIRECTOR, IRAQ TRANSITION ASSISTANCE OFFICE

SUBJECT: Report on Project and Sustainment Assessments of Qudas Power Plant,
Turbine Restoration and Plant Expansion Projects, Baghdad, Iraq
(Report Numbers SIGIR PA-07-101 and SIGIR PA-07-104)

The Office of the Special Inspector General for Iraq Reconstruction (SIGIR) is conducting a series of assessments to determine the progress of ongoing projects, the current condition of completed projects subsequent to their transition to the Government of Iraq, and whether the projects are likely to remain operational in the future.

We are providing this report for your information and use. The assessment was made to provide you and other interested parties with real-time information to enable appropriate action to be taken, if warranted. This report does not contain any negative findings or recommendations for corrective action. Therefore, management comments were not required. However, U.S. Army Corps of Engineers, Gulf Region Division did review the draft and offered no additional information and had no comments.

We want to express our thanks to United States Army Corps of Engineers, Gulf Region Division, Electricity Sector personnel for their assistance in coordinating the site visit. In addition, Electricity Sector representatives provided SIGIR inspectors ready access to key personnel and needed information in a timely manner. If you have any questions, please contact Mr. Brian Flynn at brian.flynn@sigir.mil or at 914-360-0607. For public or congressional queries concerning this report, please contact SIGIR Congressional and Public Affairs at publicaffairs@sigir.mil or at (703) 428-1100.

Stuart W. Bowen, Jr.
Inspector General

Special Inspector General for Iraq Reconstruction

SIGIR PA-07-101

October 19, 2007

SIGIR PA-07-104

Qudas Power Plant Turbine Restoration and Qudas Power Plant Expansion Baghdad, Iraq

Synopsis

Introduction. These project assessments were initiated as part of the Special Inspector General for Iraq Reconstruction's continuing assessments of selected reconstruction activities funded by the Iraq Relief and Reconstruction Fund.

The objective of the Qudas Power Plant Turbine Restoration (SIGIR PA-07-101) project included requirements to inspect, evaluate, restore, convert to crude-oil firing, and start up two General Electric Frame 9E combustion gas turbine units. In addition, the turbine unit restoration project included requirements to evaluate, restore, commission, and turn over four General Electric LM-6000 units.

The Qudas Power Plant Expansion (SIGIR PA-07-104) project provided for the design, manufacturing, delivery to the site and off-loading, erection, painting, commissioning, start-up, testing, and turn over of two new General Electric Frame 9E open-cycle gas turbine units.

The restoration of the turbine units previously installed and addition of two new turbine units will strengthen the "Baghdad Ring,"¹ increasing the supply of available electricity by as much as 584 megawatts. Turbine restoration, installation, and sustainment activities at the Qudas Power Plant are valued at approximately \$238 million.

Assessment Objectives. The overall objective of these assessments was to provide timely relief and reconstruction project information to interested parties to enable appropriate action, when warranted.

In PA-07-101, the Special Inspector General for Iraq Reconstruction determined whether:

- the project was at full capability or capacity when accepted by the United States government, when transferred to Iraqi operators, and when observed by the Special Inspector General for Iraq Reconstruction inspectors
- sustainability for full capacity operations was adequately planned and likely to continue

In PA-07-104, the Special Inspector General for Iraq Reconstruction determined whether:

- project components were adequately designed before construction or installation
- construction or rehabilitation work complied with the design standards
- contractor quality control and United States government quality assurance programs were adequate

¹ Included in the "Baghdad Ring" are the Qudas, Taji, Baghdad South, Doura, and Musayhib power plants.

- project outcome was consistent with original objectives
- project sustainability was adequately addressed in the contract or task order

Conclusions. These projects had two main objectives—the restoration of previously installed turbines and the ability to sustain operations and maintenance of the restored turbines and the expanded capacity of Qudas Power Plant.

Turbine Restoration: Qudas projects to restore turbine units and expand electricity generation capacity were adequately designed and either properly completed or progressing satisfactorily at the time of the Special Inspector General for Iraq Reconstruction’s assessment. Specifically, work required to restore four LM-6000 and two General Electric Frame 9E turbine units at Qudas Power Plant under the requirements of Task Order 0006 was satisfactorily completed on 28 January 2006.

In addition, work required under contract W91GXY-06-C-0094 to expand Qudas capacity by more than 200 megawatts (by installing two new General Electric Frame 9E units) was consistent with the objectives and progressing satisfactorily as of 15 August 2007. This occurred because project requirements were adequately specified in each contract or task order, and construction management practices enforced compliance with specifications and requirements. Also, contractor quality control and the government’s quality assurance programs were satisfactory. As a result, approximately 584 megawatts of additional electricity will be available to the power grid.

Sustainability: Sustainability was adequately planned and addressed in applicable contracts or task orders. The United States government demonstrated a strong commitment to programs designed to mentor Ministry of Electricity personnel and to sustain operations in the short term. Specifically, contract W91GXY-06-C-0066 provided a program designed to mentor the ministry staff in the managerial skills and resources needed to properly operate and maintain Iraq’s electric utility system.

The United States Army Corps of Engineers Gulf Region Division has implemented additional programs to help ensure that generation assets received or will receive scheduled inspections and maintenance to enhance the likelihood of sustainable operations in the short term. Further, ministry personnel, contractors, and United States government officials will need to continue to effectively coordinate and communicate to ensure program effectiveness. The long term sustainability of generation assets will depend primarily on whether the Government of Iraq can implement and fund an effective electric power generation operations and maintenance program at the Qudas Power Plant.

Recommendations and Management Comments. Our report does not contain any negative findings or recommendations for corrective action. Therefore, management comments were not required. However, the United States Army Corps of Engineers Gulf Region Division reviewed the draft report and offered no additional information or comments.

Table of Contents

Synopsis	i
Introduction	
Objective of the Project Assessments	1
Background	1
Contract and Task Order to Restore Turbines	2
Contract to Expand Generation Capacity	4
Operations and Maintenance Program	4
Spare Parts Program	5
Other Sustainment Programs	5
Fuel Availability and Impact on Operations and Maintenance	6
Site Assessment	7
Conclusions	8
Recommendations	9
Appendices	
A. Scope and Methodology	10
B. Acronyms	11
C. Report Distribution	12
D. Project Assessment Team Members	14

Introduction

Objective of the Project Assessments

The overall objective of these assessments was to provide timely relief and reconstruction project information to interested parties to enable appropriate action, when warranted.

Pertaining to SIGIR PA-07-101, we determined if:

- the project was at full capability or capacity when accepted by the U.S. government (USG), when transferred to Iraqi operators, and when observed by SIGIR inspectors; and
- sustainability for full capacity operations was adequately planned and likely to continue.

Pertaining to SIGIR PA-07-104, we determined if:

- project components were adequately designed before construction or installation;
- construction or rehabilitation work was compliant with the design standards;
- contractor's quality control and the USG quality assurance programs were adequate;
- project outcome was consistent with original objectives; and
- project sustainability was adequately addressed in the contract or task order.

Although the announced objectives for SIGIR PA 07-101 and SIGIR PA 07-104 differed, actual field work required to address the announced objectives was very similar. Accordingly, this report includes the combined results for both project assessments.

Background

The Qudas Power Plant (Aerial Image 1) is located in a rural area approximately 25 kilometers north of Baghdad, east of the Tigris River and adjacent to the Baghdad East Oil Field. Topography of the site is generally level in grade. Prior to Phoenix Project-Restore Qudas Gas Turbine Units (Contract No. W914NS-04-D-0003), two of four previously installed General Electric (GE) Frame 9E² combustion gas turbine units and four of four previously installed GE LM-6000³ aero derivative gas turbine units were not operational. Specifically, the two GE Frame 9E units that were set-up to run on diesel fuel were not operating because diesel fuel deliveries by truck were sporadic. In addition, various commissioning and startup requirements were not completed by the Ministry of Electricity (MOE) since initial installation of the four LM-6000 units.

Each GE Frame 9E unit (Site Photo 1) has an International Standards Organization rated maximum capacity of 123 megawatts (MW) of electricity when the turbine is fired with natural gas. However, when fired with crude oil, the Frame 9E MW capacity is approximately 106 MW. Similarly, each LM-6000 unit (Site Photo 2) has an International Standards Organization rated maximum capacity of 43 MW when fired with natural gas, but drops to approximately 40 MW when fired with diesel fuel.

² In comparison to aero derivative gas turbines, the GE Frame 9E (industrial) gas turbine is larger, more rugged, less efficient and suited for static demand base-load operations.

³ The GE LM-6000 is one of General Electric's larger aero derivative gas turbine units. It is light weight (approximately 6 tons), very efficient, and suited to smaller systems.

The combined restoration and expansion projects discussed in this report represented approximately 584 additional MW of electricity as detailed in the following chart.

Contract No. and Purpose	No. and Turbine Model Current Status	Fuel Used At Qudas	Capacity With Shown Fuel	Additional Capacity Added
W914NS-04-D-0003 Turbine Restoration	(2) Frame 9E Operable	Crude Oil	106 MW	212 MW
W914NS-04-D-0003 Turbine Restoration	(4) LM-6000 Operable	Diesel Fuel	40 MW	160 MW
W91GXY-06-C-0094 New Turbines	(2) Frame 9E Pending	Crude Oil	106 MW	212 MW
				584 MW

Note: 372 MW operable and 212 MW pending completion of construction.

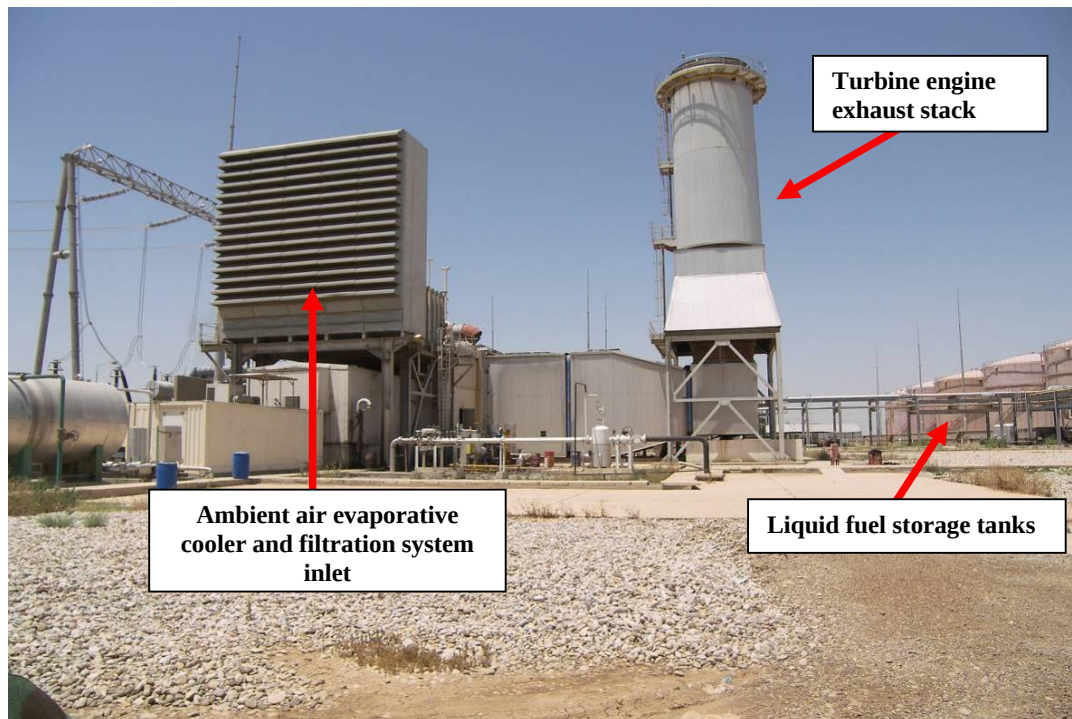


Aerial Image 1. Qudas Power Plant

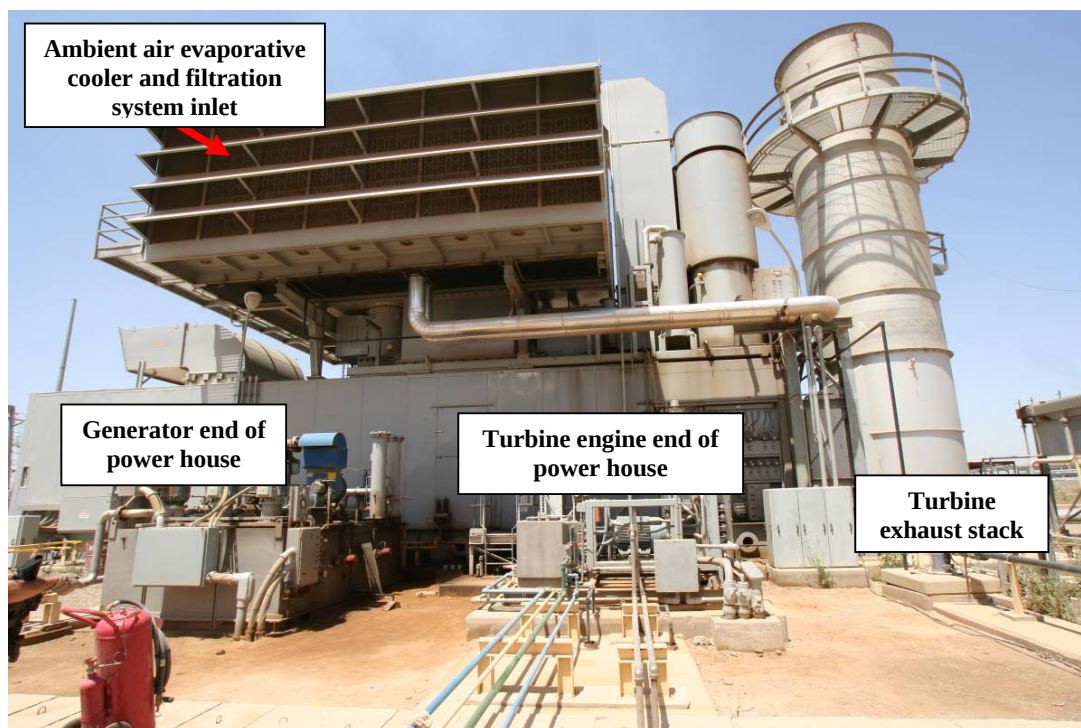
Contract and Task Order To Restore Turbines (SIGIR PA-07-101)

Basic Contract W914NS-04-D-0003, dated 11 March 2004, was an indefinite delivery/indefinite quantity, design-build, cost-plus-award-fee contract with a \$500 million ceiling. The Coalition Provisional Authority awarded the contract to Fluor AMEC, LLC. The scope of the basic contract included work associated with the design, construction, demolition, reconstruction, renovation, restoration, investigation, remediation, and operation and maintenance of Electrical Sector projects country-wide. Specific work requirements to meet the general scope of the basic contract were accomplished through a series of task orders. Requirements to restore some Qudas turbines were included in Task Order (TO) 0006 dated 18 December 2004. TO 0006 Modification 01, Contract Line Item Number (CLIN) 0001AF signed by the contracting officer on 19 January 2005, included requirements to restore two Frame 9E and four LM-6000 turbines and to convert to crude-oil firing two Frame 9E turbines that were previously installed but not operating. In addition, TO 0006 Modification 04 signed by the contracting officer 16 July 2004 included requirements to purchase functional and emergency spare parts which will be discussed in more

detail later in this report. Final construction costs for TO 0006 CLIN 0001AF to restore turbines was approximately \$17.4 million.⁴



Site Photo 1. Frame 9E turbine unit.



Site Photo 2. LM-6000 turbine unit.

⁴ Fuel requirements, availability, and supply were discussed in SIGIR PA-05-029, dated 31 January 2006.

Contract to Expand Generation Capacity (SIGIR PA-07-104)

A firm fixed price (FFP) contract W91GXY-06-C-0094 for approximately \$160 million was issued on 31 August 2006 by the Joint Contracting Command-Iraq/Afghanistan to URUK Engineering Services and a Baghdad Company for Gas Turbines LTD Joint Venture. The contract to expand the power production capability of the Qudas Power Plant included requirements costing approximately \$142 million to design, manufacture, deliver to the site and off-load, erect and paint, commission, start-up, test, turn-over, and provide an evaporative cooler system for two new GE Frame 9E open cycle gas turbine units. In addition, the contract included a requirement for \$5.4 million worth of spare parts.

At the time of our inspection on 27 May 2007, progress appeared satisfactory. Based on our review of quality control and quality assurance documentation and discussions conducted with United States Army Corps of Engineers (USACE), Gulf Region District (GRD) Electricity Sector managers, it appears likely the project will be successfully completed if effective construction management practices continue. As of 30 July 2007, GRD reported the project to be approximately 37 percent complete.

Operations and Maintenance Program

A Cost-Plus-Fixed-Fee letter contract (W91GXY-06-C-0066) dated 5 July 2006 was awarded to Washington International, Inc. to develop, implement, and sustain an effective operations and maintenance (O&M) program. The final definitized value of the O&M contract was approximately \$81.3 million⁵ with a 5 July 2006 through 4 July 2007 period of performance and included specific requirements for Qudas Power Plant. Contract administration was the responsibility of the Joint Contracting Command-Iraq/Afghanistan, Electricity Sector, Baghdad, Iraq.

GRD Electricity Sector managers explained that long term success of an O&M program executed by the MOE is dependent on training enough operators and maintainers and developing standardized procedures. The O&M program has established goals of developing a local program of classroom and on-the-job training for a large number of working-level personnel as well as requirements to develop standard operating procedures for operators and maintainers. Once attained, those goals should improve the long term effectiveness of the O&M program.

The primary requirement of the O&M contractor was to establish a fully functional O&M organization and develop effective daily operations while simultaneously performing effective O&M services. While the main service requirement focused on the O&M, some managerial and maintenance support was required for the transmission and distribution systems. The contractor was required to coordinate services with the MOE and provide proactive support as generally outlined within the Statement of Work in order to transform the MOE's performance to the highest achievable level and instill international standards and industrial best practices. The contract included provisions for a nationwide O&M plan including manning sites, engineering support, emergency maintenance support, critical spare parts support, and other key components. The O&M program was designed to mentor the MOE staff and demonstrate the managerial

⁵ The O&M contract was Iraq-wide and included Qudas, Doura, Khor-Zubair, Baghdad South, Baiji, Kirkuk, Nassiriyah, and Musayhib Power Plants. In that this assessment was not intended to review or disclose detailed financial information, we did not determine the exact amount applicable to Qudas activities. However, an even spread between sites would approximate \$8.1 million allocable to Qudas.

skills needed to properly operate and maintain Iraq's electric utility system. The program was not designed to be an O&M service contract.

Spare Parts Program

Contract W914NS-04-D-0003, TO 0006, to restore Qudas turbines, and Contract W91GXY-06-C-0094, to add new generation units, included requirements to provide spare parts. Specifically, TO 0006, Modification 04, project EG-051, signed by the contracting officer on 16 July 2005, provided for ⁶ in an amount not to exceed \$2 million and ⁷ \$8.9 million.

Contract W91GXY-06-C-0094, dated 31 August 2006, included a specific CLIN in the amount of \$5.4 million for spare parts. The spare parts were for all the projects completed as part of the Phoenix program and included the Qudas, Baiji, Burzurgan, Shauiba, Basrah Petrochemical, Nasiriyah and Mosul East Power Plants.

The Qudas plant manager had a small budget to purchase consumable and small parts that generally fall under or fit into a routine maintenance category. However, the Qudas plant manager did not have sufficient budget resources or authority to approve and purchase higher cost parts or system components needed in an emergency repair situation.

Other Sustainment Programs

Beyond the scope of the aforementioned contracts to restore Qudas turbines; expand Qudas capacity; help MOE develop, implement, and sustain an effective O&M plan; and obtain spare parts, GRD has implemented additional programs to help ensure the projects funded by USG have received or will receive proper scheduled maintenance and routine inspections. A brief summarization of key contracting actions taken to implement the programs is listed below:

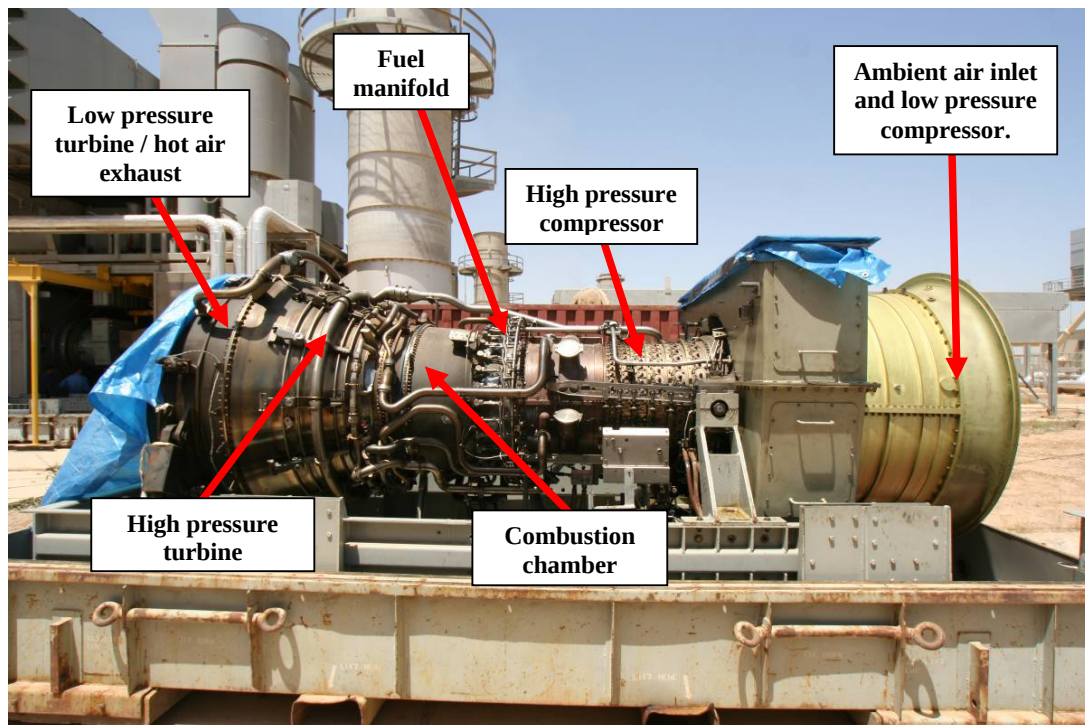
- FFP contract W91GXY-06-C-0053 awarded on 12 April 2006 for approximately \$8.1 million included requirements for inspection and complete core engine change out on LM-6000 units with damaged combustor systems.
- FFP contract W91GXY-07-C-0005 dated 1 December 2006 for approximately \$14 million provided for the purchase of one new or refurbished LM-6000 turbine engine (Site Photo 3). The Qudas portion of the overall cost for the contract was approximately \$7 million.
- FFP contract W91GXY-06-C-0050 with Modification 0007 dated 8 July 2007 for approximately \$34.8 million provided for Hot Gas Path Inspections (HGPI); Combustion Inspections (CI); and inspection and scheduled critical maintenance on all auxiliary systems of the four GE Frame 9E units located at the Qudas Power Plant and two Frame 9E units located at Baghdad South Power Plant. In addition, the contract added requirements to perform a major overhaul of a Qudas Frame 9E turbine unit and parts necessary for the HGPI and CI inspections. The Qudas portion of the overall cost for the contract was approximately \$27.2 million.
- FFP contract W91GXY-07-C-0014 dated 10 March 2007 for approximately \$14.9 million provided for continued HGPI and CI

⁶ Emergency Spare Parts are material components provided and warehoused for Government of Iraq use at a later time for emergency repairs.

⁷ Functional Spare Parts are material components required to be installed to meet Statement of Work requirements for a functional end product.

services and scheduled critical maintenance on all auxillary systems of the four GE Frame 9E units located at the Qudas Power Plant and two Frame 9E units located at the Baghdad South Power Plant. The Qudas portion of the overall cost for the contract was approximately \$9.9 million.

The four contracts referred to in this section directly address real time maintenance tasks beyond the scope of the general mentoring provided for under contract W91GXY-06-C-0066 and the O&M program. In order to complete work required by the contracts noted in this section, MOE personnel, contractors, and USG officials will have to continue to effectively coordinate and communicate. It appears that GRD has demonstrated a strong commitment to programs designed to not only mentor MOE personnel, but sustain operations in the short term.



Site Photo 3. LM-6000 turbine engine is similar to what powers many large commercial and military airplanes.

Fuel Availability and Impact on Operations and Maintenance

The four GE LM-6000 turbines restored via TO 0006 can be fired with either natural gas or diesel. Under TO 0006, two GE Frame 9E turbine units were restored and converted to fire on crude oil.

Although Qudas Power Plant is co-located with the Baghdad East Oil Field, fuel availability in terms of preferred fuel or crude oil volume is limited. Accordingly, TO 0006 included requirements to determine the feasibility of utilizing gas processed through an on-site Gas Oil Separation Plant (GOSP) to fire the four GE LM-6000 turbines because sufficient and reliable sources of diesel fuel were not assured, due to a reduction in electrical sector funding by over \$500 million in October 2005. In July 2005, initial discussions took place on which projects would be cancelled. In October 2005, the cancelled projects were identified and the money reallocated. Any project to expand GOSP gas production was cancelled. However, Electricity Sector managers stated that

projects to expand GOSP gas production have been reconsidered by the electrical sector since almost all of the funding was returned in February 2006.

With heavier fuels such as crude oil, the operating time between major overhauls of the turbine's combustion unit is reduced by a factor of two to three as compared with natural gas. A 2004 General Electric publication, "Heavy-Duty Gas Turbine Operating and Maintenance Considerations" addresses the effects of various fuel types burned in gas turbines. For example, units have to be shut down every five to seven days to complete a water wash procedure of the turbines hot components. Accordingly, availability and MW hours of production are decreased. Although diesel fuel is not as harmful to turbines as crude oil, major overhauls of the combustion components are needed 1.5 times as frequently as with natural gas. In addition, the diesel supplied to the plant has been of questionable quality. Therefore, every truckload of diesel fuel is tested to measure the impurity level of the lead, vanadium, and biological contaminants. Before use, diesel fuel is run through a centrifuge separator to reduce harmful contaminants.

Natural gas is preferred to diesel fuel or crude oil because it is more efficient and effective in terms of maximizing electricity production by minimizing maintenance down time and cost while increasing equipment longevity. However, GRD Electricity Sector managers and MOE have to deal with the reality of the situation at hand. Currently, the most pressing problem is generating maximum MW electricity for the grid. In addition, the low grade crude oil is adjacent to the power plant and not as susceptible to insurgent interdiction as an exposed cross country pipeline. Compared to the high cost of imported diesel fuel, the fuel cost savings associated with using crude oil offset, to an unmeasured degree, the increased maintenance and equipment longevity costs. Once there is enough reliable generation capacity, any available resources could be targeted to obtain reliable, economical and preferred sources of fuel to enhance sustainability over the long term.

Site Assessment

SIGIR conducted a site visit on 22 May 2007. While on site, SIGIR observed the current condition of the power plant and conducted discussions with GRD Electricity Sector personnel. In addition, inspectors observed the status of the on-going work to expand generation capacity. Given the time delay between our 22 May 2007 site visit and the date of this report, we conducted follow-on discussions with GRD Electricity Sector managers and reviewed additional documentation in July and August 2007 to determine whether any material facts based on our previous work needed to be updated. As a result, this report provides timely information.

General Observations

Project Capability. Work required under TO 0006 to restore two Frame 9E turbines and four LM-6000 turbines and to convert two Frame 9E units to fire on crude oil was completed 28 January 2006. Work required under contract W91GXY-06-C-0094 to expand Qudas capacity by installing two new Frame 9E units appeared to be progressing satisfactorily as of 22 May 2007. Based on discussions with GRD Electricity Sector managers, a review of design documentation and quality management documentation, and on-site observations, the project to expand Qudas production by over 200 MW should be completed in a timely manner.

Project Sustainability. As mentioned earlier in this report, assessments SIGIR PA-07-101 (turbine restoration) and SIGIR PA-07-104 (turbine/plant expansion)

differed mostly in terms of completion dates for restored or new hardware projects, while field work required to complete the assessments was very similar. Our work related to project sustainability for SIGIR PA-07-101 and SIGIR PA-07-104 was essentially the same regardless of whether the equipment had been installed or was pending in the near term.

Formal Maintenance Program. SIGIR observed that no equipment or system components were identified for scheduled maintenance. GRD managers stated that a formal maintenance program or a work order driven preventative maintenance system for routine and emergency maintenance or equipment change-out has not been effectively implemented by the MOE or the Qudas plant manager. The O&M contractor reported that the plant manager was not effectively using the provided work order listing to implement a preventative maintenance program. Also, the O&M contractor reported that the work order system was a backlog of outstanding maintenance issues and a centralized form of plant level tool management did not exist. However, GRD Electricity Sector managers are mentoring MOE managers and providing plant level personnel training as a means to overcome these challenges. In addition, the programs implemented by GRD to inspect turbines and perform real-time routine maintenance, as complex as complete overhauls of turbine cores, demonstrates GRD's awareness of the current situation and a necessary and practical approach to sustaining USG funded assets in the short term.

Spare Parts Program. In addition to the various spare parts provided in the restoration, expansion, and O&M contracts previously summarized in this report, the O&M contractor reported and described situations or processes to help maintainers move toward implementation of an effective spare parts program. Although warehouse and inventory training has been provided, a formal computerized system to control spare parts inventory has not been fully implemented. The O&M contractor reported that added computer hardware would be obtained to improve the effectiveness of a spare parts inventory control system at Qudas Power Plant. In addition, the O&M contractor reported that the physical storage of spare parts inventory has improved by adding shelving and sorting and locating parts by size to facilitate better control over the inventory. The plant manager now allows high wear items such as pumps and motors to be rehabilitated on site by MOE mechanics or sent off site to a variety of different vendors.

Conclusions

These projects had two main objectives—the restoration of previously installed turbines and the ability to sustain operations and maintenance of the restored turbines and the expanded capacity of Qudas Power Plant.

Turbine Restoration: Qudas projects to restore turbine units and expand electricity generation capacity were adequately designed and either properly completed or progressing satisfactorily at the time of SIGIR's assessment. Specifically, work required to restore four LM-6000 and two GE Frame 9E turbine units at Qudas Power Plant under the requirements of Task Order 0006 was satisfactorily completed on 28 January 2006.

In addition, work required under contract W91GXY-06-C-0094 to expand Qudas capacity by more than 200 MW (by installing two new GE Frame 9E units) was consistent with the objectives and progressing satisfactorily as of 15 August 2007. This occurred because project requirements were adequately specified in each contract or task order, and construction management practices enforced compliance with specifications and requirements. Also, contractor quality control and the

government's quality assurance programs were satisfactory. As a result, approximately 584 MW of additional electricity will be available to the power grid.

Sustainability: Sustainability was adequately planned and addressed in applicable contracts or task orders. The U.S. government demonstrated a strong commitment to programs designed to mentor Ministry of Electricity personnel and to sustain operations in the short term. Specifically, contract W91GXY-06-C-0066 provided a program designed to mentor the ministry staff in the managerial skills and resources needed to properly operate and maintain Iraq's electric utility system.

USACE GRD has implemented additional programs to help ensure that generation assets received or will receive scheduled inspections and maintenance to enhance the likelihood of sustainable operations in the short term. Further, ministry personnel, contractors, and U.S. government officials will need to continue to effectively coordinate and communicate to ensure program effectiveness. The long term sustainability of generation assets will depend primarily on whether the Government of Iraq can implement and fund an effective electric power generation operations and maintenance program at the Qudas Power Plant.

Recommendations and Management Comments

Our report does not contain any negative findings or recommendations for corrective action. Therefore, management comments were not required. However, USACE GRD reviewed the draft report and offered no additional information or comments.

Appendix A. Scope and Methodology

We started SIGIR PA-07-101 and SIGIR PA-07-104 in January 2007, but had to delay initial fieldwork, which resumed in July 2007. Accordingly, information provided in this report was updated as needed to reflect the work performed between mid-July and August 2007. These projects were conducted in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment teams included an engineer/inspector and an auditor/inspector.

In performing these project and sustainment assessments we:

- Reviewed SIGIR PA-05-029. *Project Phoenix Restore Qudas Gas Turbine Units to Operation*, dated 31 January 2006. The objectives determined whether: consumables' quantity and quality were consistent with original objectives; maintenance manuals were on hand and being used; preventative maintenance was implemented; spare parts requirements were addressed, obtained, and on site; and adequate training was accomplished. This project assessment can be obtained from our website (www.sigir.mil);
- Reviewed the Statements of Work for contracts W914NS-04-D-0003, W91GXY-06-C-0094, W91GXY-06-C-0066, W91GXY-06-C-0053, W91GXY-07-C-0005, W91GXY-06-C-0050, W91GXY-07-C-0014, and TO 0006;
- Reviewed solicitation and Statement of Work documentation for the forthcoming O&M program to supersede W91GXY-06-C-0066;
- Obtained and reviewed other relevant project information provided by GRD;
- Conducted extensive discussions with GRD Electricity Sector officials and managers located in the International Zone;
- Conducted an on-site assessment on 22 May 2007 which was limited due to security concerns; and
- Disclosed the results of fieldwork and conclusions with appropriate GRD Electricity Sector officials before distributing a draft report for management comments.

Appendix B. Acronyms

CI	Combustion Inspection
CLIN	Contract Line Item Number
FFP	Firm Fixed Price
GE	General Electric
GOSP	Gas Oil Separation Plant
GRD	Gulf Region Division of the US Army Corps of Engineers
HGPI	Hot Gas Path Inspection
MOE	Ministry of Electricity
MW	Megawatt(s)
O&M	Operation(s) and Maintenance
SIGIR	Special Inspector General for Iraq Reconstruction
TO	Task Order
USACE	U.S. Army Corps of Engineers
USG	United States government

Appendix C. Report Distribution

Department of State

Secretary of State

Senior Advisor to the Secretary and Coordinator for Iraq

Director of U.S. Foreign Assistance/Administrator, U.S. Agency for
International Development

Director, Office of Iraq Reconstruction

Assistant Secretary for Resource Management/Chief Financial Officer,
Bureau of Resource Management

U.S. Ambassador to Iraq

Director, Iraq Transition Assistance Office

Mission Director-Iraq, U.S. Agency for International Development

Inspector General, Department of State

Department of Defense

Secretary of Defense

Deputy Secretary of Defense

Under Secretary of Defense (Comptroller)/Chief Financial Officer

Deputy Chief Financial Officer

Deputy Comptroller (Program/Budget)

Deputy Assistant Secretary of Defense-Middle East, Office of
Policy/International Security Affairs

Inspector General, Department of Defense

Director, Defense Contract Audit Agency

Director, Defense Finance and Accounting Service

Director, Defense Contract Management Agency

Department of the Army

Assistant Secretary of the Army for Acquisition, Logistics, and Technology

Principal Deputy to the Assistant Secretary of the Army for Acquisition,
Logistics, and Technology

Deputy Assistant Secretary of the Army (Policy and Procurement)

Commanding General, Joint Contracting Command-Iraq/Afghanistan

Assistant Secretary of the Army for Financial Management and Comptroller

Chief of Engineers and Commander, U.S. Army Corps of Engineers

Commanding General, Gulf Region Division

Chief Financial Officer, U.S. Army Corps of Engineers

Auditor General of the Army

U.S. Central Command

Commanding General, Multi-National Force-Iraq

Commanding General, Multi-National Corps-Iraq

Commanding General, Multi-National Security Transition Command-Iraq

Commander, Joint Area Support Group-Central

Other Federal Government Organizations

Director, Office of Management and Budget
Comptroller General of the United States
Inspector General, Department of the Treasury
Inspector General, Department of Commerce
Inspector General, Department of Health and Human Services
Inspector General, U.S. Agency for International Development
President, Overseas Private Investment Corporation
President, U.S. Institute for Peace

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

U.S. Senate

Senate Committee on Appropriations
 Subcommittee on Defense
 Subcommittee on State, Foreign Operations, and Related Programs
Senate Committee on Armed Services
Senate Committee on Foreign Relations
 Subcommittee on International Development and Foreign Assistance, Economic Affairs, and International Environmental Protection
 Subcommittee on International Operations and Organizations, Democracy and Human Rights
 Subcommittee on Near Eastern and South and Central Asian Affairs
Senate Committee on Homeland Security and Governmental Affairs
 Subcommittee on Federal Financial Management, Government Information, Federal Services, and International Security
 Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia
Permanent Subcommittee on Investigations

U.S. House of Representatives

House Committee on Appropriations
 Subcommittee on Defense
 Subcommittee on State, Foreign Operations, and Related Programs
House Committee on Armed Services
 Subcommittee on Oversight and Investigations
House Committee on Oversight and Government Reform
 Subcommittee on Government Management, Organization, and Procurement
 Subcommittee on National Security and Foreign Affairs
House Committee on Foreign Affairs
 Subcommittee on International Organizations, Human Rights, and Oversight
 Subcommittee on the Middle East and South Asia

Appendix D. 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:

Lloyd Wilson

Wesley Snowden, P.E.