

ERBIL MATERNITY AND PEDIATRIC
HOSPITAL
ERBIL, IRAQ

SUSTAINMENT ASSESSMENT

SIGIR PA-06-094
APRIL 19, 2007



SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

April 19, 2007

MEMORANDUM FOR DIRECTOR, IRAQ RECONSTRUCTION MANAGEMENT OFFICE
COMMANDING GENERAL, MULTI-NATIONAL SECURITY
TRANSITION COMMAND-IRAQ
COMMANDING GENERAL, GULF REGION DIVISION, U.S.
ARMY CORPS OF ENGINEERS

SUBJECT: Report on Erbil Maternity and Pediatric Hospital Sustainment, Erbil, Iraq
(Project Number SIGIR PA-06-094)

The Office of the Special Inspector General for Iraq Reconstruction is conducting a series of assessments to assess the current condition of completed projects subsequent to their transition to the Government of Iraq to determine whether the projects are likely to remain operational.

We are providing this report for your information and use. It addresses construction work performed on the Erbil Maternity and Pediatric Hospital in Erbil, Iraq, to determine if the project was operating at full capability or capacity when accepted by the United States Government, when transferred to Iraqi operators, and when observed during the site inspection by the Special Inspector General for Iraq Reconstruction. This assessment was made to provide you and other interested parties with real-time information on relief and reconstruction projects in order to enable appropriate action to be taken, if warranted.

The comments received from the Iraqi Reconstruction Management Office and from the Commanding General, United States Army Corps of Engineers-Gulf Region Division in response to a draft of this report addressed the recommendations and both responses non-concurred with our findings and stated that our recommendations exceeded what was provided for in the scope of the inspection and also addressed the lack of funding to implement our recommendations. We will work with the Gulf Region Division and the Reconstruction Management Office to reach a mutually satisfactory resolution.

We want to express our thanks to all United States Army Corps of Engineers personnel located at the Mosul Area Office and the Erbil Resident Office, who assisted or provided Special Inspector General for Iraq Reconstruction inspectors with travel, security, and billeting.

We appreciate the courtesies extended to our staff. 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-06-094

April 19, 2007

Erbil Maternity and Pediatric Hospital Erbil, Iraq

Synopsis

Introduction. This project assessment was initiated as part of our continuing assessments of selected reconstruction activities. The overall objective was to determine whether the project is operating at the capacity stated in the original contract or task order objective. We conducted this limited scope assessment in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included an engineer/inspector and an auditor/inspector.

Project Objective. The intent of the project was to rehabilitate and modernize the existing Maternity and Pediatric Hospital in Erbil, Iraq.

Project Assessment Objectives. The assessment objective was to determine if the project was operating at full capability or capacity when accepted by the United States Government, when transferred to Iraqi operators, and when observed during the site inspection by the Special Inspector General for Iraq Reconstruction.

Conclusions. Special Inspector General for Iraq Reconstruction inspectors found evidence that the original rehabilitation work on the hospital and installation of new equipment had met specifications. However, they did find what the Special Inspector General for Iraq Reconstruction refers to as "sustainment" issues, where a lack of trained personnel, hospital waste disposal procedures, routine cleaning practices, and inadequate equipment maintenance and parts programs have and are continuing to have a negative impact on hospital operations. While the assessment focused on work performed during the rehabilitation project, the Special Inspector General for Iraq Reconstruction inspectors did observe routine hospital practices which could negatively impact hospital cleanliness. These observations are also included in this report.

Examples of sustainment issues identified during this project assessment include:

- 1) The hospital sewer system has clogged on occasion and caused waste water to back up through floor drains into some sections of the hospital. This may have occurred because of the improper disposal of medical waste materials. During the site visit, Special Inspector General for Iraq Reconstruction inspectors observed large amounts of medical waste products in the sewer system's traps, manholes, and septic tank.
- 2) Some mechanical equipment installed during renovation was inoperable at the time of the site visit because operations and maintenance practices had been ineffective, or the facility personnel chose not to use the new equipment. For example, Special Inspector General for Iraq Reconstruction inspectors observed that a new incinerator installed during renovation was not used because those initially trained to operate the incinerator were no longer employed at the hospital. In addition, a boiler was not operating and was used for parts, a circuit breaker was broken causing a switch gear not to function, the water purification system was not

operating, and the water softener system was not operating. The new sophisticated oxygen generator and distribution system was, by choice, used only as a back-up system, while hospital staff continued to use oxygen tanks.

- 3) In some cases, maintenance needed to comply with equipment manufacturers' warranty requirements was not performed.
- 4) An adequate replacement system or small parts program for hospital equipment was not in place.
- 5) Excessive amounts of water have been used to clean hallways and bathroom floors, resulting in damage to the facility. Special Inspector General for Iraq Reconstruction inspectors observed cleaning crews using a water hose, wet mop, and squeegee to clean hallway and bathroom floors. As a result, considerable water has been absorbed into the walls. Excess water has also leaked from the second story hallways and bathrooms to various first floor rooms, including critical patient care areas.

Recommendations.

- 1) Representatives from the United States Government should coordinate with appropriate Iraqi Government officials and request that hospital officials implement proper medical waste disposal procedures and ensure that all medical waste materials are collected and disposed of properly. The waste materials must not be disposed of in hospital drains and/or the sewer system.
- 2) Representatives from the United States Government should coordinate with appropriate Iraqi Government officials and request that hospital officials implement a formal preventative maintenance program that includes a process for scheduling and tracking completed equipment and facility maintenance tasks. The preventative maintenance program should include a library of operations and maintenance manuals which includes a list of part numbers, potential suppliers and delivery options, which is readily available to maintenance personnel. Relying on manufacturers' warranties is not a substitute for an effective operations and maintenance program.
- 3) Representatives from the United States Government and Erbil Maternity Hospital officials should coordinate and develop a plan to provide additional training for equipment users and facility maintenance personnel.
- 4) Representatives from the United States Government should coordinate with appropriate Iraqi Government officials and request that hospital officials ensure that cleaning crews use the minimal amount of water necessary to clean the facility.

Management Comments. The Special Inspector General for Iraq Reconstruction requested management comments from the Iraq Reconstruction Management Office and from the Commanding General United States Army Corps of Engineers-Gulf Region Division. Both organizations non-concurred with our recommendations. Following is a synopsis of their reasons:

Iraq Reconstruction Management Office noted that regardless of the merits, the Special Inspector General for Iraq Reconstruction's recommendations appear to exceed the contract requirements and purview or authority of either Iraq Reconstruction Management Office or Gulf Region Division to enforce. Recommendations such as how

much water to use to clean floors or dispose of medical waste could be construed as an intrusion or micro-managing of Iraqi operations.

Iraq Reconstruction Management Office also contends that the Special Inspector General for Iraq Reconstruction went beyond the scope of its inspection when it identified “sustainment” issues that have and are continuing to have a negative impact on hospital operations.

United States Army Corps of Engineers - Gulf Region Division stated that the rehabilitation project did not include funding or the requirement to provide the Special Inspector General for Iraq Reconstruction recommended training. If additional funding were provided, the Gulf Region Division could award a service contract for the Special Inspector General for Iraq Reconstruction recommended training.

The full texts of Iraq Reconstruction Management Office’s and Gulf Region Division’s management comments are attached as Appendix E and Appendix F respectively.

Evaluation of Management Comments. Iraq Reconstruction Management Office’s and Gulf Region Division’s contention that they have no authority or responsibility to support sustaining efforts leaves a significant operation and maintenance gap that will significantly shorten the useful lives of transitioned construction projects. Failure to take corrective action will severely risk the United States Government investment in the Iraqi reconstruction effort.

With respect to Iraq Reconstruction Management Office’s comment that the Special Inspector General for Iraq Reconstruction’s recommendations were outside of its inspection scope, we refer to the report introduction which defines the scope to determine if 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. The third inspection objective determines whether the transitioned project was adequately operated and maintained (sustained) by the Iraqi Government. Although the Special Inspector General for Iraq Reconstruction presumed the implication to sustaining was evident we will provide a more descriptive objective in future inspection reports.

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Introduction

Objective of the Project Assessment

The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties to enable appropriate action, when warranted. Specifically, we determined whether the completed project was operating at the capacity stated in the original contract or task order objective. To accomplish this, we determined if the project was at full capability or capacity when accepted by the U.S. Government, when transferred to Iraqi operators, and when observed by the Special Inspector General for Iraq Reconstruction (SIGIR).

Pre-Site Assessment Background

Contract, Task Order, Costs, and Payments

Contract / Task Order (TO) W914NS-04-D-0006 / TO 0010, issued 22 September 2004 by Project and Contracting Office (PCO), was awarded to Parsons Delaware Inc., to renovate seven hospitals in northern Iraq. TO 0010 was a Cost-Plus Award Fee (CPAF) contract that was definitized in the total amount of \$15,958,603. Additionally, the Erbil Maternity Hospital portion of TO 0010 renovation work was definitized in Modification 16 in the amount of \$6,832,360. However, the contractor was only paid \$6,830,887 because some small consumable spare parts were never provided by the contractor.

The TO and modification were issued and administrated by PCO, and construction management services were performed by the United States Army Corps of Engineers (USACE). The Resident Engineer (RE) provided information that the actual start date was 15 December 2004 and the actual completion date was 1 May 2006.

Project Objective and Pre-Rehabilitation Description of the Facility

Task Order 0010, Statement of Requirements (SOR), stated that the objective of the project was to rehabilitate and modernize the existing Erbil Maternity and Pediatric Hospital in Erbil, Iraq. Portions of the facility and its equipment had degenerated to the point where the facility could not meet the functional and cleanliness requirements of a hospital.

The pre-rehabilitation condition of the facility was discussed with the USACE RE and Deputy Resident Engineer (DRE). Based on these discussions and a review of USACE pre-rehabilitation photos, SIGIR inspectors found that the language within the SOR did not overstate the pre-construction condition of the facility and that substantive rehabilitation work was required. For example, the hospital's sewer system was not functional because pipes throughout the system and the septic tank's center section and pump were clogged. As a result, the septic tank system was bypassed and hospital sewage was pumped directly from the cesspool to the municipal system (Site Photos 1, 3, 5, and 7).

During interviews and reviews of records and photographs, SIGIR found that substantive improvements were made to the facility during the rehabilitation (Site Photos 2, 4, and 6). These improvements are addressed later in this report, but are introduced here for comparison purposes.

External toilets were plugged and human feces, piled on the floor, was scooped and removed by workers to facilitate renovation.



Site Photo 1. External toilet prior to renovation. (USACE photo taken 18 June 2006)



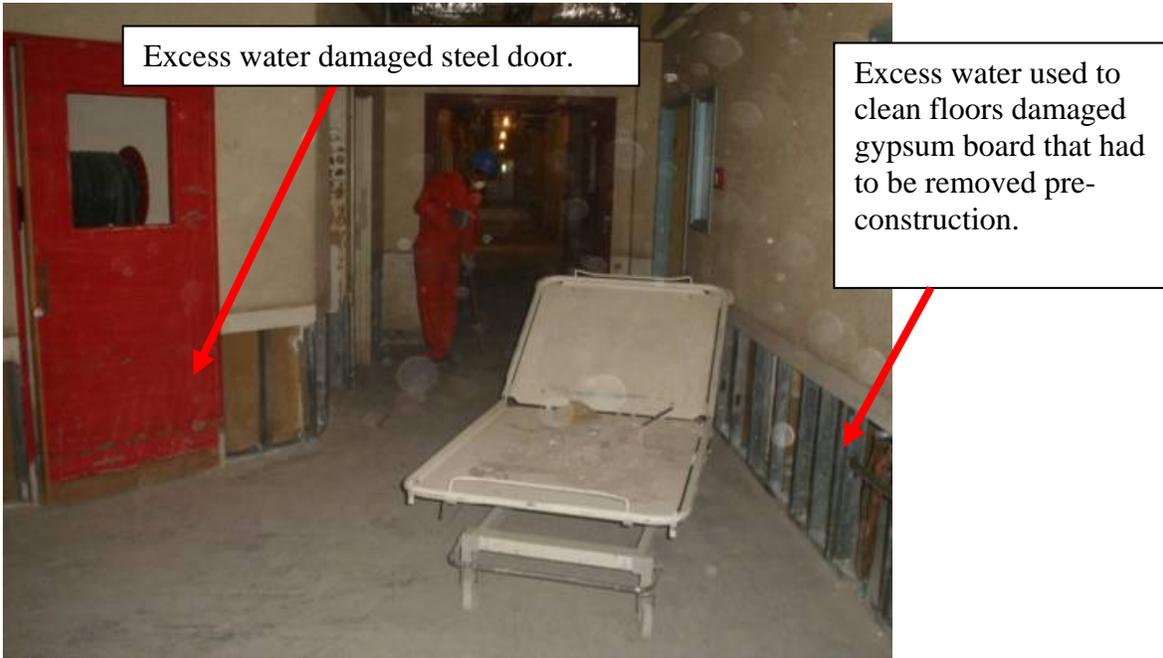
Site Photo 2. External toilet following renovation. (USACE photo taken 18 Jan 2006)



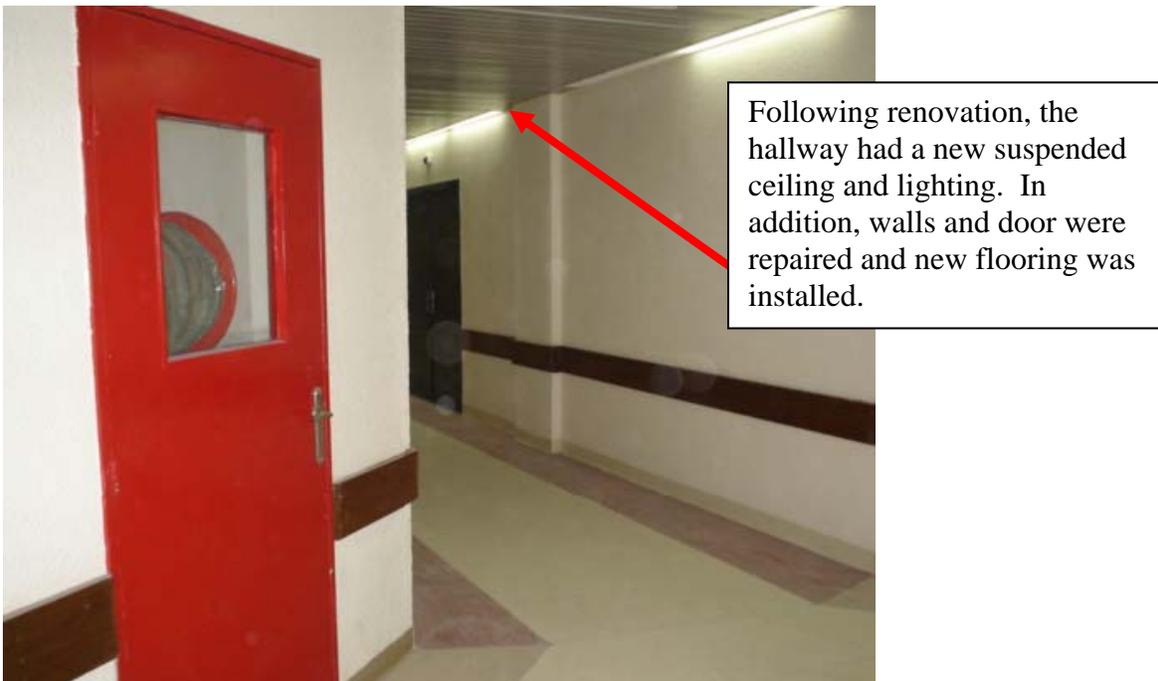
Site Photo 3. Water closet/toilet prior to renovation. (USACE photo taken 11 August 2005)



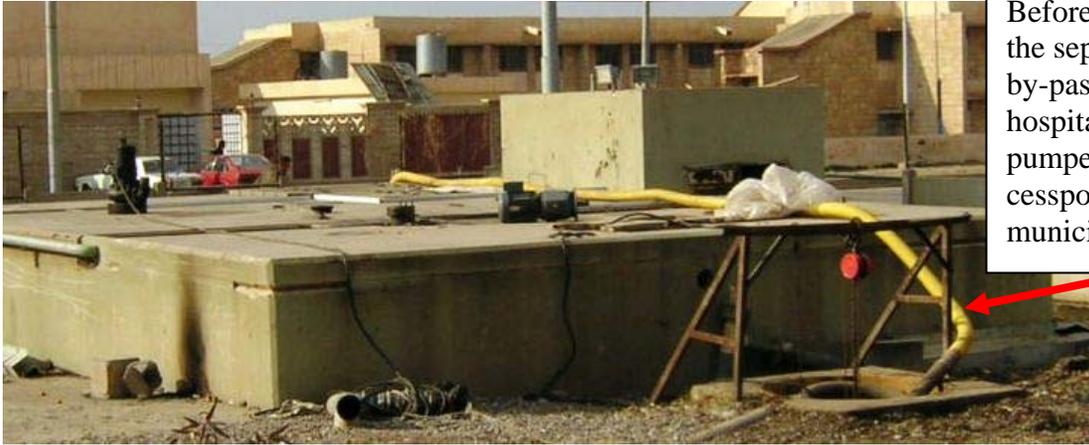
Site Photo 4. Toilet with sink following renovation. (USACE photo taken 8 Jan 2006)



Site Photo 5. Hallway prior to renovation. (USACE photo taken 18 June 2005)



Site Photo 6. Hallway following renovation. (USACE photo taken 8 Jan 2006)



Before renovation, the septic tank was by-passed and hospital sewage was pumped from the cesspool to the municipal system.

Site Photo 7. Plugged septic tank prior to renovation. (USACE photo taken 4 Jan 2005)

Statement of Work of the Rehabilitation Project Task Order

The Statement of Work (SOW) required the contractor to provide all labor, equipment, materials, security, housing, travel, testing, inspection, and permits required to perform the assessment, design, construction, demolition, repair, operation and maintenance, inspection, and supervision necessary to complete the project. In addition, the contractor was required to work in a manner that minimized disruption to hospital operations in order for the facility to remain functional throughout the duration of the project. The TO included the installation of various pieces of non-medical and medical equipment and included a requirement to consider the needs of the Iraqi Ministry of Health.

The SOW specified the contractor's roles and responsibilities for the project and detailed the work required and prioritized requirements needed to modernize the Erbil Maternity and Pediatric Hospital in Erbil, Iraq. General hospital renovation requirements were included as Appendix I to TO 0010.

Prioritization

Facility systems targeted for renovation included mechanical, electrical, sanitary, life safety, and communications. These systems required the repair of existing equipment and installation of new equipment. General cleanup and cosmetic renovations were considered secondary. Renovation work was prioritized as Level I, Level II, or Level III. SIGIR limited its inspection to selected Level I requirements that likely had the most impact on near-term and future hospital operations. Level I requirements included the following:

Water, Sewer, and Plumbing Systems

Water supply work included the repair, replacement, or new installation of purification systems in order to supply sufficient water for the facility that would meet World Health Organization (WHO) Potable Water Quality standards. In addition, the contractor was required to repair or replace a water softener for industrial water. Sewer work included the repair or replacement of the sanitary sewer systems and/or septic systems. Plumbing work required the contractor to repair or replace interior plumbing systems and fixtures and repair or replace water storage and pumping systems. Lastly, the contractor was required to provide an assessment of whether additional plumbing fixtures, water storage tanks, lift stations, and water coolers were needed.

Mechanical Systems

The contractor was required to repair or replace heating and/or cooling systems. Mechanical work also included the repair, replacement, or new installation of Ultra-Violet (UV) lights on the supply ducts for operating theaters and the exit ducts of the dirty areas. In addition, air louvers and mechanical filters were required for make-up and fresh air supply ducts. In those hospital areas without pre-renovation cooling and/or heating, the contractor was required to provide reliable electric cooling and/or heating systems.

Electrical Systems

The repair or replacement of electrical service, panels, motor control centers, interior wiring, and fixtures were included, as well as the repair or replacement of a back-up generator system. In addition, electrical systems work included installing additional electrical capacity and additional or replacement outlets, switches, and fixtures, as required. The installation of reliable central fire detection and alarm systems was also required.

Warranty

Based on the TO 0010, the contractor was required to provide and certify manufacturer warranties for all equipment installed for 12 months after turnover and provide any other commonly offered extended warranties for equipment and machinery purchased and installed. Warranties were to be written in the name of the appropriate Ministry.

Site Assessment

Sewer

Improvements to the sewer system were a Level I priority. The contractor was required to renovate the sewer system in order to ensure that the hospital's sewer system was functional. The sewer system consisted of internal lines which empty into cleanout traps throughout the facility. All lines are routed to manhole traps which, in-turn, connect to a lift station that pumps sewage material to a filtration basket located in the septic tank's first section. The center section has an agitator or aeration pump to stimulate the biological breakdown of suspended solids found in normal sewage. In the third stage of the septic system, semi-treated sewage from the center section, or effluent, is pumped to the municipal system for final treatment.

Renovation

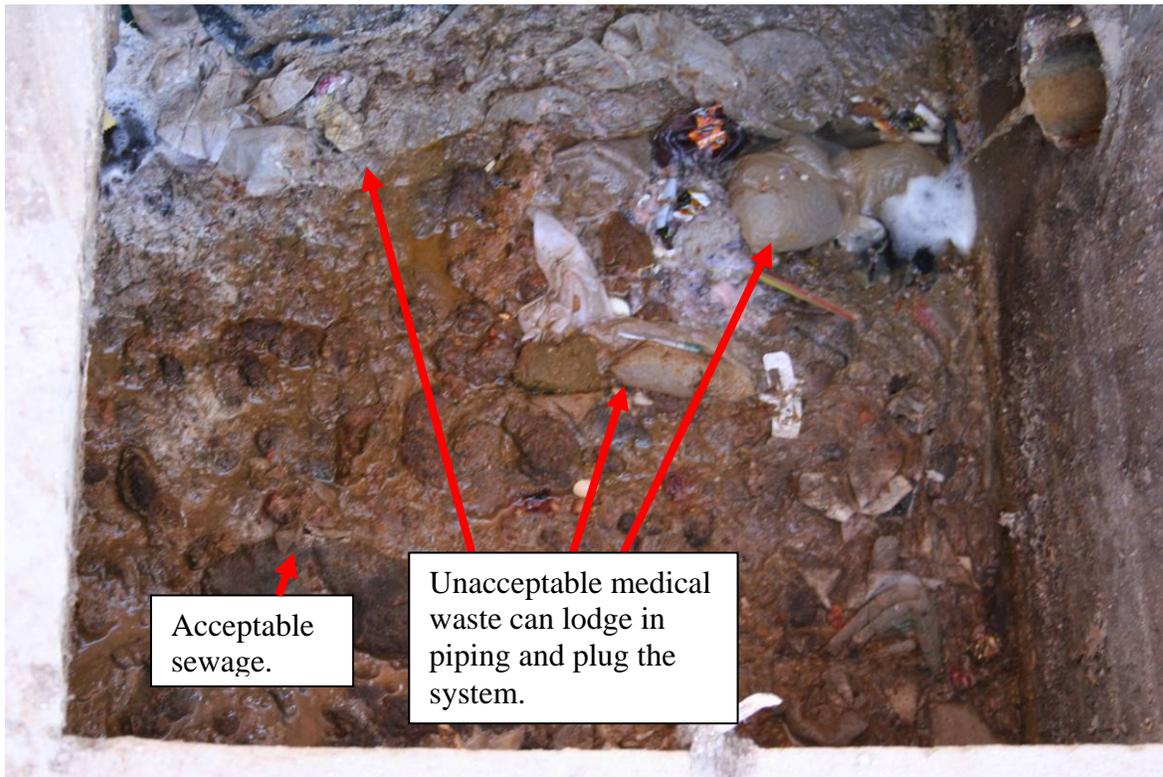
A review of quality control (QC) and USACE quality assurance (QA) reports, a review of design drawings, discussions with the USACE RE and DRE, and site visit observations by SIGIR inspectors indicate that the contractor adequately renovated the sewer system and that the drains were functional when turned over to ¹Iraqi officials on 1 May 2006. The plumbing design appeared adequate. For example, the piping design utilized two 45 degree elbows instead of a single 90 degree elbow to make "right angle" turns in the piping. Such a design improved flow capability of the piping under adverse conditions, such as when disposing of large waste materials or when limited water was available. A USACE site photo shows that the sewer system was clean and free flowing on 20 June 2005, following renovation.

¹ Erbil Governorate signed for the project on 1 May 2006.

After Turnover

SIGIR inspectors were told by the Minister of Health (MoH), Kurdistan – Iraq and the RE that the sewer system clogged occasionally after the facility was rehabilitated and turned over to Iraqi authorities. When this occurred, grey and waste water² generated inside the hospital did not drain, but instead backed up into sections of the hospital, causing health concerns.

While SIGIR inspectors cannot be certain of the primary cause of such back ups, they did not find this was likely due to inadequate design or insufficient renovation work. Instead, they found a significant contributing factor, if not the primary cause, to be the hospital staffs' improper disposal of medical waste materials into the drains and sewer system. During the site visit, SIGIR inspectors observed large quantities of medical waste materials in the sewer system's traps, manholes, and in septic tank (Site Photo 8).



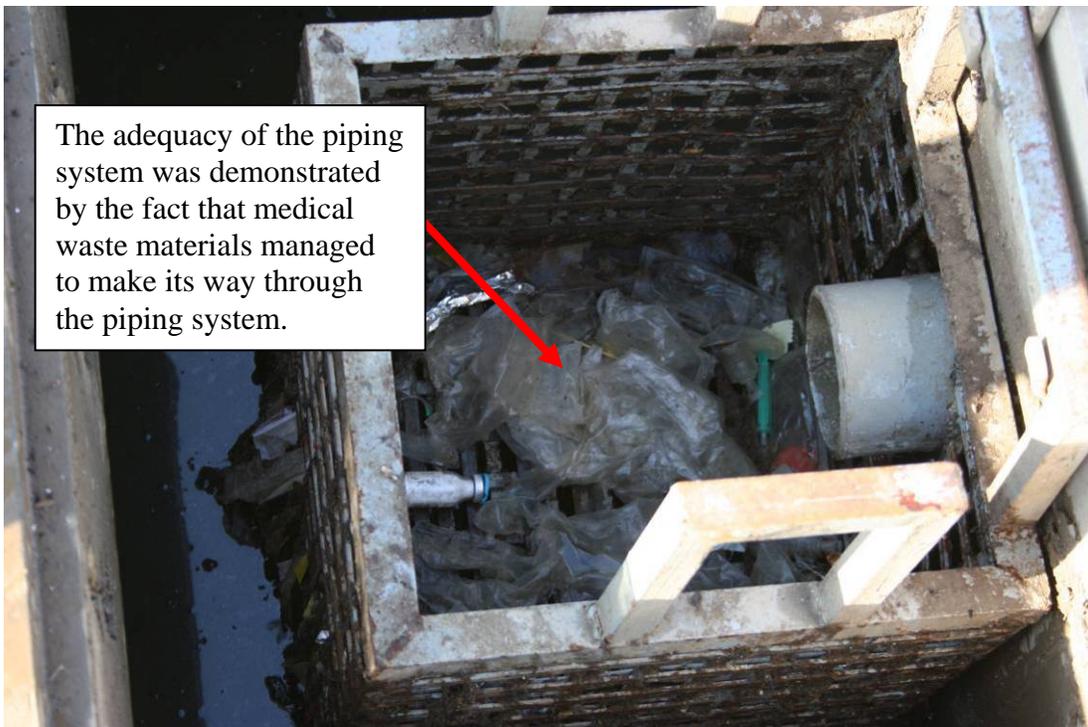
Site Photo 8. Medical waste material found in manholes and traps

A comparison of the septic tank before and after turnover to Iraqi authorities is presented below. The USACE photo (Site Photo 9) was taken during rehabilitation work. The SIGIR photo (Site Photo 10) was taken on 19 January 2006 during the site inspection, well after the project was turned over to Iraqi authorities.

² Grey water is water that generally comes from sinks, wash basins, laundries, showers and etc while waste water is generated by toilets and urinals.



Site Photo 9. Inlet to septic tank was clean during commissioning. (USACE photo)

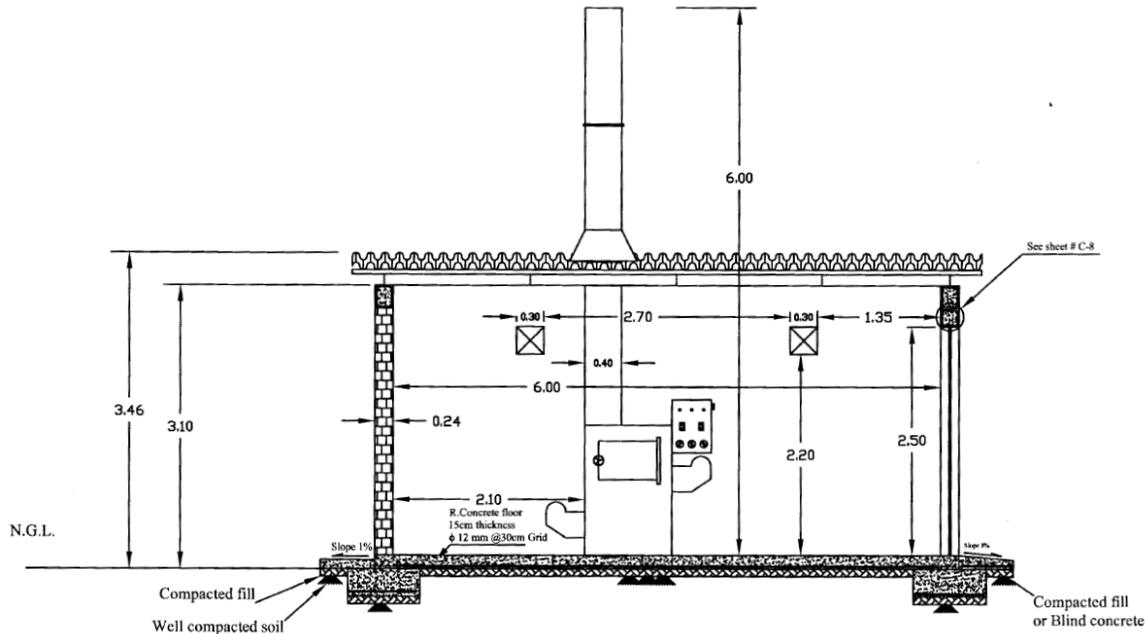


The adequacy of the piping system was demonstrated by the fact that medical waste materials managed to make its way through the piping system.

Site Photo 10. Inlet to septic tank as observed

Incinerator

An updated incineration system was part of the SOW for the project. Accordingly, a new diesel incinerator system was successfully built and commissioned to help the hospital better manage waste materials as part of an effective hospital sanitation program. The incinerator system installed by the contractor included a Diesel ATI Type CP 15 incinerator, comprised of a burner, a combustion chamber and a control unit, plus a building approximately 10 feet wide by 20 feet long and designed specifically for incinerator use. Site Exhibit 1 is a drawing of the incinerator and Site Photo 11 is a photo of the completed incinerator building.



Site Exhibit 1. Incinerator building drawing copied from contractor submittal.



Site Photo 11. Incinerator building

SIGIR inspectors found the incinerator building to be well constructed, but the doors were locked with a conventional padlock. Upon inquiry, the inspectors were told by hospital maintenance and sanitation workers that they did not know where the key was and that the new incinerator was not used to dispose of waste materials since the trained operator(s) were no longer employed at the hospital. The inspectors chose not to question hospital managers about the departure of the trained operators.

However, interviews with the MoH, the hospital manager, and hospital staff were conducted. The inspectors inquired about hospital procedures for disposing of medical waste materials. Specifically, one inspector asked if procedures ensured that waste materials were collected and burned in order to avoid situations where medical waste materials could find their way into the sewer system or otherwise be improperly handled. The hospital manager responded first that medical waste was gathered and disposed of in a conventional dumpster and some medical waste materials were burned once a month in the hospital's old and substantially smaller incinerator. However, the MoH stated that all medical waste materials were properly collected and burned twice a week. These statements were not challenged by SIGIR inspectors.

SIGIR found medical waste at various locations at the facility. As previously mentioned, they were found in the sewer system. They were also found on the ground near the door of the incinerator building (Site Photo 12). They were also scattered about the area between the sewer system's cesspool and the rear of the incinerator building (Site Photos 13, 14, and 15).



Site Photo 12. Medical waste materials scattered on the ground area in front of the new incinerator.



Site Photo 13. Hypodermic needles and other medical waste.



Site Photo 14. Bandages and other medical waste on the ground.



Site Photo 15. Needles and other medical waste.

Comparison of Area Before and After Turnover

USACE site photos taken immediately after project work was completed show that the areas were clear of all medical waste materials and in good condition (Site Photos 16 and 17). This same area was littered with medical waste materials when observed by SIGIR inspectors on 19 January 2006 (Site Photo 18). The medical waste materials observed included medical gloves, needle sharps, syringes, ampules, bandages, and other types of medical supplies.



Site Photo 16. Immediately following renovation, area behind the incinerator was clean. (USACE photo)



Site Photo 17. Immediately following renovation, the area adjacent to the cesspool was clean. (USACE photo)



Site Photo 18. During the inspection, the area between the cesspool and septic tank was littered with ineffectively burned medical waste materials.

Cleaning Practices

SIGIR inspectors observed cleaning practices that very likely caused and will continue to cause damage to the walls, floors and the basic structure of the facility. Cleaning crews were observed cleaning the lower and upper story hallways with too much water (Site Photo 19).



Site Photo 19. Cleaning crew workers used too much water to clean floors.

According to the USACE RE, this practice has caused water to leak or migrate from the hallways and bathrooms to other places in the facility. It is reasonable to conclude that contaminated water from an upper story hallway or bathroom could migrate to a first floor wall or leak directly through the ceiling. In addition to leading to damage of the walls and floors, the water could spread contaminants. Site Photos 20 and 21 show the damage caused by water migrating from the upper story to the walls of the lower story. In both photos, potentially harmful mold³ or mildew was visible on the moist drywall. Site Photo 22 shows the room of an expectant mother who had been moved because too much water had migrated from the upper story to her room on the lower story.

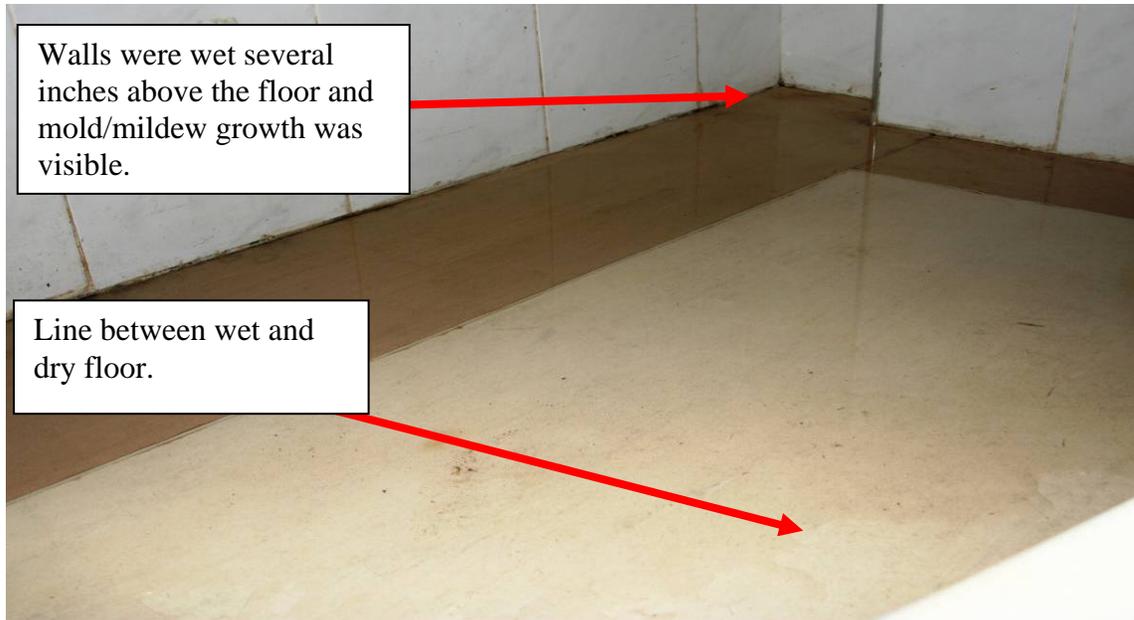
³ According to the U.S. Centers for Disease Control and Prevention, all molds should be handled with caution while some suspected harmful molds grow only on wet cellulose products like drywall, but not concrete, linoleum, or tile.



Site Photo 20. Water saturated and damaged wall.



Site Photo 21. Water saturated wall and mildew and mold growth.



Site Photo 22. Unusable room after water migrated through the walls.

Additional Water Leaking and Unusable Sinks

Inspectors also observed an upper floor bathroom where water dripped continuously from the wall (Site Photo 23). The water pooled on the bathroom floor and leaked through the ceiling to a lower story storage room. The damage caused to the ceiling of the storage room is shown in Site Photo 24. While the inspectors could not observe the source of the water, they suspected it was caused by a broken or loose pipe, coupling, or fitting inside the wall, not by workers using too much water to clean floors. The RE advised that the bathroom in question was not included in any renovation work performed by the contractor.



Site Photo 23. Steady dripping of water from a bathroom wall.



Site Photo 24. Damage from dripping water shown in Site Photo 23.

SIGIR inspectors also observed that numerous sinks in patient care rooms were either broken, missing faucet handles or drain pipes, or purposely rendered non-operational. Site Photo 25 shows a sink in a patient care room where the faucet was rendered non-operable, while Site Photo 26 shows a sink, in another patient care room, which was missing the drain pipe/trap assembly. Hospital officials told SIGIR inspectors that parts (drain piping/trap assemblies) were taken to repair sinks elsewhere in the hospital.



Site Photo 25. Some patient care room sinks were unusable.



Site Photo 26. Drain pipe/trap was removed from patient care room sink.

Mechanical Equipment

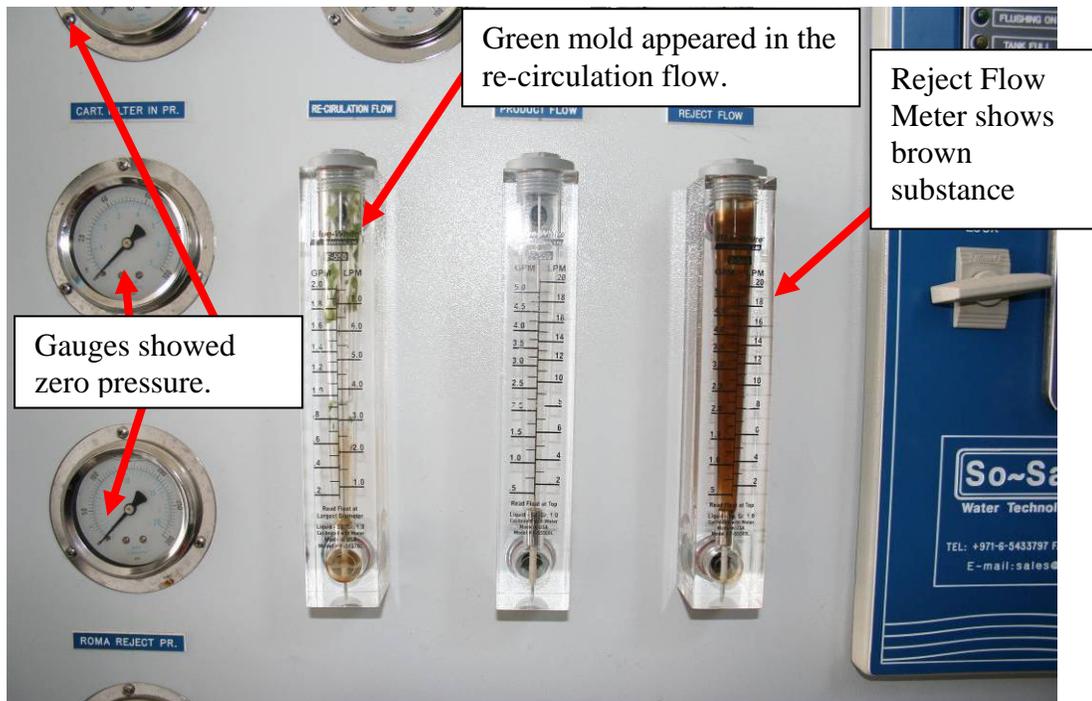
Water Reverses Osmosis System

The SOW included the requirement for a water purification system. The contractor installed a reverse osmosis (RO) filtration system that consisted of a feed pump, a multimedia filter, a pre-chlorination treatment, a Granular Activated Carbon purifier, a water softener, a brine tank, a cartridge filtration unit, and an RO module. The RO module consisted of a high pressure pump, four RO membranes, and four pressure vessels. The RO system installed was designed to meet hospital needs by producing a maximum 6,400 gallons per day.

Although turnover documentation indicated that the USACE turned over a fully functional RO system on 1 May 2006, the system was not operational when the SIGIR inspectors conducted their site visit on 19 January 2007. Site Photo 27 shows the front panel of the RO unit with flow meters and pressure gauges. A mold like buildup was observed in the left re-circulation flow meter, while a dark substance stained the reject flow meter and the pressure gauges registered zero pressure.

While SIGIR could not verify when the RO system ceased to function, it appeared that biological contamination fouled RO membranes. It is likely that the RO system's membranes have been permanently damaged based on warnings disclosed in the manufacture's operations and maintenance manual.

The inspectors found that the manufacture's RO preventative maintenance program, if properly followed, would likely have prevented the biological fouling. However, visual evidence indicated that the preventative maintenance program was likely not followed and the RE agreed with this assessment. The inspectors observed new filters piled in the corner of the RO room that could have been used for preventative maintenance.



Site Photo 27. RO Unit's instrument panel.

Heating and Cooling Systems

The SOW required the contractor to repair or replace heating and/or cooling systems. Accordingly, the contractor provided and installed new boilers for heating, new chillers for cooling, and a new exchanger system. In addition, a new water conditioning system was provided.

Boilers

The contractor installed three dual fuel boilers capable of using natural gas or diesel for fuel. Boilers generate heat from the combustion of fuel and transfers it to water for distribution. The boilers' specifications included dual fuel operation, a fully pressurized steel boiler, 350kw-1150kw power, maximum pressure rating of 6 bars and a temperature range of 50 degrees Celsius (C) to 90 degrees C.

Although all boilers were operational when commissioned and turned over, one of the boilers was inoperable when SIGIR inspectors visited the site. Hospital personnel told the inspectors that the boiler malfunctioned and has since been used as a parts source to maintain the other boilers. In Site Photo 28 the middle boiler has the cover removed and is coated with a carbon film, possibly caused by a fire. Only one boiler was operating at the time of the SIGIR site visit.



Site Photo 28. One of the three boilers was cannibalized for parts.

Chillers

The SOW required the contractor to install a cooling system comprised primarily of three water-cooled screw compressors and three cooling towers. By design, water cooled via the chiller system passes through a heat exchanger system which absorbs warm return air from the hospital's ventilation system and the resulting cool air is distributed via air supply ducts.

Inspectors observed three new chiller compressor systems installed in the mechanical room. One of the chiller compressors is shown in Site Photo 29. Although cold weather prevented inspectors from observing chiller operations, the RE stated that the chillers were operational when commissioned and turned over 1 May 2006 and hospital personnel told the inspectors that the cooling system was operational.



Site Photo 29. Chiller installation appeared satisfactory.

Heat Exchanger System

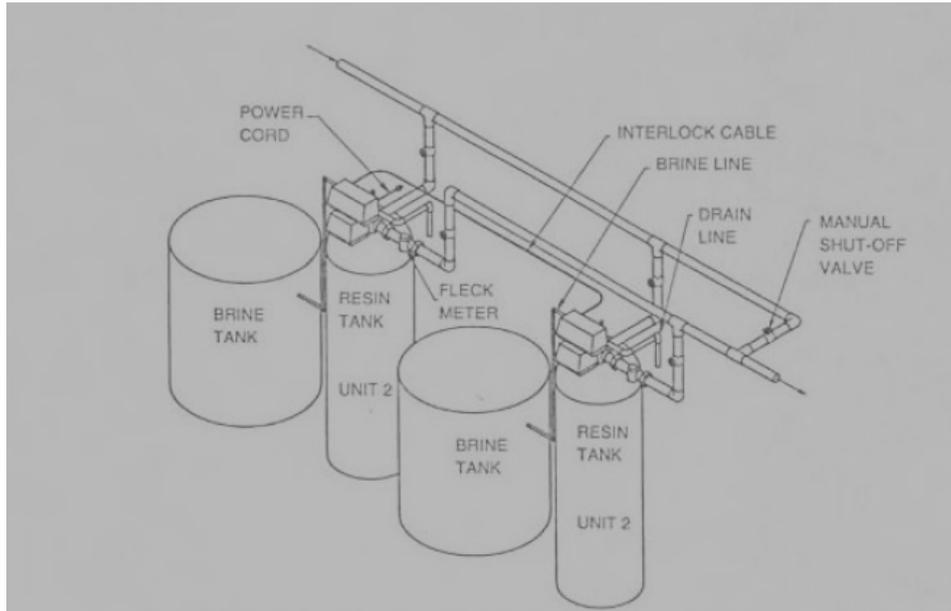
In accordance with TO requirements, the renovation included the installation of a new locally supplied shell and tube type stainless steel heat exchanger system. Heat exchangers move heat from one medium to another. Cooling results when cold water in the exchanger absorbs heat as warm air from the warm air return ducts passes through the exchanger. Conversely, heating occurs when hot water in the exchanger transfers heat as cold air from the cold air return ducts passes through the exchanger. SIGIR inspectors verified that the heat exchanger unit was operational.

Water Conditioning and Quality

Water Softener System

The contractor installed a water softener system as part of the heating and cooling system. The purpose of the water softener system is to reduce calcium and magnesium carbonate buildup in pipes, cooling towers, boilers, heat exchangers, chillers, and other heating and systems components equipment. A small buildup of calcium and magnesium carbonate would reduce efficiency, while a large buildup could lead to complete breakdown of various heating and cooling components. Turnover documentation and a discussion with the RE indicated that the water softener system was functional at the time of commissioning and turnover, yet the SIGIR inspectors observed that the water softener was not functional at the time of the site visit.

The softener system consists of two softeners each capable of providing 24 meters³/hour of conditioned water with a continuous water flow rate with 1 bar pressure drop. Each water softener sub-system consisted of a brine tank and a resin tank. The resin tank exchanges calcium and magnesium ions with sodium ions and the brine tank provides concentrated brine to recharge the resin with sodium ions. Site Exhibit 2 shows a standard brine and resin tank configuration similar to the installation observed.

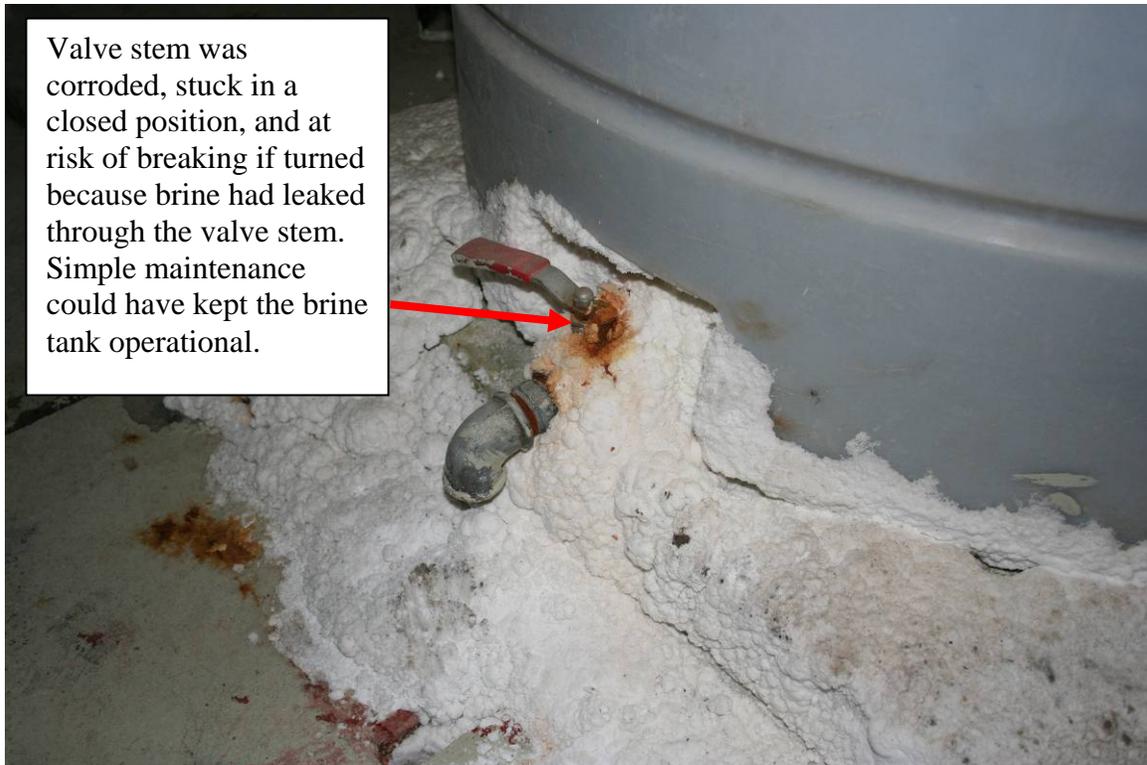


Site Exhibit 2. Diagram shows relative position of the water softening tanks.

At the time of inspection, the water softener system appeared not to have been operating for an extended period of time. The tanks contained thick discolored brine that had a pungent odor. Inspectors observed a buildup of salt around the brine tank drain valve. Site Photo 30 shows dried brine around a tank. The salt encircled the base of the tank and encased the drain pipes in a thick mass of salt. Corrosion (rust) coated the valve stem and the tank's drain valve. Oxidation, due to the salt, deteriorated the valve to the degree that serviceability appeared questionable at the time of inspection. If turned, it appeared that the valve's stem could have broken off.

The buildup at the base of the tank appeared thick and formed a solid structure. This suggested a low water flow (a leak) over a considerable time. The salt formation suggested water evaporation as the primary reason for the buildup. Additionally, the volume of salt in the relatively small surface area suggests that a large amount of salt and water had leaked and dried.

The RE and inspectors agreed that more than likely ineffective maintenance practices caused the breakdown of the water softener system. The RE also agreed that water softener operations and maintenance is not complex when compared to the heating and cooling system as a whole. However, the lack of a functioning water softener system could lead to future large-scale problems in the heating and cooling system.



Site Photo 30. Dried salt was layered around the base of the brine tank.

Water Quality

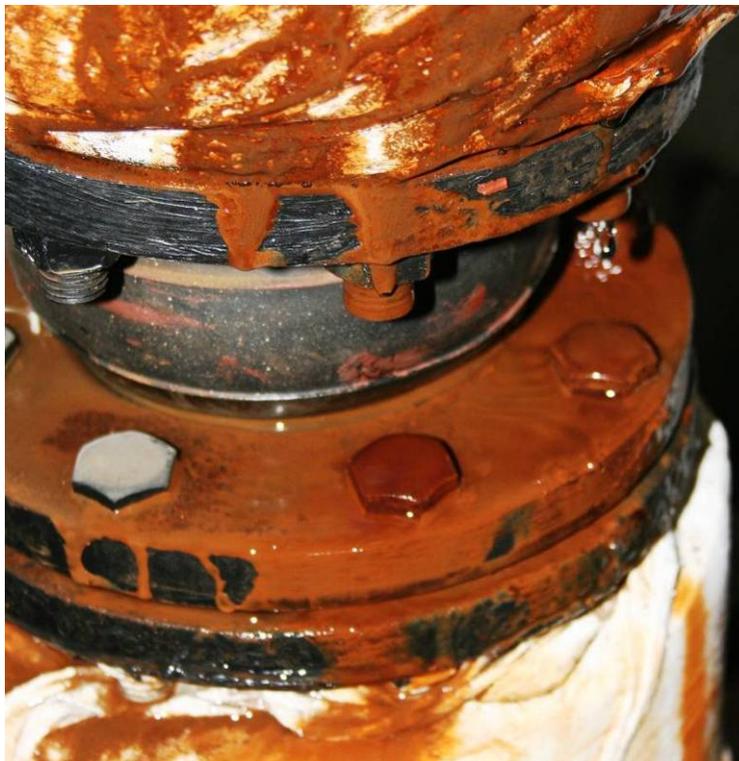
Maintaining a high level of water quality in a Heating Ventilation and Air Conditioning (HVAC) system is paramount because suspended particles affect heat exchange efficiency. Particles settle together to form clogs, which can cause boiler overheating and damage. An improperly maintained HVAC system could lead to breakdown, while clean water could prevent breakdowns and improve efficiency.

SIGIR found evidence of past maintenance problems with the HVAC system at the facility prior to the U.S. funded reconstruction project. Specifically, particles clogged the HVAC system before construction. A clog made up of settled particles that closed off a chiller water line is shown in Site Photo 31.



Site Photo 31. Plugged chiller water line before renovation. (USACE photo)

A flushed system with clean filters could prevent future failures, overheating and boiler cracking caused by plugging, and deterioration of materials. Inspectors observed rust and a water leak in piping above the hot water pump. In Site Photo 32, a water leak developed layers of rust across the surface of hot water piping. The rusty water from the leak indicates a very strong likelihood of a rust and particulate buildup forming inside the new piping. Considering the hospital's history of the clogged HVAC pipe pre-renovation and other maintenance practices, it is likely that without a positive change in operations and maintenance practices, degradation of the HVAC will result.



Site Photo 32. Evidence that rust contaminated water has leaked from a hot water line flange for an extended period of time.

Oxygen Production

SOW requirements included an updated oxygen and delivery system. The new generation system was operational at the time of the site visit (Site Photo 33). To meet hospital needs, the design was comprised of an oxygen generator capable of producing 94.5% pure oxygen at a rate of 800 liters/minute at 4.09 - 4.49 bars of pressure, an oxygen tank capable of holding 3000 liters, an air compressor, refrigerated air dryer, and an air filtration line. In addition, the contractor installed a centralized system of piping and controls to deliver oxygen to patient care rooms. As a backup to the new system, the contractor's design included retaining the original system. However, the inspectors were told by hospital workers that "they mistrusted the new system." As a result, the inspectors observed that the original oxygen system was used as the primary source of oxygen to patients while the new system was used as a backup.



Site Photo 33. Renovation included an O₂ generation system.

The original oxygen system consisted of storing full oxygen bottles (cylinders) throughout the hospital for use in individual rooms when needed. Accordingly, empty cylinders would be exchanged or replaced with full cylinders from the inventory stored in the immediate area. SIGIR inspectors observed six oxygen cylinders stored on a second floor ward for exchange purposes (Site Photo 34). In that workers did not have a good cart to move bottles, a hospital worker told the inspectors that "dragging cylinders damaged the new vinyl floor."

The inspectors also observed that the cylinders were stored in an unsafe manner. Specifically, valves were not protected with a cap, a chain or cable placed just above the midpoint was not used to secure cylinders in an upright position, and the cylinders were not stored in a protected area away from hallway traffic.



Site Photo 34. O2 bottles were stored in the hallway.

The manufacturer's recommended maintenance for the oxygen generator system was minimal and only required periodic weekly and monthly monitoring. In accordance with the manufacturer's O&M manual, weekly monitoring consisted simply of observing the system a few minutes each week while operating it to ensure that the automatic filter bowl drain system and air buffer drain system were functioning properly.

According to the manufacturer's O&M manual, filters on the air compressor were expected to last six months if properly maintained. However, it appeared that the air compressor's filter had not been replaced since the system was turned over to hospital officials on 1 May 2006 based on SIGIR's observations and a discussion with the RE. SIGIR could not determine whether weekly and monthly monitoring activities of the automatic filter bowl drain system and air buffer drain system were performed by hospital workers.

Generators

The SOW required repair or replacement of an electric power back-up system and expansion of the overall electrical capacity. SIGIR inspectors observed three generators at the facility: two generators originally on site and a new generator installed by the contractor. The World Health Organization had previously provided a 1000 kilo-watt (kW) generator that was designated as the primary generator for the system (Site Photo 35). The second generator on site before renovation of the hospital was much smaller and older. However, the RE confirmed that the smaller generator was refurbished and operational and not intended to be the primary or first back-up.



Site Photo 35. Generator installed pre-rehabilitation by World Health Organization.

In compliance with SOW requirements, the contractor installed a new 800 kW 1000 kVA generator. Site Photo 36 shows the new generator installation. The RE stated that the new generator was designated to act as the first back-up. In addition, documentation retained in USACE project files indicated that the “tie-in” of all generators was properly completed before being turned over to Iraqi officials. As required by the SOW, the new generator significantly increased overall electrical capacity. While on site, SIGIR inspectors observed the generator system operating.



Site Photo 36: New generator was used as a back-up.

Switchgears link the power system and generators. Site Photo 37 shows a broken breaker that prevents the switchgear from automatically operating as designed. In the photo, a piece of the broken switchgear lays on the floor while the circuit remained in the open or off position. Although hospital personnel pointed out the broken breaker to inspectors and the switchgears remained under warranty, hospital maintenance workers told SIGIR inspectors and the RE that they had not initiated any efforts to secure repair or replacement via the manufacturer.



Site Photo 37. Broken circuit breaker that disabled switch gear equipment.

Fire Alarm

As required by the SOW, the contractor installed a fire detection and alarm system. Observed on site by the SIGIR inspectors, the system contained fire alarm panels, accessories, and manual call ports, optical smoke detectors, heat detectors, and remote indicators for the entire building. Additionally, the oxygen generation room had a functional overhead fire suppression system (Site Photo 33). At the time of the site visit, fire alarm system instruments showed that the alarm system was operable.

Equipment Warranties and Maintenance

A general lack of equipment and facility maintenance was observed by the inspectors during the site visit. SIGIR inspectors observed that major equipment items, such as the switch gear circuit breaker, the heating and cooling systems' water treatment system, and the RO system were non-operational most likely because of ineffective maintenance practices or misuse by hospital workers. Accordingly, such items may not be repaired by a manufacturer because hospital practices or use did not meet the manufacturers' maintenance or use requirements.

During the site visit, equipment operators told SIGIR inspectors that warranty repairs were needed for broken down equipment; however, hospital managers had not contacted equipment manufacturers or service representatives. The inspectors and RE agreed that had the hospital staff followed the manufacturers' specified maintenance programs, they could have very likely prevented most of the equipment breakdowns cited in this report. Based on a review of manufacturer documentation and a discussion with the RE following the site visit, manufacturers were most likely under no obligation to repair the improperly maintained equipment. However, hospital maintenance workers told SIGIR inspectors and the RE that they wanted hospital equipment to be fixed or replaced via warranty coverage.

Conclusions

SIGIR inspectors did not find evidence that the original rehabilitation work on the hospital and installation of new equipment had not met specifications. However, they did find what SIGIR refers to as “sustainment” issues, where a lack of trained personnel, hospital waste disposal procedures, routine cleaning practices, and inadequate equipment maintenance and parts programs have and are continuing to have a negative impact on hospital operations.

Examples of sustainment issues identified during this project assessment include:

- 1) The hospital sewer system has clogged on occasion and caused waste water to back up through floor drains into some sections of the hospital. This may have occurred because of the improper disposal of medical waste materials. During the site visit, SIGIR inspectors observed large amounts of medical waste products in the sewer system’s traps, manholes, and septic tank.
- 2) Some mechanical equipment installed during renovation was inoperable at the time of the site visit because operations and maintenance practices had been ineffective, or the facility personnel chose not to use the new equipment. For example, Special Inspector General for Iraq Reconstruction inspectors observed that a new incinerator installed during renovation was not used because those initially trained to operate the incinerator were no longer employed at the hospital. In addition, a boiler was not operating and was used for parts, a circuit breaker was broken causing a switch gear not to function, the water purification system was not operating, and the water softener system was not operating. The new sophisticated oxygen generator and distribution system was, by choice, used only as a back-up system, while hospital staff continued to use oxygen tanks.
- 3) In some cases, maintenance needed to comply with equipment manufacturers’ warranty requirements was not performed.
- 4) An adequate replacement system or small parts program for hospital equipment was not in place.
- 5) Excessive amounts of water have been used to clean hallways and bathroom floors, resulting in damage to the facility. SIGIR inspectors observed cleaning crews using a water hose, wet mop, and squeegee to clean hallway and bathroom floors. As a result, considerable water has been absorbed into the walls. Excess water has also leaked from the second story hallways and bathrooms to various first floor rooms, including critical patient care areas.

Recommendations

- 1) Representatives from the United States Government (USG) should coordinate with appropriate Iraqi Government officials and request that hospital officials implement proper medical waste disposal procedures and ensure that all medical waste materials are collected and disposed of properly. The waste materials must not be disposed of in hospital drains and the sewer system.
- 2) Representatives from the USG should coordinate with appropriate Iraqi Government officials and request that hospital officials implement a formal preventative maintenance program that includes a process for scheduling and tracking completed equipment and facility maintenance tasks. The preventative maintenance program should include a library of operations and maintenance

manuals which includes a list of part numbers, potential suppliers and delivery options, which is readily available to maintenance personnel. Relying on manufacturers' warranties is not a substitute for an effective O&M program.

- 3) Representatives from the USG and Erbil Maternity Hospital officials should coordinate and develop a plan to provide additional training for equipment users and facility maintenance personnel.
- 4) Representatives from the USG should coordinate with appropriate Iraqi Government officials and request that hospital officials ensure that cleaning crews use the minimal amount of water necessary to clean the facility.

Management Comments

SIGIR requested management comments from the Iraq Reconstruction Management Office and from the Commanding General United States Corps of Engineers-Gulf Region Division of the GRD. Both IRMO and GRD non-concurred with our recommendations. The following is a synopsis of their reasons:

IRMO noted that regardless of the merits, SIGIR's recommendations appear to exceed the contract requirements and purview or authority of either IRMO or GRD to enforce. Recommendations such as how much water to use to clean floors or dispose of medical waste could be construed as an intrusion or micro-managing Iraqi operations.

IRMO also contends that SIGIR went beyond the scope of its inspection when it identified "sustainment" issues that have and are continuing to have a negative impact on hospital operations.

USACE-Gulf Region Division stated that the rehabilitation project did not include funding or the requirement to provide the SIGIR recommended training. If additional funding were provided, the GRD could award a service contract for the SIGIR recommended training.

The full text of IRMO's and GRD's management comments are attached as Appendix E and Appendix F respectively.

Evaluation of Management Comments

IRMO's and GRD's contention that they have no authority or responsibility to support sustaining efforts leaves a significant operation and maintenance gap that will significantly shorten the useful lives on transitioned construction projects. Failure to take corrective action will severely risk the USG investment in the Iraqi Reconstruction effort.

With respect to IRMO's comment that SIGIR's recommendations were outside of its inspection scope, we refer to the report introduction which defines the scope to determine if the project was at full capability or capacity when accepted by the USG, when transferred to Iraqi operators, and when observed by SIGIR.. The third inspection objective determines whether the transitioned project was adequately operated and maintained (sustained) by the Iraqi Government. Although SIGIR presumed the implication to sustaining was evident we will provide a more descriptive objective in future inspection reports.

Appendix A. Scope and Methodology

We performed this project from mid-January through March 2007 in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included an engineer/inspector and an auditor/inspector.

In performing the project we:

- Reviewed contract and Task Order documentation to include the SOW;
- Reviewed design package (drawings and specifications) and contractor submittal documentation, QC reports, and QA reports;
- Conducted fieldwork discussions with the USACE RE and DRE;
- Conducted an on-site assessment of the facility and participated in an information meeting with the MoH and staff on 19 January 2007;
- Reviewed and studied on-line periodicals that provided creditable information related to controlling infection and cross-contamination in hospitals and oxygen cylinder storage requirements; and
- Briefed the results of fieldwork with USACE GRN Commander, Area Engineer, Resident Engineer and Deputy Resident Engineer before returning to the IZ.

Appendix B. Acronyms

DRE	Deputy Resident Engineer
CPAF	Cost Plus Award Fee
GRN	Golf Region North
IRMO	Iraq Reconstruction Management Office
IZ	International Zone
IRRF	Iraq Relief and Reconstruction Fund
J-7	Engineering Staff Section
kVA	Kilo-Volt Ampere
kW	Kilo-Watt
MNSTC-I	Multi-National Security Transition Command - Iraq
MoH	Minister of Health, Iraq-Kurdistan Government
O&M	Operations and Maintenance
PCO	Project and Contracting Office
QA	Quality Assurance
QC	Quality Control
QM	Quality Management
RE	Resident Engineer
SIGIR	Special Inspector General for Iraq Reconstruction
SOW	Statement of Work
SOR	Statement of Requirements
TO	Task Order
USACE	United States Army Corps of Engineers
USG	United States Government
UV	Ultra Violet
WHO	World Health Organization

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 Reconstruction Management 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)

Director, Project and Contracting Office

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 Operations and Organizations, Democracy and Human Rights
 Subcommittee on International Development and Foreign Assistance, Economic Affairs and International Environmental Protection
 Subcommittee on Near East 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
 Permanent Subcommittee on Investigations
 Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia

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
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 Middle East and South Asia
Subcommittee on International Organizations, Human Rights, and Oversight

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:

William Tweedy

Lloyd Wilson

Appendix E. Management Comments – Iraq Reconstruction Management Office



Embassy of the United States of America
Iraq Reconstruction Management Office
Baghdad, Iraq

March 24, 2007

MEMORANDUM FOR THE SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

FROM: Acting Director, Iraq Reconstruction Management Office

SUBJECT: SIGIR Assessment of Erbil Maternity and Pediatric Hospital (PA-06-094)

This memo provides management comments on your draft report, "Erbil Maternity and Pediatric Hospital." IRMO concurs with the positive finding that the original scope and objective of the contract was met. IRMO strongly non-concurs with SIGIR recommendations that were outside the scope of the assessment and considered as outside SIGIR or IRMO authority or control.

The stated overall objective of the above referenced IRRF project was "...to determine whether the project is operating at the capacity stated in the original contract." The Report correctly states that "[t]he intent of the project was to rehabilitate and modernize the existing [hospital]." The conclusion of the report was that [SIGIR] inspectors did not find evidence that the original rehabilitation work of the hospital and installation of new equipment had not met specifications."

While the report indicates that the original purpose and objective of the contract was met, the report goes beyond the original scope to identify what "[SIGIR] refers to as 'sustainment' issues, where a lack of trained personnel, hospital waste disposal procedures, routine cleaning practices, and inadequate equipment maintenance and parts programs have and are continuing to have a negative impact on hospital operations."

The SIGIR draft report then recommends that IRMO should coordinate with appropriate Iraqi Government officials and request that the hospital officials:

- 1) implement proper medical waste disposal procedures;
- 2) implement a formal preventative maintenance program;
- 3) USACE coordinate and develop a plan to provide additional training for equipment users and facility maintenance personnel; and
- 4) ensure that the correct amount of water is used in cleaning.

Several points should be noted.

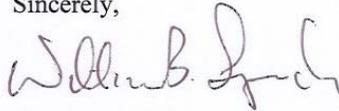
- 1) This project is for rehabilitation and modernization of an existing facility that remained functional throughout the duration of the project, and not new construction.
- 2) This previously existing hospital is Iraq owned and managed.
- 3) According to the SIGIR assessment, neither the contractor's Statement of Work (SOW), nor overall Task Order (TO) included requirements for training or hospital management services.

- 4) IRMO is the funding entity with no purview or operational status, while USACE/GRD is the implementer.

Regardless of their merits, recommendations identified in the SIGIR assessment appear to exceed the Statement of Work, purview or authority of either IRMO as funding agency, or USACE/GRD as the implementer to enforce. Recommendations such as how much water to use in cleaning floors or disposal of medical waste could be deemed as an intrusion on, or attempt to micro-manage operations of an Iraqi entity that we have no controlling interest over. Finally, SIGIR's report does not discuss or suggest under what authority (or leverage) the US Government through IRMO or USACE/GRD could employ to continue to provide the assistance/oversight recommended in points 1-4.

IRMO therefore non-concurs with all four SIGIR recommendations as not within the scope, authority, or purview of IRMO to direct such actions. A similar view may be taken by MNSTC-I regarding similar SIGIR recommendations in assessments under its control.

Sincerely,



William Lynch
Acting Director,
Iraq Reconstruction Management Office

Appendix F. Management Comments – U. S. Corps of Engineers Gulf Region Division



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
GULF REGION DIVISION
BAGHDAD, IRAQ
APO AE 09348

CEGRD-CG

30 March 2007

MEMORANDUM FOR Special Inspector General for Iraq Reconstruction, 400 Army Navy Drive, Arlington, VA 22202

SUBJECT: Draft SIGIR Project Assessment Report – Erbil Maternity and Pediatric Hospital, Erbil, Iraq (SIGIR- PA-06-094)

1. The purpose of this memorandum is to provide the U.S. Army Corps of Engineers, Gulf Region Division response to the subject draft assessment report.
2. The Gulf Region Division non-concurs with the recommendation addressed to GRD in the draft report. Thank you for the opportunity to provide our response for incorporation as an appendix in the final report.
4. If you have any questions, please contact Mr. Milton L. Naumann at (540) 665-5021 or his email Milton.L.Naumann@tac01.usace.army.mil.

Encl

A handwritten signature in black ink, appearing to read "Michael J. Walsh".

Michael J. Walsh
Brigadier General, USA
Commanding

COMMAND REPLY

SIGIR Draft Assessment Report – Erbil Maternity and Pediatric Hospital (SIGIR-PA-06-094)

SIGIR Recommendation and GRD Comments

Recommendation. United States Army Corps of Engineers (Project and Contracting Office) and Erbil Maternity Hospital officials should coordinate and develop a plan to provide additional training for equipment users and facility maintenance personnel.

Actions Taken. Non-Concur. This was a rehabilitation project and did not include funding or the requirement to provide the SIGIR recommended training. If additional funding were provided, the Gulf Region Division could award a service contract for the SIGIR recommended training.