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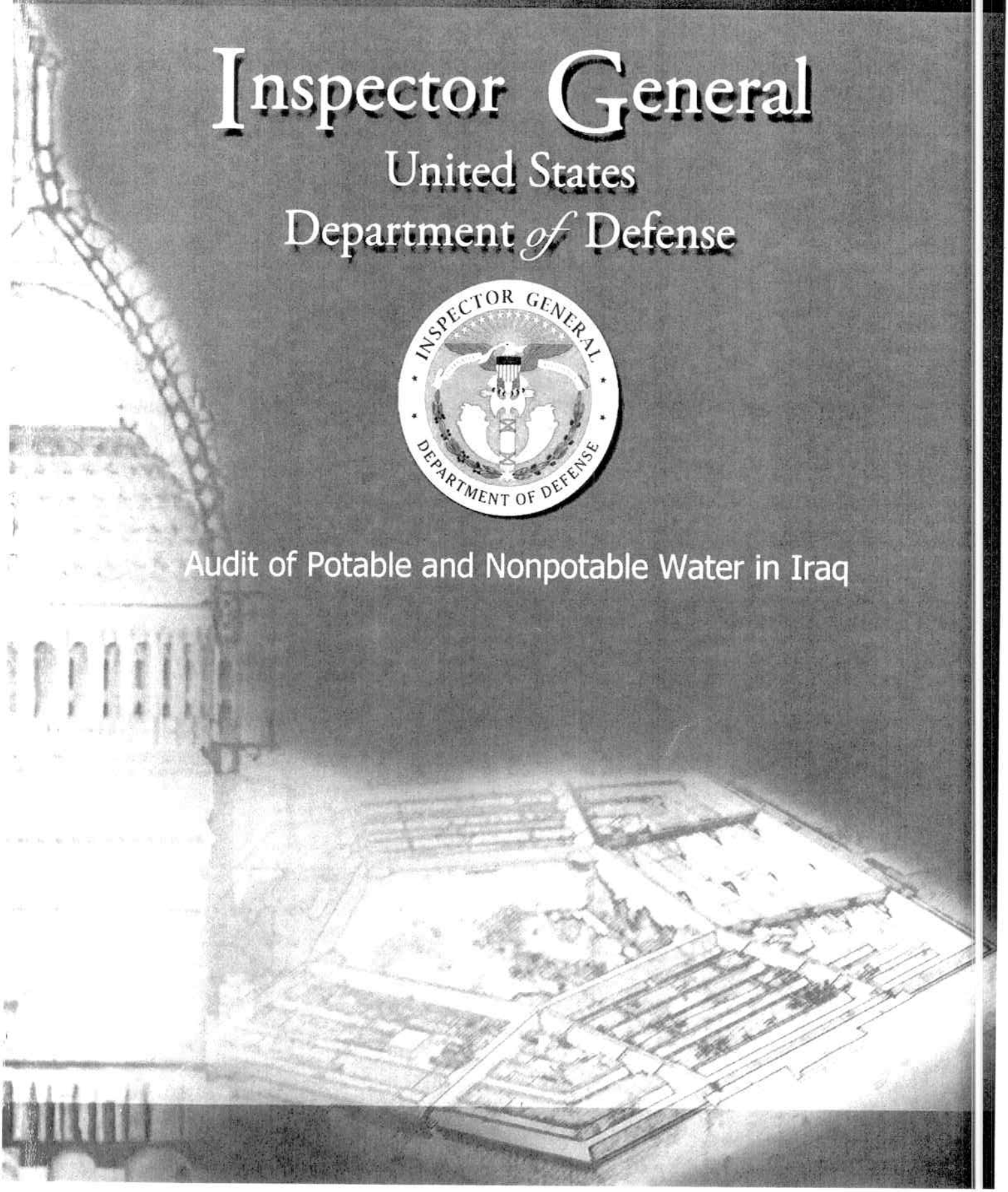
# Inspector General

## United States Department of Defense

# Audit of Potable and Nonpotable Water in Iraq



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(Project No. D2006-D000LQ-0254.000)

**SUBJECT: Audit of Potable and Nonpotable Water in Iraq**

**Objective.** The overall objective of the audit was to determine whether the processes for providing potable and nonpotable[1] water to U.S. forces in Iraq were adequate. We conducted the audit at the request of Senator Byron L. Dorgan, Chairman of the Democratic Policy Committee. Specifically, Senator Dorgan requested that we review an alleged failure of the contractor, Kellogg, Brown, and Root (KBR), to provide safe nonpotable water to U.S. forces in Iraq. Because the processes for providing potable and nonpotable water overlapped, we expanded the audit scope to include the processes for both.

**Scope and Methodology.** We performed audit work in Iraq and the continental United States from September 2006 through November 2007 in accordance with generally accepted government auditing standards. The scope of the audit covered water operations in Iraq during Operation Iraqi Freedom from January 1, 2004, through December 31, 2006. According to documentation provided by KBR and the Multinational Corps–Iraq (MNC-I ) Preventive Medicine office, as of February 25, 2007, there were 59 U.S. water production (treatment) sites in Iraq composed of 37 sites operated by contractors and 22 sites operated by the U.S. military. We judgmentally selected and visited six sites; four operated by U.S. contractors and two operated by the U.S. military. We reviewed water production operations and associated records at Camp Ar Ramadi, Camp Ali, Camp Q-West, Logistical Support Area (LSA) Anaconda, Camp Liberty, and Camp Victory. The six sites provided water for about 56,000 U.S. forces. The selected locations were all under the command and control of the Multinational Force–Iraq (MNF-I) with operational control provided by MNC-I. We reviewed the processes for water production, distribution, storage, and oversight by examining production and oversight records; researching military medical databases;[2] reviewing government oversight of contractor operations; and researching operational requirements for military field water. We interviewed military and contractor personnel responsible for water operations at the operational, supervisory, and managerial levels. Personnel interviewed included those deployed during the audit fieldwork as well as previously deployed personnel. After completing the audit fieldwork, we issued a response letter to Senator Dorgan on May 23, 2007, with a summary of the alleged failure. Subsequently, the Majority Counsel for the Senate Armed Services Committee requested we conduct additional interviews of Military Service members who served in the area of Camp Ar Ramadi during the alleged failure, October 2004 through May 2005 (see report section titled "Survey of U.S. Forces at Ar Ramadi").

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[1] Potable water is safe to drink and does not contain harmful chemical, microbiological, radiological, or other contaminants. Nonpotable water is unsafe for human ingestion, but used for other purposes including laundry and personal hygiene.
[2] Medical databases researched included those used by the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Air Force Institute of Operational Health (AFIOH), and Joint Medical Work Station (JMEWS).

# Results in Brief and Effect

We identified deficiencies in water operations at three contractor-operated facilities and two military-operated facilities, and in the oversight of those operations. Contractors provided bottled drinking water and bulk water[3] to U.S. forces. Military water purification units only provided bulk water.

From March 2004 to February 2006, the quality of water provided by contractors, through treatment or distribution at three of the sites we visited, was not maintained in accordance with field water sanitary standards as specified in the Department of Army, Technical Bulletin (Medical) 577, "Sanitary Control and Surveillance of Field Water Supplies," March 1986, with revision December 15, 2005 (TB MED 577).[4] Although required, KBR did not maintain the quality of the water it distributed to point-of-use storage containers at Camp Ar Ramadi, Camp Q-West, and Camp Victory. Additionally, at Camp Q-West, KBR improperly provided chlorinated wastewater from its Reverse Osmosis Water Purification Unit (ROWPU) to personal hygiene facilities.

During the time we reviewed water operations, from January 2004 through December 2006, the military processes for providing potable and nonpotable water did not always meet field water sanitary control and surveillance requirements as required by TB MED 577. Specifically, operators of the military water production sites we visited were not performing all required quality control tests nor did they maintain appropriate production, storage, and distribution records.

Because of corrective actions taken, contractor processes for providing potable and nonpotable water were adequate as of November 2006 when internal quality control procedures and DoD oversight were in place to provide quality assurance for the processes of water production, production site storage, distribution, and storage at point-of-use facilities. However, military water purification units at LSA Anaconda and Camp Ali did not perform required quality control tests and did not maintain appropriate records of water produced, stored, and issued during the period reviewed. Therefore, water suppliers exposed U.S. forces to unmonitored and potentially unsafe water. Although there was no way to determine whether water provided by the contractors and military water purification units caused disease, contractors and military units responsible for water operations must always ensure that water provided to the forces meets all established standards and is safe to use.

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[3] Bulk water refers to potable or nonpotable water not packaged for individual use that is transported from large storage containers (50,000 gallons) at the production site to smaller common point-of-use storage containers of various sizes.

[4] During the audit scope (from January 2004 through December 2006) the Army updated TB MED 577. Unless otherwise specified, all references here to TB MED 577 refer to the December 2005 version.

# Results and Effect on Operations

We identified deficiencies in water operations at three contractor-operated facilities and two military-operated facilities and in the oversight of those operations. On three occasions, the quality of water provided by contractors, through treatment or distribution, was not processed in accordance with field water sanitary standards as specified in the Department of Army, Technical Bulletin (Medical) 577, "Sanitary Control and Surveillance of Field Water Supplies," December 15, 2005. This occurred because KBR did not implement established water quality monitoring controls. Specifically:

- KBR did not perform water quality tests on the water it stored in point-of-use containers at Camp Ar Ramadi from October 13, 2004, to May 26, 2005.
- KBR improperly applied Army field water standards governing the process for purification wastewater disposal and source water selection at Camp Q-West from March 14, 2004, through February 3, 2006.
- KBR did not perform water quality tests on the water it stored in point-of-use containers at Camp Victory from November 2004 to February 2006.

Additionally, as of March 4, 2007, KBR had not established or disseminated standard emergency response procedures to comply with contract requirements for reporting compliance violations. Noncompliance with the established controls resulted in water of unknown quality being used for personal hygiene by U.S. forces on Camp Ar Ramadi (approximately 7,300 personnel) and water purification facility wastewater being used in personal hygiene units at Camp Q-West (approximately 5,000 personnel).

During the time of our review, the military processes for providing potable and nonpotable water did not always meet field water sanitary control and surveillance requirements as required by TB MED 577. Specifically, operators of the military water production sites were not performing all required quality control tests nor did they maintain appropriate production, storage, and distribution records. This occurred because the military also did not implement established water quality monitoring controls. Specifically:

- Military water purification operators at Camp Ali did not fully understand which tests were needed at the production site and how often to conduct them.
- Military water purification operators at Camp Ali and LSA Anaconda did not possess the Water Quality Analysis Set-Purification equipment needed to perform the required tests.[5]

MNF-I water operations were deficient in the areas of oversight, quality control, recordkeeping, and troop education. Examples include:

[5] Operator requirements include testing for water temperature, total dissolved solids, turbidity, chlorine residual, and pH (TB MED 577, Chapter 8, paragraph 8-7. a.).

- MNC-I officials did not perform monthly oversight visits to all military water purification units as required by TB MED 577.
- Organizations responsible for water quality oversight – Preventive Medicine, Defense Contract Management Agency (DCMA), and Veterinary Services – did not coordinate their efforts, preventing comprehensive oversight of water supplies.
- Oversight entities lacked inventories of water storage containers to ensure that all water supplies received proper testing.
- Army water purification personnel at LSA Anaconda and Camp Ali did not consistently perform and maintain records of the quality control testing required by TB MED 577.
- Army water purification personnel at LSA Anaconda and Camp Ali did not maintain records of the amount of water issued, or the organizations receiving the water, as required by TB MED 577.
- The MNF-I command did not have a standard troop education procedure to inform U.S. forces of the proper uses of the different types of water provided in Iraq.

MNF-I officials must reduce the potential for water contamination and resultant adverse effects by:

- improving quality control and recordkeeping procedures at military production sites,
- establishing coordination among oversight offices,
- verifying that all water production and storage sites receive oversight visits, and
- increasing troop awareness of water safety standards.

Because of corrective actions taken, contractor processes for providing potable and nonpotable water were adequate as of November 2006. Internal quality control procedures and oversight personnel from military preventive medicine detachments, Defense Contract Management Agency (DCMA), and military Veterinary Services were operationally in place. The procedures and oversight provided quality assurance for the processes of water production, production site storage, distribution, and storage at point-of-use facilities. However, military water purification units at LSA Anaconda and Camp Ali did not perform required quality control tests and did not maintain appropriate records of water produced, stored, and issued. Therefore, water suppliers exposed U.S. forces to unmonitored and potentially unsafe water. However, the military medical databases for reportable illness and diseases showed only 26 disease non-battle injury cases[6] among the 137,000 average monthly U.S. forces in Iraq. The 26 cases included food and waterborne diseases, including hepatitis, giardiasis, and typhoid fever. Although there was no way to determine whether water provided by the contractors and military water purification units caused the diseases, contractors and military units responsible for water operations must always ensure that water provided to the forces meets all established standards and is safe to use.

On March 31, 2007, we issued six memoranda to MNF-I, MNC-I, DCMA, and The Army's Logistics Civil Augmentation Program (LOGCAP) officials for their action on the conditions

[6] Not all disease non-battle injury cases were reported in the military medical databases. See report section titled "Treatment and Oversight at Camp Q-West."

discussed in this report. See the "Command Notification and Management Action" section of this report.

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## Background

Most water production sites providing water to U.S. forces in Iraq were operated by two contractors, KBR and Oasis International Incorporated. KBR provided bulk water and Oasis International Incorporated provided bottled water. We found no problems with the production of bottled water by Oasis International Incorporated.

The Army's Logistics Civil Augmentation Program provides logistical support including housing, food, and water to U.S. forces in Iraq, Afghanistan, Kuwait, Djibouti, and Georgia. The Army's Operations Support Command issued a LOGCAP contract to KBR effective December 14, 2001. The LOGCAP contract is a 10-year cost-plus-award-fee contract with 1 base year and 9 option years (2006 was the contract's fourth option year). The LOGCAP contract provides for services through individual contract task orders. LOGCAP contract task orders 59 (awarded June 2003), 89 (awarded May 2005), and 139 (awarded August 2006) included water services for the U.S. forces in Iraq during the audited period.
The LOGCAP Deputy Program Director – Iraq reported that by August 2006, the award date for task order 139, 87 percent of the LOGCAP contract was supporting the Iraq mission.

Through the LOGCAP contract, KBR is the main provider of bulk water used in dining, medical, and personal hygiene facilities. Oasis International Incorporated (Oasis) has a separate contract, not under LOGCAP, issued by the Joint Contracting Command-Iraq to provide bottled drinking water throughout Iraq.

In Iraq, the main sources for water are the Euphrates and Tigris Rivers. Water from all sources is nonpotable until it is treated (produced), tested, and certified to meet the potable quality standards. The water treatment facilities we visited used the reverse-osmosis purification method. Reverse-osmosis water purification unit (ROWPU) systems were housed in moveable containers that can be set up and operated in remote locations. At the end of the reverse-osmosis treatment process, the water received an infusion of chlorine as a residual disinfection agent. It was stored at the production sites for distribution and then trucked to separate point-of-use storage containers from which it was pumped into medical, dining, or personal hygiene facilities.

**Established Standards.** TB MED 577 establishes field water quality standards and water certification processes and defines operational and oversight roles. The LOGCAP contract requires KBR to comply with TB MED 577. It provides detailed requirements for the sanitary control and quality surveillance of land-based field water support. The requirements are

designed to ensure that field water supplies are safe. TB MED 577 provides officials with the internal controls necessary for proper quality control and recordkeeping.

TB MED 577 requires that water used for drinking, cooking, and medical facilities must be potable. U.S. forces use nonpotable water for other purposes including laundry and personal hygiene (bathing, showering, shaving, and cleaning). Because exposure to harmful contaminants in nonpotable water can occur through the eyes, nose, mouth, and open cuts and wounds, all nonpotable water used in personal hygiene units must meet certain minimum safety standards outlined in TB MED 577.[7] When those minimum standards are met, the Army refers to the water as "disinfected fresh (nonpotable)."

## Contractor Water Operations

We visited three KBR water production sites and one Oasis site. Oasis produced bottled drinking water. KBR produced water in bulk (not bottled for individual use). Both of the contractors produced and maintained potable water for human consumption and generally met the standards as prescribed in the Army's field water standards.[8] However, on three separate occasions KBR did not meet the established requirements for quality monitoring and maintenance of nonpotable water.[9] Although the water KBR produced was originally potable, when it is distributed using trucks not certified for potable distribution, the water must be designated as nonpotable. All nonpotable water was distributed and stored in bulk. From November 2004 to February 2006, KBR did not perform water quality testing at point-of-use storage containers on Camp Victory. From October 13, 2004, to May 23, 2005, KBR did not monitor water quality at point-of-use storage containers on Camp Ar Ramadi. From March 14, 2004, to February 3, 2006, KBR inappropriately distributed chlorinated wastewater from its purification facility at Camp Q-West into personal hygiene facilities without informing preventive medicine personnel. As a result, water quality within those point-of-use storage containers may have degraded to the point of causing waterborne illnesses among U.S. forces.

**Production of Bottled Drinking Water by Oasis.** MNC-I Theater-Specific Requirements for Sanitary Control and Surveillance of Field Water Supplies (MNC-I Operations Order 06-02, September 4, 2006) states that only bottled water is authorized for drinking in Iraq. TB MED 577 requires Veterinary Services or Preventive Medicine to inspect and provide monthly monitoring of the bottling facilities and water quality to ensure that the bottled water is safe. Oasis operates six bottled-water facilities to produce drinking water for U.S. forces throughout Iraq. We visited the facility at Camp Liberty on the Victory Base Complex in

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[7] Standards for water used during personal hygiene include chlorination to at least 1 mg/L chlorine residual (TB MED 577, Chapter 8, paragraph 8-13 b. and Table 3-1).

[8] TB MED 577, prescribes standards for drinking water as well as for water used for personal hygiene (Table B-2 and Chapter 8 paragraph 8-13, b, (1))

[9] Quality monitoring included testing water at all storage facilities for proper chlorination levels [LOGCAP contract quality control requirements; TB MED 577 Dec 05, paragraphs 8-7 a, 8-13 g., paragraphs 9-7 b., 9-8, Table B-3; and TB MED 577 Mar 86, paragraphs 1-4 g (4) (5), i (2), j (2), and 8-10 a (1)].

Baghdad. We observed its operations and reviewed the preventive medicine oversight records for December 27, 2005, through December 2, 2006. The Oasis bottled water production facility at Camp Liberty operated in accordance with the applicable quality control and oversight procedures.

**Production, Distribution, and Storage of Bulk Water by KBR.** The three KBR sites we visited started producing bulk water for U.S. forces on January 31, 2004 (Camp Q-West); on October 30, 2004 (Camp Victory); and on May 23, 2005 (Camp Ar Ramadi). We reviewed KBR records of test results[10] for the first full month that each site started producing water and for November 2006. At all three sites, KBR potable and nonpotable water operations generally met the standards for field water quality because of an emphasis by MNF-I and MNC-I commands and LOGCAP management to produce all water at the potable quality level. KBR also emphasized hourly testing during the production process and daily testing of water stored at production and point-of-use storage containers. Additionally, KBR set up quality control laboratories at its water production sites.

During the audit site visits, we observed that KBR effectively produced, distributed, stored, and maintained potable water in bulk for use in dining and medical facilities according to approved potable water standards. KBR also produced potable water for shower and latrine units, exceeding the TB MED 577 minimum quality level of "disinfected fresh (nonpotable)"[11]. Even though treatment procedures produced potable water, water officials conspicuously posted signs at personal hygiene facilities stating, "Nonpotable Water, Do Not Drink." The postings were appropriate because, according to oversight officials, not all distribution trucks and storage containers were certified and maintained at the potable level.

The LOGCAP contract required KBR to implement quality control procedures that included conducting periodic (hourly and daily) tests to maintain the required quality during production, distribution, and storage (production and point-of-use). As of January 30, 2007, KBR had established and were conducting daily tests at 413 point-of-use testing locations at the three campsites we visited.

**Treatment and Testing at Camp Victory.** At Camp Victory, KBR did not perform water quality tests at point-of-use storage containers from November 2004 to February 2006. KBR began distributing water on November 2, 2004, and, therefore, was contractually responsible for performing those tests. During that period, military preventive medicine personnel conducted monthly oversight tests at Camp Victory point-of-use storage containers. Test results showed that the quality of water met Army field water standards. On February 11, 2006, the MNC-I Chief of Preventive Medicine issued a memorandum, "Clarification of Specifications for Potable Water Production and Testing in Iraq," requiring daily testing at point-of-use water storage containers. Since the issuance of that memorandum, KBR performed the required testing at Camp Victory.

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[10] KBR records included hourly and daily production, distribution, and storage tests of equipment settings and water quality readings (pH and Free Available Chlorine levels).
[11] See section titled "Established Standards" under "Background" in this report.

**Treatment and Testing at Camp Ar Ramadi.** Water operations at Camp Ar Ramadi supported approximately 7,300 personnel. The quality of water produced, distributed, and stored there from October 13, 2004, to May 23, 2005, is unknown. This occurred because contractor and military quality control operations –testing, recordkeeping, and oversight –were not accomplished in accordance with the LOGCAP contract (Task Order 59, Modification 14) or with TB MED 577. The standards require water quality testing at production, distribution, and point-of-use storage containers.[12] Although Army quartermaster company detachments produced the water for the camp during that period, KBR distributed it. According to the DCMA Theater Administrative Contracting Officer (ACO) for LOGCAP-Iraq, the contract required KBR to monitor and maintain the quality of water it distributed to meet the established quality standards. Specifically, the ACO stated that the government's expectations were for KBR to inspect and maintain distribution and storage tanks, chlorinate the water supplies, and ensure proper levels of chlorine residual. Although the point-of-use storage containers were not specifically called out as part of the service, the water distribution and point-of-use storage containers were integral to the water works systems (including on-site storage as needed) that the contract required KBR to provide, install, operate, and maintain in accordance with applicable Army regulations.

According to KBR officials, KBR began distributing water at Camp Ar Ramadi on October 13, 2004, but did not begin water treatment and quality monitoring until May 23, 2005. KBR managers stated that this occurred because KBR was awaiting delivery and setup of its purification equipment. The lack of water quality monitoring and maintenance increased the risk of exposure to potentially unsafe water. Upon receipt of its purification equipment, KBR established an additional production site independent of the military production site. The military production site continued its operations and then became known as the Camp Ali site, while the new KBR site was referred to as the Camp Ar Ramadi, B-4 site.

**Survey of U.S. Forces at Ar Ramadi.** We interviewed an unbiased sample of 251 U.S. Military Service members regarding their experiences and observations while using the water supplied to them during their deployment to Ar Ramadi. The Army Soldier Record Data Center in Alexandria, Virginia, provided a list of 7,225 Military Service members that were deployed to Ar Ramadi during the period October 1, 2004, through May 31, 2005. We interviewed service members from all branches of service from the list based upon their contact availability. Of the 251 service members interviewed[13]:

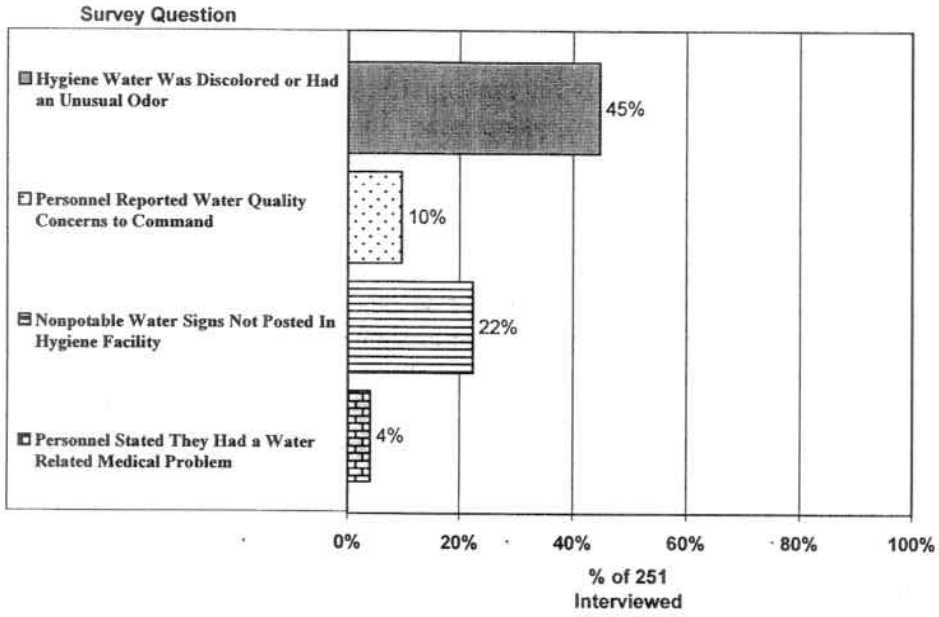
- 45 percent (112 of 251) said that the water supplied to them for personal hygiene was discolored or had an unusual odor,

[12]Testing requirements include hourly during water production, daily at production and point-of-use storage, at distribution, and monthly oversight surveillance [TB MED 577, Dec 05, Chapter 8, paragraphs 8-7 a., 8-13 g., and Table B-3 and Chapter 9, paragraphs 9-7 b., 9-8.; TB MED 577, Mar 86, paragraphs 1-4 g (4) (5), i (2), j (2), and 8-10 a (1)].

[13] Survey answers are not mutually exclusive and will not total 251 (100 percent). Responders could answer affirmatively to none, one, or multiple categories.

- 10 percent (24 of 251) said they reported their water quality concerns to command authorities and 46 percent (11of 24) said they received a command response to their reported concerns,
- 22 percent (56 of 251) said no signs were posted at the hygiene facilities to identify the water as nonpotable, and
- 4 percent (10 of 251) said they experienced a water related medical problem.[14]

**Figure 1. Survey of U.S. Forces Stationed in Ar Ramadi**
October 2004 - May 2005




Although the interview results seemingly corroborate allegations that unsafe water was supplied to U.S forces at Ar Ramadi, the physical observations alone do not delineate water quality. Water quality standards described in TB MED 577 (1986), Chapter 2, paragraphs 2-2(a) and (b) state that potable water may or may not be palatable. Palatable water is pleasing in appearance and taste, is significantly free from color, turbidity, taste and odor, and is cool and aerated. Yet palatable water may not be potable. Thus, the determining factor for the quality level of potable and nonpotable water used for personal hygiene is not based on the visual appearance and odor of the water. TB MED 577 quality standards for nonpotable water use only one measurement in its determination of whether the water is safe for hygiene use – whether the water is chlorinated to at least 1-milligrams-per-liter of chlorine residual. Additionally, according to medical specialists, medical diagnosis of an illness related to waterborne pathogens could also be attributed to foodborne pathogens.

[14] Medical problems were taken from Service member statements only and not taken from the disease non-battle injury medical database records.

Because water quality tests were not performed and disinfection residual levels were not monitored and maintained at point-of-use storage containers during the period surveyed, the potential for water quality degradation existed and the risk of contamination was present. However, auditors found no supporting records to confirm or deny that actual contamination occurred. The survey results are the perceptions of the water users who attributed their concerns to water quality, but they do not document actual water quality test results.

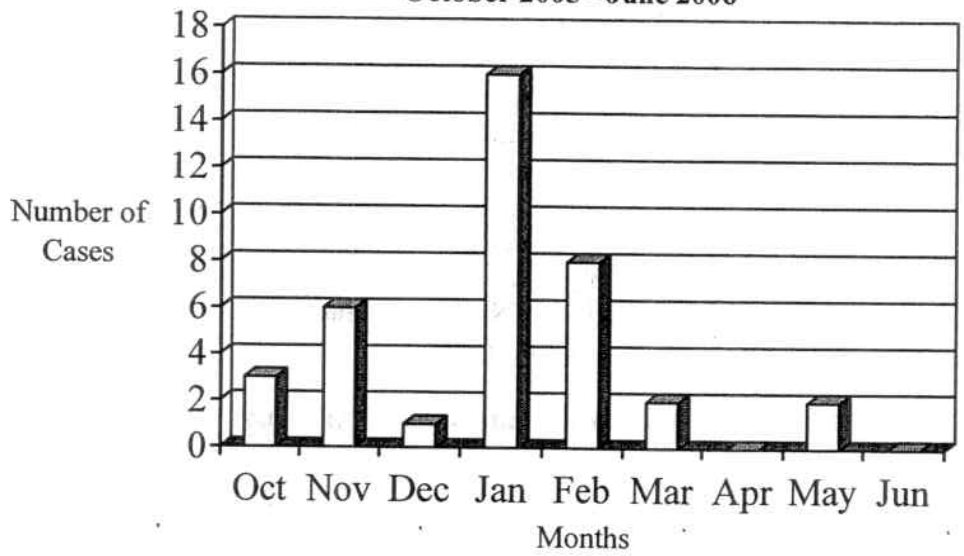
**Treatment and Oversight at Camp Q-West.** On February 1, 2006, military preventive medicine personnel discovered that KBR was using chlorinated wastewater from its ROWPU to fill personal hygiene facilities at Camp Q-West. KBR distributed the chlorinated wastewater from March 14, 2004, through February 3, 2006, to a camp population of approximately 5,000 personnel. KBR did not monitor or record the quality of water at point-of-use containers before April 2006, even though the LOGCAP contract required the company to do so. KBR inappropriately distributed the ROWPU wastewater[15] directly into shower and latrine point-of-use containers without informing military preventive medicine oversight officials. KBR officials stated that they did this because of frequent source water shortages at Camp Q-West.[16] KBR also misapplied TB MED 577 governing the selection of water sources and the management of production wastewater. The wastewater is a concentrated byproduct of the water purification process and its composition is different from that of the original source water. The contaminants present in the wastewater include most of the contaminants that are in the source water, but they are at different concentrations. The suspended solids concentration is less than that of the raw water because the ROWPU pretreatment filtration system removes them. However, the dissolved solids, alkalinity, metals, and chloride concentrations are as much as two times their respective concentrations than in the source water, since pre-reverse-osmosis filtration does not remove them and the ROWPUs membranes reject them.[17] This "new source" water should have undergone an analysis by medical personnel before its use. TB MED 577 required wastewater to be disposed of 25 yards downstream of the raw water intake and gave no option for its reuse.[18] KBR did not inform preventive medicine personnel before using the wastewater. As a result, preventive medicine could not inspect or test the water for suitability and verify that it would not impair the health of U.S. forces. To complicate matters, before January 20, 2006, preventive medicine personnel did not perform the required periodic[19] water quality monitoring at point-of-use storage. Preventive medicine management officials gave several reasons for not performing the oversight: a shortage of personnel caused by sending staff to another unit that did not have its own preventive medicine support; a lack of transportation; the number of camps within the unit's area of responsibility; and competing medical priorities. Oversight officials

[15] ROWPU wastewater was also referred to as brine or concentrate.
[16] According to the Camp Q-West personnel, the water source for the camp is provided through a 21-mile pipeline network from the Tigris River. The pipeline is susceptible to power equipment failures, unauthorized access taps, sabotage, breaks, and frequent leaks. The pumping station, electrical pumps, and pipeline are 30 years old and frequently fail often leaving the camp with limited or no water.
[17] TB MED 577, December 2005, Chapter 11, paragraph 11-2 c.
[18] TB MED 577, March 1986, Chapter 5, paragraph 5-5 b.
[19] TB MED 577, March 1986, Chapter 8, paragraph 8-6 a. and 8-7.

were therefore unaware of the pending water quality risks that existed at Camp Q-West before February 1, 2006.

From October 2005 through June 2006, the local brigade medical sick-call records showed 38 cases[20] that an attending medical official said could be attributed to water, such as skin abscesses, cellulitis, skin infections, and diarrhea. Of the 38 cases, 24 (or 63 percent) were diagnosed in January and February 2006. The following figure illustrates an increase in medical problems during that period.

**Figure 2. Q-West Medical Cases**
**October 2005 - June 2006**




On January 20, 2006, the local medical personnel informed MNC-I Preventive Medicine personnel of an increase in bacterial infections, causing preventive medicine to begin testing water at point-of-use storage containers. On February 1, 2006, preventive medicine determined that KBR had used ROWPU wastewater to supply personal hygiene facilities. The discovery resulted in KBR superchlorinating[21] the water storage tanks and redirecting the wastewater output lines. In addition, preventive medicine increased its oversight monitoring of water quality at point-of-use storage containers.

**Emergency Response Procedures.** KBR did not have standard emergency response procedures to execute if water became unsafe. We documented three examples of potential water quality issues: (1) a false positive reading for mustard gas at Kalsu in October 2006, (2) the direct use of treatment wastewater in personal hygiene facilities at Camp Q-West, and (3)

[20] The attending physician stated that these cases were from the local brigade surgeon sick-call clinic and not reported into the disease non-battle injury databases through the camp troop medical clinic.
[21] Superchlorinating is the sanitizing of a water container (tank or truck) using water with a 100 mg-per-liter chlorine concentration for at least one hour.

uncertainty about whether the water at Camp Ar Ramadi was properly chlorinated and maintained at the required quality level.[22] Although KBR officials quickly reported the Kalsu reading to appropriate military officials, KBR did not notify the military of the other two conditions. As of March 4, 2007, KBR had not established standard operating procedures to implement the contract requirement to report violations of water quality compliance. We informed KBR officials of this weakness during the audit, and the company subsequently prepared internal operating procedures to correct the deficiency We asked LOGCAP officials, DCMA, and MNF-I to review the procedures for adequacy.[23]

## Military Water Operations

MNC–I, a subcommand of MNF-I, performs the operational command and control of military units in Iraq. Military water purification detachments produce, store, and monitor the quality of bulk potable water at production sites. We visited two military water production sites, Camp Ali in Ar Ramadi and LSA Anaconda in Balad. We observed their ongoing operations and reviewed their production and storage records. The detachments operating the military water production sites did not perform all required quality control tests and did not maintain appropriate records of water produced, stored, and issued. In addition, MNF-I lacked standard education procedures for informing U.S. forces of the proper use of water in Iraq.

**Quality Control Testing and Recordkeeping at LSA Anaconda and Camp Ali.** Army quartermaster company detachments did not consistently perform water quality testing at LSA Anaconda (from October through December 2006) or at Camp Ali (from September through December 2006) as required by TB MED 577. Camp Ali operators did not have the Water Quality Analysis Set-Purification equipment needed to perform the required tests for temperature, total dissolved solids, turbidity, chlorine residual, and pH levels.[24] Also, Camp Ali operators did not fully understand the requirements for hourly quality control checks during production, daily tests of water stored at the production site, and a test for potability before issue. By not complying with the required quality control checks, the operators risked exposing U.S. forces to unsafe water.

Army quartermaster company detachments and local preventive medicine personnel did not maintain records of water quality tests for production, storage, distribution, and oversight in accordance with TB MED 577 requirements.[25] For example, from September through December 2006, the Army quartermaster company detachments at Camp Ali did not maintain records to show the results of water quality tests (hourly tests of water produced, daily tests of water stored

[22] See earlier discussions of Q-West and Ar Ramadi.
[23] See Management Notification section.
[24] TB MED 577, Chapter 8, paragraph 8-7 a.
[25] TB MED 577, required water production personnel to maintain records of equipment settings; the chlorine residual and the pH of treated water; chemical usage; the amount of water issued; and the units that were issued water (Chapter 8, paragraphs 8-7 and 8-14). Preventive medicine personnel should retain copies of inspections and water test results (Chapter 8, paragraph 8-3 b.).

at the production site, tests of water issued), the amount of water issued, or the organizations receiving water. The quartermaster company detachment at LSA Anaconda had incomplete records for its operations from October through December 2006. The records did not show the results of hourly quality tests required during water production, the amount of water issued, or the organizations receiving water. Similarly, the preventive medicine detachments at Camp Ar Ramadi and LSA Anaconda did not maintain the required records to validate the performance of oversight for water production and storage sites in their areas of responsibility. Additionally, the water production and oversight personnel did not maintain on-site records from previous units' operations. Although there was no requirement to keep past records on-site, future water operations can benefit by water purification and oversight personnel having immediate access to detailed water quality records. In our opinion, access to historical data can aid in water quality analysis and provide needed information in resolving water quality issues.

**Troop Education.** MNF-I lacked a standard education procedure to inform U.S. forces of the proper uses of water provided in Iraq. MNF-I officials stated that personnel coming into theater received a briefing on the uses of potable and nonpotable water – specifically, that the only approved drinking water in theater is bottled water. We judgmentally selected 10 individuals from 4 different units and asked whether they had received a briefing regarding water use. The individuals had deployed as individual augmentees or as members of a unit. Their ranks ranged from staff sergeant to colonel, and they were assigned to an infantry battalion, a quartermaster company, support command headquarters, and the staff of MNF-I. Only 1 of the 10 asked had received a briefing on water uses, and that was at a voluntary newcomers' briefing conducted in May 2006 at Camp Victory by the previous Corps command.

# Oversight of Water Quality

Oversight of the military units did not occur as required. Specifically, preventive medicine officials did not perform oversight visits to all water supply operations. Oversight officials from the MNF-I Office of Resources and Sustainment, MNC-I Preventive Medicine and its detachments, DCMA Iraq/Afghanistan, LOGCAP, and KBR lacked comprehensive inventories of water storage containers, without which they were unaware of all water storage sites, and their locations, to visit. Additionally, the organizations did not coordinate their oversight efforts. TB MED 577 requires command surgeons to oversee the implementation of preventive medicine instructions and procedures to achieve the established water quality standards. Preventive medicine personnel are responsible for providing oversight of field water operations and for preventing waterborne illness and disease. DCMA is responsible for oversight of the contractor operations. We reviewed MNC-I Preventive Medicine records of the water operation sites that we visited. Preventive medicine personnel provided monthly oversight visits to the three KBR water operation sites that we visited. However, they did not provide consistent oversight visits to the military water operation sites.

**Oversight Coordination.** Oversight of water systems in Iraq is fragmented because both military and civilian organizations purify water, and several organizations are responsible for monitoring its quality. DCMA, Military Preventive Medicine, KBR, and Veterinary Services are the organizations responsible for conducting oversight activities, but they do not coordinate their actions. Within those organizations, we observed a lack of awareness of problems associated with water purification. For example, the required daily water quality monitoring at point-of-use containers was not completed at Camp Ar Ramadi because of a false assumption that individual unit field sanitation teams were performing the tests. TB MED 577 states that individual military unit field sanitation teams are responsible for checking and maintaining the quality of bulk water supplies that they receive for their units. However, in Iraq, individual military units do not receive bulk water deliveries. Instead, KBR delivers the bulk water to common point-of-use storage containers and is therefore responsible for testing and maintaining the quality of that water. Additionally, preventive medicine personnel did not always accomplish the required monthly oversight visits and water quality tests because of stated personnel shortages. The oversight organizations knew of their own internal operations and difficulties but were not aware of problems that other organizations were experiencing or of the effect those problems had on the quality of water provided to U.S. forces.

**Oversight Visits.** The preventive medicine personnel responsible for oversight visits to the military water production site at Camp Ali could not provide documentation supporting oversight visits from June through December 2006. Preventive medicine detachments are responsible for providing oversight of all field water supply operations. Their oversight responsibilities include monthly inspections of all water production sites and all storage containers. The monthly inspections should include tests of water during production and water stored at all locations to ensure that chlorine residual levels are appropriate. The lack of documentation existed because the MNC–I Preventive Medicine personnel did not perform

monthly oversight visits to the military operated water purification unit at Camp Ali as required by TB MED 577.[26]

Preventive medicine officials said they were unable to accomplish all water quality oversight because of personnel shortages. At Camp Ar Ramadi, the manning document for the Preventive medicine section[27] authorized two people to complete all preventive medicine duties for a brigade. However, the Camp Ar Ramadi preventive medicine section was assigned to oversee the Marine Expeditionary Force-West, a division-sized area of operations (three times the size that the manning document plans for). According to the preventive medicine officer on-site, accomplishing those duties would require at least four people. Faced with what they perceived as a personnel shortage, preventive medicine managers decided not to perform visits to the Camp Ali military water production site. Additionally, the preventive medicine officials did not fully understand that their section had oversight authority and responsibility for U.S. water operations inside an Iraqi camp. TB MED 577 requires oversight of U.S. water production sites regardless of their location. Conducting monthly oversight visits to all military operated water purification units would help prevent poor water quality and associated nonbattle injuries. Additionally, preventive medicine personnel did not know the number of military operated water purification units in Iraq and their locations. This lack of knowledge prevented proper operational control of water quality testing throughout Iraq.

**Water Storage Containers.** Officials within the MNF-I Office of Resources and Sustainment, MNC-I Preventive Medicine, the DCMA-Iraq, LOGCAP-Iraq, and KBR were initially unable to provide an inventory of all water storage containers and their locations in Iraq. The lack of maintaining a storage container inventory prevented operational control of all water quality testing throughout Iraq. For example, preventive medicine officials were unable to determine whether the water in all water storage containers had received appropriate monitoring and testing. An accurate inventory of storage containers would help officials schedule and perform the required daily and monthly water quality testing.

[26] TB MED 577, Chapter 8, paragraph 8-3 a.
[27] The Army uses a Table of Organization and Equipment to prescribe the authorized levels of personnel and equipment for each section.

# Notification to Command and Management Actions

On March 31, 2007, we issued six action memoranda to MNF-I, MNC-I, DCMA, and LOGCAP officials for their action on the conditions discussed in this report. Specifically, the memoranda discussed the deficiencies resulting from the lack of:

- oversight and quality control for the military water purification units,
- coordinated oversight by agencies responsible for ensuring water quality,
- records showing the results of required tests,
- information dissemination to troops concerning the proper use of water,
- oversight for water storage containers, and
- contractor emergency response procedures for alerting the command of unsafe water.

We requested that the officials take action to correct the identified deficiencies. On May 14, 2007, MNF-I officials responded stating they were applying the following corrective actions:

- transferring all military water production and storage operations to LOGCAP not later than July 1, 2007;
- establishing a water quality board consisting of officials from MNF-I, MNC-I, DCMA, Preventive Medicine, LOGCAP, and Joint Contracting Command-Iraq to meet quarterly and oversee the quality of water operations;
- assessing the ability of preventive medicine sections to conduct all required testing, and augmenting military units with LOGCAP contractors where needed;
- updating MNC-I Operations Order 06-02, Annex Q, Appendix 2, Tab D, Standard Operating Procedures for "Iraqi Theater-Specific Requirements for Sanitary Control and Surveillance of Field Water Supplies," to emphasize the standards for types and uses of water in Iraq and the controls in place to ensure testing and recordkeeping requirements are met;
- requiring all Base Mayor Offices to ensure every newcomer receives standard information concerning water consumption in Iraq;
- publishing an order for all Base Mayors to provide a list of all water containers to MNC-I Preventive Medicine officials. Preventive medicine officials will ensure testing of military water containers, and LOGCAP officials will ensure testing of its containers, all in accordance with TB MED 577;
- issuing a LOGCAP contractor operating procedure manual to water production operators that designates procedures to report water quality lapses.

## Management Comments on the Findings and Audit Response

U.S. Central Command (USCENTCOM), MNF-I, MNC-I, and DCMA provided comments to a draft report.

USCENTCOM provided coordinated responses from MNF-I and MNC-I related to the recommendations addressed to their commands – see the "Recommendations, Management Comments, and Audit Response" section of this report. USCENTCOM concurred with the responses provided by MNF-I and MNC-I. MNF-I and MNC-I concurred or partially concurred with the information provided in the draft report. Even though MNF-I and MNC-I delineated their concurrence and partial concurrence to the report's recommendations, their provided comments and command actions taken coincide with the conditions as stated in this report. The USCENTCOM, MNF-I and MNC-I responses are included as Attachment 2 of this report.

DCMA provided the following comments on the draft report findings. DCMA's response is included as Attachment 3 of this report.

**Contractor Water Operations and Quality Oversight.** DCMA concurred and stated that the DCMA Iraq/Afghanistan Commander implemented five new procedures that integrate quality assurance in various aspects of KBR's water production and distribution process. Specifically, the new procedures include:

- increased surveillance by the Quality Assurance Representatives (QARs) with a minimum of monthly audit visits at each KBR water production site.
- development of two comprehensive checklists to enhance DCMA audit capabilities, one focused on contractual oversight of the Task Orders and Statement of Work, the second focused on the regulatory required inspections and procedures for ensuring sanitary control and surveillance of field water supplies.
- concentrated efforts on data analysis along with a new theater-wide database to identify deficiencies and possible trends.
- increased number of Contract Officer Representatives to assist in the oversight of production and testing.
- active participation in the monthly Iraqi Theater of Operations Water Quality Board.

## Recommendations, Management Comments, and Audit Response

At the conclusion of the audit fieldwork in Iraq, we presented the following recommendations by means of six individual memoranda to functional staff elements of MNF-I, MNC-I, LOGCAP Army Sustainment Command, and the DCMA Iraq/Afghanistan commander on March 31, 2007

– see the "Notification to Command and Management Actions" section of this report. We received requested responses to a draft report from USCENTCOM, MNF-I, MNC-I, and DCMA regarding each recommendation with comments on corrective actions completed.

**1. We recommend that the Commander, Multinational Force–Iraq:**

**a. Establish a water board made up of each of the major organizations responsible for purification and oversight of water (Defense Contract Management Agency, Army Sustainment Command Logistics Civil Augmentation Program, Multinational Corps - Iraq Preventive Medicine, Veterinary Services, and Field Sanitation Teams' representatives) to serve as a forum for identifying and resolving problems as they arise and ensure proper oversight is accomplished.**

**b. Provide all in-bound military and civilian personnel written information that discusses the proper use of potable and nonpotable water.**

**MNF-I and MNC-I Comments.** MNF-I and MNC-I concurred with Recommendation 1.a. The MNC/F-I Surgeon stated that a Water Quality Board has been established that meets quarterly and more frequently as needed. The board's objectives are to:

- assist in the development policies and procedures for water quality operations,
- provide a forum of discussion on current water quality operational issues, and
- evaluate and report the quality of water operation in the Iraq Theater of Operations.

The MNC/F-I Surgeon also stated that the Water Quality Board has met six times from April 2007 through January 2008 and members of the board include:

- MNC-I Force Health Protection Officer (chairperson),
- DCMA Lead Administrative Contracting Officer,
- DCMA Lead Quality Assurance Representative,
- LOGCAP Representative,
- KBR Contractor Representative,
- MNC-I Logistics Representative (C4 supply and Services),
- Task Force Medical Command Representative,
- Joint Contracting Command Iraq Representative, and
- U.S. Army Corps of Engineers Representative.

MNF-I partially concurred with Recommendation 1.b. stating that "Mayor's cells" are responsible to brief newcomers on what to do in their deployed environment, including providing information concerning the use of water. Additionally, support contractors are required to post signs at all locations where they provide water that states the water is nonpotable.

**Audit Response.** MNF-I and MNC-I did not delineate its partial concurrence with Recommendation 1.b.; however, because MNF-I commands and controls all operations in Iraq, base Mayor cells included, the MNF-I stated actions meet the intent of the recommendation.

**DCMA Comments.** DCMA concurred with Recommendation 1.a. and stated it has taken steps to ensure the goal of the recommendation is accomplished. DCMA representatives are active participants on the MNC-I Water Quality Board.

**2. We recommend that the Commander, Multinational Corps–Iraq:**

**a. Develop and maintain a comprehensive inventory of military water purification units operating in Iraq that includes:**

**(i) the military preventive medicine detachment and element responsible for conducting oversight and quality control for each purification site,**

**(ii) the date when the oversight official conducted the latest oversight visit at each location,**

**(iii) all water quality tests performed during the oversight visit and the results.**

**MNC-I Comments.** MNC-I partially concurred with Recommendation 2.a. stating that although there is no regulatory requirement to maintain a current listing of all military-operated ROWPUs in Iraq, the MNC-I C4 maintains a current listing of them. The MNF-I and MNC-I command surgeon stated that copies of preventive medicine monthly oversight visits are archived at the MNC-I Force Health Protection office, sent to the U.S. Army Center for Health Promotion and Preventive Medicine, as well as stored on Task Force computer web portals and share-points.

**Audit Response.** The MNC-I response and actions meet the intent of the recommendation.

**b. Develop and implement a plan of action with milestones for conducting oversight and quality control visits by the appropriate oversight personnel on a monthly basis as required by TB MED 577 for all water production and treatment sites.**

**MNC-I Comments.** MNC-I concurred and stated that on May 7, 2007, it published procedures for Iraqi Theater-specific Requirements for Sanitary Control and Surveillance of Field Water Supplies in response to the audit findings. It republished the procedures on November 30, 2007, as Tab H, Appendix 6, Annex Q, to MNC-I SOP 08-01. MNC-I also provided a status of preventive medicine oversight efforts listing medical detachments, the water operation sites they visit, inspection plans, and their last inspection dates.

**c. Develop and maintain a comprehensive list of all contractor and military storage containers throughout Iraq to provide accountability for 100 percent quality oversight of all water storage throughout Iraq.**

**MNC-I Comments.** MNC-I partially concurred stating there is no requirement to maintain a central listing of all storage containers; however, through a Letter of Technical Direction it

requested that KBR provide a monthly inventory of all storage containers and ablution clusters to the MNC-I Force Health Protection office. The monthly inventory will be distributed to ensure oversight is conducted in accordance with the TB Med 577 and the MNC-I SOP.

**Audit Response**. The MNF-I and MNC-I response and actions meet the intent of the recommendation.

**d. Formally publish instructions requiring all water purification operations and their associated preventive medicine oversight officials to:**

**(i) produce and maintain all production, distribution, testing, and oversight records in accordance with TB MED 577;**

**(ii) transfer ownership of all water records to their replacement units when they leave the theater; and**

**(iii) maintain an archive of water records at operational sites for use in water quality analysis and resolving water quality issues for the duration of the military operations.**

**MNF-I and MNC-I Comments**. MNC-I partially concurred stating it published an MNC-I SOP for Theater-specific Requirements for Sanitary Control and Surveillance of Field Water Supplies directing all preventive medicine officials to comply with TB Med 577 testing and recordkeeping requirements. The command surgeon's response also stated that the MNC-I Force Health Protection office will maintain archived records of all preventive medicine oversight visits to both military and contractor water production sites. The reports will be forwarded weekly to the Occupational and Environmental Health Surveillance (OEHS) data repository maintained by the U.S. Army Center for Health Promotion and Preventive Medicine. The reports will also be available to incoming units by web access of the OEHS data repository or the MNC-I Surgeon's computer Sharepoint Portal in theater.

**Audit Response**. The MNC-I response and actions meet the intent of the recommendation.

**3. We recommend that the Commander, Defense Contract Management Agency-Iraq establish a process to collaborate and share information and results from water operation oversight efforts with the MNC–I Command Surgeon, Preventive Medicine.**

**DCMA Comments**. DCMA concurred with Recommendation 3. and stated it will establish a process to collaborate and share information with the MNC-I Command Surgeon Preventive Medicine.

**Date: March 7, 2008**
**Report No. D-2008-060**
(Project No.: D2006-D000LQ-0254.000)

We are providing this final report for your information and use. We considered the management comments on a draft of this report when preparing the final report.

We appreciate the courtesies extended to the staff. Please direct your questions to Mr. Timothy Moore at (703) 604-9068, DSN 312-664-9068. See Attachment 4 for the report distribution.

By direction of the Deputy Inspector General for Auditing:

Paul J. Granetto

Paul Granetto
Principal Assistant Inspector General
for Auditing

# Congressional Request Letter

Final Report Reference

BYRON L. DORGAN
NORTH DAKOTA
[illegible]
WASHINGTON, DC [illegible]
[illegible]

COMMITTEES:
APPROPRIATIONS
COMMERCE, SCIENCE & TRANSPORTATION
ENERGY & NATURAL RESOURCES
INDIAN AFFAIRS

CHAIRMAN, DEMOCRATIC POLICY COMMITTEE

United States Senate
WASHINGTON, DC 20510-3405

STATE OFFICES:
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January 24, 2006

Thomas F. Gimble
Acting Inspector General
Department of Defense
Arlington, VA 22202-4704

Dear Mr. Gimble:

I request that you promptly investigate the alleged failure of KBR, a subsidiary of Halliburton, to provide safe non-potable water to U.S. troops in Iraq. I understand that KBR is contractually obligated to provide such water under Task Orders 59 and 89 of its current LOGCAP contract.

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As you know, yesterday I chaired a hearing of the Senate Democratic Policy Committee to examine this issue. Ben Carter, a former KBR water specialist, testified that Halliburton provided unsafe non-potable water to the troops at Camp Ar Ramadi -- water that our troops used to shower, wash their hands and faces, brush their teeth, wash their clothes, and sometimes make coffee.

During his testimony, Mr. Carter referred to an e-mail from William Granger, the current KBR employee in charge of water quality for the Iraq and Kuwait theater, in which Mr. Granger concluded that the non-potable water provided to the troops at Camp Ar Ramadi in the period from approximately May 2004 to May 2005 was twice as contaminated as regular untreated water from the Euphrates River. Mr. Granger later explained to Mr. Carter that the camp's non-potable water was in fact the concentrated waste water from the reverse osmosis water purification unit.

Mr. Carter also testified that Mr. Granger wrote a 21-page report as part of an internal KBR investigation of the water contamination problem. According to Mr. Carter, the Granger report confirmed the existence of the problem and found that the lack of testing and improper water treatment were not confined to Camp Ar Ramadi, but existed at military facilities throughout Iraq.

Based on the DPC hearing testimony, I request that you conduct an investigation into this matter, to determine the following:

(1) Did KBR perform all required water quality tests on non-potable water provided to our troops at Camp Ar Ramadi and other military facilities throughout Iraq?

(2) Has KBR properly treated non-potable water provided to our troops at Camp Ar Ramadi and other military facilities throughout Iraq?

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(3) Has any contaminated non-potable water been provided to our troops at Camp Ar Ramadi or any other military facility in Iraq at any time since the effective date of the water supply contract with KBR?

(4) Did KBR inform U.S. military commanders about contamination of non-potable water provided to our troops at Camp Ar Ramadi or any other military facility in Iraq?

(5) Did KBR or U.S. military commanders take any steps to inform our troops that they had been exposed to unsafe non-potable water at Camp Ar Ramadi or any other military facility in Iraq?

We request that you provide us with the findings of your investigation, including a copy of the aforementioned 21-page report, records of any water quality testing at Ar Ramadi and elsewhere in Iraq prior to May 2005, and records of any measures taken to inform any KBR or military personnel exposed to untreated or potentially contaminated water.

For your reference, we are enclosing a full transcript of yesterday's hearing, along with copies of internal KBR e-mails that were provided to the DPC by witnesses at the hearing. If you have any questions, please contact me or have your staff contact Neal Higgins, DPC Counsel and Investigator, at (202) 224-3571.

Sincerely,

Byron L. Dorgan

Senator Byron L. Dorgan
United States Senator

# Command Comments (USCENTCOM)

Final Report Reference

UNITED STATES CENTRAL COMMAND
OFFICE OF THE CHIEF OF STAFF
7115 SOUTH BOUNDARY BOULEVARD
MACDILL AIR FORCE BASE, FLORIDA 33621-5101

**INFO MEMO**

28 January 2008

FOR: INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

FROM: MajGen Thomas L. Moore, Jr., Chief of Staff, U.S. Central Command

SUBJECT: Department of Defense Inspector General Draft Report, "Audit of Potable and Nonpotable Water in Iraq", Project No. D2006-D000LQ-0254.000

Honorable Kicklighter,

This is the United States Central Command (USCENTCOM) response to the DoDIG draft report, "Audit of Potable and Nonpotable Water in Iraq", Project Number D2006-D000LQ-0254.000.

**BACKGROUND**

- USCENTCOM received the draft report from the DoDIG on 28 December 2007 and staffed the report to MNF-I and MNC-I for comments to the recommendations addressed to their commands.

**DISCUSSION**

- USCENTCOM concurs with the responses provided by MNF-I and MNC-I.

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**SUMMARY**

- USCENTCOM provides the coordinated responses and supporting documentation from MNF-I and MNC-I to the recommendations addressed to their commands.

Attachments
Tab A: MNF-I/MNC-I Response
Tab B: Water Quality Board SOP
Tab C: Water Inspections 2004-2006 IG Report 2007 Spreadsheet
Tab D: "TAB H", App 6, Annex Q, MNC-I SOP 08-01

Attachments Tabs B, C, and D were omitted because of length. Copies can be provided upon request

Prepared By: LTC Steven A. Davis, USCENTCOM/CCIG, (813)827-6660

# Command Comments (MNC-I and MNF-I), Tab A to USCENTCOM

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**DODIG DRAFT REPORT (28 DEC 2007)**
**PROJECT NUMBER D2006-000LQ-0254.000**

**"AUDIT OF POTABLE AND NONPOTABLE WATER IN IRAQ"**

**MNC/F-I SURGEON COMMENTS**

1. We recommend that the Commander, Multinational Force–Iraq:

a. Establish a water board made up of each of the major organizations responsible for purification and oversight of water (Defense Contract Management Agency, Army Sustainment Command Logistics Civil Augmentation Program, Multinational Corps - Iraq Preventive Medicine, Veterinary Services, and Field Sanitation Teams' representatives) to serve as a forum for identifying and resolving problems as they arise and ensure proper oversight is accomplished.

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MNC/F-I SURGEON RESPONSE: MNF-I concurs with the recommendation provided in this Draft DODIG Report. The Water Quality Board has been established (see SOP attached), and has met 24 April 2007, 31 May 2007, 5 Oct 2007, 4 Nov 2007, 18 Dec 2007, and 8 Jan 2008 either separately, or in conjunction with the monthly Preventive Medicine Forum. During these meetings, subjects that have been discussed are: Iraqi Theater-specific Requirements for Sanitary Control and Surveillance of Field Water Supplies, Tab D to Appendix 2 to Annex Q to MNC-I SOP 06-04 update, KBR requirements for reporting locations and status of all KBR ROWPUs and storage containers, and upcoming water projects such as well-drilling or ROWPU movements.

b. Provide all in-bound military and civilian personnel written information that discusses the proper use of potable and nonpotable water.

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MNC/F-I SURGEON RESPONSE: MNF-I partially concurs with the recommendation provided in this Draft DODIG Report. As stated in the MNF-I response dated 14 May 2007 to the DoD IG findings dated 31 March 2007, Mayor's cells are responsible to brief newcomers on what the do in their new environment when deployed to Iraq. It is required in that orientation to provide information concerning the consumption of bottled water versus the use of non-potable water in ablutions and water from the tap in Iraqi buildings. Additionally, LOGCAP and other life support contractors are required to post signs at all locations where they provide water to a building or other structure that states that the water is non potable.

**MNC-I COMMENTS**

2. We recommend that the Commander, Multinational Corps–Iraq:

a. Develop and maintain a comprehensive inventory of military water purification units operating in Iraq that includes:

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(i) the military Preventive Medicine detachment and element responsible for conducting oversight and quality control for each purification site,

(ii) the date when the oversight official conducted the latest oversight visit at each location,

(iii) all water quality tests performed during the oversight visit and the results.

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MNC/F-I SURGEON RESPONSE: MNC-I partially concurs with the recommendation provided in this Draft DODIG Report. Although there is no regulatory requirement, MNC-I C4 maintains a current listing of all military-operated ROWPUs in Iraq. Military water and storage operations have been transferred under LOGCAP for all areas where force protection permits IAW FRAGO 07-366, 13 October 2007. Additionally, the MNC-I Force Health Protection (FHP) office maintains archives of all Preventive Medicine oversight to both military and contractor water production sites. These reports are forwarded weekly to both the MNC-I FHP and to the Occupational and Environmental Health Surveillance data repository maintained by the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM). Copies of the monthly oversight inspections are also archived at the MNC-I FHP and sent to the CHPPM data repository.

TF 62 maintains records from the Preventive Medicine detachments showing water quality testing for a combination of sources including: points of use (DFAC, shower, latrine, restaurant, barber shop), ROWPUs, bulk water storage containers, ice plants and water trucks (see attached Excel spreadsheet for a summary). This data does not show consistent coverage for the areas and dates in the report, but is provided on the chance that missing data from the original inspection may be included.

| Location | Dates | Where stored |
|---|---|---|
| LSAA | Feb-Dec 04 | TF56 HHD FHP Office, Hard copies |
| LSAA | Jan-Dec 2005 | TF56 NIPR Sharepoint |
| LSAA | Feb-Dec 2005 | TF62 SIPR Web portal |
| LSAA | Feb,May,Jun,Sep,Oct 2005 | TF56 HHD FHP Office, Hard copies |
| LSAA | Jan-Dec (-Mar) 2006 | TF62 SIPR Web portal |
| Liberty | Mar,May,Jun,Jul,Aug,Sep,Oct 2005 | TF62 SIPR Web portal |
| Liberty | Feb,Mar,Apr,May,Jun,Jul,Aug,Oct Nov,Dec 2006 | TF62 SIPR Web portal |
| Q-West | Apr 2006 | TF62 SIPR Web portal |
| Ramadi | Mar,Apr 2006 | TF62 SIPR Web portal |
| Victory | Feb-Oct 2005 | TF62 SIPR Web portal |
| Victory | Feb,Mar,May,Jun,Jul,Aug,Oct,Nov | TF62 SIPR Web portal |

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b. Develop and implement a plan of action with milestones for conducting oversight and quality control visits by the appropriate oversight personnel on a monthly basis as required by TB MED 577 for all water production and treatment sites.

MNC-I RESPONSE: MNC-I concurs with information provided in this Draft DODIG Report. The MNC-I FHP office published Tab D, Appendix 2, Annex Q to MNC-I SOP 06-04, Iraqi Theater-specific Requirements for Sanitary Control and Surveillance of Field Water Supplies, 7 May 2007, in response to these findings in order to provide clear guidance in support of TB Med 577 to ensure proper oversight an quality control of both military and contractor supplies water. This SOP has been updated multiple times and most recently has been republished as Tab H, Appendix 6, Annex Q, MNC-I SOP 08-01, see enclosure 2.

The following information is the current status of preventive medicine oversight:

1) 71st Medical Detachment, LSA Adder/Tallil
   a) Military ROWPUs:
      i. CSC Scania
         - inspected monthly (last 12 Dec 07)
         - records from our inspections available, records from QM unit available
         - QM unit conducting test IAW TB Med 577
         - QM unit sends samples to KBR-Tallil water lab bi-weekly for testing.
      ii. Camp Echo (1 – operational, 1 – non-operational)
         - inspected monthly (last 27 Dec 07)
         - records from our inspections available, records from QM unit available
         - QM unit conducting test IAW TB Med 577
            - checks conducted hourly for pH, Cl
            - daily checks conducted
            - TB Med 577 weekly checks conducted daily
            - TB Med 577 monthly checks conducted weekly
            - TB Med 577 quarterly checks conducted monthly
      iii. PM assets conduct bi-monthly checks
   b) KBR ROWPUs located at:
      i. COB Adder, Camp Bucca, CSC Cedar II, Camp Delta, Camp Echo
      ii. All are inspected monthly. Records available
   c) Currently, all locations have water samples being drawn at least monthly from various locations – ablution trailers, DFAC, wet trailers, AAFES facilities, etc.
   d) Our plan is to continue inspecting IAW TB Med 577. If any issues arise, we will increase sampling to ensure health and safety of personnel on all our COBs, Camps, CSC, etc locations.

2) 155th Medical Detachment, LSA Anaconda/Balad
   a) KBR ROWPUs
      i. East gate

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- inspected monthly
- last inspected 7 Jan 08

ii. Water tower
- inspected monthly
- last inspected 7 Jan 08

b) Blivets
i. 50+ at various locations
ii. inspected monthly

3) 926th Medical Detachment, COB Speicher/Q-West
a) Military ROWPU
i. Q-West Grid Coordinates LE 30881E 62667N
- 226th Quarter Master CO
- ROWPU unit ID# 17Q81
- Last inspected 05 DEC 2007
- Full Spectrum

b) KBR ROWPU
i. Q-West #1
- Grid Coordinates LE 29283E 59236N
- Unit ID#L293964
- Last Inspected 10 DEC 2007
- Full Spectrum

ii. Q-West #2
- Unit ID#L293963
- Last Inspected 10 DEC 2007
- This ROWPU only runs periodically.

c) They have an inventory of all water tanks on Q-West. They supply food service establishments, TMC, Ab units, etc. Currently there are 118 tanks.

4) 345th Medical Detachment, Camp Victory
a) 345th has no military ROWPU sites in AO. They conduct monthly ROWPU site inspections for the KBR run sites. The documentation for this is available.
b) 345th is getting an inventory of the ablution units on VBC. Every month KBR comes by to take a team to do the "10% QA check." They do not have an inventory to know if the checks are satisfying the required 10% or if they are sampling representatively. They have requested this list from KBR management.

c. Develop and maintain a comprehensive list of all contractor and military storage containers throughout Iraq to provide accountability for 100 percent quality oversight of all water storage throughout Iraq.

**MNC/F-I SURGEON RESPONSE:** MNC-I partially concurs with information provided in this Draft DODIG Report. There is no requirement to maintain a central listing of all storage containers. However, it has been requested through an LOTD that KBR provide a monthly inventory of all storage containers and ablution clusters as a deliverable to the MNC-I FHP

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office. This will be distributed to ensure that Preventive Medicine oversight is being conducted IAW TB Med 577 and the MNC-I SOP.

d. Formally publish instructions requiring all water purification operations and their associated Preventive Medicine oversight officials to:

(i) produce and maintain all production, distribution, testing and oversight records in accordance with TB MED 577;

(ii) transfer ownership of all water records to their replacement units when they leave the theater; and

(iii) maintain an archive of water records at operational sites for use in water quality analysis and resolving water quality issues for the duration of the military operations.

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MNC/F-I SURGEON RESPONSE: MNC-I partially concurs with information provided in this Draft DODIG Report. In the publication of the MNC-I SOP for Theater-specific Requirements for Sanitary Control and Surveillance of Field Water Supplies, PM officials are directed to comply with testing and recordkeeping requirements of TB Med 577. Military water and storage operations have been transferred under LOGCAP for all areas where force protection permits IAW FRAGO 366, 13 October 2007. Additionally, the MNC-I Force Health Protection (FHP) office maintains archives of all Preventive Medicine oversight to both military and contractor water production sites. These reports are forwarded weekly to both the MNC-I FHP and to the Occupational and Environmental Health Surveillance data repository maintained by the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM). Copies of the monthly oversight inspections are also archived at the MNC-I FHP and sent to the CHPPM data repository. These reports are available to incoming units via web access of the OEHS data repository or the MNC-I Surgeon's Sharepoint Portal in theater.

# Command Comments (DCMA)

DEFENSE CONTRACT MANAGEMENT AGENCY
6350 WALKER LANE, SUITE 300
ALEXANDRIA, VIRGINIA 22310-3226

IN REPLY REFER TO DCMA-DMI

FEB 1 2 2008

MEMORANDUM FOR PROGRAM DIRECTOR SOUTHWEST ASIA OPERATIONS
OFFICE OF INSPECTOR GENERAL

SUBJECT: DODIG Draft Report on Audit of Potable and Nonpotable Water in Iraq
Project No. D2006-D000LQ-0254.000

Reference: DODIG Draft Audit Report, D2006-D000LQ-0254.000

We have attached the Headquarters Defense Contract Management Agency response to recommendation 1a and recommendation 3 cited in the subject audit report.

Point of contact is Dorotherine Eaddy at 703-428-1446 or dorotherine.eaddy@dcma.mil.

Keith D Ernst

KEITH D. ERNST
Acting Director

Final Report Reference

SUBJECT: Audit of Potable and Nonpotable Water in Iraq (Project Number D2006-D000LQ-0254)

**FINDING #1: Contractor Water Operations**

We visited three KBR water production sites and one Oasis site. Oasis produced bottled drinking water. KBR produced water in bulk (not bottled for individual use). Both of the contractors produced and maintained potable water for human consumption and generally met the standards as prescribed in the Army's field water standards. However, on three separate occasions KBR did not meet the established requirements for quality monitoring and maintenance of nonpotable water. Although the water KBR produced was originally potable, when it is distributed using trucks not certified for potable distribution, the water must be designate nonpotable. All nonpotable water was distributed and stored in bulk. From November 2004 to February 2006, KBR did not perform water quality testing at point-of-use storage containers on Camp Victory. From October 13, 2004, to May 23, 2005, KBR did not monitor water quality at point-of-use storage containers on Camp Ar Ramadi. From March 14, 2004, to February 3, 2006, KBR inappropriately distributed chlorinated wastewater from its purification facility at Camp Q-West into personal hygiene facilities without informing Preventive Medicine personnel. As a result, water quality within those point-of-use storage containers may have degraded to the point of causing waterborne illnesses among U.S. forces.

**RECOMMENDATION 1a:**

We recommend that the Commander, Multinational Force–Iraq:

a. Establish a water board made up of each of the major organizations responsible for purification and oversight of water (Defense Contract Management Agency, Army Sustainment Command Logistics Civil Augmentation Program, Multinational Corps - Iraq Preventive Medicine, Veterinary Services, and Field Sanitation Teams' representatives) to serve as a forum for identifying and resolving problems as they arise and ensure proper oversight is accomplished.

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**DCMA COMMENTS: Concur.** DCMA Iraq/Afghanistan has taken steps to ensure the goal of recommendation #1a is accomplished. The Commander at DCMA I/A implemented 5 new procedures that integrate Quality Assurance in various aspects of the water production and water distribution process completed by KBR. Specifically, the Theater QAR is actively participating in the monthly Iraqi Theater of Operation's Water Quality Board meetings.

**Finding #3: Oversight of Quality Water**

Oversight of the military units did not occur as required. Specifically, Preventive Medicine officials did not perform oversight visits to all water supply operations. Oversight officials from the MNF-I Office of Resources and Sustainment, MNC-I Preventive Medicine, Defense Contract Management Agency-Iraq, LOGCAP, and KBR lacked a comprehensive inventory of water storage containers, without which they were unaware of the number and location of storage sites to visit. Additionally, the

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SUBJECT: Audit of Potable and Nonpotable Water in Iraq (Project Number D2006-D000LQ-0254)

organizations did not coordinate their oversight efforts. TB MED 577 requires command surgeons to oversee the implementation of Preventive Medicine instruction and procedures to achieve the established water quality standards. Preventive Medicine personnel are responsible for providing oversight of field water operations and for preventing waterborne illness and disease. DCMA is responsible for oversight of the contractor operations. We reviewed MNC-I Preventive Medicine records of the water operation sites that we visited. Preventive Medicine personnel provided monthly oversight visits to the three KBR water operation sites that we visited. However, they did not provide consistent oversight visits to the military water operation sites.

**RECOMMENDATION 3:**

We recommend that the Commander, Defense Contract Management Agency – Iraq establish a process to collaborate and share information and results from water operation oversight efforts with the MNC–I Command Surgeon, Preventive Medicine.

**DCMA COMMENTS:** **Concur**. The DCMA I/A Commander will establish a process to collaborate and share information with MNC–I Command Surgeon, Preventive Medicine. Page 20

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