"An Oversight Hearing on Whether Halliburton Has Failed to Provide Clean Water to United States Troops in Iraq"

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January 23, 2006

Good afternoon, I am Erik D. Olson of the Natural Resources Defense Council (NRDC), a national non-profit, nonpartisan public interest organization dedicated to protecting public health and the environment, with over one million members and e-activists. I head up the drinking water work at NRDC and am Senior Attorney in the Environment and Health Program. I also serve as Chair of the Campaign for Safe and Affordable Drinking Water, a national alliance of over 300 public health, medical, environmental, consumer, and other organizations working together to strengthen the protection of the nation's drinking water, though this testimony is submitted on behalf of NRDC only. I appreciate the opportunity to testify this afternoon.

I have worked in the drinking water field for about 20 years, first at the U.S. Environmental Protection Agency and since then at two non-profit organizations. I have therefore developed some knowledge of drinking water treatment and safety issues. I cannot speak with personal or direct knowledge of the drinking water or non-potable water situation at U.S. bases in Iraq, but can describe the implications of the facts as they have been represented to me by Democratic Policy Committee investigators and the statements of other witnesses today.

The Importance of Safe Water at Military Bases

Military doctors have long known that the readiness of armed forces can be seriously compromised if the troops lack access to safe water supplies. Indeed, as the Greek military expert and student of Socrates Xenophon emphasized over 2,300 years ago[1], a good water supply is critical to an army: "When on active service the commander must prove himself conspicuously careful in the matter of … water-supply…and all other requisites; forecasting the future and keeping ever a wakeful eye…." As the U.S. Army Field Manual states:

> Throughout military history, the vast majority of casualties in war have been from disease and nonbattle injury. This loss of manpower can be drastically reduced by ensuring that soldiers have adequate supplies of potable water.

Field Manual 10–52; Water Supply in Theaters of Operations (*see* http://www.almc.army.mil/alog/issues/MayJun04/alog_wateriniraq.htm and http://www.globalsecurity.org/military/library/policy/army/fm/10-52/Ch2.htm#s4p1).

The U.S. Army and other armed forces recognize that not only the water that is provided as drinking water must be treated to be safe, but also water that is used by the troops and support for brushing teeth and even for showering must be adequately protected. According to military regulations and the Field Manual, the types of water and its uses are:

Uses for Potable and Nonpotable Water[2]

Potable	*Nonpotable*
• Drinking • Heat treatment (cold water and ice for troops) • Personal hygiene (shaving, and cleaning of equipment daily sponge washing, brushing teeth) • Food preparation • Medical staff and equipment cleaning • Hospital medical treatment	• Centralized hygiene (showering) • Laundering • Preparation of human remains • Nuclear, biological, and chemical decontamination of equipment • Vehicle maintenance • Aircraft washing • Engineer construction

Why "Non-Potable" (including Shower) Water Needs to be Safe

Military regulations recognize that shower water must be chlorinated and treated to some extent to assure safety, and, as noted above, water used for personal hygiene is required to be "potable." While non-potable water *is primarily not intended for human consumption*, as anyone who has ever showered knows, small amounts of water often are inhaled as aerosol or swallowed during showering. Indeed, scientific investigations have shown that waterborne disease can be transmitted simply through inhaling aerosolized contaminated shower water.[3] The Centers for Disease Control and Prevention (CDC) published a report showing that in the U.S., even an "interactive fountain" that sprayed chlorinated water into the air at a water park caused a waterborne disease outbreak of *Shigella* and *Cryptosporidium*.[4] Scientific studies have shown that for some infectious organisms like *Cryptosporidium* only a sip of water—indeed just a few microscopic oocysts — can make you sick.[5] Thus, water that is used for showering and for tooth brushing, and certainly even for small sips of water to take pills for example, should not be contaminated with microorganisms that can cause waterborne illness.

How Non-Potable Water is Reportedly Derived and Treated at Some U.S. Bases in Iraq

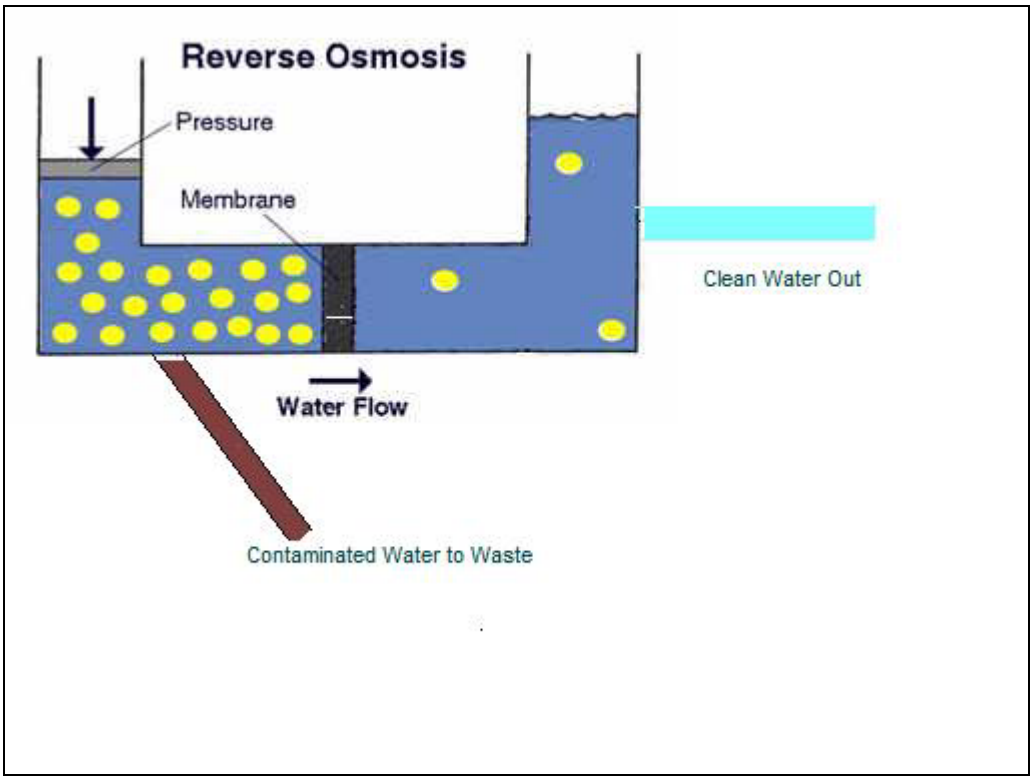
According to some reports, raw water is taken from the Euphrates River at a point less than two miles *downstream* of a human sewage discharge point. There are likely to be other human and animal fecal discharges and runoff into this major river. If this is correct, like many rivers in the United States and around the world that receive runoff and sewage discharges, the

raw water from the Euphrates is likely to be contaminated by a variety of disease-causing organisms, ranging from total coliform, *E. coli* and other bacteria, to viruses and hardy protozoa like *Giardia* and *Cryptosprodium.* These disease-causing organisms can cause a wide variety of symptoms, including diarrhea, nausea, vomiting, headaches, fever, lightheadedness, and in the event of serious infections can sometimes cause kidney failure and even death.

According the information provided to us, while the *potable drinking water* at the U.S. B4 Ar Ramadi base in Iraq is either bottled water or is treated appropriately, the so-called non-potable water used for showering (and apparently in some cases for hygiene such as brushing teeth) is the concentrated reject water from water treatment which reportedly is sometimes or often un-disinfected and unfiltered, and therefore is likely to be unsanitary.

Specifically, it has been reported that military contractors charged with supplying water at B4 Ar Ramadi base in Iraq have been taking water from the Euphrates River, and filtering it and using a Reverse Osmosis Water Purification Unit (ROWPU). They reportedly have been using the treated water for potable drinking water, *but using the reject waste water or "concentrate" from the ROWPU for non-potable water.* Clearly, such water should at a minimum always be chlorinated to reduce the levels of bacteria and viruses. But it should be pointed out that even if this water is chlorinated, some chlorine-resistant disease-causing microbes like *Cryptosporidium* would not be killed by chlorine alone, and could still cause illnesses if present in the water.[6] This is a potentially dangerous situation for anyone who uses the non-potable water for showering or hygiene such as brushing teeth.

Schematic of Reverse Osmosis Treatment Unit



As the schematic above shows, an RO filter's semi-permeable membrane works like an extremely fine screen, straining even very small contaminants, including bacteria, viruses, and oocysts such as *Cryptosporidium* out of the raw water. It concentrates the contaminants in the waste water, and produces clean "finished water" intended for human consumption. The waste water often has several times higher concentration of contaminants than the raw water — it is *more polluted* than the raw untreated water. This waste water should not be used for any human use such as showering or for human hygiene uses like tooth brushing.

It has been reported that at B4 Ar Ramadi and perhaps some other U.S. bases in Iraq, some sinks in bathrooms that are used to brush teeth, to take medications, and perhaps to take a quick sip of water, that are supposed to have "potable water" may be plumbed to supply non-potable water. If this is accurate, this water too could put users at risk of waterborne illness.

Finally, it is worth noting that while NRDC certainly does not have sufficient information to claim that waterborne disease has been caused by this issue, we are aware that soldiers are often evacuated out of Iraq for non-combat related illnesses. The Association of Military Surgeons found that 9.1 percent of soldiers evacuated in 2003 suffered from problems of the digestive system; another 6.4 percent had nervous system disorders; 6.1% suffered urological problems; and 8.3 percent suffered from unknown illnesses.[7] It is known from published literature before the war that *Cryposporidium* and other waterborne disease have been a problem in Iraq,[8] and U.S. military assessments have indicated that there are threats in Iraq from waterborne parasites such as *Cryposporidium* and *Giardia.*[9]

Conclusion

If reports are accurate that water used for showering and potentially for hygiene uses such as tooth brushing at some U.S. bases in Iraq is not properly treated, and sometimes actually the concentrated contaminated reject water from Reverse Osmosis treatment units that use Euphrates River water as their raw water source, this would present substantial public health concerns for personnel using this water. We urge that this practice be ceased and that proper water treatment be initiated immediately for all such uses.

NOTES

[1] Xenophan, "The Calvary General," Section VI, translation available at http://www.sonshi.com/xenophon6.html
[2] First Lieutenant Jarred Wm. Guthrie, "Obtaining and Purifying Water in Iraq," (2004), available online at http://www.almc.army.mil/alog/issues/MayJun04/alog_wateriniraq.htm.
[3] See, for example, K. Nygard et al., "Waterborne outbreak of gastroenteritis in a religious summer camp in Norway," Epidemiology & Infection, 2004 Apr; 132(2):223-9.
[4] P. Minshew et al., "Outbreak of Gastroenteritis Associated With an Interactive Water Fountain at a Beachside Park --- Florida, 1999," Morbidity & Mortality Weekly Report, 49(25);565-8, June 30, 2000, available online at www.cdc.gov/mmwr/preview/mmwrhtml/mm4925a3.htm
[5] Messner MJ, Chappell CL, Okhuysen PC, "Risk assessment for Cryptosporidium: a hierarchical Bayesian analysis of human dose response data," Water Res. 2001 Nov;35(16):3934-40
[6] CDC, "*Cryptosporidium* Infection Cryptosporidiosis: Fact Sheet," (2005), available online at http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_cryptosporidiosis.htm
[7] D.R. Harman et al., "Aeromedical Evacuations from Operation Iraqi Freedom: A Descriptive Study," Military Medicine (June 2005), available online at www.findarticles.com/p/articles/mi_qa3912/is_200506/ai_n13644581; see

also "Whistleblowers' Stomach Curdling Story: Halliburton Serves Contaminated Water to Troops, available online at www.halliburtonwatch.org/news/contamination.html

[8] Nadham K. Mahdi, Imad A. Al-Sadoon and Adel T. Mohamed, "First report of cryptosporidiosis among Iraqi children," Eastern Mediterranean Health Journal Volume 2, Issue 1, 1996, Page 115-120, available online at www.emro.who.int/Publications/EMHJ/0201/16.htm

[9] Interestingly, a U.S. military routine report noting these diseases is available online in Google's cache at http://72.14.203.104/search?q=cache:RIIlyFZS-8sJ:www.gulflink.osd.mil/declassdocs/dia/19950825/950825_84429041.html+euphrates+cryptosporidium&hl=en but apparently has been removed from the military website at which it originally appeared.