

SUMMARY OF DEPLETED URANIUM TEST RESULTS FOR IRAQ WAR VETERANS

Dan Fahey¹
17 March 2006

SUMMARY

The use of armor-piercing ammunition made from depleted uranium (DU) during the war in Iraq has raised concerns about DU exposures among military personnel and civilians. Since 2003, the US Department of Defense (DoD) and Department of Veterans Affairs (VA) have tested more than 2,100 Iraq war veterans for DU exposure and the UK Ministry of Defence (MoD) has tested approximately 350 veterans. There have reportedly been few positive test results, but these results obscure problems with selection processes and testing methods. In this paper I summarize publicly available information about the use of DU munitions in Iraq, analyze differences between DoD/VA and MoD testing processes, review the results of government testing efforts, and discuss the significance of the testing processes and results.

DEPLETED URANIUM IN IRAQ

The US and British militaries have confirmed that they used DU ammunition during the war in Iraq, but the exact quantities and locations where DU was shot remain uncertain.² The US Army and Air Force shot approximately 115 metric tons of DU between March 2003 and March 2004³ (Table 1). The US Marine Corps has not disclosed how much DU its Abrams tanks and AV-8B Harrier jets shot since 2003, but I estimate the additional use by the Marine Corps would bring the total use through March 2004 up to between 118 to 136 metric tons (130 to 150 tons).⁴ British forces apparently shot DU munitions only during the 2003 invasion; the MoD has acknowledged that British Challenger II tanks shot approximately 870kg/DU (1,920 lbs/DU).⁵

The use of DU munitions by US forces since March 2004 remains uncertain. The testing of veterans for exposure to DU through September 2005 could be taken as a sign of ongoing, though limited use of DU munitions,⁶ but in January 2005 then-Chairman of the U.S. Joint Chiefs of Staff General Richard Myers wrote: “munitions containing DU are not being used in the current stability and support operations in Iraq or Afghanistan.”⁷ Possible exposures may have resulted from the destruction of DU ammunition or the breaching of DU armor on tanks,⁸ and some servicemembers wounded by fragments have been tested “to ensure DU residues were not used in an improvised explosive device.”⁹

Table 1. Estimate of the Use of DU Munitions in Iraq, March 2003 to March 2004¹⁰

Armed Force Shooting DU	Number of Rounds	Quantity of DU (kg)
US Air Force (A-10 aircraft)	Tanks: ~2,466 ¹¹	Tanks: ~11,442
US Army (Abrams tank, Bradley Fighting Vehicle)	Bradleys: ~121,000 ¹² Jets: ~309,000 ¹³	Bradleys: ~10,300 Jets: ~93,400
UK Royal Army (Challenger tank)	Tanks: ~185	Tanks: ~870
TOTAL (Including estimated US Marine Corps expenditure)		118,000 to 136,000 (260,000 to 300,000 lbs.)

Table compiled by Dan Fahey

There is no credible evidence that missiles and bombs containing natural or depleted uranium have been used in Iraq. A US Department of Defense official has explicitly stated: “none of the guided bombs or cruise missiles that the US used in Iraq and Afghanistan contained uranium of any type.”¹⁴ Myths and misrepresentations form the basis of recent activist claims that natural uranium found in air filters in England originated from US air strikes in Iraq.

TESTING PROCESS

DoD and MoD have similar processes for selecting servicemembers for DU testing, but once identified, MoD uses a more sensitive testing method than that employed by DoD.

Selection Process. DoD selects servicemen and women to receive testing based on the results of the questionnaire “Post Deployment Health Assessment” (DD 2796).¹⁵ There is an assumption inherent in this self-identification process that servicemembers were fully aware of all the times and places they may have been exposed to DU, but even for those who believe they were exposed, testing has been incomplete. In September 2004, investigators from the US Government Accountability Office (GAO) reported that a review of several units’ questionnaires showed that out of 32 veterans who indicated they were “sometimes” or “often” exposed to DU during service in Iraq, only 3 were provided with a DU test.¹⁶ In addition to the questionnaires, military officials have identified three entire units for DU testing.¹⁷ MoD also provides DU testing based on self-reported exposures and official identification of servicemembers possibly exposed to DU during and after two friendly fire incidents.¹⁸ MoD reportedly issued a card to its servicemen and women in Iraq that states: “You may have been exposed to dust containing DU during your deployment... You are eligible for a urine test to measure uranium.”¹⁹

Testing Method. MoD uses a testing method that is more sensitive than the test used by DoD and VA.²⁰ The essence of the difference between these test methods is that DoD/VA’s test must be administered within 180 days of exposure in order to reliably identify the presence of DU in a veteran’s urine,²¹ while MoD’s tests can identify DU in urine more than a decade after exposure.²² DoD/VA’s test screens for total uranium levels in urine, but since everyone excretes small amounts of uranium, this method is not capable of detecting small amounts of DU in urine containing normal levels of uranium.²³ DoD/VA’s test is useful for identifying veterans retaining DU fragments from wounds, who typically excrete high levels of DU for years, but after 180-days it may not detect small amounts of DU in the urine of veterans who had inhalation, ingestion, or wound contamination exposures. By contrast, MoD’s test is capable of detecting small amounts of DU in urine containing normal levels of uranium. The 180-day window for the DoD/VA test to be considered effective is particularly troubling given that many servicemen and women serve 1-year tours in Iraq.

TEST RESULTS

It is encouraging to note that DoD has tested more than 2100 veterans and found only 8 positive results (Table 2), but since DoD has provided no detailed information about when these veterans were tested (i.e. before or after the 180-day window), it is difficult to evaluate the significance of these results. Although the vast majority of those tested served in Iraq, DoD has also tested “a few” veterans who served at Karshi Khanabad (K-

2) in Uzbekistan,²⁴ where DU from Soviet weaponry was found in the soil.²⁵ The vast majority of servicemembers tested served in the US Army in Iraq (Table 3).

Table 2. Results of Urine Testing of US Iraq War Veterans

Time Period	Number Tested	Elevated Uranium	Confirmed DU Exposure
30 June 2003 – 31 March 2004 ²⁶	766	14	5
1 April 2004 – 30 September 2004 ²⁷	841	97	1
1 October 2004 – 31 March 2005 ²⁸	363	25	1
1 April 2005 – 30 September 2005 ²⁹	152	1	1
Total 30 June 2003 – 30 September 2005	2122	186³⁰	8

Table compiled by Dan Fahey

Table 3. Tests by Branch of Service, 2003-2005³¹

Branch of Service	Number Tested
U.S. Army	1785
U.S. Navy/U.S. Marine Corps	321
U.S. Air Force	16

Table compiled by Dan Fahey

MoD has tested approximately 350 British veterans of the Iraq war for DU exposure.³² MoD has been vague about its test results, saying only that “fewer than ten” tested positive for DU exposure.³³ Those who tested positive were wounded in March 2003 in one of two friendly fire incidents involving DU ammunition.³⁴

DISCUSSION

While MoD uses the best-available test capable of detecting minute levels of DU years after exposure, DoD and VA use the most cost-effective (i.e. cheaper) but less sensitive DU test. The low number of positive DU test results in US Iraq war veterans may be a sign that few troops have been exposed to DU, or it may be due to DoD/VA’s use of a testing method that may produce false-negatives more than 180 days after exposure. The main problem in interpreting the DoD/VA test results is the lack of information about the selection process and time of test post-exposure or post-deployment. If some veterans self-reporting DU exposures are not being tested and if others are being tested more than 180 days after their exposure, the credibility of the DoD/VA results is questionable.

A side effect of the problems with the DoD/VA testing process is that opportunistic activists have emerged to exploit the DU issue and manipulate veterans’ concerns. In particular, the Canada-based Uranium Medical Research Centre (UMRC) has claimed to have found evidence of DU exposure in dozens of veterans, but UMRC’s integrity has been fatally undermined by recent revelations that laboratory contamination resulted in many false-positive test results,³⁵ and by the group’s groundless claim that natural uranium it found in Afghanistan came from US weaponry.³⁶

More broadly, the lack of information about where and how much DU was released in Iraq has fed speculation about exposures and effects. Peace groups looking for reasons to oppose the war in Iraq routinely promote unsupported and hyperbolic claims about DU that are fabricated by disreputable and self-serving activists. Some activists, including a

few veterans, have concocted alarming but unsubstantiated stories about DU causing thousands of cancers and innumerable birth defects. Much of the information about DU on the Internet and in the media should be understood as “cyber-claims”; i.e. claims that originate and propagate in cyberspace with little or no connection to scientific evidence or verifiable facts.

In the three years since the invasion of Iraq, DoD/VA have tested about four times as many Iraq war veterans for DU as the total number of Gulf War veterans tested since 1991 (Chart 1).³⁷ This may be interpreted in a variety of ways, but one important aspect of this outcome is that the VA uses the same test for veterans of the 1991 Gulf War that is being provided to Iraq war veterans. That is, VA is using a test that is unlikely to determine DU exposures in Gulf War veterans who do not retain DU fragments. British scientists have developed a test that can verify or rule out Gulf War exposures to DU by inhalation, ingestion, or wound contamination; the question now is when Congress will order DoD/VA to provide Iraq and Gulf War veterans with the best-available DU test.

Chart 1. US Veterans Tested by War and Time Period

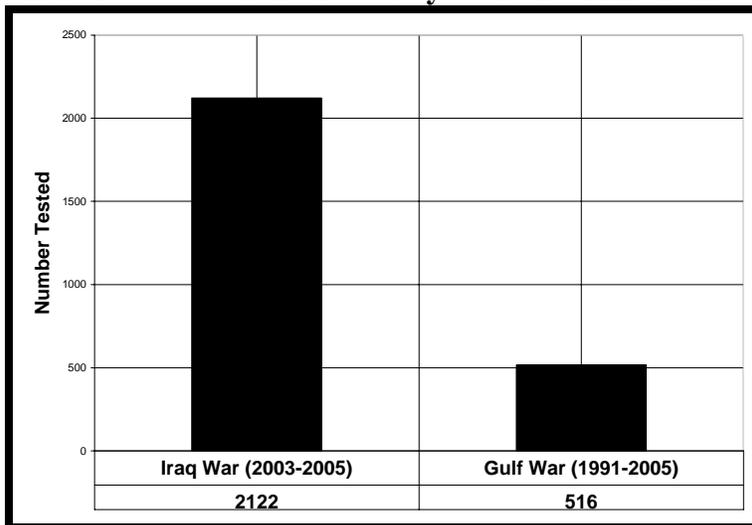


Chart created by Dan Fahey

The DU issue must also be placed in context of the other health issues facing veterans. The United Nations Environment Programme (UNEP) estimates that Iraq has “several thousand contaminated sites resulting from a combination of general industrial activities, military activities and post-conflict damage and looting.”³⁸ Many of these locations are polluted with carcinogenic chemicals, presenting risks to servicemen and women as well as local populations. The persistence of conflict is limiting the ability of UNEP and the Iraqi Ministry of the Environment to conduct environmental assessments and engage in remediation activities, and DoD has remained silent about its actions to identify or address contaminated sites. In addition, thousands of US veterans are already reporting symptoms of post-traumatic stress disorder, and hundreds—possibly thousands—more are experiencing traumatic brain injury. DU is a salient issue for military veterans and Iraqi civilians, but it should be understood as one of the many serious health issues facing veterans and one of a multitude of environmental health hazards present in Iraq.

Endnotes

¹ Dan Fahey is a Ph.D. student in the Department of Environmental Science, Policy and Management at the University of California, Berkeley. His reports and additional information about DU can be found at www.danfahey.com and www.wise-uranium.org/diss.html. Contact email: duweapons@hotmail.com.

² Statement of Dr. Michael Kilpatrick, "Depleted Uranium," National Public Radio, Science Friday, 18 April 2003, http://www.sciencefriday.com/pages/2003/Apr/hour1_041803.html; UK Ministry of Defence, http://www.mod.uk/issues/depleted_uranium/middle_east_2003.htm.

³ The most recent release of information about the quantities of DU shot by US forces in Iraq took place during a 6 March 2004 conference on DU at the Massachusetts Institute of Technology. DoD's Dr. Michael Kilpatrick provided information for US Army and Air Force expenditures only. The US Marine Corps has not disclosed how much DU it has shot. See "Depleted Uranium Weapons: Toxic Contaminant or Necessary Technology", Massachusetts Institute of Technology, 6 March 2004, <http://web.mit.edu/pugwash/du/>. See additional information and a link to an audio recording of the conference proceedings at: <http://www.wise-uranium.org/diss.html#MITDU04>.

⁴ See Dan Fahey, "Unresolved Issues Regarding Depleted Uranium and Veterans of Operation Iraqi Freedom and Operation Enduring Freedom," 24 March 2004, www.danfahey.com.

⁵ Lord Bach, Under Secretary of State and Minister for Defence Procurement, response to Baroness Miller of Chilthorne Damer, UK Parliament (London, 12 June 2003)

www.publications.parliament.uk/pa/ld199900/ldhansrd/pdvn/lds03/text/30612w03.htm#30612w03_sbhd3. If each round is approximately 4.7 kg, this would equate to approximately 185 rounds shot in combat.

⁶ W. Winkenwerder, Jr., Deputy Secretary of Defense for Health Affairs, "Subject: Operation Iraqi Freedom Depleted Uranium Bioassay Results—Fourth Semi-Annual Report and Request for Data Submission," 27 February 2006.

⁷ Richard B. Myers, General, letter to Sandy Silver, President, Women's International League for Peace and Freedom (WILPF), 27 January 2005, "Information Paper, Subject: Depleted Uranium (DU) Information Summary and Response," 10 January 2005.

⁸ Associated Press, "Abrams tank set ablaze; crew escapes," *The Army Times*, 10 March 2006, <http://www.armytimes.com/story.php?f=1-292925-1590086.php>.

⁹ W. Winkenwerder, Jr., Deputy Secretary of Defense for Health Affairs, "Subject: Operation Iraqi Freedom Depleted Uranium Bioassay Results and Semi-Annual Data Submission," Memorandum for Assistant Secretaries of the US Army, Navy and Air Force, 28 July 2005.

¹⁰ Fahey, *supra* n. 4.

¹¹ Hon. J. Kyl, US Senate, letter to Mr. Jack Cohen-Joppa, 14 July 2003. Senator Kyl states that the tank rounds shot by Army tanks were M289A1. The M829A1 has a DU penetrator weight of 4.64 kg.

¹² Bradley Fighting Vehicles shoot the 25 mm M919 round, which has a DU penetrator weight of 0.0855 kg. While the exact number of DU tanks rounds was previously reported (see n. 10), the exact number of 25mm DU rounds shot has not been released. The figures for the Bradley were calculated based on the total amount of DU shot by the Army, as reported by Dr. Kilpatrick, minus the quantity of DU shot by Abrams tanks, as reported in July 2003. Consequently, these numbers should be taken as approximations until DoD releases more accurate figures.

¹³ Dr. Kilpatrick said the US Air Force released approximately 93,400 kg of DU (103 tons) by March 2004.

¹⁴ Glenn Lamartin, U.S. DoD, letter to Hon. John Kyl, 25 August 2004, <http://www.wise-uranium.org/pdf/lamiq04.pdf>.

¹⁵ U.S. Undersecretary of Defense for Personnel and Readiness, "Post Deployment Health Assessment," DD 2796, April 2003. A positive response to questions 14, 17, or 18 triggers an evaluation and possible bioassay, according to the U.S. Department of Defense Deployment Health Clinical Center (DHCC), "Depleted Uranium Provider Reference Pocket Cards," Post Deployment Health Clinical Practice Guideline, Version 1.0, December 2003, Card 2.

¹⁶ U.S. Government Accountability Office (GAO), "Preliminary Medical Screening Data: Operation Iraqi Freedom (OIF) Servicemembers Indicating Suspected Exposure to DU on Their Post-Deployment Health Assessment Forms," Briefing for The Honorable Ciro Rodriguez (D-TX) and The Honorable Bob Filner (D-CA), 30 September 2004.

¹⁷ See Dan Fahey, "Summary of Government Data on Testing of Veterans for Depleted Uranium Exposure During Service in Iraq," 10 February 2005, www.danfahey.com.

¹⁸ Brian G. Spratt, "Health hazards of depleted uranium munitions: estimates of exposures and risks in the Gulf War, the Balkans, and Iraq," undated, forthcoming in *Critical Reviews in Chemistry*.

-
- ¹⁹ Neil Mackay and Amy Wilson, “MoD ‘lied’ over depleted uranium,” *The Sunday Herald* (UK), 29 February 2004.
- ²⁰ DoD/VA use inductively coupled plasma mass spectrometry (ICP-MS); MoD uses multicollector (MC)-ICP-MS and sector field (SF)-ICP-MS. SF-ICP-MS is similar in quality to ICP-MS, but MC-ICP-MS is superior to both methods, and is the primary method used by MoD. See R. Parrish et al, “Determination of ²³⁸U/²³⁵U, ²³⁶U/²³⁸U and Uranium Concentration in Urine Using SF-ICP-MS and MC-ICP-MS: An Interlaboratory Comparison,” *Health Physics* 90(2) (February 2006) 127-138; Spratt, supra n. 17.
- ²¹ J.G. Webb, U.S. Army Medical Command, “Subject: Medical Management of Army Personnel Exposed to Depleted Uranium (DU),” OTSG/MEDCOM Policy Memo 05-003, 4 March 2005; W. Winkenwerder, Deputy Secretary of Defense for Health Affairs, “Subject: Operation Iraqi Freedom Depleted Uranium Medical Management,” 9 April 2004.
- ²² Spratt, supra n. 18.
- ²³ Ibid; cf. Parrish, supra n. 20.
- ²⁴ Fahey, supra n. 16.
- ²⁵ U.S. Deployment Health Clinical Center (DoD), “Environmental Conditions at Karshi Khanabad (K-2),” 9 September 2002; Fahey supra n. 4.
- ²⁶ W. Winkenwerder, Deputy Secretary of Defense for Health Affairs, “Subject: Operation Iraqi Freedom Depleted Uranium Bioassay Results and Semi-Annual Data Submission,” Memorandum for Assistant Secretaries of the US Army, Navy and Air Force, 10 September 2004.
- ²⁷ W. Winkenwerder, Deputy Secretary of Defense for Health Affairs, “Subject: Operation Iraqi Freedom Depleted Uranium Bioassay Results and Semi-Annual Data Submission,” Memorandum for Assistant Secretaries of the U.S. Army, Navy and Air Force, 14 February 2005.
- ²⁸ Winkenwerder supra n. 7.
- ²⁹ Winkenwerder supra n. 5.
- ³⁰ DoD’s most recent report on test results lists the total elevated uranium count as 186, but this does not correspond to results presented in the four reports presented by DoD; information contained in all four test results reports shows a figure of 137. I cannot explain the difference, but have reported DoD’s total.
- ³¹ Winkenwerder supra n. 5.
- ³² Spratt, supra n. 18.
- ³³ Ian Bruce, “Fewer than 10 Gulf war troops had uranium poisoning,” *The Herald* (UK), 5 February 2004. See also UK Depleted Uranium Oversight Board, “Interim Summary of Results,” www.duob.org.uk/interim_summary.htm.
- ³⁴ Rory McCarthy, “Friendly fire kills two UK tank crew,” *The Guardian* (UK), 26 March 2003; Audrey Gillan, “I never want to hear that sound again,” *The Guardian* (UK), 31 March 2003; Spratt, supra n. 18.
- ³⁵ Reportedly eight of the urine samples tested by UMRC were re-tested by scientists using best-available methods, and all were found to contain no depleted uranium. One of these false-positives has been reported in the press: see BBC News, “Man loses depleted uranium action,” 2 March 2006, <http://news.bbc.co.uk/1/hi/england/somerset/4766580.stm>. For descriptions of other problems with the UMRC’s tests, see mention of the “Durakovic et al” paper in Parrish et al, supra n. 20.
- ³⁶ See my discussion of this claim in Dan Fahey, “Science or Science Fiction? Facts, Myths and Propaganda in the Debate Over Depleted Uranium Munitions,” 12 March 2003; www.danfahey.com.
- ³⁷ The VA’s DU Program includes 32 veterans; the DU Program has also tested and/or examined and additional 484 Gulf War veterans (466 were only tested; 38 others participated in the DU Program during the 1990s). Cf. McDiarmid et al, “Biologic Monitoring for Urinary Uranium in Gulf War I Veterans,” *Health Physics* 87(1) July 2004: 51-56; M. McDiarmid et al, “Urinary Uranium Concentrations in an Enlarged Gulf War Veteran Cohort,” *Health Physics* 80(3) (March 2001) 270-273; M. McDiarmid et al, “Biological monitoring and surveillance results of Gulf War I veterans exposed to depleted uranium,” *International Archives of Occupational and Environmental Health* 79 (2006) 11-21; Dan Fahey, “Environmental and Health Consequences of Depleted Uranium Munitions,” in Avril McDonald et al, Eds., *The International Legal Regulation of the use of Depleted Uranium Weapons: A Cautionary Approach*, (Den Haag: Asser Press, forthcoming 2006).
- ³⁸ United Nations Environment Programme (UNEP), “Assessment of Environmental ‘Hot Spots’ in Iraq,” (Geneva: UNEP, 2005), <http://postconflict.unep.ch/publications.htm#iraq>.