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Uranium Contamination of Iraq and Afghanistan

and the Health Consequences of
Radiological Warfare

Total Radioactivity Released by Uranium Weapons

Conflict	Mass (Tonnes)	Activity (Bq)
Chernobyl Reference		1.9×10^{18}
Gulf War I	350	1.3×10^{13}
Balkan Conflict	11	4.1×10^{11}
Afghanistan	1000 (estimate)	3.7×10^{13}
Gulf War II	1700 (estimate)	6.3×10^{13}
Total	3061	1.3×10^{14}

Chronology of Studies

- 1991:** Clinical, Laboratory, and Whole Body Counting Evaluation of Gulf War Veterans
- 1997:** Neutron Activation Analysis of the Urine of Contaminated Gulf War I Veterans
- 1999:** Medical Effects of Internal Contamination with Uranium
- 2001:** On Depleted Uranium Gulf war and Balkan Syndrome
- 2002:** The Quantitative Analysis of Depleted Uranium Isotopes in British, Canadian, and United States Gulf War Veterans
- 2003:** Estimate of the Time-zero Lung Burden of Depleted Uranium in Gulf War Veterans by the 24 Hour Urinary Excretion and Exponential Decay Analysis
- 2003:** Undiagnosed Illnesses and Radioactive Warfare
- 2004:** The Quantitative Analysis of Uranium Isotopes in the Urine of the Civilian Population of Eastern Afghanistan after Operation Enduring Freedom
- 2004:** Spectrometry Analysis of Uranium Concentration and Ratio, Chromosomal Studies, and Clinical Assessment of Contaminated Victims

UMRC Field Work and Sample Collection Activities

Afghanistan:

1. May-June, 2002: Field Investigation
2. September, 2002: Field Investigation
3. June, 2003: Field Investigation
4. September, 2003: Field Investigation

Iraq: Gulf War II

1. September-October, 2003: Post-conflict Field Trip
 - Radiation survey of shock and awe bombsites
 - Public health investigation of ten cities
 - 100 biological, geological, and ballistic debris samples

Ratio of Uranium Isotopes

	^{238}U	^{235}U	$^{238}\text{U}/^{235}\text{U}$	$^{235}\text{U}/^{238}\text{U}$
Natural Uranium	99.2739	0.7200	137.88	0.00725
Shrapnel (DU)	99.7945	0.2026	492.60	0.00203
Urine	99.3778	0.6542	162.23	0.00616

The Unique Signature of Artificial Uranium

	$^{238}\text{U} / ^{235}\text{U}$ Ratio
Natural Uranium	137.88
Depleted Uranium	492.60
Non-Depleted Uranium	$137.88 + ^{236}\text{U}$

Uranium Contamination in Afghanistan

Afghanistan Field Trip 1: Jalalabad

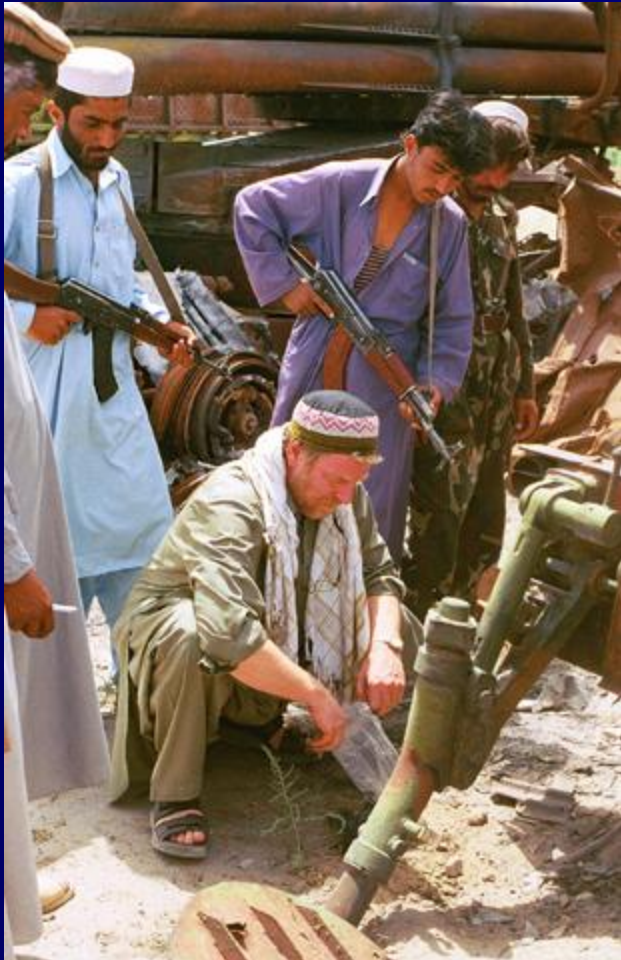
Map of Afghanistan



Bomb Crater, Jalalabad, Afghanistan



UMRC Team Member Gathering Soil Samples at Military Base



Gathering Water Samples at Village near Jalalabad



NERC Isotope Geosciences Laboratory

Keyworth, Notts, United Kingdom



Afghanistan Trip 1: Results

Jalalabad

Isotopic Ratios:

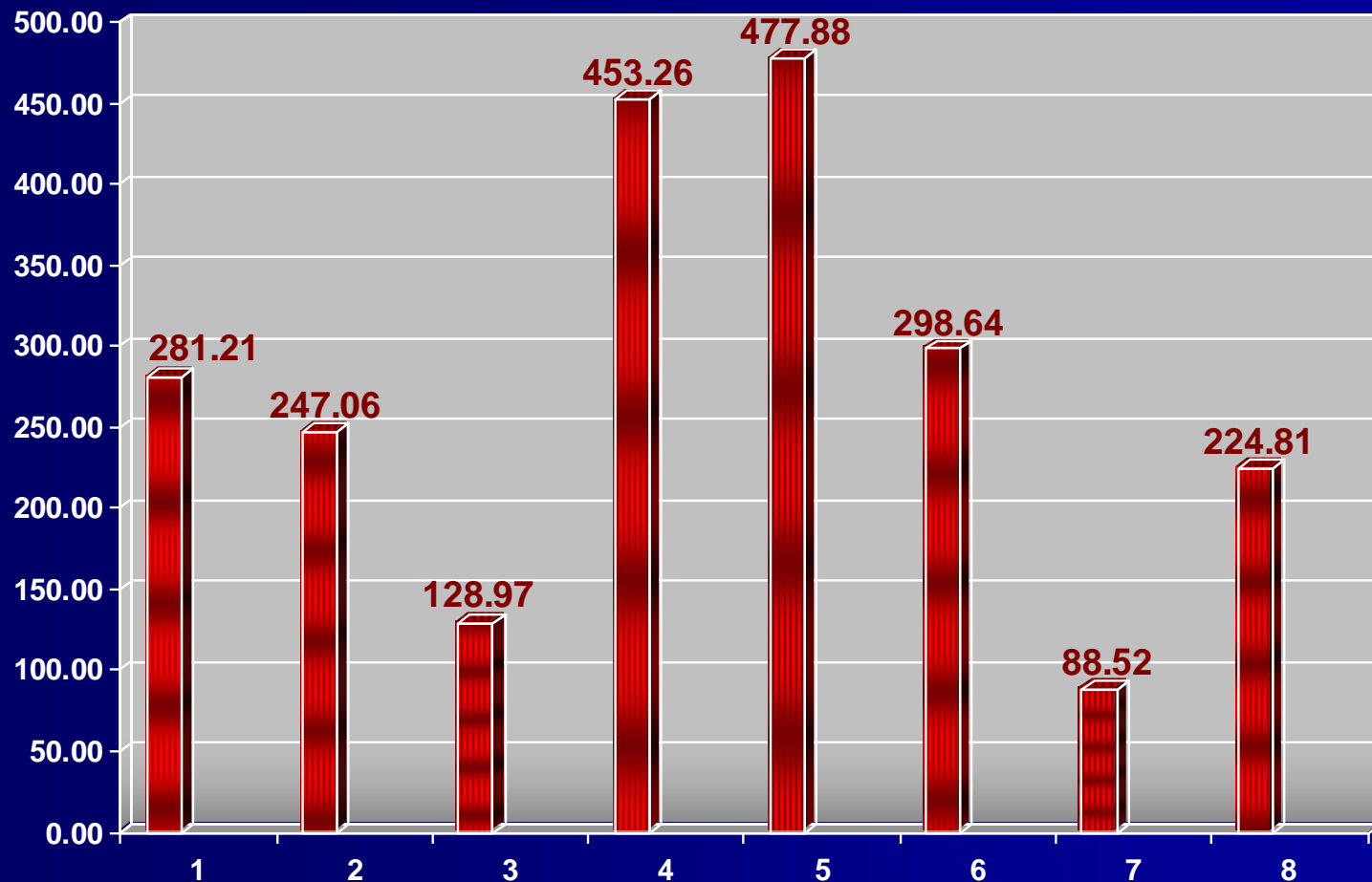
Natural $^{238}\text{U}/^{235}\text{U}$ and $^{234}\text{U}/^{238}\text{U}$ ratios (N=8)
 ^{236}U not detected

Uranium Concentration:

88-477 ng/L compared to 1-20 ng/L in a normal population

Afghanistan Trip 1: Jalalabad

Uranium Urine Concentration

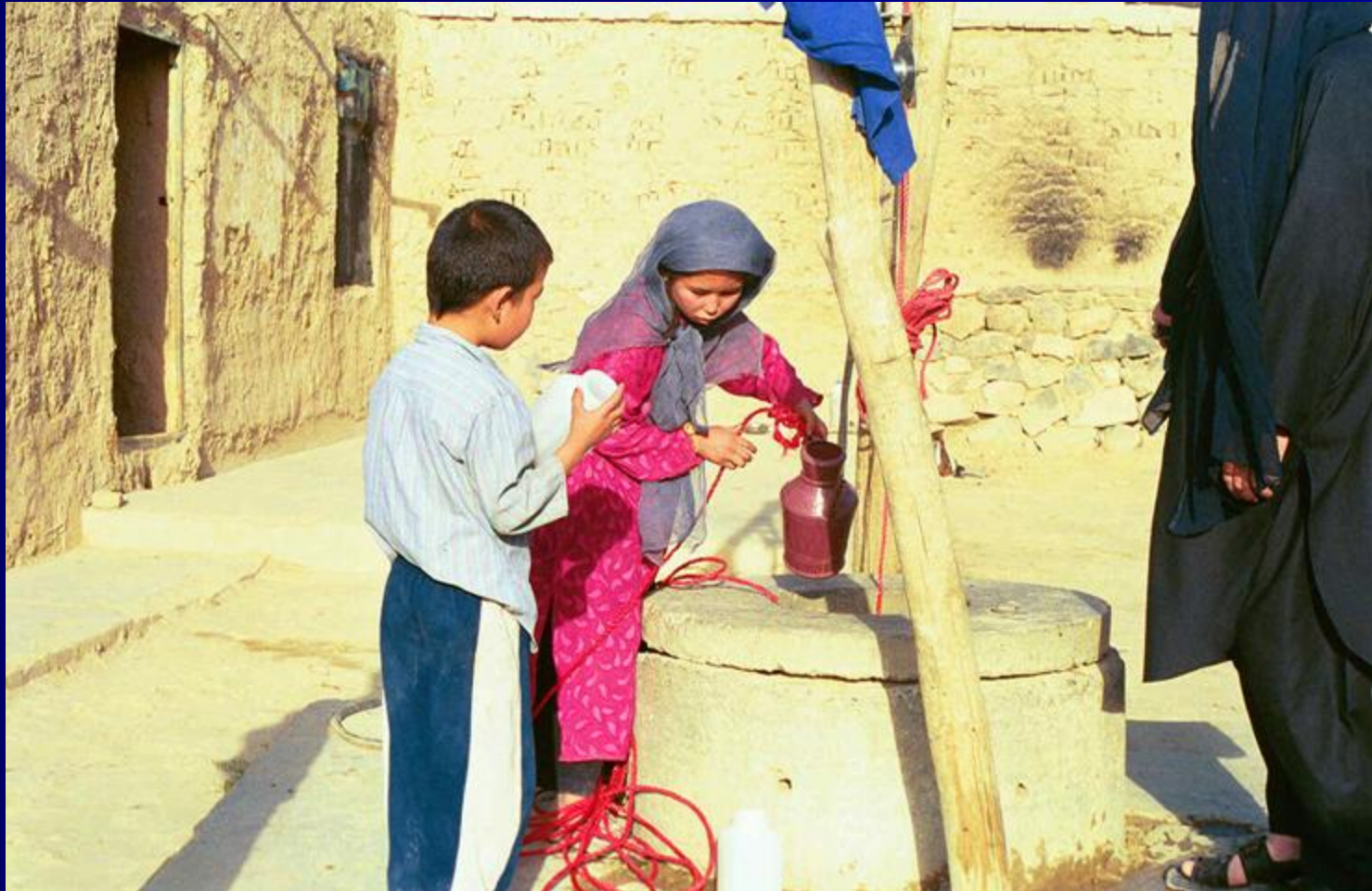


Afghanistan Field Trip 2: Kabul

Child Survivors of the Bombing of Houses in Bibi Mahrow



Children Drawing Water for Testing at Bibi Mahrow



Mosque Near Military Base Destroyed by Cruise Missile



Afghanistan Trip 2: Results

Kabul

Isotopic Ratios:

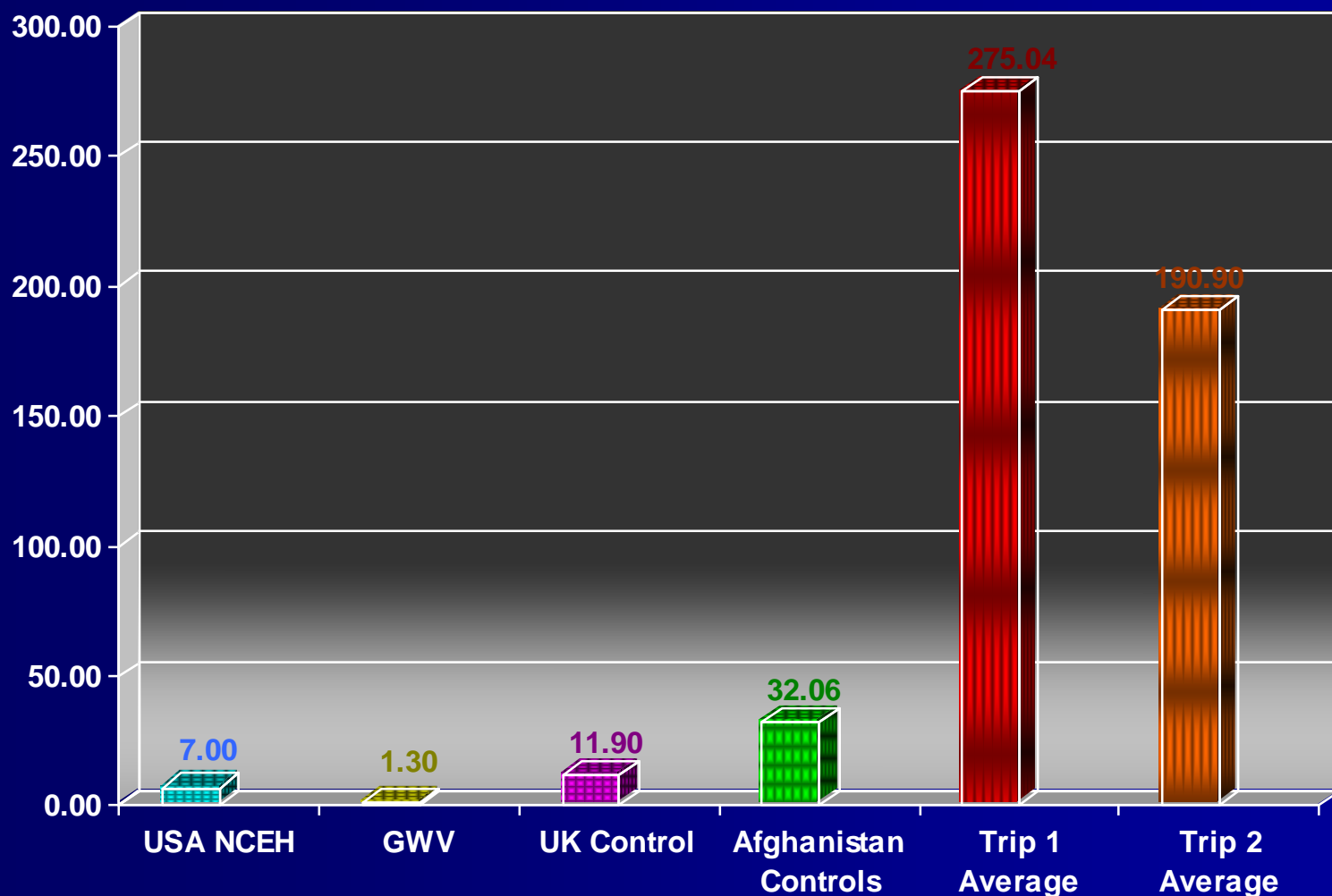
Natural $^{238}\text{U}/^{235}\text{U}$ and $^{234}\text{U}/^{238}\text{U}$ ratios

^{236}U detected in 7 of 14 samples

Uranium Concentration:

13 samples ranged from 1-100 ng/L with one child having a concentration of 2031 ng/L

Comparison of Uranium Abundance in Urine



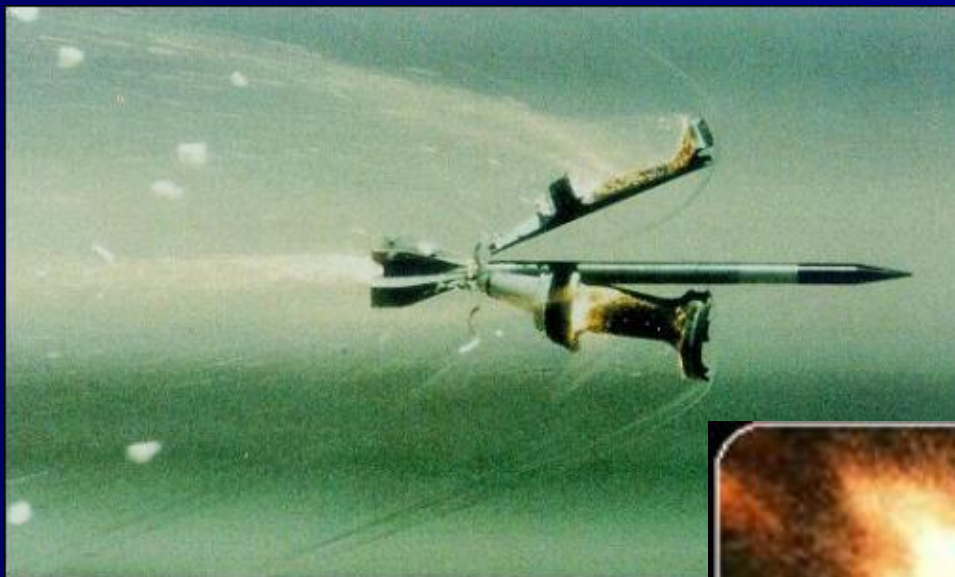
Gulf War II

DU Contamination of Military
Personnel and the Civilian
Population

Map of Iraq



120mm DU Anti-tank Long Rod Penetrator



Penetrator travels at
1.5+ km/sec

Impact equivalent to
1.5 kg of TNT



British 120mm DU Round Slices Tank Turret



Contaminated Tank, Outskirts of Baghdad International Airport



Contaminated Tank Serving as a Bus Stop, Abu Kasib



A-10 30mm DU Round Exit Hole, An Nasiriyah



Ice Factory Hit by DU Round

Fresh Water Tank is Contaminated with Uranium



Destroyed Tank and Craters in Road from A-10 DU Rounds



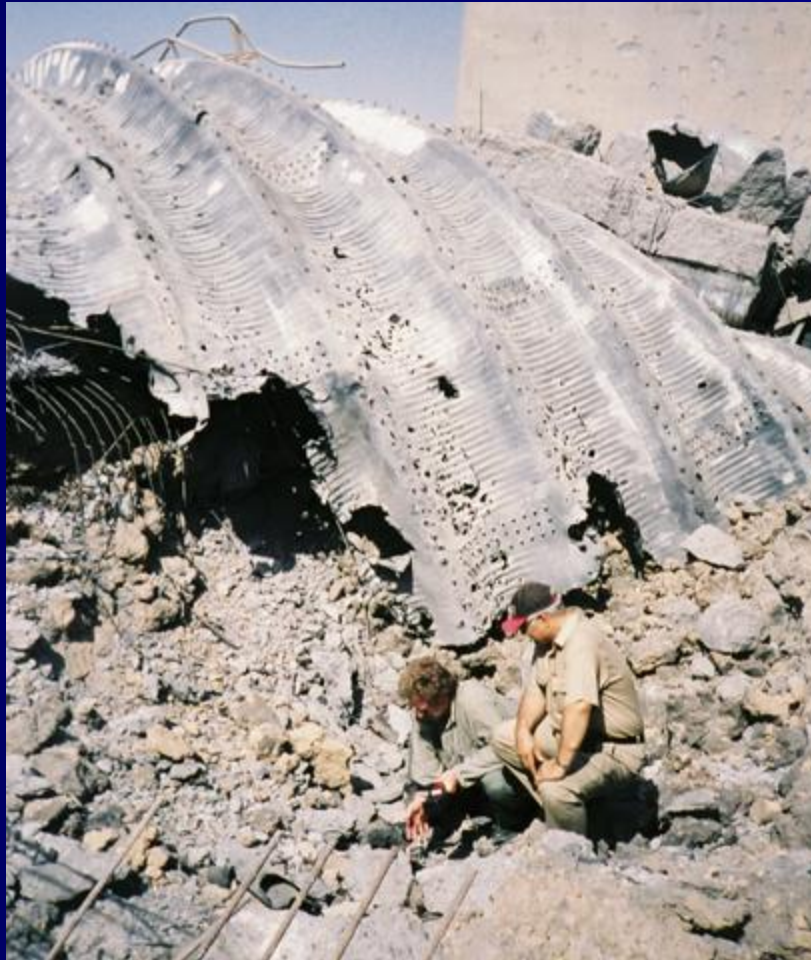
Bomb Explosions in Iraq



Decapitation Strike in Mansour District



Radar Station, Al Rashid Air Force Base



Baghdad Central Market



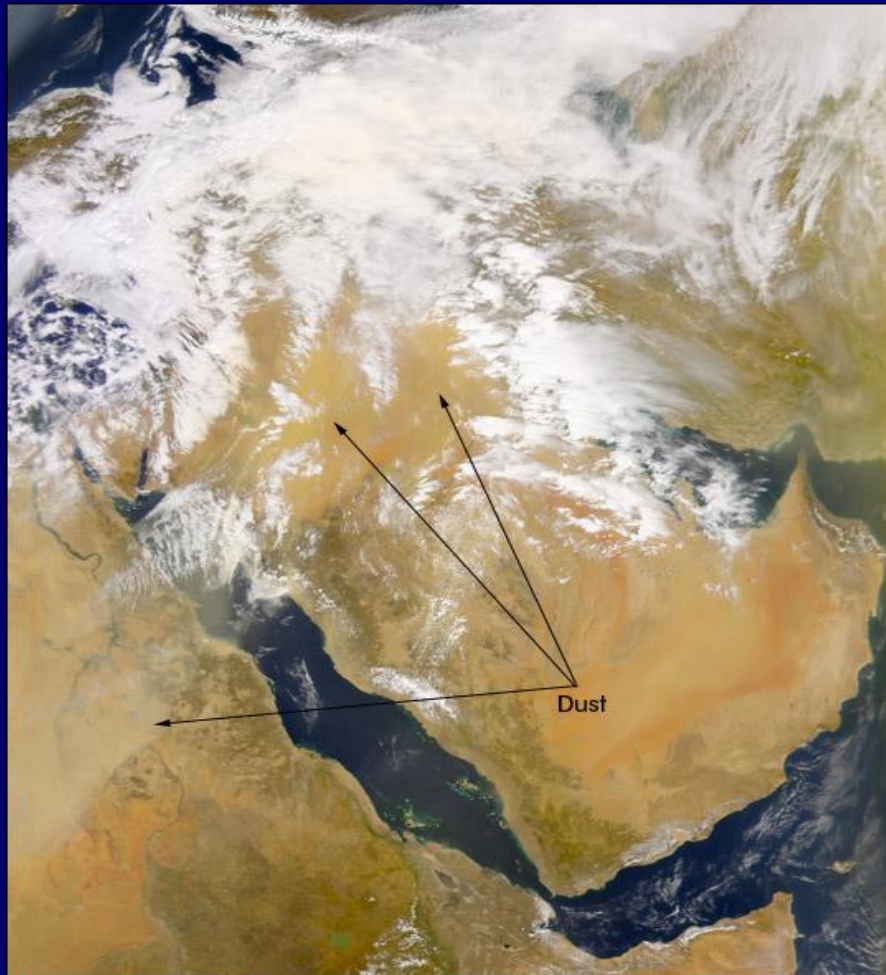
Bunker Buster Crater, Baghdad Central Market



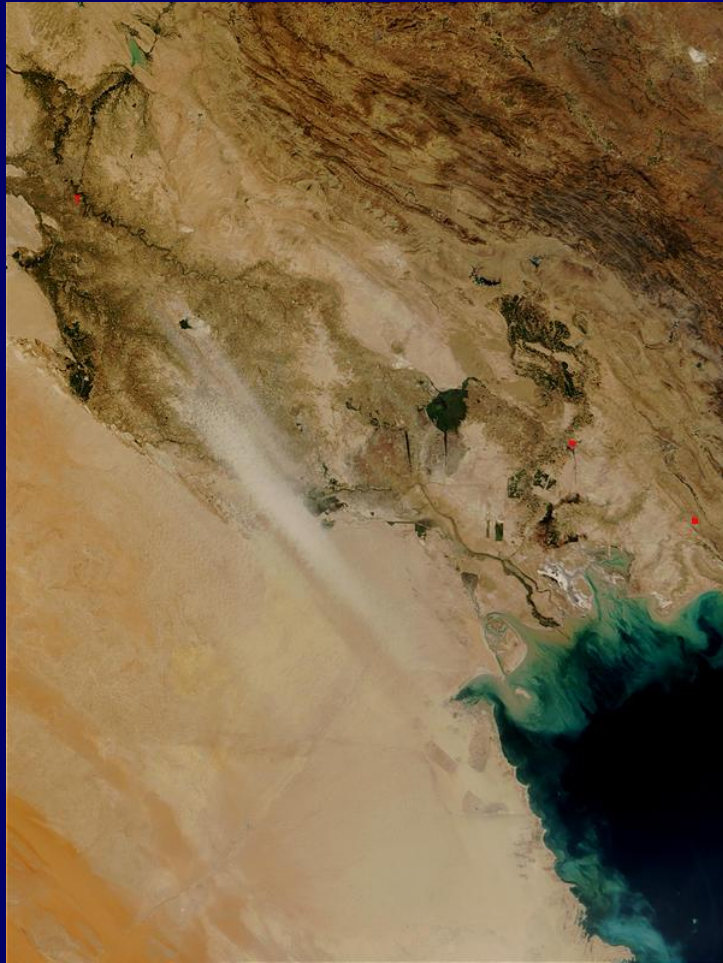
Radio and Television Station, Baghdad



Dust Storms over the Arabian Peninsula



Dust Storm in Iraq



Troops in the Midst of a Dust Storm

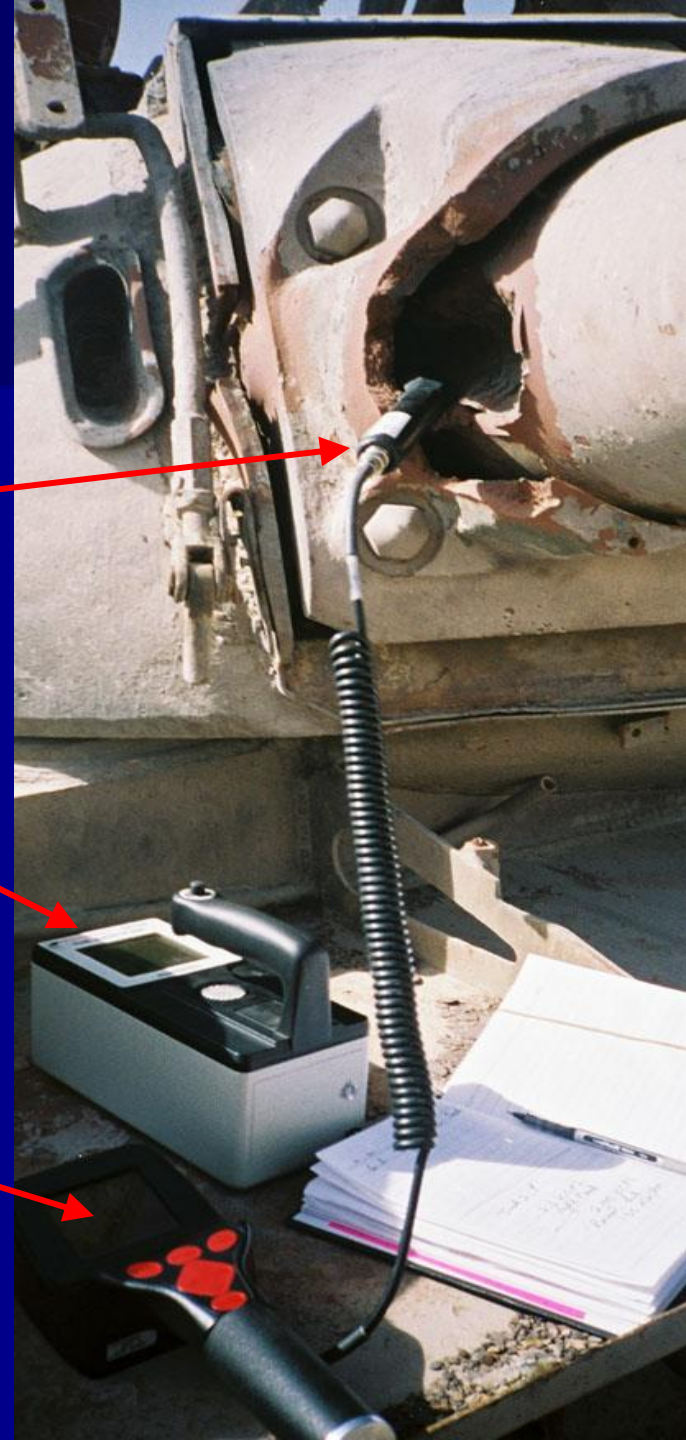


Survey Equipment

Remote Frisking Probe
Victoreen 489-110d

Exploranium Multi-channel
Isotope Analyzer

Victoreen Advanced Survey
Meter 990 GM Radiation
Detector



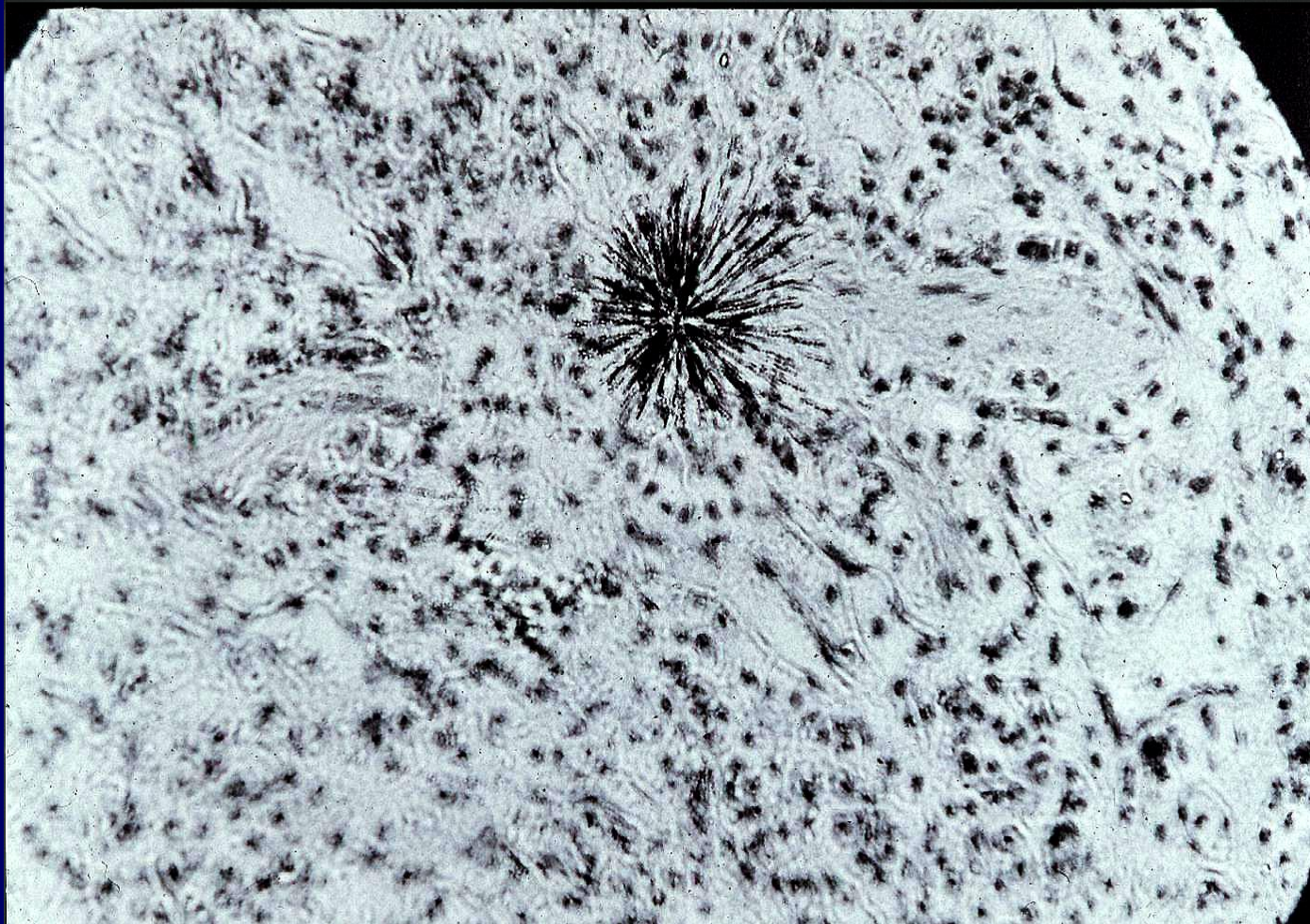
G-M Counter Overloads from Sudden Increase in Radioactivity



Radioactive Soldier's Vest for Uranium Aerosols



Alpha Radiation in Lung Tissue



Mass Spectrometry Laboratory

Institute of Mineralogy

JW Goethe University, Frankfurt



Mass Spectrometry Laboratory

Institute of Mineralogy

JW Goethe University, Frankfurt



Iraqi Civilians: Results

Baghdad, Basra, and Nasiriyah

Isotopic Ratios:

Depleted uranium detected in 5 of 20 samples

^{236}U detected in 10 of 20 samples

Uranium Concentration:

Concentration ranged from 1-65 ng/L

Iraq: Results

Soil Samples

Isotopic Ratios:

Depleted uranium detected in 10 of 10 samples from tank battlefields and bomb sites

^{236}U detected in all samples

Uranium Concentration:

Concentration ranged from 0.1 - 1030 mg/kg

Iraq: Results

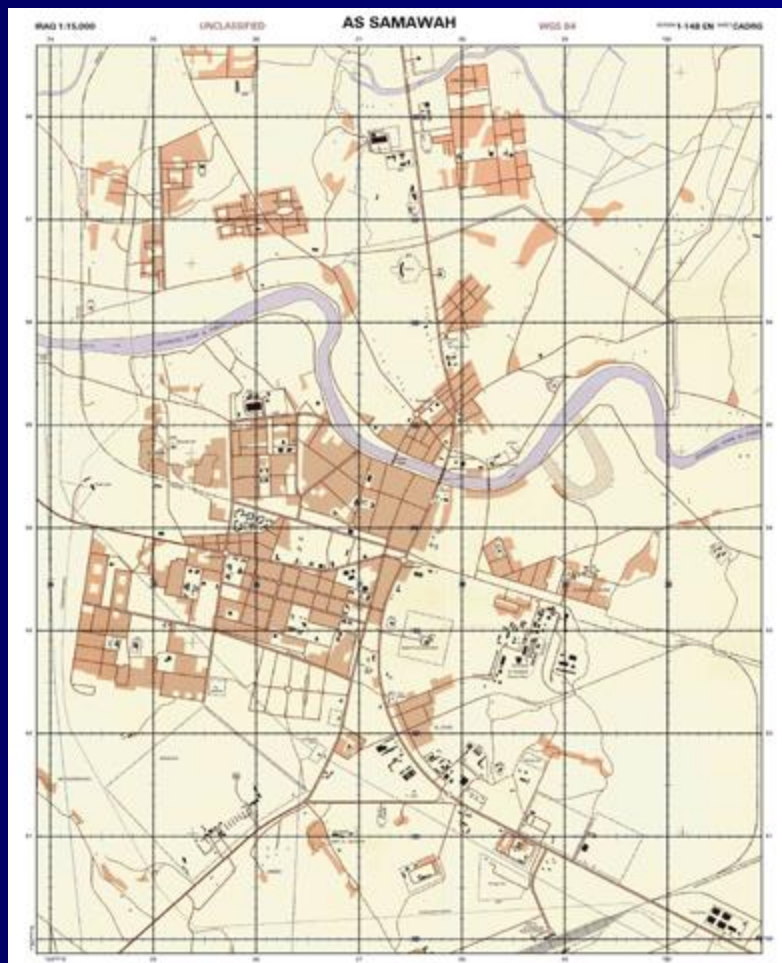
UMRC Field Team

Two of the three member UMRC field team tested positive for depleted uranium after returning from Iraq.

Gulf War II

Uranium Contamination in US
Soldiers Deployed in Samawah

Map of As Samawah



Destroyed Iraqi APC on the Road to As Samawah



Dutch Troops in As Samawah

Source: UK MOD Website



US Soldiers Tested Positive for DU Contamination



**Army Sgt.
Hector Vega at
his Bronx home**



**Train shed at
railway dept in
Samawah where
members of
442nd slept from
June to August
last year**



**Augustin Matos
with his daughter
Samantha**

Gulf War II Soldiers: Samawah

Isotopic Ratios:

Depleted uranium detected in 4 of 9 samples

^{236}U detected in 7 of 9 samples

Uranium Concentration:

Concentration ranged from 1.6 – 6.2 ng/L

Conclusion

The results demonstrate significant presence of depleted uranium and uranium-236 in four of nine United States soldiers tested who were contaminated from the inhalation of radioactive dust in the As Samawah region of Iraq during deployment in Gulf War II. In addition, three of the soldiers without DU ratio had definitive presence of uranium-236 in their urine.

Uranium Medical Research Centre

