

**SEM-EDXRF AND ICP-MS INVESTIGATION OF THE MORPHOLOGICAL AND
CHEMICAL COMPOSITION OF DEPLETED URANIUM PARTICLES FROM KUWAIT
AREAS AFFECTED BY THE 1991 GULF WAR**

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Selected soil samples collected in Kuwait locations where residues of DU ammunition existed as a legacy of the 1991 Gulf War, have been investigated by scanning electron microscopy equipped with an energy dispersive X-ray fluorescence detector (SEM- EDXRF) with the objective to identify the presence of DU particles and characterize their shape and size. The isotopic and total bulk concentrations of uranium in the samples were measured by inductively coupled plasma mass spectrometry (ICP-MS) and alpha spectrometry. The samples studied by SEM-EDXRF were prepared by gently tapping an aluminum stab covered with a doubled-sided adhesive carbon disk, thereby ensuring that the physical integrity of the samples was maintained. The results have indicated that soil collected just below (~ 5 cm) corroded DU penetrators contained several DU oxide particles (isotopic ratio $^{235}\text{U}/^{238}\text{U} = 0.0021$) ranging in size from 1 to 10 microns (approximate geometrical diameter) having an irregular shape. The particles are most likely corrosion products from the DU penetrators. Some particles are imbedded in a larger matrix containing aluminum oxide (corrosion product of the penetrator jacket) and silica (sand). Swipes collected inside holes in tanks hit by DU ammunition, using ultra-pure cotton cloths, have indicated the presence of many small DU particles in the range 1 to 10 microns. In this case the particles were found to contain also small quantities of Fe, probably the results on alloying process occurring when the DU penetrators impact with the tank armor.