

# ENVIRONMENTAL ASPECTS OF THE USE OF DEPLETED URANIUM ORDNANCE DURING THE KOSOVO CONFLICT

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## Abstract

The NATO airstrikes on Kosovo (Yugoslavia) early in 1999 have caused considerable environmental damage to the broader region. Increased public concern regarding the dumping of unspent ordnance and the use of depleted uranium munitions during military operations, has resulted in several field campaigns by international organizations aimed at assessing possible risks to humans and the environment. Preliminary investigations have shown that some components of DU ordnance contain trace amounts of transuranics and fission products indicating the use of reprocessed uranium in the manufacture of these components. This study gives a summary of publicly available information on the environmental aspects of DU expenditure in Kosovo and the Adriatic region.

*Keywords – Adriatic Sea, diseases, radioactivity, trace elements*

## Introduction

The 11 weeks of North Atlantic Treaty Organization's (NATO) airstrikes in Kosovo (Yugoslavia) seem to have caused considerable environmental damage. A large number of industrial facilities were reportedly attacked and destroyed. As a consequence of this, significant amounts of hazardous chemicals have been released into surface waters, ground waters, air and soil, affecting the wider Balkans region. However, these transboundary pollution events have caused less public concern than subsequent admittance that the alliance had used depleted uranium (DU) ammunition both in Kosovo and during the earlier military operations in Bosnia and Herzegovina. Reports in public media have often echoed anger and dismay regarding the use of DU, suggesting that depleted uranium ordnance contributed to the "Balkan syndrome". In contrast, government contractors and the army itself have issued a series of reports and studies suggesting that depleted uranium represents no real threat to health and safety. Moreover, serious concerns were raised over the possibility that ordnance, mainly aviation bombs, dumped in various parts of the Adriatic sea by aircraft returning to their bases in Italy, contained depleted uranium.

In this study, we have surveyed publicly available reports in an attempt to put these apparent controversies into perspective and summarize the environmental aspects of DU deployment during the NATO air campaign in Yugoslavia (Kosovo).

## Depleted uranium and use of DU-ammunitions in Kosovo

Depleted uranium (DU) is a by-product (or waste) of the enrichment process used in the production of fuel rods for nuclear power plants and nuclear powered ships, as well as from the production of highly enriched uranium (U-235) for nuclear weapons. Chemically and toxicologically DU behaves in the same way as the metallic form of natural uranium. Fine particles of the metal ignite easily, producing oxides. According to technical literature (referenced in 2), uranium in a DU projectile upon impact vaporizes in the form of a uranium oxide aerosol, which presents an additional health risk to personnel within the armored vehicle, as well as rescue teams. DU particles released as aerosols and dust may be carried by wind over considerable areas, and will eventually settle on the ground surface. It is dispersed in soil, particularly in areas of high rainfall. Cultivation of contaminated soil and use of contaminated water and food may pose health risks, but these are expected to be limited. Radiochemical toxicity would be expected to be the main health concern, rather than external radiation exposure (3).

During the spring 1999 airstrikes in Yugoslavia (Kosovo), NATO fired some 31.000 depleted uranium shells (4). The alliance has recently released detailed grid locations where their aircraft engaged targets in Yugoslavia and earlier in Bosnia 1993-1995 (5,6). Reportedly all DU ordnance was 30mm aircraft-cannon munitions fired from A-10 "Warthog" anti-tank combat aircraft and AH-64 Apache helicopters used in air-to-ground missions. The ammunition was of the PGU-14/B API Armor Piercing Incendiary type. It consists of a lightweight body with a subcalibre high-density DU penetrator weighing 0.3 kg. In addition to its penetrating capability, the DU is a natural pyrophoric material which enhances incendiary effects. A total of 10 tons of this ammunition still litters various parts of the area, causing concerns about environmental contamination and human health risks.

Following an apparent policy of information transparency and full disclosure, much data including maps of targeted areas have been made publicly available and accessible on the NATO websites (4). According to available reports (4), aviation bombs (both smart weapon systems and "dumb" bombs) used in operations against unar-

mored ground targets (military installations, industries and other structures) contained no DU components. Undeployed ordnance was discarded in waters of the Adriatic sea by aircraft returning to their bases (mainly in Italy, and carrier vessels stationed in the Adriatic).

## Results of analyses on samples from depleted uranium sites in Kosovo

UNEP's Depleted Uranium Assessment Group, during its field assessment mission in November 2000, visited 11 of the 112 sites that were identified as being targeted by DU ordnance. Altogether, 340 samples were collected for analysis in 5 European laboratories. The samples include 247 soil samples, 30 vegetation samples, 10 smear tests, 8 parts of munition parts (sabots and penetrators). The final report is scheduled for publication in March 2001, but preliminary reports state that in addition to the "expected" uranium isotopes, parts of DU ordnance contained U-236 (0.0028 % of the total uranium content) and traces of other fission products, implying that these components were made from reprocessed uranium (7). Following this disclosure, a report by the Department of the Army of the United States of America, dated January 2000, was made public (8). The report states that DU components used by the US armed forces may contain trace amounts of transuranics (TRU) and Tc-99. The TRU may contain Am-241, Np-237, Pu-238, Pu-239 and Pu-240. However, the TRU contamination of DU components contributed an additional 0.8 % to the radiation dose from the DU itself, considering this a very low radiological hazard associated with the primary DU material.

## Conclusions

Ammunition containing DU components leave behind a long-lasting contamination on the battlefields, which is incompatible with civil radiation protection norms. Transuranium elements and other fission products possibly contaminating DU ordnance cause additional concerns over risks to the health of humans and the environment.

Ordnance dumped in the Adriatic Sea reportedly contained no DU munitions. An understanding of the biogeochemical uranium cycle in the marine environment provides no apparent reason for concerns regarding radiological hazards of DU - even if moderate quantities of DU ordnance were dumped in the sea, this would not be the cause of hazardous uranium levels in the marine environment

Complete reports with full disclosure of the relevant facts regarding DU deployment in the Balkans and in the Adriatic region will be welcomed by the scientific community and civilian population living in affected regions.

## References

1. Fetter, S. and von Hippel, F., 1999. After the dust settles. *Bulletin of the Atomic Scientist*, 55/6, 42-45.
2. Schmid, E. and Wirz, Ch., 2000. Depleted uranium. Background information on a current topic. AC - *Laboratorium Spiez report, Spiez, Switzerland*.
3. Repacholi, M.H., 2001. Background material on depleted uranium. *WHO Fact Sheet No. 257, Geneva, Switzerland*.
4. NATO website on Depleted Uranium (and references and links contained therein). <http://www.nato.int/du/home-new.htm>
5. Data concerning the locations of depleted uranium ordnance expended during Operation Allied Force (grid co-ordinates). <http://www.nato.int/du/docu/d010124a.htm>
6. Data concerning the locations of depleted uranium ordnance expended during Operations Deny Flight - Deliberate Force, 1993-95 in Bosnia (grid co-ordinates). <http://www.nato.int/du/docu/d010124b.htm>
7. UNEP confirms Uranium-236 found in DU penetrators. UNEP Balkans Press Release, 16 January 2001. <http://balkans.unep.ch/press/press010116.html>
8. Analysis of Transuranics and Other Contaminants in Depleted Uranium Armor. Report by the Department of the US Army - AMSAM-TMD-SB, January 2000.