Presentation on UNEP and DU Contamination
Gretel Munroe, Science Team, ICBUW
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The United Nations Environmental Programme, UNEP, has been a pioneer in the investigation of DU in the environment with its report on Kosovo in 2001[1] and its subsequent reports on Serbia and Montenegro[2] and Bosnia and Herzegovina[3]. In 2003 they also published the Desk Study on the Environment in Iraq,[4] but without going there.

UNEP's mission in the Balkans was to investigate DU contamination or possible contamination in areas where DU munitions had been used. **(SLIDES: Anatomy of a DU penetrator and DU penetrators with and without jackets)**[5].

A serious criticism of UNEP's work in the Balkans is that teams did not go to conflict areas immediately after the conflict when DU contamination would be at its most visible.

The 30mm DU shell that is fired from the A-10 aircraft is small, about the size of a cigar. Fragments of shells are smaller. UNEP used beta and gamma radiation detectors to locate DU shells on the ground where they might be covered by grass or leaves (**SLIDES showing intact DU shell and a DU shell fragment in the grass, under some leaves)** [6]. Gamma radiation detectors could locate DU shells or fragments that were buried in the ground 10-20 cm down. However shells were found at deeper levels, at 40 cm or deeper. The teams took soil, air and water samples. They tested lichen, moss and bark samples for presence of DU; If there is DU in a sample, that indicates that DU was in the air above the site in the past.

Problems the UNEP teams faced during their investigations included:

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[1] UNEP, **Depleted Uranium in Kosovo: Post-Conflict Environmental Assessment**, Geneva: United Nations Environmental Programme, 2001, http://www.unep.org
[2] UNEP, **Depleted Uranium in Serbia and Montenegro: Post-Conflict Environmental Assessment in the Federal Republic of Yugoslavia**, Geneva: United Nations Environmental Programme, 2002, http://www.earthprint.com/Product.aspx?n=3026
[3] UNEP, **Depleted Uranium in Bosnia and Herzegovina: Post-Conflict Envirnomental Assessment**, Geneva: United Nations Environmental Programme, 2003, http://www.earthprint.com/Product.aspx?n=3219
[4] UNEP, **Desk Study on the Environment in Iraq**, Geneva: United Nations Environmental Programme, 2003, http://www.unep.org
[5] UNEP, **Kosovo**, p. 15; UNEP, **Bosnia & Herzegovina**, p. 135.
[6] UNEP, **Bosnia & Herzegovina**, pp. 32, 128.

1. Difficulty in gaining access and inability to visit many sites. For example, Kosovo was heavily bombarded – 85 sites were known to have been targeted but the team only visited 11 sites. The team visited Kosovo 1 ½ years after the conflict. In Serbia and Montenegro the UNEP team visited the area 2-3 years after the conflict and visited just 6 sites plus a vehicle. Bosnia and Herzegovina was visited 7-8 years after the conflict. UNEP visited 15 sites. The amount of DU used was not known for 10 of these sites.

2. Frequently other authorities/ organizations had been to sites before UNEP.[7] For example in Kosovo there were no vehicles to examine.

3. Detective work was needed generally because when the number of DU shells and the size of the area sustaining attack were known and only a few DU shells were found, it was necessary to conjecture whether a certain number of shells had hit hard targets and aerosolized or had been buried in the ground. Most 30 mm DU shells miss their target. In general, radioactivity could be picked up within 1-2 meters[8] of a DU shell or in some cases up to 200 meters[9].

4. Some sites were heavily mined and had unexploded cluster bombs, making the site either partly or completely inaccessible. Dense vegetation on several sites also made searching for DU shells or fragments extremely difficult.

In **Kosovo**, the UNEP team found, "there is no risk of high radiation doses or serious heavy metal toxicity now or in the future.[10]" – or the equivalent – at the sites they visited although they were unable to do more than a limited investigation at a number of the sites. They did however find localized points of contamination at many sites that were heavily contaminated.[11]At one of these sites, **Gjakove/Djakovica garrison**, a large concrete platform had 30 impact holes. A sample taken from the platform contained 1,326 mg DU per kg or about 1 g of DU. UNEP suggested vacuuming the concrete platform, collecting and disposing of the dust or putting a new layer of concrete over the platform.

A site where overall radioactivity was also insignificant (under 1 mSv) was **Radoniq/Radonijick lake,** an artificial reservoir which supplies drinking water for most of southern Kosovo. 655 DU rounds had been fired near a large dam, using nearly 400 kg. of DU. (**SLIDE road to dam where cluster bombs and DU shells are in or on the ground**)[12] and

[7] See UNEP, **Serbia and Montenegro**, p. 91 and UNEP, **Bosnia and Herzegovina**, p. 137.
[8] UNEP, **Serbia & Montenegro**, p. 33 and UNEP, **Bosnia & Herzegovina**, p. 49.
[9] There are different findings. For 200 meters, see **Bosnia & Herzegovina**, pp. 9, 92. In **Kosovo** (p. 25) UNEP gives the figure of 10-50 meters and in **Serbia & Montenegro** (p. 41), UNEP gives the figure of 100 meters.
[10] UNEP, **Kosovo**, p. 54 and 9 other sites.
[11] **Ibid**, p. 82.
[12] **Ibid**, p.55.

the vast majority of the DU shells were buried in the ground – just one DU shell and a jacket were found at the site. There was concern potentially for future groundwater contamination.

In Serbia and Montenegro the UNEP team visited Bratoselce, where a total of 1,337 DU shells had been fired. The Federal Republic of Yugoslavia had found 8 DU shells and some jackets. Over 90 percent of the shells were buried in the ground. Several shells were found at depths of 40 cm and 60 cm. DU was found in some lichen samples and also in an air sample but the radioactivity of the air sample was insignificant. A publication by the Institute of Nuclear Sciences in Belgrade and the School-Centre of NBS Defense, gives figures of 1,800-23,400 Bq per kg for one or possibly more sites in Bratoselce[13].

At **Cape Arza** on the Montenegran coast, an area important for tourism, a total of 300 DU rounds were fired in 1999 (**SLIDE view of Cape Arza)**[14].The Montenegran government has funded 400,000 DM for the decontamination of a densely vegetated area around a 19th century citadel. 102 whole DU shells were found in the decontaminated area alone. The 25 workers wore protective half masks, overalls and gloves while working. Approximately 10 kg of "highly contaminated soil" with the activity of 1,450-7,000 Bq Uranium was removed as well as two tons of rock and soil showing low levels of radioactivity[15].

The UNEP team investigated both the decontaminated and non-decontaminated areas of the site but could do little work in the non-decontaminated area due to the dense vegetation. There was evidence of DU in both areas.

Bosnia and Herzegovina was visited by UNEP in 2002, 7-8 years after the use of DU munitions (1994-1995) there. The UNEP team went to 10 of the 15 sites because the authorities had had reports that DU munitions might have been used there. However UNEP could not find evidence of DU shells at these sites. Nearly 300 contamination points were found in this region, largely at the Hadzici Tank Repair facility (**SLIDE DU penetrator fragment at Hadzici Tank Repair facility)**[16] which had a contaminated air sample and water in two wells showed evidence of DU contamination. One air sample showed activity in the upper background radiation range while the radioactivity in one well water sample was about 0.1 uSv or insignificant.

The Han Pijesak Artillery Storage and Barracks was hit with 2,400 DU rounds or 729 kg of DU. There were many hidden DU shells at this site. DU was detected in air, soil and lichen samples. Three air samples showed evidence of DU but these were termed insignificant. Dust containing DU was found in a wooden storage barn (**SLIDE UNEP team member taking a**

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[13] The Institute of Nuclear Sciences Vinca, Belgrade, Yugoslavia and the School-Centre of NBC Defence, Kruevac, Yugoslavia, **Federal Republic of Yugoslavia: DU Contamination in FR Yugoslavia**, (no date), Bratoselce

[14] UNEP, **Serbia & Montenegro**, p.70. Other authorities involved in the decontamination and clean-up of various sties mentioned in **Serbia and Montenegro**, p. 35 and UNEP, **Bosnia and Herzegovina**, p. 8.

[15] **Ibid**, pp. 71-72.

[16] UNEP, **Bosnia & Herzegovina**, p. 31.

smear sample in the contaminated barn)[17]. One sample of dust and sand material taken from the concrete floor against the wall, contained 1,890 mg DU/kg, a concentration that is about 1,000 times higher than the uranium content of the soil[18].

In Bosnia and Herzegovina, DU shells buried in the ground showed that 25 percent of the mass of DU shells (66-92 g)[19] had corroded over the 7-8 years. (**SLIDES of corroded DU shell and corroded DU shell with loose DU corrosion products in front of shell)**[20].The depth of detectable dispersion of DU corrosion products was 40 cm below the ground surface. This dispersion could increase the uranium in the soil up to a maximum of 100 times and could in time exceed safety drinking water standards[21]. However UNEP said of the soil at the Han Pijesak Artillery and Storage Barracks the mobility of corrosion products from DU shells would be very low[22].

UNEP stated that the longer decontamination was put off, the more difficult it became. In their report on Serbia/Montengro they said, "It is very difficult to achieve comprehensive detection and complete decontamination of DU at a given site"[23].

UNEP found evidence of DU in dust, air and water in Bosnia and Herzegovina 7-8 years after DU shells had been used. However Dr. Randall Parrish and co-workers reported in a study[24] published last fall that DU had been found recently in attics and garages in homes near the former National Lead Industries facility where DU munitions were manufactured until 1980. The former factory is located in Colonie, New York near the state capitol. Five former workers had DU in their urine over 23 years after the end of their exposure to DU from the factory. Up to 4 former residents also had DU in their urine. Environmental contamination by DU dust and particles was such that approximately 2 tons of DU had been dumped within a 2-kilometer radius of the factory. DU was found in the soil up to 5 km from the factory.

UNEP published **The Desk Study on the Environment in Iraq** shortly after the U.S. attacked Iraq. Unfortunately UNEP had to rely on media reports and military briefings for its information as they could not send a team. The report mentions use of DU munitions in urban areas. The

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[17] **Ibid**, p. 93.
[18] **Ibid**
[19] **Ibid**, p. 92
[20] **Ibid**, pp. 33, 217.
[21] **Ibid**, p. 34.
[22] **Ibid**, p. 92.
[23] UNEP, **Serbia & Montenegro**, p. 35.
[24] Randall R. Parrish et al., "Depleted uranium contamination by inhalation exposure and its detection after ~20 years: Implications for human health assessment", **Science of the Total Environment**, fall 2007, doi:10.1016/j.scitotenv.2007.09.044 and Dr. David O. Carpenter, "Depleted Uranium (DU) in Workers and Nearby Residents of the National Lead Industry Facility in Colonie, New York, Presentation at the Fourth International Conference of the International Coalition to Ban Uranium Weapons (ICBUW), UN Church Center, New York City, October 3, 2007. (DVD of Carpenter Presentation available through Gretel Munroe, ICBUW).

report pointed out the need for people to wear “high quality dust masks” when within 150 meters of sites where DU munitions had been used, to avoid radiation exposure[25]. They also recommended the need to identify sites where DU had been used as well as the need to conduct clean-up operations in such areas as well as the need to minimize accidental exposure to DU and other chemicals and pollutants.[26]

I will conclude with some photos of Iraq, of places and situations with which UNEP might have had contact had they gone to Iraq. The photos are the work of Kazakh Vartanian, an engineer employed by the government in Basra. He attended a UNEP seminar on the measurement of radiation from depleted uranium. Mr. Vartanian is a member of Green Land Iraq, an environmental group and a member of ICBUW. Here are the photos.

Slide: Here is a map of Basra indicating where DU shells hit.

Slide: Mr. Vartanian measures radioactivity of a tank hit by one or more DU shells.

Slide: Local map of a neighborhood in Basra where DU shells destroyed a house as well as two tanks.

Slide: Where DU shells impacted in this neighborhood.

Slide: Family whose house was destroyed.

Slide: What remains of the house. Mr. Vartanian is taking soil samples.

Slide: A tank with a DU penetrator hole in it and “DU” written on the tank as a warning.

Slide: Boy collecting scrap metal from a tank possibly contaminated by DU.

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[25] UNEP, **Desk Study on the Environment in Iraq**, p.82.
[26] **Ibid**, pp. 85-86.