

## **INVESTIGATION OF HEAVY METALS IN THE SOIL OF SHOOTING RANGE: A CASE STUDY OF FRONTIER CORPS TRAINING CENTER WARSAK PESHAWAR, PAKISTAN**

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### **Abstract**

This study was carried out to determine heavy metals concentration in shooting range soil and its impacts. For this purpose thirteen soil samples were collected from different locations of Frontier Corps Training Centre Warsak Peshawar shooting range (3 from shooting point, 3 from left, 3 from right, 3 from stop-butt and 1 from middle). All the collected samples were ground and aggregated to reduce the number of samples to five i.e. shooting point, left, right, middle and stop-butt. The five soil samples were analyzed for pH, conductivity and heavy metals i.e. Pb, Cd, Cr, Zn and Ni. The soil samples were digested by using aqua regia method and the aliquots obtained were analysed by using Atomic Absorption Spectrophotometer to determine the concentration of heavy metals in the samples. The concentration of Cd at left, right, shooting point, middle and stop-butt of shooting range was 1.404 mg/kg, 1.443 mg/kg, 1.911 mg/kg, 2.379 mg/kg, and 2.574 mg/kg respectively and the concentration of Zn at left, right, shooting point, middle and stop-butt was 67.275 mg/kg, 77.337 mg/kg, 63.804 mg/kg, 71.019 mg/kg, and 75.036 mg/kg respectively hence exceeding the background levels as given by Bohn et al. which are 0.06 mg/kg and 50 mg/kg for Cd and Zn respectively. The concentration of Pb was found to be maximum at stop-butt i.e. 2049.45mg/kg and its concentration at left, right, shooting point and middle was 14.001 mg/kg, 18.837 mg/kg, 47.424 mg/kg, and 18.213 mg/kg respectively hence exceeding the background level which is 10 mg/kg for Pb. The concentrations of Cr and Ni at all five locations were within the normal range as given by Bohn et al. This study revealed that the bullet-borne contaminants are contaminating the shooting range soils because the pellets used in ammunition are composed of Pb, Zn, Cu, and Ni. In Pakistan the environmental perspective of shooting range soils is overlooked and there is a need to take steps to avoid such contamination of soils because these heavy metals can enter the food chain by plant uptake and can leach underground and contaminate the aquifer as well. Replacement of vegetation of site with metal tolerant species, addition of soil conditioners and uncontaminated soil would reduce the mobility of these contaminants into aerial portions of plants.