

## Geochemical and Physical Characteristics of YPG Dust Course Samples

The goal was to analyze soil samples from three Yuma Proving Ground (YPG) dust courses and two proposed new dust test courses. We addressed questions pertaining to suitability for dust, the characteristics of the dust at present and where there might be alternative areas suitable for new dust courses. This project addressed concerns for possible impact on military equipment functionality in deserts around the world. At the time this project was conducted we and others had recently established that the chemical composition of dust could affect the testing of military equipment for global operations. The project was conducted at YPG and the interim results were reported in 2005. Our analyses produced information about the composition of dust and soil samples on the YPG dust test courses and compared them with samples from Israel and Iraq.

**Summary of Project Details:** Our approach was to sample three existing sites and two possible new sites. The sites varied in soil characteristics and landscape setting, so we sampled in a manner to capture the variability. Current dust courses are on well-developed desert pavement while the proposed sites also include active wash, floodplain and weak desert pavement. The samples were analyzed for particle size distribution, calcium carbonate, pH, electrical conductivity, x-ray fluorescence and x-ray diffraction. Our results are presented in a series of charts, tables and figures.

**Management Implications:** We reported three important points regarding the dust test courses. First, the current test courses provide similar dust physical and chemical properties. Second, the proposed test courses are similar to the existing courses, although there was some variability within the proposed new areas. We made recommendations on how best to site new test courses to provide ideal conditions for testing. Third, we reported that the dust-rich soil layers are shallow. The implications are that test courses on these types of soils will have a limited use time before dust conditions change considerably from their original conditions.

For these reasons we recommended additional targeted analyses in specific sites to identify more dust-rich soils. We recommended seeking out other sites that might be suitable for new test courses and outlined how to document initial conditions for monitoring as the course is used over time. Last, we suggested that dust parameters from key areas of interest around the world be evaluated so that YPG dust courses would be tailored to better represent those areas of strategic concern.

**Figure 8.** Sampling design for dust courses located on desert pavements (a) are referred to as soil samples (MugS1). Course samples were taken from within the roadway (b, KD-C1). A typical desert pavement consists of a thick vesicular (Av) horizon formed by the accumulation of dust (c, MugS3). Course samples have been mixed and eroded resulting in a more coarse textured soil (d, MugC3).

