

Landforms and surface cover of Vehicle Endurance and Dust Test Courses at U.S. Army Yuma Proving Ground Final Report

The goal was to provide Yuma Proving Ground (YPG) and Department of Defense with documentation and maps of the geomorphology of the areas within and adjacent to the vehicle endurance and dust test courses. We provided a science-based assessment of each test course, including information on the geology, landform type, soil cover, degree of desert pavement development, and dust potential. This project addressed concerns on the state of the test courses. The newest of the dust test courses had several years of use, prompting the additional concern of how representative test courses were of then-current operational areas in southwest Asia. The test courses had been (and remain) in use since being established in the 1950's, experiencing hundreds of thousands of miles of impact from vehicle endurance testing over the same course. The project was conducted at YPG and results were reported in 2006. Our analyses produced information about the test courses based on the physical properties of the underlying landscape.

Summary of Project Details: Our approach was to map and document the geomorphology and surface characteristics of 13 test courses that were in operation at the time of this project. The courses we mapped included 8 endurance courses and 3 dust courses. We produced 8 maps for each course area and provided photographs depicting representative terrain. We used high spatial resolution satellite imagery to identify landform type and age. Soil data was integrated with the landform data to produce maps of surface cover, revised soils, dust content, and desert pavements. We created slope maps from digital elevation model data.

Management Implications: We created a comprehensive set of maps, figures and photographs for each of the test courses evaluated along with descriptions that convey the physical characteristics of each. This format provided testers with a guidebook that enables both an overall assessment of the geomorphology of each test course as well as detailed information about any particular segment of any course.

Table 5. Mineralogy of YPG dust course and proposed dust course samples based on XRD analysis.

Course	Location	ID	Depth (cm)	Silicates					CO ₃ ⁻²		Evaporites		Clay Minerals		
				Quartz	Plagioclase	K-feldspar	Muscovite	Augite	Calcite	Dolomite	Halite	Gypsum	Bassanite	Mtite	Chlorite
Cibola	Course	CD-C1	0-10	***	**	*	*	**	**						
	Course	CD-C2	0-10	***	**	**	*	**	**						
	Course	CD-C3	0-10	***	**	*	*	***							
	Soil	CD-S1	0-8	***	**	**	*	***					*		
	Soil	CD-S2	0-8	***	**	**	*	***							
Kofa	Course	KD1-C1	0-10	***	**	**	*	**							
	Course	KD4-C	0-10	***	**	**	**	***							
	Soil	KD1-S	0-5	***	**	**	**	***							
			5-25	***	**	**	*	***							
	Soil	KD4-S	0-3	***	**	*	*	**					*		
Muggins	Course	MUG1C	0-10	***	**	**	*	**							
	Soil	MUG1S	0-10	***	**	**	*	**							
			10-20+	***	**	*	*	***					*		
Kofa Proposed	Wash	KDP1	0-10	***	***	*	*	*							
	Wash	KDP2	0-10	***	**	*	*	**							
Tower M	Floodplain	TM-1	0-10	***	**	**	*	**					*		
			10-23	***	*	*	*	**							
	Weak Pavement	TM-2	0-9	***	**	**	*	***							
			9-25	***	**	**	**	***							
		TM-3	0-9	***	**	*	*	*							
		9-25	***	**	**	*	**								

*Carbonates

** No data: sample of insufficient size for XRD

Relative amounts of mineral abundance:

***	major (primary mineral)
**	minor (secondary mineral)
*	trace (low abundance)