SAMPLE EMPLOYMENT SCENARIOS AND CONSIDERATIONS FOR LIGHTWEIGHT MECHANICAL NEUTRALIZATION SYSTEMS

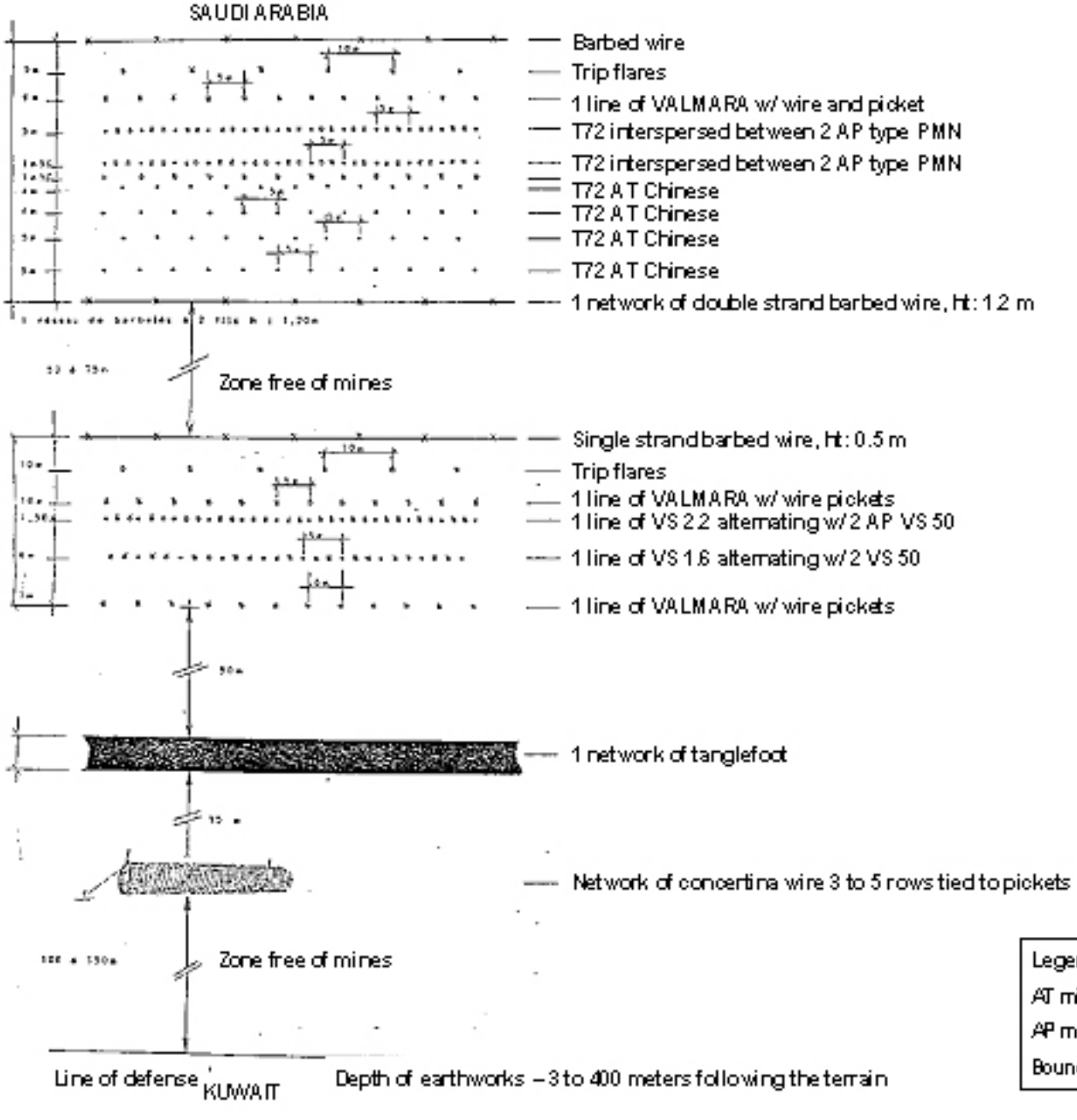
Amphibious Breach

Per MCWP 3-17.3, the amphibious breach is "designed to support an amphibious assault by overcoming anti-landing defenses." Mines and obstacles in the deep water zone, the shallow water zone, the very shallow water zone, the surf zone, and the beach zone will be neutralized by the Navy component of the Naval Expeditionary Force (NEF). The Navy component also is responsible for clearing the Initial Craft Landing Sites (ILCS) for Landing Craft Air Cushioned (LCAC). Since the Light Armored Vehicle (LAV) is generally transported to the beach by LCAC, a mechanical neutralization system mounted on LAVs must not adversely affect their transportability characteristics. Amphibious Assault Vehicles (AAV) and Expeditionary Fighting Vehicles (EFV) could either swim to the beach on their own power or be shuttled to the beach aboard LCACs. In the first case a mechanical neutralization system mounted on AAVs and EFVs must not interfere with lane navigation systems for guidance through the transit lanes. In the second case a mechanical neutralization system must not adversely affect the AAV's and EFV's transportability characteristics. Once on the beach, mechanical neutralization systems will be used to breach the remaining minefields (which will be a component of a complex obstacle belt, defined as mines supplemented by other obstacles such as wire, ditches, berms, or other obstacles) blocking the beach exits. According to Marine Corps Combat Development Command authority, the objective breaching speed will be 10 minutes from the high water mark through a 100 meter deep complex obstacle belt, with 20 minutes being the threshold. The lightweight mechanical neutralization systems would be required to neutralize mines and reduce wire obstacles. Other systems would attack heavier obstacles, ditches, and berms. The soil trafficability of a range of beaches must be considered in any development of lightweight mechanical neutralization systems, since the platform LAVs, AAVs, and EFV would be traversing beaches having a variety of soil characteristics, from wet sand, through mud, to shingle.

Deliberate Breach

As stated in MCWP 3-17.3, "[a] deliberate breach is used against a strong defense or complex obstacle system." A complex obstacle system is further defined as, "functionally related obstructions composed of multiple parts which together create a mobility dilemma." An example complex obstacle system would be a minefield protected by wire obstacles, located in front of an anti-tank (AT) ditch. A lightweight mechanical neutralization system would not be expected to reduce the ditch, but would be expected to attack the minefield and wire. An example of a threat minefield is shown in the Figure.

Iraqi Minefield on Kuwait-Saudi Border, '91



In breaching this layout of multiple minefields, a lightweight mechanical neutralization system would be required to neutralize mines in a path 4.5 meters wide and several hundred meters long (note that there is an empty space between two minefields to reduce the effect of explosives countermeasures). In the 4.5 meter wide path, a lightweight mechanical neutralization system would encounter several buried AT mines, some with pressure fuzes and some with magnetic fuzes. Buried and surface laid anti-personnel (AP) mines (emplaced to counter dismounted, covert mine clearing attempts) would be encountered. During the breach, the enemy may try to isolate minefield breaches by air-delivered or artillery-delivered scatterable, surface antitank mines, probably with magnetic fuzes. The threat includes off-route, side-attack mines, positioned at intervals in the minefield to counter vehicle-mounted mechanical neutralization systems.

Hasty Breach

As stated in MCWP 3-17.3,"[a] hasty breach is used against a weak defender, when the enemy situation is vague or changes rapidly, or against very simple obstacles… To maintain momentum and take advantage enemy weaknesses, the hasty breach is normally conducted with the resources immediately available." Since a hasty breach would not be attempted against a complex obstacle, there would be no requirement to reduce complex obstacles. Similarly, a hasty breach should only be attempted against a minefield with a lower density of mines or a minefield that consisted entirely of surface laid or scatterable mines. A lightweight mechanical neutralization system would be required to neutralize mines in a path 4.5 meters wide, over a relatively short distance, while probably encountering the same types of mines, with fewer encounters.

Route Clearance

Lines of Communication (LOCs) may be subject to enemy attempts at interdiction by ambushes or point mining. As a result, logistics convoys would be escorted by LAV platoons, or a combined force of LAVs and engineers would be assigned the task of clearing the route in advance of convoys. The LAVs would advance at a rate of 50 km/hr. Upon receiving indications of the presence of mines, either by stand-off detection or visual indicators, the LAV/engineer force would slow to about 5 km/hr during clearance of the point minefield, and then resume a higher speed of advance until the next indication of mining.

For a route clearance missions in a desert, it may be assumed the LAV/engineer force would traverse a distance of 50 km (20 km on unpaved roads, 20 km on sand/gravel, and 10km over brushy terrain). For a route clearance missions in a mountain environment, it may be assumed the LAV/engineer force would traverse a distance of 50 km (25 km with slopes greater than 30%; 25 km of those over road and 10 km over frozen ground), cross 50 culverts, and go through two cities and four villages. The route would be 4.5 to 10m wide. The LAV/engineer force might encounter off-route, side-attack mines, sited 50-150m off of the route, with fuzes varying from acoustic/infrared sensors to breakwires/simple trip wires. The force would encounter buried AT mines, some difficult to detect, non-metallic, with pressure fuzes; others may be metallic with magnetic fuzes. Both buried and surface laid AP mines may also be encountered.

Scatterable mines and unexploded ordnance (UXO) may be encountered. Clutter (metal, rocks, debris, and voids) will complicate the detection situation. For the assumed 50 km route clearance task, an assumed level of clutter is 500 metallic objects, of which only five contain explosives (two surface and three buried), and 500 non-metallic objects, with five containing explosives (two surface and three buried).

Area Clearance

As stated in FM 20-32, "…clearing operations are done when engineers receive a mission to clear an area of mines or to clear a specific minefield on a friendly area of operations." The assumed area clearance mission is a 500m by 100m area, containing two buildings, a road, and a trail. While this is principally a task for dismounted engineers and explosive ordnance disposal (EOD) technicians using manual means, a mechanical neutralization system could be used if the presence of magnetically-fuzed or seismic-fuzed mines were suspected. A mechanical neutralization system may also be used to clear out vegetation and trip wires. In the area of this assumed area clearance task are buried nonmetallic AT mines and nonmetallic AP mines. The area includes UXO, with bombs being inside and outside of the buildings. 10 clutter objects are assumed to be buried outside of the buildings.