Appendix H

Operations in Special Environments

Overview

Operations in special environments are those operations in which terrain, weather, nature of the operations, or a combination thereof creates a need for special techniques, tactics, training, and equipment. Special operations include cold weather, mountain, desert, jungle, riverine, river crossing, amphibious, helicopterborne, air movement, and built-up/urban area operations. This chapter identifies considerations for these special operation

Cold Weather Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
Unit density is usually low, thus attachment of artillery may be required.	Movement of wheeled vehicles restricted and slow. Artillery is nearly road bound. Chains required for prime movers. Consider the need for wreckers. Heavy vehicles move with difficulty in deep snow or muskeg. Large battlefield requires movement. Navigation difficult. Air movement affected by ice fog. Movement by helicopter makes large signature. CSS to artillery positioned by helicopter may be difficult.	Ammunition effects are reduced by snow, increased by ice. HE/Q and ICM ineffective in deep snow. HE/Q can be used to start avalanches. MTSQ fuses are effective. Chemical agents are adversely affected. Particles of WP may become buried in snow and cause hazard to friendly troops. Cold affects weapons. Rates of fire are reduced until weapons have warmed. Ammunition preparation is slow. Range correction factor of ± 100m per 1000m is not uncommon. Survey difficult. Survey control points and markers become obscured. Survey parties need equipment for over-the-snow travel. Radar operations hampered by extreme cold.	Hardening of positions is difficult. Construction of barriers, parapets, etc. on frozen ground may require explosives. Engineers may be attached to artillery for snow clearing, hardening of positions, and fortifications. Track plans must be strictly enforced to prevent compromise of position by tracks in snow. DS and attached artillery may be located adjacent to or within perimeter of infantry. Concentrations of shelters make unit vulnerable to attack. Camouflage discipline must be strictly enforced.	Communications primarily by radio. Wire use restricted to existing trails and roads. Wire may be laid by aircraft. Wire must be kept in warm place until laid. Due to decreased mobility, communications security and electronics security have added importance. Artillery commander must ensure supported unit aware of limitations of artillery in cold.

Cold Weather Operations -- Continued

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
	Positions selected for tactical utility, protection from the elements, and ease of CSS. Firing positions may be on or near roads, in farm yards, etc. Positions will often have limited space. Old positions can be used as supplementary positions or for ammunition storage. Two methods of snow clearing positions are racetrack and driveway methods. Positions require increased time for preparation. Dunnage may be required. Ahkios (man-portable sleds) can be used to move equipment and ammunition in position.	Firing platform stability is a problem in deep snow. Ensure positions are away from possible avalanche-prone areas. FASCAM may settle in deep snow and reduce effectiveness. Projectile plugs should be left in place or fuses immediately mated with projectiles to prevent condensation, ice, or snow in the fuse well.		

Mountain Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
Terrain often requires use of multiple maneuver columns, thus attachment of artillery may be required.	Movement of vehicles slow and restricted to roads and improved trails, which are usually scarce. Winding roads and steep slopes create difficulty for towed weapons. Self-propelled artillery traction difficult when road is rocky or icy. Can be overcome by grousers (cleats) on the tracks. Potential for bottlenecks. Artillery needs route precedence. Helicopter movement may be restricted by altitude limitations. Positions will usually be scarce and access limited. Artillery must be prepared to fire from roads. High altitude lowers load capacity of vehicles.	High angle fire often required because of masks of positions and for defilade fire. Observed fires and frequent corrections for nonstandard conditions are required. Consider check rounds. Massed fires are less effective because of enemy dispersion. However, chokepoints and passes are ideal targets. Counterfire is particularly effective due to high angle fire. Positions can be predicted because of few available positions. Rocky ground enhances lethality of HE; airbursts effective on reverse slopes; ICM, smoke, and Illum fires difficult to adjust and maintain due to winds.	All around security critical because of terrain.	Decentralized in the attack; centralized in the defense. Radio communications often degraded; use of radio relays required. Antennae must be carefully sited and masked. Wire laying restricted to roads. Cross-country wire difficult to lay and maintain. Control cells may be formed to stay with batteries.

Desert Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
Wide dispersion of forces may require attachment of artillery. Desert battles tend to be centralized.	Wheeled vehicle movement difficult with heavy loads. Roads are normally poor. Displacements will usually be frequent because of fluidity of battlefield. Units should carry mission-essential loads. Movements should occur during periods of reduced visibility when possible. Day movement causes dust signature. Helicopter operations difficult due to dust. RSOP and survey must be continuous. Often, air reconnaissance is used. Terrain gun positioning is widely used to take advantage of terrain. Consider potential changes in weather when selecting positions. Navigation difficult. Use caution in operating in wadis, particularly if rainstorms are likely.	HE/Q and delay, ICM, and FASCAM smothered by deep sands. Airbursts, smoke, Illum, and Copperhead are very effective. Long-range fires and obscuration and screening fires can be expected. Rapid changes in weather require frequent changes in corrections for nonstandard conditions. Radars highly effective. Most targets will be hardened. Survey control points are few and far between. Astronomic observation and resection may be required. Soft sand causes problems in firing of weapons. Plan for increased consumption rate of ammunition.	Security takes on added importance. Artillery vulnerability is increased by firing signature and openness of terrain. Positions must be well-dispersed, hardened, and camouflaged. Deception should be practiced, but is difficult.	Radio communications generally excellent, but vulnerable to EW and damage by sand, heat, etc. Wire is easy to install in most areas. For short ranges, visual and sound signals may be used. Some areas may have dead spots.

Jungle Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
Communications may necessitate decentralized control. Supported units often conduct decentralized or independent operations.	Limited trafficability for wheeled and tracked vehicles on few existing roads. Loads must be kept light. Air movement essential. Mutually-supporting positions should be selected when possible. Positions are usually scarce and may be inaccessible by road. Thus, air resupply will be required. Positions may have to be cleared. Positions are normally compact for control and security. Positions for radars usually limited.	Firing platforms may be required for stability in swampy areas. 6400-mil firing capability may be required. Canopy of jungle affects ammunition effectiveness and functioning. HE delay needed to penetrate canopy. Radars have reduced range and accuracy. Close-in fires may be frequent. High angle fires are common. Survey control slow and must be established when feasible. Humidity may degrade range.	All around security and hardened positions must be established. Positions in thick vegetation areas increase vulnerability to ground attack. Integrated security plans are established.	Radio communications are restricted by line of sight, dense vegetation, and adverse weather conditions. Range of radios is usually reduced by as much as 40 percent. Antennae siting are critical. Field expedient and directional antennae are used. Antennae may have to be elevated to achieve line of sight. Wire laying restricted to roads. Wire can be laid by helicopter.

Jungle Operations -- Continued

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND AND CONTROL
	Air reconnaissance and aerial photographs useful. Positions are often hampered by soft terrain. Engineer support or dunnage may be required. Distance between march elements are reduced and other security measures intensified because of limited visibility and natural obstacles. Flank security is a continuing requirement. Thorough RSOP essential.	Ammunition must be protected from moisture. Unobserved or predicted fires are often used. Adjustment by sound and the use of creeping fires are common. HE/Q can be used in low tree canopy or grassland, often producing a splintering effect.		

Riverine Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY
Widely dispersed force may require attachment of artillery. Quantity and caliber of artillery may be limited by lack of positions and water transport assets.	Movement primarily by landing craft and helicopter. Artillery may have to be positioned in hostile area before attack begins. Tidal conditions and water level may affect movement. Buoy markers should be placed on howitzers and prime movers to help recovery in event of sinking. Naval radar aboard escort watercraft can be used for position location. Position locations for barge/boat mounted artillery should have: 1) Steep banks below surface, 2) Wide streams to front and rear to reduce danger from ground attack, 3) Limited avenues of approach over land, and 4) Areas that minimize anchorage problems.	Batteries must be prepared for direct fire for self-defense. Fires without observation may be inaccurate because of lack of survey control and valid MET data. If afloat, FDCs are generally semi-permanent on separate landing craft. Fires can be delivered from the LCM-8 or barges while anchored to the bank.	Additional forces for the security of prepositioned artillery. Position areas may be small and in insecure areas. Cover and concealment may be limited. Naval element gunboats and assault support patrol boats provide boat security. CAS, CIFS, supporting artillery are requested for route security as required.

River Crossing Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
Artillery is organized for combat consistent with type of crossing to be conducted (hasty or deliberate) and intended mission after crossing. When practicable, centralized control is desired. In the defense, artillery may be attached to security forces deployed across river.	Most artillery will cross the river when continuous fire support can be delivered from the far bank. DS artillery displaces when first phase objectives are seized and positions are available for artillery. Some artillery may be airlifted to reduce congestion at the crossing site. In the assault, final positions are moved into at the last possible moment under cover of darkness. Positions should be well forward and in depth to range beyond the bridgehead line. Also, positioning should facilitate rapid crossing. RSOP is accomplished by map. There is little flexibility in selecting initial positions.	GS and GS-R units may provide close supporting fires as DS and reinforcing move. Prior to, during, and immediately following crossing, artillery may deliver illum, smoke, and deception fires. Fires can be used to screen noise of crossing. In the defense, fires may be planned on probable crossing sites, fires to canalize the enemy and stall his attack astride the river, and to support a counterattack. Fires are delivered in depth.	When supporting force crosses river, local security becomes critical.	May be complicated during times when elements are on both sides of the river.

Amphibious Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND AND CONTROL
Artillery is dispersed among available naval shipping. Thus, decentralization is required. As artillery lands, centralization is re-established as dictated by the situation.	Artillery should land and begin operations as soon as conditions permit. Artillery RSOP parties are usually brought ashore in the early stages of the landing, with artillery units landed as on-call serials. Initial position areas are planned from map reconnaissance, and if possible by air. RSOP parties will be larger in the initial phase of the operation than in other operations. Survey control must be established ashore. Beach trafficability may be a problem. Matting and partially deflated tires may be used. Vehicles must be prepared for fording. Artillery may be landed by landing craft or helicopter. Landing plan must permit artillery to land in formation with adequate personnel/equipment to support the fire support plan and scheme of maneuver.	Tactical and technical fire direction must be decentralized initially to allow for flexibility. Be prepared for inter-service call for fire. Artillery may be positioned on offshore islands to support assault. Survey generally not present initially.	Artillery vulnerable while on the beach. Units must move across the beach as rapidly as possible.	Senior artillery commander is usually an embarkation unit commander. Communications while afloat and during ship-to-shore are dependent on ship communications plan. Normally, radio will be the primary means. Most artillery traffic will be on LF/arty command/FD and artillery command nets.

Helicopterborne Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND AND CONTROL
Decentralized operations may be required for support to small task forces.	Mutual support between artillery units is desirable. 6400-mil firing capability. Reconnaissance may be limited to air, with the battery commanders conducting reconnaissance during the assault with elements of the supported force. Battery formations often dictated by the terrain of the LZ. Ammunition should be placed close to howitzers on occupation. Positions should have area for LZ. Recon and HST teams may be available for terminal guidance of aircraft. Loads should be positioned to reduce fly over of battery consistent with wind direction.	Individual piece corrections may be required.	All-round security required. Make use of defilade and natural obstacles.	Close liaison between artillery and helicopter units required. Primary means of communications is radio. Wire restricted to installations within LZ and rear areas.

Built-up/Urban Area Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND AND CONTROL
Centralized control during initial phases; decentralized control during later phases to support semi-independent action of small units.	Movement during night or periods of reduced visibility when possible. Few displacements, often by platoon or section. Positions should be selected that minimize masking, provide several routes of escape, and afford as much cover and concealment as possible. Use of existing structures (garages, office buildings, highway overpasses) is recommended. Special techniques for emplacing howitzers, such as spades against a curb when the ground is not suitable for emplacement may be required. Explosives may be required to soften emplacement of howitzers.	Both direct and indirect fires are delivered for supported units. Destruction of fortifications may require assault fire techniques. High angle fire may be required. Need for accurate MET and survey increases, as most targets are point targets. ICM and VT effects reduced by structures, although they are effective against personnel on rooftops and top floors. HE/CP used for penetration effects. Illum, chemical incendiary ammunition, and smoke are effective. Ammunition expenditures will be heavy.	Fortification of position.	Radio communications impaired by buildings. Wire can usually be run overhead. Make use of civilian communications. More use of messengers and prearranged audio and visual signals.

Built-up/Urban Area Operations -- Continued

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATION
	RSOP parties should be well armed, as they may have to clear areas to be occupied. Extensive route reconnaissance is required. Target acquisition devices somewhat degraded. Radars should be emplaced to cover likely areas of enemy indirect fire weapon employment. Radars should not be placed in the midst of an urban area because of masking.	Lasers and precision guided munitions permit destruction of targets with minimum rubble of adjacent buildings. But tall buildings may hamper laser use. Batteries must be prepared for hasty survey techniques. Magnetic instruments are impaired.		

Artillery Raids

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND AND CONTROL
Extremely decentralized.	Battery moves rapidly into position by air or ground means. The position may be across the FEBA. Only bare necessities are taken. The number of howitzers taken forward depends on the target analysis, effects required, and aircraft availability (if airlifted).	Raid is extremely short; used to deliver fire on a HVT. A mixture of HE, WP, and ICM provides excellent effects for a raid. FASCAM and DPICM are also useful. Firing data can be precomputed. Fire the highest charge possible to increase standoff range.	Security elements accompany raid. Attack helicopters may provide cover.	Detailed planning, surprise, and speed are key factors in execution. Effective SOP is essential.

Fire Base Operations

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
Generally centralized.	Positions should be in an open field, possibly on a hilltop, so unit can clear kill zones, have interlocking fields of fire, and maximize grazing fire. Howitzers should be no more than 50 meters apart and preferably in star formation for 6400-mil capability and defense of position. The firing position should allow for a pickup and/or landing zone.	High angle fires may be required. Indirect fire data should be determined to cover dead space and avenues of approach to the firebase and to target likely enemy mortar positions and/or assembly areas around the fire base. XO's minimum QE should be determined for eight sectors of fire.	Concealment is a primary concern. A strong defensive perimeter is essential. A small-arms cache should be placed in the center of the battery in case the position is overrun. Engineer support should be obtained to harden individual howitzer firing positions. As a minimum, each position should have: V Covered ammunition racks. V A personnel bunker. V Direct fire sector with a fighting trench. V Two covered ready racks. Firebases should be mutually supporting.	Wire should be used extensively, and buried at least 12 inches.

Fire Base Operations -- Continued

ORGANIZATION FOR COMBAT	MOVEMENT/POSITIONING	DELIVERY OF FIRE	SECURITY	COMMAND, CONTROL, AND COMMUNICATIONS
		Units may have to provide their own perimeter illum. If using a star formation, the center howitzer can perform this mission while other howitzers are engaging in direct fire. Infantry support may be available for defense of the fire base. Patrols should extend to the range of enemy mortars.		