

APPENDIX N

PART I

WEATHER EFFECTS ON THREAT SYSTEMS

MILITARY ASPECTS OF WEATHER

Because of recent significant political and military changes in the former Soviet Union, US Forces will have to be prepared to fight in a variety of climatic conditions on short notice. One major key to accomplishing our missions under these circumstances is understanding how weather affects both friendly and threat forces and their operations, systems, and personnel.

Current weather conditions and weather forecasts for the AO and AI are analyzed to determine the effects on friendly and enemy operations. This is especially significant when threat forces have the capability to employ NBC weapon systems.

THREAT EQUIPMENT

Some of the major arms producers and sellers in the world today are the former Soviet Union, Sweden, Brazil, Britain, Germany, France, Italy, and the United States. However, the major arms purchasers continue to be the undeveloped or Third-World countries in the Middle East, Latin America, and Asia.

The types of threat equipment that we may encounter on future battlefields will vary considerably from artillery and mortars produced during World War II to the Austrian-produced GHN-45, a 155-mm towed gun with a range of 39,600 meters (using extended-range full-bore-base bleed (ERFB-BB) technology). Almost all of the Third-World countries have bought or made their own versions of Soviet-produced tanks, APCs, artillery, antiaircraft artillery (AAA), and assorted surface-to-air (SAM) and surface-to-surface missile (SSM) systems.

CRITICAL WEATHER FACTORS

The following are major critical weather factors that can enhance or degrade combat operations, systems, and personnel.

LOW VISIBILITY. Low visibility (less than 3 km) can be beneficial to both threat and friendly forces. It conceals the center of gravity and maneuver of offensive forces and increases the possibility of achieving surprise. Some disadvantages of low visibility are that it hinders C² and reduces the effectiveness of R&S and target acquisition--especially during the defense.

SURFACE WINDS. Strong winds can reduce the effectiveness of downwind forces by blowing dust, smoke, sand, rain, or snow on them. The upwind force generally has better visibility and can advance faster and easier. Strong winds also limit airborne and aviation (primarily helicopters) operations. Winds in excess of 35 knots can cause personal injury, damage materiel and structures, create false radar returns, and reduce visibility because of blowing sand, dust, and other battlefield debris.

PRECIPITATION. Precipitation is significant because it affects trafficability, visibility, personnel effectiveness, and a wide variety of tracked and wheeled military equipment. Heavy rains can make some unsurfaced, low-lying, and off-road areas impassable. In addition, both rain and snow can drastically reduce personnel effectiveness by limiting visibility, causing discomfort, increasing fatigue, and creating other physical and psychological problems.

CLOUD COVER. The type and amount of cloud cover and the altitude of cloud bases and tops influence aviation operations. CAS employing fixed-wing aircraft would like a ceiling of at least 2,500 feet (762 m), but can be employed with ceilings as low as 500 feet. Threat CAS rotary-wing aircraft and aerial resupply missions require a minimum ceiling of 300 feet (100 m). Cloud cover affects ground operations by reducing illumination and visibility, or, in some instances, by enhancing the effects of artificial light.

TEMPERATURE AND HUMIDITY. Together, these elements have a direct impact on personnel and vehicle performance. Excessively high temperatures cause heat-related injuries to personnel and vehicle engine wear that leads to equipment failure. Very low temperatures increase cold weather injuries, cause damage to vehicle cooling systems and engines, decrease the effectiveness of vehicle lubrication, and create excessive logistics requirements.

Table N-2. Weather effects from reduced visibility.

WEATHER VALUE (METERS)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT 200			RPG-18 (rocket launcher) AKM/AKMS (7.62-mm) TKN-1T infrared periscope	ATW Rifle E-O device
LT 500	SA-14 GREMLIN SAM SA-13 SAM SA-16 SAM SA-19 (FSU) SAM		OU-3GK White infrared search light RPG-7 (Grenade launcher) PT-76 (5.45-mm) AK-74	E-O device ATW AG/LT Rifle
LT 600			ERYX	
LT 750	SA-9 GASKIN SAM			
LT 800	AT-2 SWATTER AT-3 SAGGER AT-6 SPIRAL	ATGM ATGM ATGM	ASU-85 BMD (73-mm) BMP (73-mm) Sniper rifle, SVD RPK-74, squad MG AGS-17, grenade launcher RPG-16, grenade launcher	AG/LT LAV LAV Rifle MG
LT 1,000	All Types	ATGM	SPG-9 (73-mm recoilless rifle) SD-44 (85-mm) 14.5-mm KPU hvy MG 7.62-mm PKT MG DShK NSV/NSVT PK Series MT-LB 7.62-mm coaxial machine gun for all tanks	ATW ATW AA AA AA MG MG LAV MT

Table N-2. Weather effects from reduced visibility (continued).

WEATHER VALUE (METERS)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT 1,500			7.62-mm MG 15.5-mm heavy MG gun BTR-50,-60,-70 (14.5-mm) KPVT ACRV M1974 DShK NSV/NSVT T-54, T-55, T-62 (main gun)	AA/LAV AA LAV MG MG MT
LT 2,000			T-12, MT-12 (100-mm) KPVT BRDM-2 (14.5-mm) T-80, T-72, T-64 (main gun) MATHOGO MILAN 2 RBS-56 SPIGOT	ATW MG LAV MT
LT 2,500			SA-7 GRAIL ZU-23 ZSU-23-4	FSU SAM AA AA
LT 3,000			RED ARROW 73 RED ARROW 8 SUSONGP'O AT-3 SAGGER	
LT 4,000			SA-9 GASKIN HOT 2 SWINGFIRE AT-2 SWATTER AT-5 SPANDREL AT-8 SONGSTER AT-10 STABBER SA-13 (Contrast Mode)	FSU SAM FSU SAM
LT 4,500			MAPATS	
LT 5,000			NIMROD AT-6 SPIRAL AT-11 SNIPER SWIFT (SF)	ATGM
LT 6,000			120-mm, M-1943 S-60 (57-mm)	MO AA
LT 8,000			160-mm, M-160	MO

Table N-5. Weather effects from precipitation.

WEATHER CONDITION	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
Light rain			LOW BLOW (fire control) STRAIGHT FLUSH (12 GHz) (Tracking) THIN SKIN (Height finder)	SAM radar SAM radar SAM radar
Moderate rain			STRAIGHT FLUSH (Acquisition)	SAM radar
Heavy rain			LOW BLOW (Fire control) THIN SKIN (Height finder)	SAM radar SAM radar
	ALSO SEE INTRODUCTORY PARAGRAPH			
	NOTE: The list of air defense radars on this page should be considered as a representative sample of the various other types of threat radars associated with EW operations and tactical and strategic SAM systems. Not listed are a large variety of threat combat equipment (wheeled and tracked) affected by moderate or heavy rain and snow.			

PART II

**COMPARISON OF WEATHER EFFECTS ON
US AND THREAT SYSTEMS**

The following tables illustrate how similar capabilities of weapon systems may be compared. For example, Figure N-1 shows the T-series tanks' acquisition capabilities are more limited. Obviously, the advantage lies with the friendly tanks. Under similar weather conditions, the M-1 and M-60 tanks can acquire targets up to 3000 meters.

Figure N-2 shows similar visibility comparisons of friendly and threat anti-tank guided missile systems.

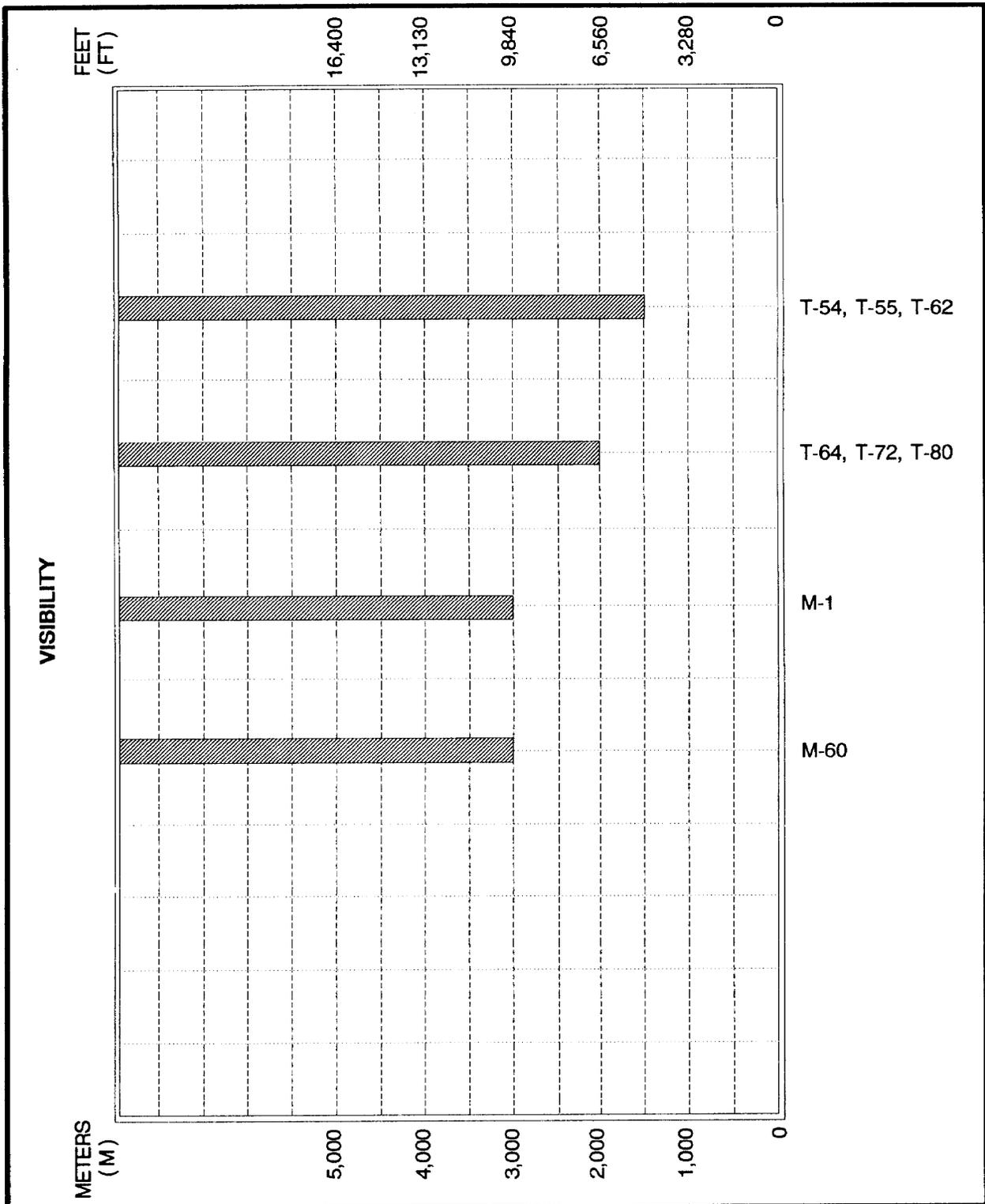


Figure N-1. Comparison of US and threat tanks.

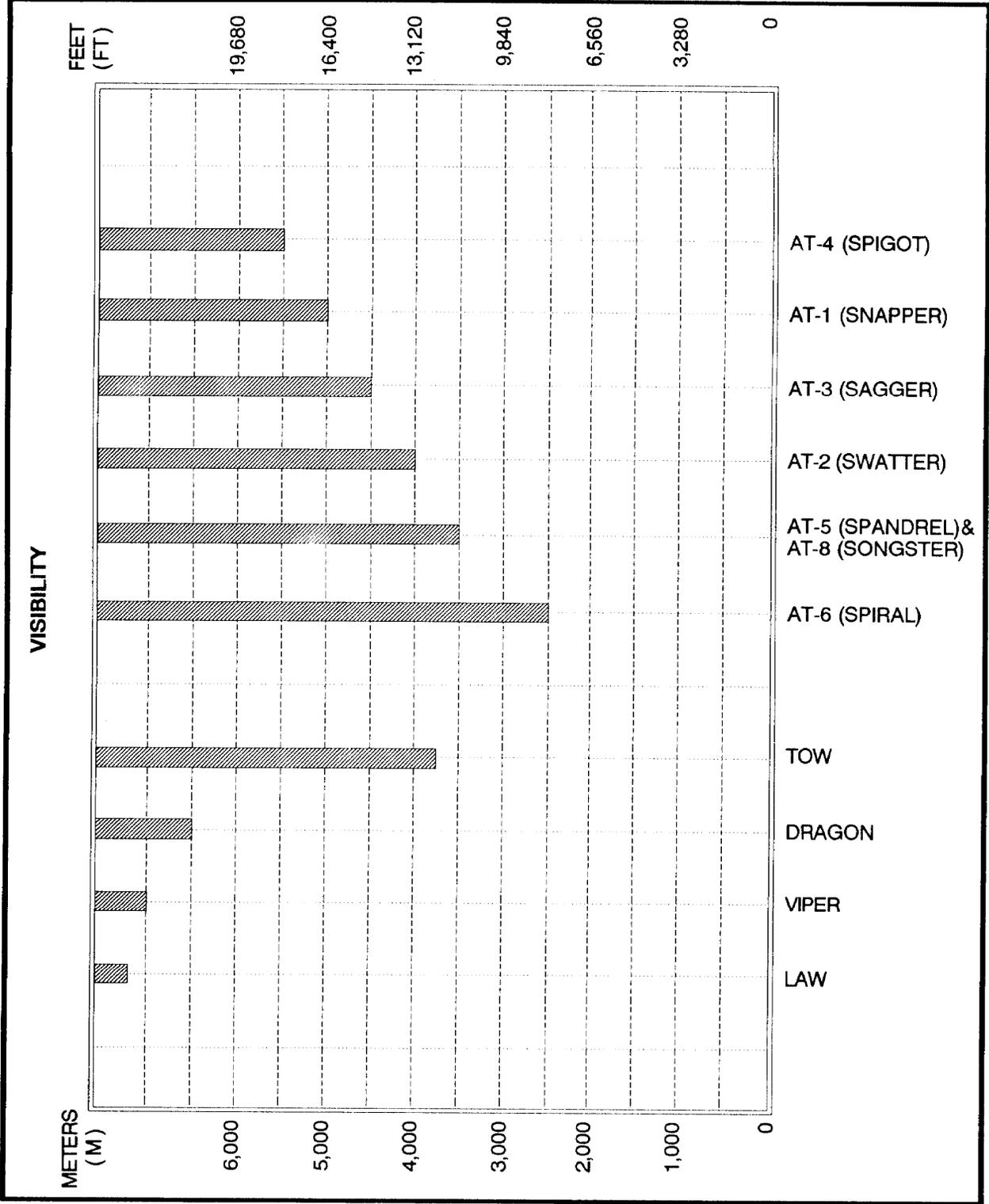


Figure N-2. Comparison between US and threat anti-tank guided missiles.