

## Chapter 5

# Supply in Tactical Operations

Organizational Supply procedures are different in garrison than in a deployed situation. Procedures during tactical operations can vary based on the type of environment. Each class of supply may require different quantities or type depending on the environment where the unit is deployed. This chapter outlines differences in supply procedures and how environmental differences can change quantities and amounts of the differing classes of supply.

5-1. **NIGHT OPERATIONS.** Night operations affect the resupply of all classes of supply, especially Classes I and III. Class I supply points and field kitchens must operate at night. Night vehicle use tends to increase idling and use of lower gears, thus increasing POL requirements. As a rule, demand increases for luminous paint and tape, engineer tape and stakes, shelters, night vision devices, flashlights, all batteries, infrared filters, red-lens goggles, replacement bulbs, and chemical light sticks.

5-2. **NUCLEAR, BIOLOGICAL, OR CHEMICAL WARFARE.** Under conditions of NBC warfare, weather, terrain, and weapons all impact supply operations. Commanders should use terrain for cover and concealment and to disperse the force. They should maintain sufficient stocks of NBC detection supplies, MOPP suits, water, and decontamination equipment. The rate of decontamination varies with time and the weather. Weather factors include precipitation, humidity, wind, and sunlight. Requirements for Classes I, II, VI, VIII, and water are much less predictable than usual. More petroleum, especially JP8, is consumed. More time is needed for LOGPAC resupply, casualty treatment, and on-site repairs. Field tests have shown that CSS operations were seriously degraded in NBC environments because of the following:

- Rate of travel was slower.
- Engines ran longer and idled more.
- Loading times were greater.
- Initial diagnosis of equipment failure was incorrect.
- Setup of unit Class III points required more time..

- Cover and protection of ammunition were significantly degraded.
- There was unsatisfactory performance in decontamination of equipment before initiating repairs, and there were reduced safety practices
- Fewer supply requests were completed.

Enemy use of NBC weapons increases delousing and maintenance requirements and the need for Class IX. Contamination may render equipment and supplies temporarily or permanently unusable. More details on NBC operations are in FM 3-3, FM 3-4, FM 3-5, and FM 3-100.

5-3. **JUNGLE OPERATIONS.** Jungle operations are affected by terrain, weather, and vegetation. Traffic and security problems increase. The transportation network may require resupply by pack animals, human portage, helicopters, and airdrop. US forces in jungle operations may be at the end of a long line of communication. Logistics operations must be done as far forward as possible to take advantage of the security offered by combat units, to cut road movement, and to reduce response time. Unit distribution is the norm. High temperature, humidity, and rainfall cause rapid rusting of weapons and equipment; deterioration of clothing, boots, canvas, and rubber items; weakening of batteries; and corrosion of electrical connections. Lenses and dials fog up rapidly. Frequent weapon cleaning and oiling are required. The terrain makes aerial resupply common. Its responsiveness allows combat trains to stock less supplies. Thus, combat trains may consist only of medics, a maintenance element, and emergency resupply of Class III and V supplies. The field trains would have subsistence, POL, vehicles, ammunition, an aid station, maintenance elements, and water purification facilities. Trains should be far enough forward to respond quickly, but still have minimal enemy exposure. However, the predominance of aerial resupply may allow collocation of the combat and field trains in the brigade trains area. All trains should be near landing zones. Field, combat, and company trains should also be close to a road, river, or trail as an alternative LOC. New landing zones and supply routes may have to be constructed to meet these requirements. The prevalence of ambushes, mines, and infiltration requires securing both the supply routes and CSS convoys. More details on jungle operations are in FM 90-5.

- **Supply Routes.** Secure supply routes by clearing vegetation alongside roads and using day and night aerial and ground patrols. Locate rear elements along supply routes and have personnel clear, secure, and maintain the routes. Use scout dogs, minesweeping teams, and surveillance, target acquisition, and night-observation devices. Secure bridges and large culverts which cross supply routes.

- **Convoys.** Secure convoys with ground and air armed escorts using airborne forward observers and forward air controllers. Conduct counter-ambush training. Prepare vehicles for movement. Put at least two layers of sandbags on cab and cargo area floors.

5-4. **URBAN OPERATIONS.** Urban areas have the advantages of cover, concealment, and adequate road networks. They sometimes have operable utility services, airfields, railroads, waterways, and underground passageways. CSS units should use existing facilities and should be dispersed throughout built-up areas to reduce vulnerability to detection and attack. Urban areas require a greater emphasis on fire protection and security against attack, sabotage, and pilferage of all classes of supply. Communications are hindered by the extremely short range of tactical radios in built-up areas. An increased emphasis is put on unit distribution. Forward delivery of supplies may be more difficult due to refugees. They may be panic-stricken and infiltrated by enemy agents and sympathizers. Obstacles, rubble, mines, snipers, and ambushes may also hinder the forward delivery of supplies. Enemy capabilities may preclude much forward aerial resupply. Resupply may require using armed convoys, substituting lightly armored vehicles for trucks, and portage by unit personnel. More details on urban operations are in FM 90-10-1.

- **Class I and Water.** Delivering prepared meals to forward elements may be extremely difficult. Forces which might become isolated should consider stocking an extra day or two of MRE, if it will not impede the unit's mobility. Water resupply may be difficult. Local sources must be tested, carefully monitored, and medically approved before consumption. The requirement for portable water containers increases for dispersed, small unit-level stockage, especially in defensive operations. Civil affairs relief efforts may increase demand for Class I and water.
- **Class III.** Tactical vehicles use less fuel due to increased unit distribution and dismounted operations. However, engineer and power generating equipment may use more fuel. Delivery difficulties may require an increased requirement for small, portable fuel containers.
- **Class IV.** Defensive operations require increased supply of barrier materiel when local materials and debris from structures (other than historical monuments, churches, mosques, temples, schools, orphanages, hospitals, and art, science, and public service buildings) are inadequate. Stockpiling sand for fire fighting in individual fighting positions is a priority.
- **Class V.** Attacking built-up areas may require MSR changes. Artillery and mortar ammunition consumption increases when using sustained isolating and interdiction fires. The proportion of time and variable time artillery fuses in basic loads may increase. Increased

consumption of demolition material, ammunition, smoke munitions, mines, hand grenades, and light antitank weapons is likely. Ammunition requirements are 5 to 10 times greater in urban environments than in field environments. Using ammunition caches in defensive positions is recommended.

- **Class VI.** Transportation priorities may limit Class VI availability. However, health and comfort packs should be supplied with LOGPACS.
- **Class VII.** Forward repair needs to be emphasized. Disabled equipment should only be evacuated to guarded sites along supply routes or to the combat trains.
- **Class VIII.** The isolation of forces and intensity of battle may increase Class VIII needs. Evacuation difficulties may increase requirements for first aid items. The disruption of civilian health services, food supplies, utilities, and sanitation services may sharply increase the risk of disease and epidemics. Local hospitals may be inoperable, and medical supply channels may be disrupted.
- **Class IX.** It may be necessary to stock high-use repair parts for weapons systems and tactical vehicles in unit trains. Controlled substitution may be required due to the inability for using aerial resupply.

5-5. **DESERT OPERATIONS.** The desert provides nothing to sustain and much to hinder a force. Units use more water and fuel. Units move faster and more often in the desert. Also, great distances between units stretch LOC. Thus, requirements for Class III and transportation support increase. Only tactical vehicles may be able to go off the few roads and only with reduced loads. The lack of significant terrain features hinders navigation. Also, the environment leaves trains and supply points exposed to the sun and sandstorms as well as land and air observation and attack. Vulnerability to attack requires wide dispersion. This increases the problems of command and control and security. Minimize stockage levels and off-vehicle stockpiling to enhance mobility. More details on desert operations are in FM 90-3.

- **Class I and Water.** Water is scarce in the desert. If water is unavailable locally, it must have a high transportation priority. Water resources are a prime enemy target. All units must continually watch for and report possible water sources to their headquarters. Sources include oases, dry wells, dry water courses, and open bodies of water. Only preventive medicine personnel evaluate water. The command surgeon determines potability. Soldiers cannot indefinitely consume less water than their bodies need. Temporary water rationing with

medical advice is possible. However, it can reduce combat efficiency. A suggested priority order for water follows:

- Drinking water.
- Vehicle and equipment cooling systems.
- Other personnel uses to include
  - Medical aid.
  - Cooking.
  - Cleaning food service equipment.
  - Personal hygiene.
  - Washing clothes.

Potable water must be used for drinking, personal hygiene, food preparation, and medical uses. All other requirements may be met with nonpotable water. Vehicle decontamination has a high priority. Daily forecasts should note the status of reserve water and rations.

- **Class II.** Soldiers need desert camouflage uniforms, tropical clothing, sweaters, sleeping bags, eye protection goggles, neck scarves, canteens, and hand tools.
- **Class III.** Rapid and frequent movement over great distances and difficult terrain increases the demand for fuel. The desert's heat, sand, and sandstorms increase the need for oils, lubricants, and filters. Fuel reserves should be divided between combat and field trains based on METT-TC. Sometimes fuel cans may be needed to apportion fuel, since sand may degrade a loaded fuel tanker's cross country capability. Cans, however, may create handling and noise problems. Class III requirements should be forecast as far in advance as possible.
- **Class IV.** Make maximum use of local materials. Sandbag use increases. Make requests for Class IV as soon as you know the requirements.
- **Class V.** Ammunition consumption is high because of excellent targeting and the need for extensive suppressive fires. The commander

may need to restrict use of some ammunition types. Battalion task force trains should have a one-day supply of ammunition and missiles for each of its vehicles. When trains are echeloned, this supply should be divided between the combat and field trains. The desert makes units quite vulnerable to air attack. Therefore, ADA units rapidly consume their ammunition stocks. A task force commander must ensure his ADA weapons are supplied with ammunition. Other task force vehicles may carry spare ADA ammunition.

- **Class VI.** Gratuitous health and comfort packs must be supplemented with extra sunblock and sunglasses.
- **Class VII.** PMCS must be conducted more often than normal due to exposure to extreme temperatures and sand.
- **Class IX.** The desert greatly increases maintenance requirements and the need for repair parts. This includes filter elements, water hoses and pumps, clamps, gaskets, oil and greases, seals, fan belts, ignition system parts, tires, wheel and sprocket nuts, wedge bolts, and spare caps for all liquid containers. Small, high-use items should be kept as far forward as possible. They may also be kept on fighting vehicles. The DS maintenance company contact teams, which may be with the task force trains, can carry heavier and larger items than unit maintenance vehicles. Sometimes Class IX items need to be flown to repair sites.

5-6. **COLD WEATHER AND MOUNTAIN OPERATIONS.** Details on cold weather operations are in FM 31-70 and FM 31-71. Details on mountain operations are in FM 90-6. Weather in mountainous regions is extreme. It varies depending on altitude, storms, and wind exposure. Fog clouds that can severely reduce visibility and mobility are common. Rain, snow, and ice can hinder operations by obscuring, degrading, blocking, or damaging bridges, roads, and trails. Landslides, flash floods, and avalanches are common. The nature of mountain warfare means that LOC are limited and difficult to maintain and secure. Tactical radios can have reduced operating ranges in mountainous terrain. Airfields, good roads, and railroads are not always readily available. A footpath may have to substitute for a good road. Mountainous terrain and weather constrain CSS units. At the same time, they offer enemy airmobile and infiltration forces opportunities to attack, ambush, mine, and set up roadblocks on supply routes. Thus, CSS units may have to enhance their mobility and dispersion while aggravating their command and control and local security difficulties. Therefore, they should emphasize security and move support as far forward as possible. Throughput distribution using aerial resupply is the preferred method of distribution in mountainous terrain. Heavy wheeled vehicles with tractor trailers can rarely negotiate narrow, unimproved, mountain roads or move cross-country over rugged terrain. The various classes of supply are affected differently by cold weather.

- **Class I.** The rigors of mountainous terrain increase caloric requirements for soldiers. Planners should plan for increased potable water usage.
- **Class II.** Operators require cold weather clothing and equipment. Examples include--
  - Tire chains.
  - Waterproof matches in waterproof boxes.
  - Winter camouflage and extreme cold weather clothing.
  - White rucksack and web gear coverings.
  - Extreme cold weather sleeping bags.
  - Skis, sleds, and snowshoes.
  - Lip balm, sunblock, and windburn prevention cream.
  - White and loam-colored camouflage face paint.
  - All-weather lubricants.

Use all-weather lubricants on all small arms below 0°F. First, strip weapons completely. Clean them with a dry-cleaning solvent to remove all lubricants and rust prevention compounds. Use white nonglossy paint for camouflaging vehicles, weapons, and equipment. As the length of arctic nights increases, so does the need for flashlights, batteries, and light sticks. Soldiers in mountainous terrain need rope and other climbing equipment. Class II items must be replaced more often.

- **Class III.** Road net limitations reduce ground fuel consumption and increase aviation fuel requirements. Vehicles may not be able to get to tank and pump units. Fuel cans may be needed. Very cold weather can cause some increases in POL use. More antifreeze and gas treatment items are needed. Engines idle more to reduce their number of starts. Seal POL containers to keep out moisture. Do not mix various grades of engine oil or gear oil. Also, do not mix standard and arctic grades of antifreeze. Allow for expansion when filling radiators.

- **Class V.** Ammunition consumption increases in mountainous terrain. Weather and terrain restrict visibility, making it more difficult to adjust artillery and mortar fire. Because of snow, heavy forests, and rugged terrain, the bursting radius of ordnance is small. Mortars expend more ammunition in mountains. Due to their portability and high-angle trajectory, mortars provide the most responsive indirect fire to cover the dead space common at mid and short-range distances. Cold temperatures cause the 4.2-inch mortar to waste more short rounds. Because snow reduces the effect of contact-detonated ammunition, demand for VT-fuse-type ammunition increases. Mountain operations may require portage by unit personnel. Store ammunition in its original container, under a tarpaulin, above the ground, and on dunnage. Mark ammunition so it can be found should snow cover it. Clean it of snow and ice before repacking. Clean magazines of all oil, snow, ice, and condensation. Check them often. Keep magazines, drums, containers, and components closed to prevent condensation. As a rule, keep ammunition at the same temperature as the weapon. Unpack only what is immediately needed. Protect variable time fuses from low temperatures. Their performance degrades below -20°F.
- **Class VII.** Sniper rifles are useful in mountains because of their long effective range. Units with more observation posts and separate positions may need extra radios and GPS, support radars, and binoculars. It is difficult to evacuate equipment. Do so only to where repairs can be made, often the combat trains area. Transportation limitations require emphasizing maintenance and repair instead of replacement of major end items.
- **Class VIII.** Demand for medical supplies may increase. The incidence of break and crush injuries may increase in cold weather or mountain operations. Cold-weather-related injuries and sicknesses may increase. Class VIII must receive high movement priority and go by ALOC when possible.
- **Class IX.** Repair parts consumption increases. Isolated operations require increased stockage at each echelon, but only for combat-essential items. This includes tires, tie rods, transmissions, brake shoes, tracks and pads, final drives, winch parts, fuel pumps, spark plugs, and fuel injectors. In operations from -10°F to -40°F many problems occur. Batteries should be stored dry because they will lose their electrical charge and a low acid level will cause the battery to freeze in extreme cold. Seals and rubber items become brittle and crack or break in extreme cold. Tires become rigid causing flat spots or sidewall cracks. Cooling systems can freeze if not adequately protected. Ice clogs fuel filters and lines. Soldiers should check fuel filters as often as every four hours. When the liquid freezes in the



filter, the unit must be disassembled and cleaned of ice and other residue. Brittle metal can cause suspensions to fail. Driving over downed timber can harm undercarriages. Snow, ice, and moisture in weapons and rapid warming from extreme cold with cyclic firing rapidly reduce the temper of weapons and cause breakdowns. Weapons must be kept clean and dry. They should be warmed up slowly.

5-7. **SUPPLY IN ARCTIC CONDITIONS.** When possible, locate supply areas near roads and terrain suitable for airstrips or DZs. Heated storage is needed for medical supplies. Continual, all-around security is needed. Higher ground has better drainage in warm weather and is easier to defend against attack. Lower ground has more wind shelter and cover and concealment. If the tactical situation allows, bivouacs should be on high ground and in woods. Trees offer fuel, construction and camouflage materiel, and shelter from wind. Arctic regions have quick, drastic temperature changes. These areas often lack roads, railroads, or other transportation networks and facilities. High winds, snow, ice, and mud hinder mobility. Visibility is usually either very good or very poor. Fog, wide and extensive cloud cover, long periods of winter darkness with heavy overcast, mirages, and the absence of shadows limit visibility. Sound conditions can vary greatly. Sound carries better over hard-crusting snow or ice and at higher altitudes. A conversation could be carried on at a distance of 1 1/2 miles. Other conditions, such as soft snow, may silence the sound of an aircraft engine at full throttle at 1/2 mile. Arctic conditions require strict light, fire, and sound discipline.

- **Equipment.** Low temperatures degrade the strength, elasticity, and hardness of metals and reduce their impact resistance. Machine guns and mortars break more often due to the lack of give of solid frozen ground to weapon recoil. Leather, canvas, and rubber lose pliability and tensile strength. Rubber, rubber compound seals, and O-rings can warp and break. Plastics, ceramics, and other synthetics are less ductile. The operating efficiency of items composed of moving parts and different types of materials declines. Glass breaks easily if exposed to a sudden temperature change. Wrap optics in heavy blankets before entering warm areas so warming will be gradual. Keep them wrapped at least four hours to prevent moisture damage. Keep sighting equipment at outside temperatures to avoid fogging. Paint tends to crack in extremely cold weather. Gasoline vaporizes making combustion more difficult. Unburned gasoline dilutes crankcase oil causing sludge formation. Oils thicken and hinder engine lubrication and starting. Grease becomes hard and dysfunctional. JP8 thickens. This makes vehicles hard to start and operate. Personnel should check the vehicle operator's manual for operation in cold weather before starting and operating under unusual conditions.
- **Repairs.** Cold weather increases the need for repairs at the same time that it slows and hinders them. Equipment must be thawed out before it can be repaired. Carbon monoxide gas or vapors must be exhausted from warm work areas. Mechanics are encumbered by cold weather

clothing. Gloves and mittens degrade the sense of touch. Thus, units require great emphasis on vehicle maintenance, command supervision, and proper procedures for prestarting, starting, warm-up, operation, shutdown, cool down, and stopping. Maintenance manuals must be followed carefully.

- **Refueling.** Multilayer clothing and liquid fuels, such as JP-4 and MOGAS, produce a lot of static electricity in cold weather. Fuel containers and other refueling equipment and personnel must all be electrically bonded to each other. Grounding to the earth may be impossible due to permafrost. Any difference in electrical charge among equipment, fuel containers, and refueling personnel must be equalized or bled off. Open the fuel container and begin refueling only then. Use proper POL dispensing equipment to avoid spills. Store fuel in outside tents away from heaters.
- **Chemical Warfare.** Warm the protective mask to room temperature every 24 hours. Carry the mask, chemical agent detector kit, and nerve agent antidote kit under outer clothing. While sleeping, keep the mask in the sleeping bag to keep it warm and maintain accountability for it. Inspect outlet and inlet valves for icing and cracks after use.
- **Carbon Monoxide Hazards.** Enclosed areas subject to carbon monoxide concentrations need monitoring. They need testing and inspection at least every three months. Driving over rough terrain can cause exhaust system leaks. Test all vehicle passenger compartments for carbon monoxide at least quarterly. Immediately deadline vehicles that fail. Never sleep in vehicles with the engine or heater running. Keep windows open slightly when using heaters.
- **Driving.** The hazards of ice, snow, and cold temperatures magnify driving hazards. Make sure all drivers are trained for winter driving. Never stop in the center of a road or on an unchecked shoulder. Snowdrifts may cover ditches. If you have to bump or push a tracked vehicle to break it loose from snow or ice, disconnect the forward drive first. Never overcrowd vehicle cabs. This cramps the driver and hinders his vision and maneuverability. Always check the vehicle at halts for problems. Keep all lights and windows clear of ice, snow, frost, and fog. Use lights whenever visibility is reduced only as the tactical situation allows. Increase the distance between vehicles when exhaust causes ice fog. Use guides for backing and finding trails in deep snow. To maintain control of your vehicle in ice and snow, take the following measures:
  - Adjust speed and vehicle intervals to driving conditions. (Stopping distance can be 3 to 11 times greater than normal)

- Brake by slowly releasing the accelerator and then braking with a pumping action. (Jamming brakes causes locking, skidding, loss of control, and longer stopping.)
- Use chains. Put brush and burlap under wheels.
- Keep pioneer tools on all vehicles to remove snow and cut brush. Avoid using neutral steer on fully tracked vehicles. Using neutral steer stresses and abuses the suspension, drive, and power systems.

5-8. **WATER SUPPLY UNDER VERY COLD CONDITIONS.** Soldiers should drink plenty of water. Dehydration is more common than cold weather injuries during field work.

- **Locating Water.** Use an ice auger or ax head welded to a steel bar to locate water and check ice depth. Water points should be near swiftly moving water. Drain water supply equipment immediately after use when a heated shelter is not used. However, if water points are unavailable, use glaciers for water and ice sources. Using water from running streams or lakes is preferable to using the fuel needed to melt snow or ice. It takes 17 cubic inches of uncompacted snow to yield only 1 cubic inch of water. A hole may be cut through a stream or lake ice to get water. Cover the hole with a poncho or board and loose snow to prevent refreezing. Open it frequently in very cold weather. Mark water holes with a stick to avoid obscuration by drifting snow.
- **Obtaining Water from Snow and Ice.** If snow or ice must be melted, take it from areas uncontaminated by humans, animals, or toxins. Use ice, the most compact snow in the area, or other snow in that order. Fresh sea ice appears milky and is angular in shape when broken. In some areas with weak current and tidal action, just the top layer of sea ice may become desalinated. This may be as much as 100 centimeters or 40 inches. Do not burn the pot when melting snow and ice. Put an inch of water in the pot. If water is not available, put the pot near the heat source and carefully melt some snow. Gradually add snow or ice, compact the snow in the pot, and stir occasionally. Store snow or ice to be melted just outside the shelter. Allow canteen space for ice expansion.
- **Purifying Water.** QM units must procure, treat, and distribute medically approved potable water to units as in any other environment. No other source of water can ever be assumed to be safe to drink. In an emergency, when water cannot be obtained from a medically approved QM source, the unit commander must ensure that water is obtained from the cleanest source available and is always treated by medically

approved methods before to consumption. The unit field sanitation team can assist the commander in performing and training soldiers in these methods. Boiling, the use of water purification tablets in canteens, and the use of calcium hypochlorite in large storage containers such as 5-gallon cans, pillow tanks, and 400-gallon trailers are the medically approved methods at the unit level. Water with lots of sediment should be allowed to settle or be filtered through tightly woven cloth before treatment by any of the above methods. In an NBC environment, none of the above unit-level methods will remove chemical or radiological contamination.

- **Transporting and Storing Water.** Water for small groups may be stored in 5-gallon containers. Sled-mounted, 250- to 300-gallon tanks are a larger option. Use immersion heaters to prevent freezing of water supply tanks. Take extra precautions when temperatures are below -30°F. When roads are hazardous in snow and ice conditions, use tracked vehicles for transporting water. When transporting 5-gallon cans, fill them only 3/4 full. Agitation will hinder freezing. Store cans off the floor in heated shelters.