



CHAPTER II

CLASS III (BULK)

INTRODUCTION

The Army's ability to move and fight depends upon its supply of fuel. The QM mission is to provide the user with fuel that meets specifications for the intended use by the most effective, efficient, and safest method available. Any interruption in the flow of fuel could have a devastating effect on the Army's ability to dominate the conflict.

RESPONSIBILITY

Today's military consumes large quantities of petroleum products in support of combat operations. To carry out the QM mission, specific channels of responsibility have been set up to ensure an uninterrupted supply of petroleum. They are discussed below.

The Theater Army Commander

The theater army commander provides broad planning guidance for Army petroleum support, supervises current operations, and conducts long-range planning. To meet petroleum specifications set at DOD level, products undergo quality surveillance and control from the time they are procured until they are used. This includes recovering, upgrading, downgrading, or disposing of fuel products.

The Joint Petroleum Office (JPO)

The JPO is a staff element of the unified commander. It provides staff management of petroleum at the theater level. Subarea petroleum offices (SAPOs) may be established at the

subunified command level to provide in-country staff responsibilities for all services.

The TAMMC

The TAMMC is the theater petroleum manager for both bulk and packaged petroleum products. It also collects long-range petroleum requirements for the theater.

The Petroleum Group

The petroleum group is the principal organization for bulk fuels distribution at the operational level. The group is responsible for the detailed petroleum distribution planning. This becomes the basis for design, construction, and operation of the distribution system for the theater. The group is also responsible for quality surveillance (up to full specification testing of petroleum products).

The Petroleum Pipeline and Terminal Operating Battalion/Company

These units operate and maintain petroleum distribution facilities required to support the theater petroleum mission. A pipeline battalion supervises from two to five pipeline companies. The petroleum pipeline and terminal operating company operates about 150 kilometers (90 miles) of military multiproduct pipeline and related terminal facilities. It stores and distributes bulk fuels on a 24-hour basis. Construction of military pipelines is an engineer responsibility. Pipeline and terminal operating units aid engineer units in installing tactical pipe sections to replace

damaged sections and operate and maintain pipelines. The battalions supervise the operation and maintenance of a military petroleum distribution system. The system may extend for up to 450 miles of pipeline.

The Petroleum Supply Battalion

This battalion provides petroleum GS at the operational and tactical levels of logistics. The mission of the petroleum supply company is to receive, store, and transfer bulk petroleum to divisional and nondivisional DS supply and service units on a 24-hour basis. These units set up operating areas for the receipt, storage, and issue of POL. In an undeveloped theater, the petroleum group, under the COSCOM, commands and controls the petroleum supply battalions.

CONCEPT OF OPERATIONS

The basic petroleum operating concept is to keep storage tanks always full. The availability of fuel depends on the location of the theater of operations. In industrialized areas, initial supplies will be obtained locally if possible. Subsequent supplies will be brought in by tanker ships. Major portions of the petroleum distribution system, such as storage tanks and pipelines, may already be in place. It may be necessary to renovate the existing system or supplement it with hose lines and collapsible tanks. In undeveloped areas, initial supplies of fuel are brought in by tanker ships. The Army will provide its own integrated distribution system using different modes of transportation. The QM mission also includes providing fuel to all inland forces, to include the Air Force, Navy, and Marine Corps and, if required, allied forces. QM petroleum liaison teams and host-nation support teams are often used for coordination.

Developed Theater

Bulk petroleum that is not locally procured is received from ocean tankers at marine petroleum terminals in a developed theater. It is then

transferred by pipeline to the tank farms. Large-scale combat operations may justify construction of welded or coupled pipelines to move bulk fuel from the operational storage locations to the tactical level. The pipeline system extends as far forward as practical, usually into the corps rear area. Assault hose line extensions carry the product into corps storage sites. Air bases and tactical airfields are serviced by the pipeline system when possible. Hose lines are used to supply smaller or temporary large-volume requirements. Bulk petroleum makes up over 50 percent of the tonnage moved in the theater of operations; therefore, pipelines significantly reduce other transportation requirements. The system is supplemented by other means of bulk delivery, such as barges, rail tank cars, tank vehicles, and aircraft. Branch lines are used where practical to supply major users from the main pipeline. Hose lines are used as temporary means of supply to general support suppliers. Tank vehicles, rail tank cars, and hose lines are used to move bulk petroleum products from GS to DS echelons. Bulk transporters normally move bulk fuel from the DS echelon to using units. Using units are authorized organic petroleum equipment to receive the bulk products and to refuel their vehicles and aircraft. In a developed theater, the petroleum group commands and controls the petroleum operating battalions. If the group works for the TAACOM, then the EAC petroleum supply battalions work under the petroleum group.

Undeveloped Theater

Bulk petroleum supplies are received in the undeveloped theater from the Navy's offshore petroleum discharge system in over-the-beach operations. It is the Navy's responsibility to provide fuel to the high water mark on the beach. The Army then takes responsibility for the fuel in tactical petroleum terminals. Hose lines initially carry the product inland. Transition to a coupled pipeline should be made as soon as practical. Under emergency conditions, fuels may be airlifted by Air Force transport to resupply ground

forces. Coastal tankers may be used to move product from deep-draft tankers anchored offshore to mooring in the water at wharves. Bulk fuel is transferred by hose lines to tank farms made up of collapsible storage tanks. Maximum use is made of pipelines, dock manifolds at ports of entry, tank farms, and other storage facilities for distribution of bulk fuel products through terminals and pump stations. To ensure continued effective support under all terrain and tactical conditions, rail, motor, air, and water transportation are normally used with pipelines. As soon as practical, the COMMZ, corps support, and division support areas will be formed. In the early stages, the theater may consist of only a division support area, which later expands to add the corps rear area. The operational level may never be formed, depending upon the duration and geographic expansion of the operation. In that case, the strategic level must be directly linked to the tactical level. Bulk petroleum supply is generally moved from base terminals and rear storage locations to the tactical level by hose lines. Coupled pipelines are used when the beachhead is expanded. Tactical air bases are connected to the main hose line or pipeline and to the appropriate tank farm initially by hose lines. The pipeline and hose line system extends as far forward as possible, usually into the corps rear area. Hose lines offer the most rapid and easily deployed system. When the hose line system exceeds 10 to 15 miles, a more permanent system is required. The initial system will consist of the tactical petroleum terminal, portable 350- and 600-gallons per minute (GPM) pumps, hose lines, and collapsible tanks. As the beachhead is expanded and the theater expands, rigid tactical pipelines, bolted storage tanks, and fixed pumping assemblies will be required. Other means of delivery such as tank vehicle, barge, and aircraft will be incorporated into the system as required. In an undeveloped theater, the petroleum group is under the command and control of the COSCOM. The group commands and controls both the petroleum operating and supply battalions.

PLANNING CONSIDERATIONS

DA, through Army regulations, sets supply levels for the theater army for days of supply. The theater army commander sets the tactical and operational levels. Supply levels at all echelons consider the needs of all users which include the Air Force, Navy, Marine Corps, and allies, when designated. For planning purposes in an undeveloped theater, a minimum of 15 days of supply should be established.

Supply Levels

At the unit level, the basic load is directed by the commander. The division should maintain one DOS at the DS level. In the corps, one DOS of DS storage and four DOS of GS storage is maintained. This equates to a total of five DOS. In the developed theater, a minimum bulk fuel supply of 30 days should be established as the theater supply level.

Petroleum Requirements Computations

An important planning element for petroleum support is requirements computation. Accurate fuel requirements are essential in designing an effective fuel distribution system. Requirements are needed for all consumers by location and for the appropriate time period. All consumers must estimate their own fuel requirements. To compute or determine petroleum requirements for a unit, several methods are used. These methods are used alone or in combination. The choice of method depends upon time, distance, weather, geography, personnel, and type of mission.

The historical data method. This method uses information from previous after-action reports of a similar mission. This is the most accurate method of measurement, but only when the terrain, weather, organizational strength, vehicles, and equipment remain constant.

The gallons-per-man-per-day method. This method is used in the early planning stages when no definite information is available on the number and types of vehicles. This method is seldom used below theater army level and never below corps

level. However, once established for a given theater, the estimated requirements can be used for requisitioning by division or separate brigades. This method is used only as a guide. It is not a substitute for exact consumption data.

The equipment consumption method. This method is used to compute the equipment consumption requirements for a particular unit. Information must be available on the type and quantity of equipment (density) in the organization, amount of fuel consumed by each type of equipment (consumption rate), and the usage rate. The consumption rates for some equipment may be high. For example, smoke-generator units consume 55 gallons of fog oil per generator per hour.

The fuel consumption unit method. North Atlantic Treaty Organization (NATO) allies use this method (employing a standardization agreement (STANAG)) for calculating consumption. The fuel consumption unit is the quantity of fuel required to operate a given unit under average conditions.

The combat profile method. This method is used for combat vehicles only, and it is the second-most accurate method of determining petroleum requirements. It produces an accurate forecast of the consumption rate and is based upon hourly usage factors. This method is a refinement of the equipment consumption method. It uses actual projected hours instead of tables.

Communications

Long-range communications systems are required in petroleum operations. FM 10-67 outlines pipeline communications requirements. Effective, secure communications are required by the petroleum group, the petroleum pipeline and terminal operating battalions, the petroleum supply battalions and companies, and other supported services. Communications systems must be compatible with those used in ship-to-shore operations and by supported air bases.

JOINT PETROLEUM OPERATIONS

Each service provides bulk petroleum support to its own forces. The Army provides GS POL

support to the other services when requirements exceed their capabilities. GS (petroleum) is defined as developing and maintaining equipment to support the overland distribution of bulk petroleum to all services. This includes providing the necessary force structure to construct, operate, and maintain overland petroleum pipelines. In some areas of operation the Army will not be the predominate service. In those cases GS will be provided by that service determined by the unified commander to be the predominant service. In addition to those responsibilities which must be performed by all services, there are others that are service-peculiar. These are listed below by service.

Army

The Army must maintain a force structure capability to provide bulk petroleum support to the Army and GS to the other services. It must develop and maintain equipment to support the overland distribution of bulk petroleum to all services. This includes providing the necessary force structure to construct, operate, and maintain overland petroleum pipelines. In an undeveloped theater, this also includes providing a system that transports bulk petroleum inland from the high-water mark of the designated ocean beach. It must also manage the overland distribution of bulk petroleum in a theater of operations. In areas of operation where the Army is not the predominate service, GS will be provided by that service determined by the joint force commander to be the predominate service.

Air Force

The United States Air Force (USAF) must maintain a capability to provide bulk petroleum support to USAF units. In support of joint operations, it must provide the Army component with any specific general support requirements.

Navy

The United States Navy (USN) must maintain a capability to provide bulk petroleum support to

its afloat and ashore forces. In support of joint operations, it must provide the Army component with any GS requirements. It provides for the delivery of bulk petroleum to the high-watermark for all services in a theater of operations. It constructs and operates coastal-based terminals and facilities that provide over-water bulk petroleum shipment to US sea- and land-based forces of all services. It must plan for petroleum marine terminal facilities and loading capability to allow efficient use and rapid turnaround of the largest tankers expected to be available and economically feasible for use in military bulk petroleum supply operations.

Marine Corps

The United States Marine Corps (USMC) must maintain a capability to provide bulk petroleum support to USMC units. In support of joint operations, it must provide the Army component with any specific GS requirements. It must also develop, operate, and maintain an expedient over-the-shore bulk petroleum distribution system.

DISTRIBUTION

The inland petroleum distribution system (IPDS) has been designed to meet any undeveloped theater petroleum distribution requirement. The four primary functional elements of an IPDS are the tactical petroleum terminal, pump station, pipeline set, and pipeline support hardware. The system consists of lightweight aluminum pipe with Victaulic quick-couplings, 800-GPM main-line pumps, 1,250-GPM flood and transfer pumps, 600-GPM hose line pumps, and the bulk fuel tank assemblies.

It is designed to meet the Army's need for a rapidly deployable, high-volume pipeline system. The installation, operation, and maintenance of the pipeline are QM responsibilities.

In the heavy division, consumers will come to a petroleum supply platoon and pickup fuel. See Figure 11-1 (page 11-6). The brigade S4 forecasts fuel requirements and forwards them to the DMMC. The DMMC, in turn, passes its forecasts

to the COSCOM. The COSCOM provides the petroleum supply battalion the unit's allocation, priorities, and projected daily requirements to be pushed forward. The petroleum supply battalion directs the petroleum supply company (GS) to resupply the supply points using tankers from the transportation medium truck company (petroleum) if required. One of the supply points could be a refuel on the move (ROM) site. The primary purpose of ROM is to ensure that the fuel tanks on all combat and fuel-servicing vehicles are topped off before they arrive in the unit's tactical assembly area. A ROM system consists of enough hose connections, fittings, valves, and nozzles to operate a four-to eight-point refueling operation using 5,000-gallon tankers, HEMTT refuelers, or other mobile bulk fuel sources. ROM operations will normally be conducted from behind the division rear boundary to the rear of the brigade rear boundary. Although ROM may be configured in many ways, a ROM kit has been developed from existing hardware that will allow eight-point refueling from a 5,000-gallon tanker. In the light division, all fuel will be throughput to the BSA (for JP-4, whenever the division Class III officer and the aviation brigade S4 determine it should be delivered).

The petroleum supply battalion provides requirements for resupply through the COSCOM and TAACOM to the Director of Bulk Fuels at the TAMMC. The TAMMC Class III section passes requirements to the theater petroleum supply group. The petroleum group directs the petroleum pipeline and terminal operating battalions and transportation medium truck companies (petroleum) to resupply fuel forward to the petroleum supply battalion in the COSCOM and TAACOM area of operations using all distribution modes available, such as pipeline, hose line, barges, rail tank cars, and tank trucks.

The HEMTT tanker aviation refueling system (HTARS) is a kit that contains enough hose, fittings, and nozzles to expand the HEMTT tanker's capability to hot refuel four helicopters at the same time by using the on-board fuel-servicing pump.

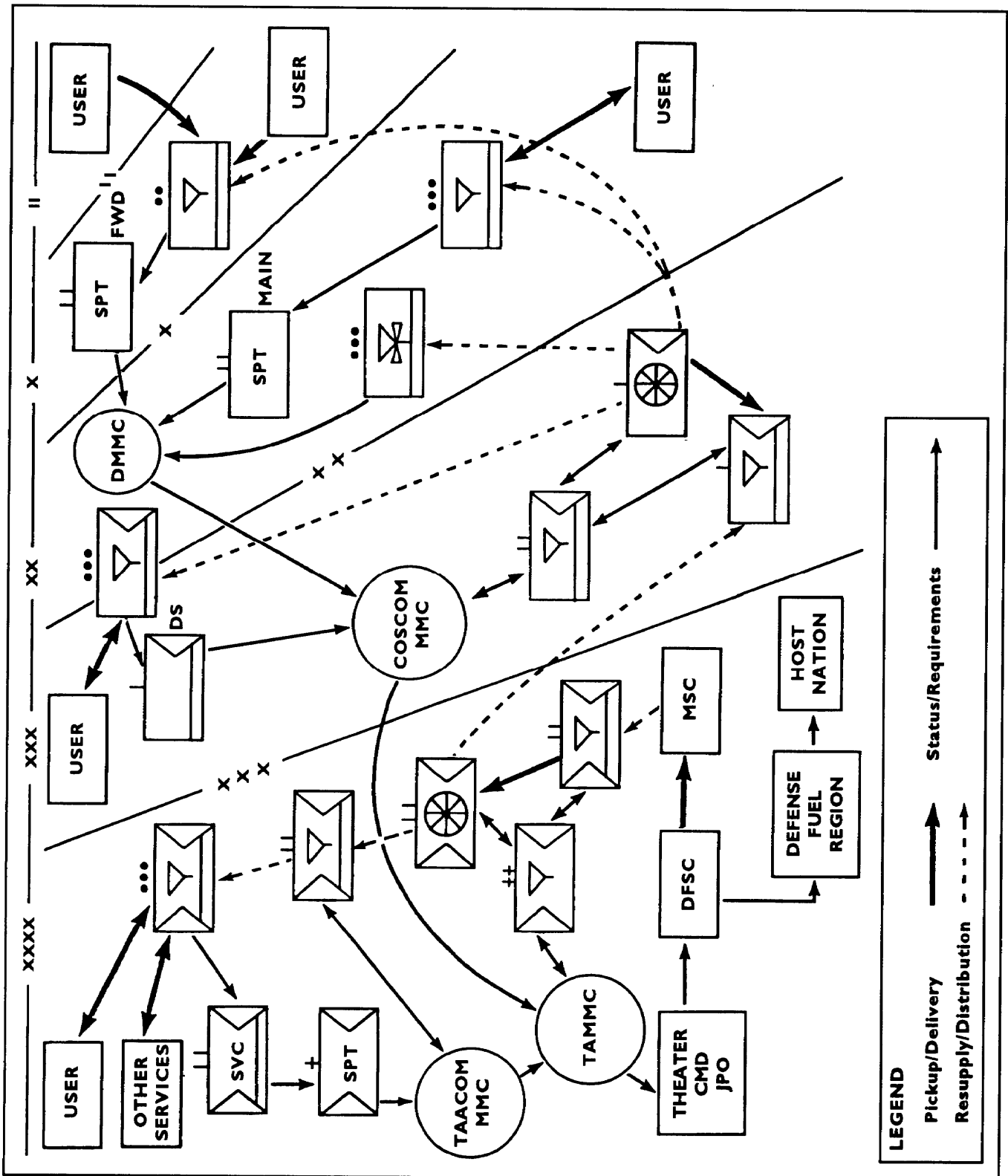


Figure 11-1. Petroleum distribution in a theater of operations

The TAMMC sends the theater Army resupply requirements to the JPO in the J4 office at theater headquarters. The JPO receives Army, Air Force, Navy, and Marine Corps fuel requirements. It combines them and forwards the requirement to the DFSC. The DFSC arranges transportation of POL products to the theater of operations. The petroleum pipeline and terminal operating battalions of the petroleum group receive the theater fuel requirements to support theater resupply.

SAFETY

Safety is important in handling petroleum products. Because of their characteristics, they can present fire, vapor inhalation, and skin contact hazards. All safety precautions described in FMs 10-18, 10-67, 10-68, 10-69, and 10-71 must be followed. The hazards and vulnerabilities of petroleum products and their distribution systems are discussed below.

Fire Hazards

Many of the petroleum products used by the Army are very volatile, especially fuel. The right combination of vapors, oxygen, and a source of ignition can cause a fire or explosion that could kill or injure personnel and damage equipment. Use proper bonding and grounding procedures during all fuel-servicing operations. Do not permit smoking materials in or around refueling areas or low-lying areas where fuel vapors may collect.

Vapor Hazards

Avoid inhalation of vapors from petroleum products, especially fuel vapor. Always stand to the side of fuel hatches during operations. Be aware that fuel vapors collect in low-lying areas close to refueling points.

Skin Contact Hazards

Petroleum products act as irritants on the skin. Therefore, protect your skin and eyes. If a petroleum product is splashed in your eyes, flush them immediately with water. If they get on your skin,

wash the affected area with soap and water. When articles of clothing are soaked with fuel, wet them with water first before you take them off. If no water is available, take hold of a grounded piece of equipment before taking your clothes off to prevent sparks. If you get petroleum product in your mouth, flush it with water. Do not swallow the water. Seek medical attention at once.

Systems Vulnerabilities

Pay particular attention to the vulnerability of nonhardened fuel storage containers, such as collapsible tanks and drums and assault hose line. They can easily be ruptured by small arms fire and knives as well as direct fire. Therefore, make every effort to cover and conceal the tanks, drums, and hose lines when possible. Use proper spacing between tanks to lessen the chance of losing multiple tanks with a single round. Fuel is highly susceptible to contamination which maybe easily introduced into vehicles, storage tanks, pipelines, and hose lines. These contaminants may slow or halt fuel supply support. Since contaminants can clog filter/separators and enter aircraft fuel tanks, they may cause a plane to crash.

EMERGING CONCEPTS

Three emerging concepts are presented here. They are the arctic forward area refueling equipment (AFARE), the advanced aviation forward area refueling system (AAFARS), and the petroleum quality analysis system (PQAS).

AFARE

This system consists of an arctic forward area refueling system (AFARS) and an arctic fuel system supply point (AFSSP). The AFARE can be operated, stored, and transported under field conditions in very cold climates (to -60 degrees Fahrenheit). The system is basically the same as the present forward area refueling equipment (FARE) and fuel system supply point (FSSP) systems. The new system is designed for cold temperature use. The AFARS system can be operated in very cold climates (to -60 degrees Fahrenheit). Its main

function is to refuel “hot” helicopters rapidly during tactical operations in an arctic environment. The system consists of--

- a gas-turbine engine-driven, 200-GPM pump;
- a hose (constructed from polymers) that remains flexible at temperatures to -60 degrees Fahrenheit;
- 500-gallon, coated-fabric fuel storage drums;
- a 200-GPM horizontal arctic filter/separator; and
- 6-inch-diameter flexible hose for transferring exhaust-gas-heated air to the filter/separator to keep ice from forming.

The AFSSP will be used in the arctic and will serve as the bulk fuel receiving, storing, and issuing facility for continuous resupply of corps, divisional, nondivisional, and brigade units. It will be capable of issuing and receiving fuel to and from 5,000- and 7,500-gallon tankers, rail-cars, bladder birds, HEMTT tankers, and tank and pump units.

AAFARS

AAFARS will allow the refueling of four helicopters simultaneously at 50 GPM per nozzle. This will allow two AAFARS to support the aviation doctrine of refueling an attack helicopter company in less than 10 minutes, to include lead-in and take-off times. Current plans call for AAFARS to replace the current FARE in aviation units. Ground units will continue to use the current FARE.

PQAS

PQAS will allow the projection of mobile petroleum laboratory capabilities forward of the FSB. It is designed to take advantage of fuels of opportunity while providing the capabilities required for long-term small deployments. PQAS will take advantage of current and emerging technologies to reduce both the space required for equipment and the personnel needed to operate the system. It will include fax/modem capability and current communications to allow information flow both up and down the chain of command. It will be transportable by all military aircraft and vehicles having a cargo mission, thus ensuring its mobility.

RELATED DOCTRINE

A number of FMs cover doctrine or operational procedures related to petroleum operations. The more important of these are listed in Table 4-1.

Table 4-1. Publications related to petroleum and petroleum operations

Field Manuals	Topic
10-18	Terminal and pipeline operations
10-67	Petroleum supply
10-68	Aircraft refueling
10-69	Supply point equipment and operations
10-71	Tank vehicle operations
10-72	Laboratories and kits