

## CHAPTER 5

### TERMINAL OPERATING PLATOON

#### Section I. Platoon Overview

##### MISSION

The mission of the Terminal Operating Platoon is to receive, store, and issue multiple types of bulk fuel on a 24-hour-a-day basis. Also, the platoon will provide quality surveillance on the fuel it handles. This mission will normally be performed by two shifts with one hour overlapping at each shift change for continuity. Each tank farm section can operate a tank farm with storage of up to 250,000 barrels. The tank farms are connected by a pipeline and switching manifold so that one or more bulk fuels can be moved into, out of, and between storage tanks and tank farms as required.

##### ORGANIZATION

The Terminal Operating Platoon consists of the following sections: headquarters, two tank farms, and a storage and issue section. For more information on each of these sections, see Sections II through IV.

##### TERMINALS

There are no distinct plans for setting up a pipeline system with terminals. The theater commander may decide that two or more Petroleum Pipeline and Terminal Operating Companies should operate together. In this case, the pipeline system and terminals would be divided into districts for efficient operation and command and control. The following describes the types of terminals commonly found along a pipeline system.

##### Base

A base terminal is near the port of entry (Figure 5-1, page 5-2) and serves as the port of entry and the initial storage facility for bulk fuel in the theater. A theater may have more than one base terminal. A base terminal should have:

- Room for future expansion.
- Enough storage area to take in a full cargo of the largest scheduled tanker within a 72-hour period.
- A reserve storage of each type of fuel to be dispatched through the pipeline.
- Sufficient operating pipeline and manifold capacity to receive product from ocean tankers and dispatch fuels to rail cars and trucks and into pipelines simultaneously.
- Sufficient storage capacity to allow fuel that is received to settle at least 24 hours before it is pumped or issued to tank trucks or railcars.
- Access to a petroleum laboratory for quality surveillance needs beyond the capabilities of the platoon.
- Alternate facilities to be used in the event the base terminal is attacked. The alternate facility should be far enough away from the original that both couldn't be critically damaged in a single attack.

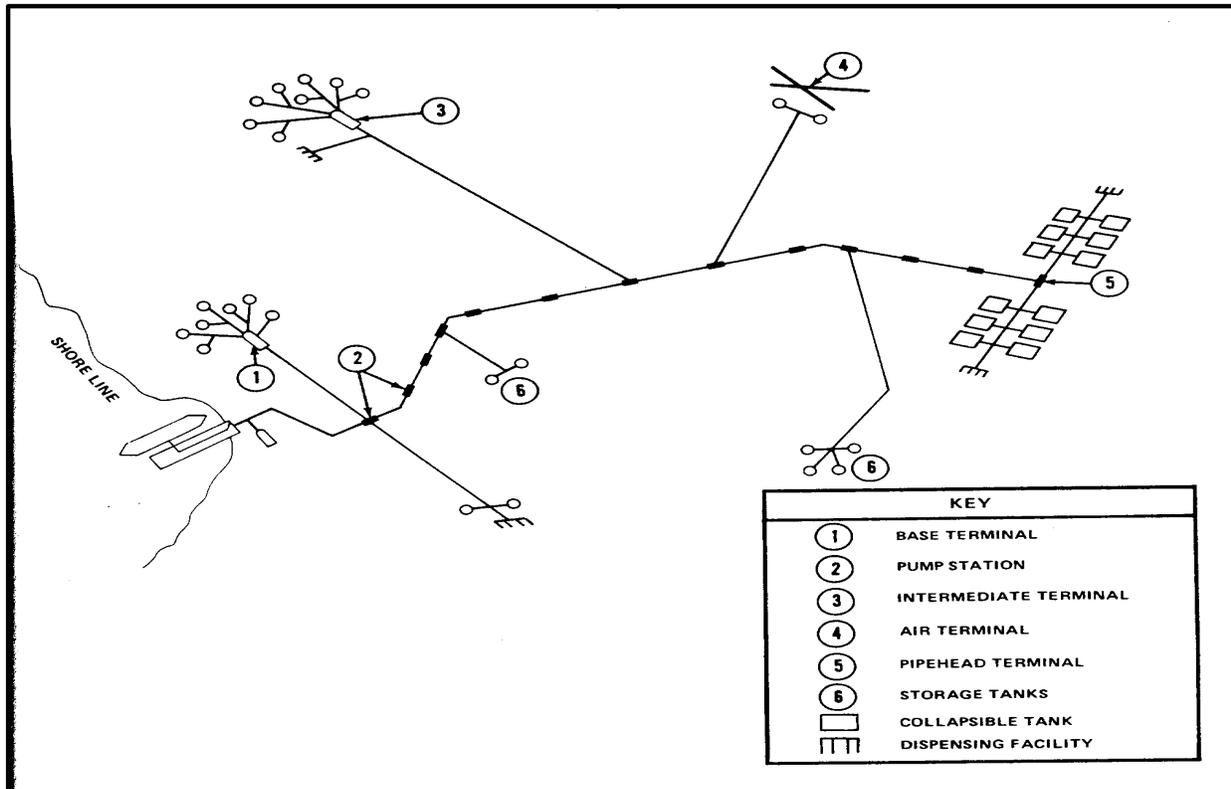


Figure 5-1. Petroleum terminals

### Intermediate

Intermediate terminals are set up when a pipeline extends over a considerable distance. These terminals may serve both as reserve storage and as dispensing and regulating activities. Usually tankage is provided for each type of fuel so that one can receive fuel while another product is being delivered to the dispensing facilities. These terminals are normally located where branch pipelines leave the main line. The tank capacity and placement of the terminals is normally determined when requirements are established for the theater.

### Head

The head terminal is the last terminal in a pipeline system. At the head, terminal fuel is dispensed from storage into tank trucks, rail tank cars, barges, tank vehicles, and other bulk fuel storage and distribution equipment. The hose line outfit may be used to extend the reach of the pipeline beyond the head terminal. The head terminal can be located off of a branch line to provide fuel for a specific need like an airfield with heavy fuel requirements.

### STORAGE TANKS

The type of tanks used will be determined by the availability of suitable commercial facilities. A theater in a developed part of the world may have adequate commercialized facilities available to meet military requirements. In this situation, the military might lease and operate the terminal or may augment the civilian work force with soldiers. The soldier augmentee's would provide oversight of the operation protecting US interests and assist the civilian workers with loading military vehicles. In an undeveloped theater, terminals would consist of tactical petroleum terminal and fuel units. In addition to the storage of theater reserves, tanks may be used to regulate the flow of product. When the pipeline system is being constructed, certain tanks can be set aside (usually at an intermediate terminal) to hold fuel temporarily. This is done to allow continued pumping upstream in the event of a breakdown down stream. These tanks are known as regulating tanks.

### **Steel Tanks**

These welded steel tanks are common in the commercial sector. They may have either fixed or floating roofs. Floating roof tanks are most often used with high vapor pressure fuels (MOGAS or JP-4) while fixed roof tanks are used for low vapor pressure fuels (diesel, heating oil). These tanks require little maintenance.

### **Underground Tanks**

Underground tanks may be of various types to include steel or concrete which will have a protective lining or coating. They may also be of natural materials such as a tank dug into bedrock.

### **Collapsible Fabric Tanks**

Collapsible tanks (or bags) are used as temporary site storage such as with the FSSP or when a unit is going into an undeveloped theater where the TPT is used. Collapsible bags may also be used to temporarily store fuel while hard wall tanks are being cleaned, repaired, or replaced. Collapsible tanks currently vary in size from 3,000 to 210,000 gallons.

## **PUMPS**

Pumps are the heart of the pipeline. While several different types of pumps may be used, a pump with different manifolds arrangements can be used for more than one function. While civilian facilities may use a multitude of different types of pumps including electric and automated pumps the TPT and IPDS rely on the 600-GPM pump.

### **Station Pumps**

Station pumps are used at the pump stations along a pipeline.

### **Booster Pumps**

Booster pumps are used in off loading tankers when there is a long ship-to-shore pipeline, a long line from the dock to storage, or where the terminal storage is located considerably above sea level. Ordinarily the tanker has pumps of sufficient capacity to push the fuel to the terminal storage tanks.

### **Flood and Transfer Pumps**

Flood (or feeder) pumps are used to provide suction pressure to the mainline pump stations. They are also used to push fuel through short branch lines to dispensing tanks. Transfer pumps are connected to the switching manifold of the tank farm to move large volumes of bulk fuel into, out of, and within the tank farm. These pumps can be used to:

- Transfer fuel from damaged or leaking tanks to other storage.
- Consolidate fuel from partially empty tanks
- Empty tanks to provide space for new fuel receipts which must be tested before it is mixed with the product on hand or issued.
- Blend different batches of fuel to uniform specifications.
- Relay tank contents to dispensing tanks.
- Load rail tank cars, tank trucks, and barges.

The 600-GPM pump included with the IPDS and TPT performs all of the functions of the three different types of pumps listed above.

### **SWITCHING MANIFOLD**

The switching manifold is an assembly of pipe, fittings, and valves that enables the simultaneous receipt and delivery of as many types of fuel as the tank farm handles. It is one of the most critical pieces of equipment in the entire system. The size of the manifold varies with the number of tanks in the tank farm, the number of different products handled, and the size of the servicing pipeline. The switching manifold may be used singly or in multiples.

## **Section II. Platoon Headquarters**

### **MISSION**

The mission of the terminal operating platoon headquarters is to supervise the receipt, storage, issue, and distribution of bulk fuels. The headquarters provides platoon administration and internal safety and security. They also inspect and perform quality surveillance on bulk fuel handled by the platoon.

### **PERSONNEL**

Effective operation of the platoon headquarters requires identifying key personnel and understanding their duties and responsibilities. Key personnel include--

Platoon Leader (Lieutenant, 92F). Directs and supervises platoon operations assisted by the platoon sergeant. Is responsible for--

- Planning the layout of major and critical pieces of equipment and section locations.
- Requisitioning major end items.
- Setting up SOPs for the platoon to include what to do in the event of an attack.
- Preparing training schedules and instructions.
- Issuing daily operations orders based on orders from the battalion operations section and the company product control section.
- Writing additional safety/environmental protection precautions.
- Ensuring records are maintained and that daily, weekly, quarterly, and annual reports are submitted correctly and on time.

Platoon Sergeant (E7, 77F40). Assists the platoon leader in directing and supervising terminal operations. Assumes responsibility of operations when the platoon leader is absent. Is responsible for consolidating all reports prepared in the operating sections. Forwards statistical data to the company's operations section and maintains the files kept by the platoon.

Construction Equipment Operator (E5, 62E20 and E4, 62E10). Constructs and maintains berms and roadways within the terminal area. Lifts and moves containers as required to construct the terminal and to effect pipeline repairs. Lifts and moves heavy valves, pipes, fittings, and filter/separators as required for construction of the TPT. Digs ditches for drainage and road crossings, levels sites, improves storage areas, prepares a site for the

FSSP (building firewalls, berms, and road networks), and covers or cleans up any petroleum spills as the tactical situation permits.

Rough-Terrain Container Handler (E4, 92A1B1). Operates MHE to unload barges and flatcars. Also lifts valves into position; moves filters and strainers; and offloads heavy-gauge pipe lengths, tank shells, valves, and couplings, skid-mounted pumps, generators, and compressors. Operates the forklift truck.

Administrative Clerk (E3, 71L10). Prepares terminal operating reports and maintains platoon personnel and equipment records. Acts as the interface between the unit administrative specialist and the soldiers of the platoon. Drives and maintains one of the platoon light-wheeled vehicles used by the platoon leader for mobility and command and control.

Petroleum Laboratory Specialist (E3, 77L10). Performs quality surveillance on bulk fuels incoming, in storage, and being issued. Performs C-type and modified B-type testing on bulk fuels as prescribed in the latest revision of MIL-HDBK-200 as needed. Performs routine test using the petroleum testing kit. When the testing requirements surpass the capabilities of the petroleum test kit, he forwards samples to higher headquarters for testing.

**EQUIPMENT**

The minimum amount of equipment, from TOE 10427, required for the platoon headquarters is listed in Table 5-1. For a complete listing of equipment, refer to your unit's MTOE.

Table 5-1. TOE equipment list for the terminal operating platoon headquarters

<b>ITEM</b>	<b>QUANTITY</b>
Alarm chemical agent automatic: Portable manpack	1
Cable telephone: WD-1/TT DR-8 1/2-km	2
Generator set diesel engine: 3-kw, 60-hz, 1-3 ph, AC 120/208, 120/240-v	1
Installation kit: MK-2502/VRC for AN/VRC-46/64 or AN/GRC-160	1
Light set general illumination: 25-outlet	1
Radiacmeter: IM-93/UD	2
Radiacmeter: IM-174/PD	1
Radio set: AN/VRC-46	1
Reeling machine cable hand: RL-39	1
Semitrailer low bed: 40-ton, 6-wheel, with equipment	1
Sign painting kit: with components	1
Truck lift fork: 5,000-pound, container handler, rough-terrain	1
Truck lift fork: 4,000-pound, rough-terrain	1
Truck tractor: 8x6, 75,000 GVW, with winch	1
Truck utility: Cargo/troop carrier 1 1/4-ton, 4x4, with equipment (HMMWV)	1
Top handler attachment: 20-foot, freight container	1
Telephone set: TA-312/PT	1
Testing kit petroleum	1
Tractor full tracked low speed: diesel, MED, DBP, with bulldozer, with scarif winch	1
Tractor wheeled IND: diesel, with backhoe, with loader, with hydraulic tool attachment	1
Trailer cargo: 3/4-ton, 2-wheel, with equipment	1

**OPERATIONS**

The operations of the platoon headquarters is to provide command and control, plan, organize, coordinate, and direct the terminal operations.

### **Planning**

Planning includes the layout of the operation, workflow, shift schedule, spill response, and sleep plan of the operation. It determines the order and when to do everything to include gaging, sampling, performing PMCS, fire suppression, and all other aspects of operations.

### **Organizing**

The platoon leader organizes the operations to provide bulk fuel to serviced units and to ensure that the platoon operations interface with those of the larger system. It is essential that operations be organized so that soldiers know what is expected of them and they can perform their duties with confidence.

### **Coordinating**

Coordination is one of the most important duties the platoon headquarters performs. Coordinating ties planning, organizing, controlling, and directing together. The flow of order bulk fuel; the cleaning and maintenance of equipment; and the receipt, storage, and issue of bulk fuel all rely on clear, concise coordination. Since the platoon operates on shifts, the work schedule must ensure efficient use of soldiers and equipment. When the shift changes, the oncoming section is briefed on the day's operations and to prepare them to resolve any ongoing problems.

### **Controlling**

Control is to ensure that everything is done according to set plans and procedures. Checks are made comparing the desired results to the actual results with corrective action taken when necessary. A supervisor's checklist for the daily operation of the platoon will assist in this.

### **Directing**

Skillful direction gets soldiers to do their missions efficiently, willingly, and quickly. The platoon leader's orders, oral or written, must be clear and concise. SOPs, acting as guides for the platoon, will help make this direction more effective.

### **Maintaining Equipment and Facilities**

As soon as the headquarters section is set up, the platoon leader should:

- Make a list of scheduled inspections of and any facilities for which he is responsible.
- Arrange informal unscheduled inspections to see if PMCS is being performed IAW the applicable TMs.
- Ensure that unserviceable items that must be sent to higher headquarters for repair/replacement are reported promptly IAW applicable regulations and policies.
- Ensure that reports and records are being submitted and maintained IAW applicable regulations, TMs, FMs, SOPs, and other guidance.
- Plan training for soldiers operating and maintaining equipment.
- Set up an inventory schedule and inventory at the change of property book officer and change of hand receipt holders.

### Monitoring Communications

The platoon leader or platoon sergeant needs to do the following to make sure that the platoon's communication equipment is operational at all times.

- Check equipment connections are IAW equipment TMs.
- Check PMCS procedures and log books.
- Verify that repairs are performed or help is requested from higher headquarters.
- Make arrangements with the communications section at the battalion for training of soldiers.
- Make provisions for the storage of the SOI and for the disposal of the SOI as it becomes out of date or compromised.

### Testing of Bulk Fuels

The laboratory specialist is responsible for testing bulk fuel as it is incoming, in storage, or being issued. FM 10-67-2 contains instructions for the use of the petroleum testing kit and a table that shows the tests that can be performed with this kit. Testing will be performed IAW the latest version of MIL-HDBK-200.

- Test results. The test performed using the petroleum test kit can show the presence of contamination and identify a bulk fuel.
- Actions on failed samples. When the tested fuel does not conform to standards, the laboratory specialist must:
  - Assume the fuel is unsuitable for use.
  - Report results immediately to his supervisor and recommend suspension of its use.
  - Forward a sample to a petroleum laboratory for further analysis.

### Firewalls/Berms

All fuel tanks must have firewalls or berms. Firewalls should have been built around hard wall tanks at the time the terminal was constructed. If these firewalls were not built or have been damaged making them useless, then the construction equipment operators must construct earthen berms around the tanks until the firewalls can be repaired. Collapsible bags used with the FSSP and TPT are almost always protected by earthen berms. Firewalls/berms should be high enough and dense enough to adequately protect the tank or bag from collateral damage or shrapnel from bombs, artillery, missiles and explosive shocks. They must have an impermeable liner. They must be high enough to contain all of the fuel that would flow from the tank if a tank ruptures or overflows plus at least 1 foot for safety. They should also help prevent the spread of fire to other tanks and installations.

## Section III. Tank Farm Section

### MISSION

The mission of the two tank farm sections is to provide personnel to operate fixed bulk petroleum terminals. The terminals consists of welded steel tanks, bolted steel tanks, underground tanks, or any combination of the above. Each tank farm may have a storage capacity of up to 250,000 barrels. The tank farms may be located at the port of entry or along the pipeline extending over a considerable distance. The terminal could also be located at the pipehead (the last terminal in the system), which provides bulk petroleum reduction facilities. The bulk petroleum reduction facilities dispense fuel into tank trucks, barges, vehicles, drums, and cans. The hose line outfit may be

used to allow portable dispensing beyond the reach of the pipeline. Tank farm and storage and issue sections may be tasked to operate and maintain an over-the-beach TPT. The TPT is designed for ship-to-shore receipt of fuel from offshore tankers. Depending on how calm the sea is, about 600,000 to 720,000 gallons of fuel may be delivered each day. Components of the TPT can also be used to set up a Class III supply point for receipt, storage, and issue of three types of fuel from 5,000-gallon tank trucks. It conducts bulk fuel operations on a 24-hour basis. The product (usually MOGAS, diesel, or JP-8) is moved through the pipeline to the storage tanks at the tank farm. Switching manifolds controls the flow of the product. This section can transfer fuel at the rated capacity of the system (usually between 700 and 1,300 barrels per hour) to the main pipeline. Additional tank farm sections as required can augment it.

### **PERSONNEL**

Effective operation of the sections requires identifying key personnel and understanding their primary duties and responsibilities. Key personnel in each tank farm section are discussed below.

Section Chief (E6, 77F30). Supervises and controls the tank farm section personnel. He supervises the installation, operation, and maintenance of petroleum storage facilities.

Petroleum Inventory Control Specialist (E5, 77F20). Assists the section chief in coordination of tank farm operations and maintenance. Maintains control of opening and closing inventories IAW AR 710-2. Keeps records on receiving and shipping and supervises the second shift.

Petroleum Heavy Vehicle Operator (E4, 77F1H7). Operates vehicles used to support the hose line outfit equipment and evacuate fuel products.

Petroleum Supply Specialist (E3/E4 (12 each), 77F10). Operates and maintains the TPT, FSSP, or other service or civilian equipment as required. Fills out appropriate receipt and shipping documents as required. Is responsible for--

- Operating tank farm transfer and booster pumps, switching manifolds, and loading facilities.
- Gaging and sampling incoming bulk fuels and bulk fuels in tanks and maintain records.
- Performing PMCS on tanks, coupled lines, hose line, valves, fittings, pumps, and filter/separators.
- Serving as fireguards and operating fire extinguishers and fire-suppression equipment.
- Directing flow of fuel into proper storage.
- Driving and maintaining the tactical vehicle used in the control of and in support of tank farm operations.

### **EQUIPMENT**

The minimum amount of equipment, from TOE 10427, required for each tank farm section is listed in Table 5-2. For a complete listing of equipment, refer to your unit's MTOE.

Table 5-2. TOE equipment list for the tank farm section.

ITEM	QUANTITY
Alarm chemical agent automatic: Portable manpack	1
Cable telephone: WD-1/TT DR-8 1/2-km	2
Compressor unit: air, trailer-mounted, diesel-driven, 250-CFM, 100-PSI	1
Detector kit: auto/aviation fuel water and solid contamination	1
Filter/separator liquid fuel: 350-GPM	1
Floodlight set electrical: portable, 6 lights, mast-mounted, 5-kw, 120/208-v	6
Generator set diesel engine: 3-kw, 60-hz, 1-3 ph, AC 120/208, 120/240-v, tactical utility	6
Hose line outfit fuel handling: 4-inch diameter hose	1
Pumping assembly flammable liquid engine-driven wheeled: 350-GPM, 275 feet of head	1
Radiac meter: IM-93/UD	1
Radiacmeter: IM-174/PD	1
Radio set: AN/PRC-77	2
Reeling machine cable hand: RL-39	1
Resuscitator-Aspirator: intermittent, positive pressure, manual cycle	2
Safety equipment set: respiratory, gasoline tank cleaning	2
Semitrailer flat bed: breakbulk/container transporter, 22 1/2-ton	1
Semitrailer tank: fuel-servicing, 5,000-gallon, 12-ton, 4-wheel, with equipment	1
Terminal tactical petroleum: marine	*
Truck utility: cargo/troop carrier 1 1/4-ton 4x4, with equipment (HMMWV)	1
Telephone set: TA-312/PT	1
Tool kit pipe cutting grooving and beveling: 6-, 8-, 10-, and 12-inch pipe	1
Trailer cargo: 3/4-ton, 2-wheel, with equipment	1
Trailer cargo: 1 1/2-ton, 2-wheel, with equipment	1
Truck cargo: 5-ton, 6x6, with equipment	1
Truck dump: 5-ton, 6x6, with equipment	1
Truck lift fork: 6,000-pound, rough-terrain	*
Truck tractor: 5-ton, 6x6, with equipment	1

\* Authorization is one per company.

## OPERATIONS

The section chief is responsible for the daily operations of the tank farm. As such, he supervises the activities discussed below.

### Preparation of Operations Orders

Operations orders are prepared from the daily pumping order. FM 10-67-1 is used as a guide and gives suggestions for preparing:

- Standard orders which can be used for tasks commonly performed.
- General orders which assign specific personnel slots to perform specific tasks.
- Specific orders which show the products and the quantity of each being moved, where the products go, and the times to start and stop each operation.

### **Sampling the Product**

A small portion of the product is inspected; from this the quality of the fuel is determined. The accuracy of the laboratory test results directly depends on the care taken in obtaining the fuel sample. FM 10-67-2 describes sampling devices, what they are used for, and the procedures for their use. The fuel in a tank must be sampled before and after new fuel is delivered to that tank.

### **Measuring the Fuel**

When soldiers measure for fuel quantity, they must do the following:

- **Step 1--Gage.** Gaging is measuring the product in a tank. FM 10-67-1 gives instructions on gaging a tank. The two methods are an innage gage and an outage gage. An innage gage is performed when you measure how high the product is in the tank. This is normally what occurs in hardwall storage tanks and tank trucks. An outage gage is performed when you determine the distance between a known reference point above the fuel to the surface of the fuel. In addition to measuring the amount of product in the tank, the amount of BS&W must also be gaged. Then using a strapping chart, determine the total volume displaced in the tank and subtract the amount of BS&W. This should equal the amount of fuel in the tank uncorrected for temperature.

- **Step 2--Measure Temperature.** All volumes of fuel of 3,500 gallons or more must be corrected for temperature. The unit commander may direct lesser volumes be corrected at his discretion. To correctly determine temperature in a standing cylindrical tank, three readings must be recorded. The three readings are taken from the top third, the middle third, and the bottom third of the tank. The three readings are added together and divided by three to get the average temperature of the tank. In tank trucks, collapsible bags, or other tanks that do not have enough height to have a temperature variation, only one recording may be made as outlined in FM 10-67-1. Note: No temperature correction is required in volumes of fuel less than 10,000 gallons. The commander may direct otherwise at his discretion.

- **Step 3--Determine observed API Gravity.** API gravity is the density or weight of the fuel. A hydrometer is used to determine API gravity according to instructions found in FM 10-67-1.

- **Step 4--Convert the Volume.** The quantity of product determined at step 1 and the temperature from step 2 are used to determine what the quantity would be at 60°F. The observed API gravity from step 3 is converted to API gravity at 60°F with charts from API/ASTM/IP Table 5. The API gravity at 60°F and API/ASTM/IP Table 6 are used to find the multiplier (conversion factor). The net quantity at observed temperature is multiplied by the conversion factor to determine the net quantity at 60°F. Examples of conversions are found in FM 10-67-1 and API/ASTM/IP.

### **Cleaning Tanks**

The tank farm attendants clean the storage tanks IAW the section SOP. The SOP is written IAW FM 10-67-1 and MIL-STD-457. Equipment may have to be ordered if not already on hand. The training should include cross-training of pump operators.

### **Receiving Bulk Fuel**

The tank farm attendants should be trained in all phases of receiving bulk fuels. As the section chief supervises activities, he uses FM 10-67-1 as a guide. He should keep in mind the following:

- Empty storage tanks should be inspected prior to receiving fuel.
- Another tank valve must be opened to receive incoming fuel when the first tank is filled to allowable capacity.

**NOTE:** Always open a valve before closing one when receiving fuel. This will prevent overpressurizing the system and blowing the pipeline.

- Tables in FM 10-67-1 show minimum allowable outage.
- Minimum quality surveillance requirements are in MIL-HDBK-200.

### **Issuing Bulk Fuel**

The section chief uses FM 10-67-1 as he trains and supervises tank farm attendants to issue bulk fuel. The following points are important:

- Storage tanks should be checked for water before issue is made. The water should then be removed before the issue is made.
- An attendant should be assigned to each pump if more than one pump is used for the issue.

### **Loading and Unloading Tankers, Barges, Rail Tank Cars, and Tank Trucks**

Depending on the location of the company, personnel of this section will be required to load and unload bulk fuel on barges, coastal tankers, rail tank cars, and tank trucks. When the section chief sets out the SOP for loading and unloading bulk fuels, he uses the following publications as a guide:

- Tank cars--FM 10-67-1.
- Tank trucks--FM 10 67-1 and the appropriate TM.
- Tankers and barges--FM 10-67-1 and MIL-HDBK-200.

### **Processing Records and Reports**

The records and reports listed below are required for terminal operations. The reports clerk uses FM 10-67-1 and the SOP as guides for preparation and submission of--

- The status report which covers the 24 hour period.
- The daily status report which is prepared for receipts and issues.
- DA Form 4786 which is used to record the flow of bulk fuels into storage areas (FM 10-67-1).
- DA Form 10-235 which is used to record the flow of bulk fuel from storage areas (FM 10-67-1).
- DD Form 250-1 which is used to record the flow of bulk fuel from tankers or barges to storage tanks.

### **Supervising PMCS**

Each piece of equipment must have before-, during-, and after-performance maintenance as required by the applicable TM. Reports required by TM 38-750 will be prepared and submitted. Inoperable equipment that cannot be repaired will be reported according to the SOP.

### **Communications**

Communications between the operating point (usually the pump) and all other areas/sections of the operation must be maintained so that the flow of product can be quickly stopped if necessary.

### **Tactical Petroleum Terminal**

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The tank farm section and storage and issue section may be required to operate a TPT in support of a bare base environment or to supplement or replace available commercial storage. The TPT is designed primarily to receive product from a pipeline (normally the IPDS) and act as either the base, intermediate, or head terminal. When used with the IPDS, the TPT may receive up to 720,000 gallons per day (600-GPM for 20 hours). This may be supplemented by truck or barge receipts. The TPT is configured into three fuel units.

- Fuel unit. Major components of the fuel unit are:
  - Six each 5,000-barrel BFTAs to store up to 30,000 barrels (1,260,000 gallons) of fuel.
  - One each switching manifold which controls the flow of fuel into, out of, and around the fuel unit.
  - One each truck fill assembly which dispenses filtered fuel to receiving tank trucks and or rail tank cars.
  - One each pump station to pump the fuel into receiving vehicles or into the pipeline.

While the TPT may handle up to three different fuels (one per fuel unit), the fuel unit can only carry one.

Layout considerations. The tactical situation determines the general location for the TPT. Existing terrain and cover affect the actual layout. Nevertheless, you will need to plan for and consider the following:

Site selection. The site you select should be level and drained to prevent water damage. Keep in mind that any *slope must not exceed 1 1/2 percent* or the tanks could roll toward the low side. Select a site that has easy access to road networks; this is a prime consideration if it will be used to fill tank trucks. Avoid low areas where vapors may collect. Environmental protection considerations for siting must be addressed. Consult with the local environmental officer, via the chain of command, to comply with local and host nation requirements. In general, the TPT should not be located uphill or upstream from a potable water supply or other environmentally sensitive areas.

Offloading. RTCHE is required to move the 20-foot ISO containers used to pack and transport the TPT. *Do not discard the wood used for packing the TPT in the containers--you will need it when you pack it up.* A rough-terrain forklift is required to move the heavier components (BFTAs, filter/separators, valves) into place.

Operational suggestions. To help operations, prevent damage to the collapsible tanks, and prevent products from mixing, direct soldiers to--

- Search for and remove any sharp objects that could damage the collapsible bags before laying the tank out.
- Inspect the collapsible tank for holes and tears as it is being laid out.
- Construct a wooden support to relieve stress placed on the tank by the elbow coupling.
- Paint the name and type of fuel stored in the collapsible tank on the tank so it is visible from all directions.

<b>CAUTION</b> Do not use an acid-based paint.
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- Tag all valves on the switching manifold with the type of product and tank or tank farm the valve services.
- Use a 5,000-gallon tanker to pack the lines in reverse before using the pump station to pump fuel from collapsible tanks.
- Gently slope the ground toward the outlet side of the collapsible tank. Do not exceed 1 1/2 percent.

- Where possible, set up dedicated ship-to-shore lines, one per type of fuel handled, to remove the requirement for an interface system.

## **Section IV. Storage and Issue Section**

### **MISSION**

The mission of the storage and issue section is to operate the FSSP, two 5000-gallon tankers, and four tank and pump units. This section, when required, can also perform limited bulk fuel reduction.

### **PERSONNEL**

Effective operation of the platoon headquarters requires identifying key personnel and understanding their duties and responsibilities. Key personnel include--

Section Chief. The section chief (E6, 77F30) supervises the day-to-day operations of the section to include:

- Prepares work, cleaning, and maintenance schedules along with reports and records.
- Designates and trains one soldier to assist the section chief and be in charge of the second shift if required.
- Represents the section at meetings and conferences.
- Plans training and cross-training for all personnel to include licensing for the section's equipment.

Petroleum Heavy Vehicle Operator. The petroleum heavy vehicle operator (E4 (2 each), 77F10) operates 5-ton tractors, 5,000-gallon fuel servicing tanker, and 12-ton stake semitrailer. Distributes fuel to the FSSP and local customers.

Petroleum Light Vehicle Operator. The petroleum light vehicle operator (E4 (1 each) 77F10, H7; E4 (1 each), 77F10; E3 (3 each) 77F10) performs the following duties:

- Drives and maintains the 5-ton cargo trucks with trailers.
- Operates the 5-ton cargo trucks and trailers with the tank and pump unit installed.
- Performs duties similar to those listed for petroleum heavy vehicle operators.

Petroleum Supply Specialists. The petroleum supply specialist (E4 (3 each) 77F10; E3 (5 each), 77F10) performs the following duties:

- Cleans and fills petroleum containers.
- Marks petroleum containers to include nomenclature; NATO code number; weight or volume; filling date; and safety precautions as required.
- Performs operator maintenance and emergency repairs on all equipment.
- Posts identification and safety signs for storage locations.
- Digs trenches and firewalls/berms to protect storage locations.
- Inspects and gages theater reserve stocks as required.

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- Operates pumps, manifolds, and generators.
- Operates dispensing equipment.
- Prepares and submits reports and records.
- Operates the section's light- and heavy-wheeled vehicles and MHE.

### EQUIPMENT

The minimum amount of equipment, from TOE 10427, required for the storage and issue section is listed in Table 5-3. For a complete listing of equipment, refer to your unit's MTOE.

Table 5-3. TOE equipment list for the storage and issue section.

ITEM	QUANTITY
Cable telephone: WD-1/TT DR-8 1/2-km	1
Dispensing pump: hand-driven, hose-nozzle discharge, adjustable range	1
Filter/separator liquid fuel: 350-GPM	2
Floodlight set electrical: portable, 6 lights, mast-mounted, 5-kw, 120/208-v	1
FSSP: portable, 60,000-gallon, less filter, pump, and tanks	1
Generator set diesel engine: 5-kw, 60-hz, 1-3 ph, AC 120/208, 120/240-v, tactical utility	1
Pumping assembly flammable liquid engine-driven wheeled: 350-GPM, 275 feet of head	2
Radio set: AN/PRC-77	4
Reeling machine cable hand: RL-39	1
Repair kit collapsible fabric tank: type II repairs, up to 6 inches	1
Semitrailer flat bed: breakbulk/container transporter, 22 1/2-ton	1
Tank and pump unit, liquid-dispensing, truck mounting	4
Tank assembly, fabric collapsible: 10,000-gallon petroleum	6
Tank, liquid-dispensing, trailer mounting	4
Telephone set: TA-312/PT	1
Trailer cargo: 1 1/2-ton, 2-wheel, with equipment	5
Truck cargo: 5-ton, 6x6, with equipment	5
Truck lift fork: 10,000-pound, rough-terrain	1
Truck tractor: 5-ton, 6x6, with equipment	1

### OPERATIONS

The section chief is responsible for the daily operations of the storage and issue section. As such, he supervises the activities below.

#### Fuel System Supply Point

The FSSP consists of two 350-GPM centrifugal pumps, two 350-GPM filter/separators, six collapsible tanks of varying sizes, 4-inch Y- and T-assembly, fittings, discharge and suction hoses, and various tools and accessory items. (The pumps, filter/separator, and tanks are all separate TOE items.) The fuel system is used to receive and store fuel from trucks, railway cars, barges, pipelines, assault hose line, and aircraft and to dispense fuel to using units in the field. Fuel enters the system through the 4-inch Y- and T-assembly and is moved to the collapsible tanks by one of the 350-GPM pumps. In some cases, the fuel will be moved to the tanks by the transport's pump or by residual pressure from the pipeline or assault hose line. When fuel is dispensed, it is pumped from the

collapsible tanks through the filter/separators to the vehicles or containers. When necessary, the system can be divided into two parts and operated independently so that more than one fuel can be handled or customers can be serviced more effectively.

The section chief supervises setting up the FSSP. TB 5-4930-201 shows how to prepare the terrain and place the equipment. FM 10-69 describes and details the operation of the supply point. The following should help the section chief supervise the layout and operation of the system:

- Ensure that equipment manuals are on hand for each piece of equipment.
- Fire extinguishers are required for each pump, collapsible tank, receiving point, and issuing point. CTA 50-915 contains data for requesting fire extinguishers.
- The section SOP should contain instructions for testing, using, and maintaining fire extinguishers.
- DA Pamphlet 710-2-1 contains detailed instructions for filling out and processing DA Forms 3643 and 3644.
- When a unit brings 500-gallon collapsible drums, issue should be requested on a DA Form 2765 or DD Form 1348-1. A copy of these documents are retained and turned over to the control section as support documents for the DA Form 3644.

Training should always stress safety to include:

- Fire extinguisher operation.
- Grounding and bonding procedures.
- Cautions on overfilling vehicles and containers.
- Operator's maintenance procedures and practices.
- Spill prevention and response.

### **Petroleum Tank Vehicles**

Petroleum tank vehicles may be used for internal support (retail issues or bulk movement and storage) and external support (retail issues and limited bulk deliveries). Use FM 10-67-1 in addition to the equipment technical manuals for detailed guidance on their operations and maintenance. Some general operating and training follows:

- Never overfill the tanks, always leave room for expansion and to prevent fuel spillage when traveling cross-country.
- Attend nozzles constantly and do not wedge open or block the nozzle operating lever.
- Keep pump filled to avoid having to prime it.
- Avoid touching metal with bare hands in cold weather.
- Train all soldiers in the location of fire extinguishers and emergency procedures.
- Cross-train soldiers so that they can operate and maintain all vehicles and equipment during day and night operations.

### **Assault Hose Line Outfit**

The hose line outfit provides about 2 1/2 miles of flexible hose that can be quickly installed for temporary use in various situations involving the transfer of bulk fuel. The outfit consists of the hose (in 13 flaking boxes); roadway guard crossing; repair, packing, flow control, displacement and evacuation, and suspension kits; and the wheel-mounted 350-GPM regulated pumping assembly.

- Uses:
  - Moving product from the storage area to the user's storage area. These might include an airfield, airbase, or main supply battalion.
  - Moving fuel from the point of delivery to the storage area such as from a rail tank car or barge off-loading operation.
  - Furnishing bulk fuel to areas where more cover and concealment is needed or where truck traffic is not suitable.
- Layout. FM 10-67-1 contains information on choosing a route; loading the boxes; laying down the hoses to include stream crossings, gaps, and road crossings; and marking the route.
- Training. The section chief should include the following in the training plan:
  - Use of metal and wood road-crossing guards.
  - Fire hazards
  - Procedures for removing the fuel from the line before the line is repacked for shipment.
  - Procedures for repair and testing the hose line.

### **The 500-Gallon Collapsible Drum**

The 500-gallon collapsible drum is a durable, nonvented, collapsible container. When it is filled to capacity through a pressure control valve, it can be towed at speeds up to 10 MPH (16 km/h) for short distances over smooth terrain. It is towed using the towing and lifting yoke. The drum is impregnated with fuel-resistant synthetic rubber. It can be collapsed, folded, and transported by cargo truck. Follow these guidelines to fill the 500-gallon collapsible drum:

- Select a level and firm site near the source of fuel. The site should be clear of debris so that the drums can be lined up, filled, and then rolled away to allow room to fill more drums.
- Secure the drums if necessary to prevent slipping or rolling while being filled. Drums may be secured by chock blocks, ropes, and stakes, or other means as required.
- Inspect all drums before filling them as outlined in FM 10-67-1. Segregate all serviceable from unserviceable drums. Store drums according to the fuel being used in them.
- Drums must be cleaned before being used for another type of fuel.
- Ensure drums are marked properly.

### **Maintenance of Theater Reserve Stocks**

Higher headquarters will determine what types of fuel, in what quantities, and in which locations theater reserves will be stored. Normally, theater reserves are stored in the same tanks as operating stocks. This makes managing and maintaining the stocks simpler because they are continually being rotated and sampled. However, under certain circumstances storage will be allocated strictly for theater reserves.

**Storage.** The engineers usually emplace the collapsible storage tanks needed to store the theater reserve when the pipeline is constructed. If the storage area is not set up, the section chief, along with the platoon leader and company commander will need to develop a layout plan. Earth-moving equipment and lifting equipment will be needed from the platoon headquarters along with the operators. The area for the storage must be located far enough from the nearest activity that an attack on one will not affect the other. The area must provide natural cover and protection or be easily camouflaged. The section chief makes sure the following are done:

- Higher headquarters furnishes tanks if the requirement exceeds that of the FSSP.
- An area is designated for each type of fuel.
- Each tank is numbered and the numbering system is consistent throughout the system.
- Control records are set up and maintained to show type and quantity of fuel in each tank.

**Inspection.** Inspect collapsible tanks daily for signs of leaks, tears, punctures, unusual wear, and fabric deterioration. Enter inspection results on the inspection control sheets.

**Sampling.** Sample reserve stocks according to the established schedule of the SOP. Record dates and results on the sample control sheet. Report any contamination to the nearest laboratory.

**Gaging.** If hardwall tanks are used, the tank farm attendants will gage the tanks weekly or IAW the established schedule or SOP. If collapsible tanks are used, the gage may be visually estimated as follows:

- Start with each tank completely empty.
- Fill the tank to capacity using a meter or known quantity of fuel such as two 5,000-gallon tank trucks for one 10,000-gallon collapsible tank.
- Drive a stake into the ground on opposite sides of the tank that are higher than the tank. Fasten a wire to the stakes so that it is taut and just barely touches the top of the tank.
- Estimate by noting the level of the tank in relation to the wire.

**Issue.** If an order to issue reserve stocks is received, the section chief makes sure the product is used on an FIFO basis.

### **Fire Protection**

The section chief sets up the fire protection plan. FM 10-67-1 contains information on types of fire extinguishers and characteristics of various fuels. The section chief must develop and implement procedures and training for preventing, controlling, and extinguishing fires. The section chief must check:

- Fire extinguishers for condition and a full charge.
- The condition of firewalls/berms for worthiness.
- For spills, leaks, and improper tank ventilation.
- That no smoking areas are enforced.
- That equipment is marked as required by MIL-STD-101 or 161.

## **FM 10-416**

The section chief should hold fire drills in the daylight hours until all soldiers are well trained. He then should call day or night drills without notice. These drills should include the following:

- Simulate closing valves and shutting down pumps.
- Soldiers should man the fire extinguishers and at least one should be operated during each drill.
- Use training film in the training to make soldiers aware of the causes of fire and the precautions that prevent them.

### **Spill Response**

In case of POL spills or leaks, an environmental clean-up or restoration must begin immediately. Immediate spill reporting requirements must also be met. Spill cleanup kits must be available on site and properly maintained. Personnel must be familiar with the local SPCC plan, have spill-response training, and have participated in spill exercises. For more information, refer to the local SPCC plan, consult with the local environmental officer through the chain of command, and see Appendix A.