

CHAPTER 6

PERFORMING QUALITY SURVEILLANCE IN THE THEATER

Section I. Petroleum Quality Surveillance in the Developed Theater

DESCRIPTION OF THE SYSTEM

The procurement of petroleum products and their delivery to the developed theater are described in DOD 4140.25-M. Normally, time will be available to ensure that petroleum procured from host nation or CONUS based refineries meets US military specifications. Responsibility for ensuring the quality of fuels delivered to the theater lies with DFSC, JPO, and their subordinate agencies. The JPO is responsible to the developed theater commander for establishing and monitoring the theater QS program. The Army provides overland petroleum support to US land-based forces of all DOD components. Only when fuel is delivered to the consumer does it gain service identity. The theater Army commander normally delegates the authority to control the QS mission to the petroleum group commander. The petroleum group accomplishes the QS mission by supervising the testing of fuels throughout the theater. Testing facilities depend on testing requirements, criticality of the fuel, intended use of the fuel, and type of theater (developed or undeveloped). A description of these facilities and their capabilities can be found in Chapter 3.

BASE PETROLEUM LABORATORY

The base petroleum laboratory is normally found in the COMMZ at the base terminal of a petroleum pipeline and terminal operating battalion. It is under the control of the petroleum group.

MOBILE PETROLEUM LABORATORY

The mobile petroleum laboratory is contained in a 10-ton semi-trailer van. The van is air transportable. Because space is a limiting factor for the mobile petroleum laboratory, it cannot support as great a sample work load as the base laboratory. Mobile petroleum laboratories are found in the COMMZ and Corps attached to pipeline and terminal operating battalions and to petroleum supply battalions.

AIRMOBILE PETROLEUM LABORATORY

The airmobile petroleum laboratory is authorized for the airborne and air assault light divisions and the heavy division in the MSB.

TEST KITS

Aviation Fuel Contamination Test Kit. The aviation fuel contamination test kit is used by all units having a bulk aviation fuel refueling mission.

Ground Fuels Petroleum Test Kit. The ground fuels petroleum test kit provides a testing capability at the general support operating level and at the direct support level. The ground fuels test kit is normally located with units having a bulk petroleum storage, supply, and refueling mission.

Sampling and Gaging Kit. The sampling and gaging kit is found in the brigade forward supply

section of all divisions. It is used as a final check to ensure proper identification of products received from division main and corps support units.

Captured Fuels Test Kit. The captured fuels test kit is located with selected armor and mechanized infantry combat units to allow for testing and use of captured or commandeered fuels.

Aqua-Glo Test Kit. The Aqua-Glo test kit is used by personnel involved in aviation refueling operations.

TESTING REQUIREMENTS

The testing of DLA-owned and Army owned petroleum products in the developed theater in peacetime is described in MIL-HDBK-200. It provides a detailed breakdown of the types of tests required for each class of product. The handbook and Tables 6-1 through 6-3, beginning on page 6-3, provide guidance for testing in a tactical developed or undeveloped theater.

PROCUREMENT OF PETROLEUM PRODUCTS

Procurement in the developed theater is usually from friendly host nations. There is normally sufficient lead time to ensure that procured products meet US military specifications. Personnel with MOS 77L, E6 and E7, or MOS 77F, E8, should be requested by higher HQ to be QARs when the procurement mission requires support.

STANDARDIZATION AGREEMENTS

STANAGs, such as STANAG 3149, between nations of are used to provide minimum QS for petroleum products.

CHANNELS OF COMMUNICATION

Providing QS in a developed theater of operations requires good communication between higher HQ and QS testing facilities located in the theater.

Such communication falls into two categories: command and technical. The command channel of communications for the petroleum organization in the theater of operations is discussed in FMs 10-67 and 10-602. The technical channel of communications provides for exchange of technical information. It is directed by the responsible JPO.

LABORATORY REQUIREMENTS

Laboratories in a developed theater in peacetime are designed to meet the QS testing mission of the theater. In the tactical developed theater, their design may not be adequate. Modifications to existing laboratories or construction of new ones may be required. Such construction requires coordination with the facilities' engineers. Facilities' engineers are responsible for providing the laboratory with water, electricity, drainage, waste disposal, equipment repair, and equipment calibration. These items are addressed when planning for modification of existing peacetime testing facilities. Equipment requiring calibration is placed on a regular schedule with the appropriate calibration teams. See Chapter 4 for additional information concerning equipment calibration. TB 43-180 provides calibration requirements for Army equipment. Normal operator standardization is carried out per the appropriate ASTM or FTMS test procedures. According to ASTM E 77, all petroleum laboratories must maintain a temperature of $73.4\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$ and humidity of 50 ± 5 percent. These requirements must be met to maintain equipment and to ensure the accuracy of testing.

QUALITY SURVEILLANCE MISSION

A number of factors (including fuel requirements, methods of supply, storage capability, and allied/joint services agreements) must be considered when determining the total QS work load within the theater. Laboratories maintain historical data on all testing performed. The data are analyzed to determine the number and types of tests performed. Appendix B is a guide for the number of man hours needed for each type of test.

Table 6-1. Test requirements for fuel

Action	Peacetime	Developed Theater	Undeveloped Theater
Procurement QA	Full specification testing according to current regulations (contractor or base laboratory)	Full specification testing, less anti-knock and Cetane ratings by test engines; if not available locally (contractor, base, or mobile laboratory).	Minimum emergency tests by mobile, airmobile, or contractor laboratory; if available, depending
Bulk Distribution QS (Wholesale)	According to MIL-HDBK-200, type B-1, B-2, B-3, or C tests. Refer to MIL-HDBK-200	According to Mil-HDBK-200, anti-knock and Cetane engine ratings. Refer to MIL-HDBK-200	Minimum emergency tests by mobile or airmobile laboratory or aviation fuel test kit. See Table 2-2.
Direct Support QS (Retail)	Refer to MIL_HDBK-200, Appendix B of this manual, and current FM or TM guidance.	Refer to current FM or TM. 1. Ground fuels test kit. 2. Aviation fuel contamination test kit.	Refer to current FM or TM. 1. Ground fuels test kit. 2. Aviation fuel contamination test kit.
Captured Fuel	1. Ground Fuels test kit. 2. Aviation fuel contamination test kit. NA	Not for contingency use. Withhold all captured stocks from use until either a base or mobile laboratory can certify usability by B-1 testing. For immediate consumption, test with captured fuels test kit.	Not for contingency use. withhold all captured stocks from use until either a base or mobile laboratory can certify usability by B-1 testing. For immediate consumption, test with captured fuels test kit.

Table 6-2. Minimum procurement tests (QA) for fuels

Fuel	Test	Test Method Number
Motor Gasoline	Visual Appearance Color Specific Gravity Distillation Reid Vapor Pressure	ASTM D 4176 ASTM D 1500 ASTM D 1298 or 287 ASTM D 86 ASTM D 323
Diesel Fuel	Visual Appearance Flash Point Distillation Specific Gravity Cetane Index Cloud Point Particulates	ASTM D 4176 ASTM D 93 ASTM D 86 ASTM D 1298 or D 287 ASTM D 976 ASTM D 2500 ASTM D 2276
Turbine Fuels	Visual Appearance Particulate Distillation Copper Corrosion Reid Vapor Pressure Flash Point (JP-5 only) Fuel System Icing Inhibitor Water Separation Index, Modified by Portable Separometer Conductivity Specific Gravity Thermal Stability Freezing Point	ASTM D 4176 ASTM D 2276 ASTM D 86 ASTM D 130 ASTM D 323 ASTM D 93 FTMS 791 (Method 5327.3) or B-2 Test Kit ASTM D 3948 ASTM D 2624 ASTM D 1298 OR D 287 ASTM D 3241 ASTM D 2386

Table 6-3. Test requirements for lubricants, hydraulic fluids, and related products

Action	Peacetime	Combat Developed Theater	Combat Undeveloped Theater
Procurement QA	Refer to current regulations	Full specification testing	Contractor or mobile laboratory reduced test schedule: Type B-2 tests.
QS	Refer to current regulations	No testing is required as long as container is received undamaged and product is within its shelf life. If containers are damaged or product is past its shelf life, forward samples to nearest base petroleum laboratory.	No testing is required as long as container is received undamaged and product is within its shelf life. If containers are damaged or product is past its shelf life, forward samples to nearest base petroleum laboratory.
Captured QC/QS Packaged Products	NA	Do not use. Send samples to nearest base petroleum laboratory for B-2 testing.	Do not use. Send samples to nearest base petroleum laboratory for B-2 testing.

Section II. Petroleum Quality Surveillance in the Undeveloped Theater

DESCRIPTION OF THE SYSTEM

A bulk petroleum QS program is critical in the undeveloped theater. Time may not be available to ensure fuels procured in the theater meet US military specifications. Some risks may have to be accepted to provide fuel in sufficient quantities to support the theater's operational plan. As a result, it is critical that petroleum testing be available early in the undeveloped theater buildup. The petroleum laboratory testing equipment must be capable of performing minimum bulk fuel tests. The DFSC, the JPO, and their subordinate organizations are responsible for ensuring quality fuel is available and delivered to the theater. The JPO is responsible to the theater commander for establishing and monitoring the theater QS program. The senior Army commander is responsible to the

theater commander for establishing an Army QS program. Depending on how the undeveloped theater is structured, the senior Army commander may be a division, corps, or theater Army commander. As in the developed theater, all fuels which enter an Army-operated petroleum distribution system do not necessarily become Army-owned fuels. The Army, with the bulk fuel mission of supporting all DOD land-based forces, may be required to resupply other services with bulk petroleum.

TESTING REQUIREMENT

Testing of DLA-owned petroleum products in CONUS for supply into the undeveloped theater is described in MIL-HDBK-200. The type of petroleum testing facility and the manner in which it is employed are the same as in the developed theater.

PROCUREMENT OF PETROLEUM PRODUCTS

Fuels procured within an undeveloped theater will undergo a minimum of testing for general use. This testing may be done either at the refinery laboratory under the supervision of a QAR or by having samples sent to the nearest operational laboratory out of the country. Under emergency conditions, a mobile or airmobile laboratory may be required to perform tests indicated as minimum tests in MIL-HDBK-200. Personnel with MOS 77L, E6 and E7 or MOS 77F, E8, should be requested by higher HQ when procurement testing within the theater can be done at the refinery laboratory.

COMMANDEERED/CAPTURED PETROLEUM PRODUCTS

These products are obtained under emergency conditions. Units should only use this fuel for short periods of time and in extreme combat emergency. Personnel should identify the type of fuel (for example, diesel or gasoline) and have reasonable assurance that it is clean and free of sediment and water. Short-term use is dictated by battlefield conditions and is not measurable in hours or miles. Use of such fuels involves great risk to engine life and performance characteristics. Use should be discontinued when US products are available, unless the foreign fuel is approved for use by a petroleum laboratory. Units requiring long-term use (more than 48 hours or 100 miles) of these fuels must provide samples to a petroleum laboratory for analysis. Units must follow use or blending recommendations made by the petroleum laboratory.

CHANNELS OF COMMUNICATION

It is critical to maintain good communication between higher HQ, QS testing facilities, and units submitting samples. As in the developed theater, two channels of communication are command and technical. They function the same as they do in the developed theater.

LABORATORY REQUIREMENTS

Fuel requirements, methods of supply, storage capability, and allied joint service agreements are areas of concern in the undeveloped theater. Data on these areas are used as a basis for determining the number of types of units requiring QS laboratories. To determine the number of laboratories for the undeveloped theater, project a developed theater and the laboratories it requires. These laboratories are then time-phased into the theater with their respective petroleum unit. The types of testing performed will be different in the initial stages of the undeveloped theater. Factors affecting testing in the initial stages of the undeveloped theater are listed below.

- The number of coastal tankers required to lighter large ships.
- Initial installation of submarine pipelines and floating hose lines.
- Configuration of TPTs.
- Number of base TPTs required to supply the theater (a TPT has limited storage capacity).
- Number of collapsible tanks at intermediate and head terminals.
- Filling points for tank truck operations.

As the undeveloped theater matures and fixed petroleum distribution facilities are constructed, the types of testing performed become those required for a developed theater as discussed in Section I of this chapter.

ADDITIONAL REQUIREMENTS

Construction of base laboratories and placement of mobile or airmobile laboratories require planning. Factors affecting construction or placement of laboratories in the undeveloped tactical theater are facility support, climate, and terrain.

Facility Support. Placement of base laboratories in the undeveloped theater requires coordination with supporting engineers who are responsible for providing water, electricity, equipment repair,

drainage, waste disposal, and equipment calibration. These items are planned when projecting requirements for the undeveloped theater. Equipment requiring calibration is placed on a regular schedule with the appropriate calibration teams. TB 43-180 provides calibration requirements for Army equipment. Laboratory personnel (operators) must standardize the laboratory according to the appropriate ASTM or FTMS test procedures. Mobile and airmobile laboratories do not require engineer support during initial emplacement. However, for prolonged periods of deployment, obtain engineer support for electricity, water, wastewater disposal, and calibration of laboratory equipment.

Climate. The climate of an area affects the condition of a fuel. A hot climate ages fuel faster, causing accelerated deterioration. This deterioration may mean that more frequent testing must be performed.

Terrain. The terrain of the theater affects the mobility of laboratories. The base laboratory is not normally moved once it is established in the theater. The mobile petroleum laboratory is readily deployable. Moving the mobile laboratory over great

distances is usually done by air. The petroleum airmobile laboratory is the most readily deployable of the three main laboratories. It can be loaded on a 5-ton, drop side truck. It can also be moved by CH-47 helicopter via sling load and it is transportable by any of the current cargo aircraft.

TIME-PHASED LABORATORIES

To ensure quality fuels are provided to the undeveloped theater, testing facilities capable of performing the minimum required tests must be available from the start of operations. The airmobile laboratory is the first testing facility time phased into the theater. It is placed with the first division ashore, assuming a pipeline is built. As the beachhead and the theater expand, the airmobile laboratory moves forward to support the division. Mobile laboratories are then moved to the head terminal in support of the petroleum supply battalion while additional mobile laboratories are deployed with the terminal and operating battalions. At the same time, a modular base laboratory will be constructed or established. Table 6-4 provides a guide for laboratories time-phased into the undeveloped theater.

Table 6-4. Petroleum laboratory timetable

Type of Laboratory	Transport Mode	Estimated Time (in hours)
Airmobile	Air	D through D+5
Mobile	Air or Surface	D+5 through D+60
Base	Surface	D+60 through D+90