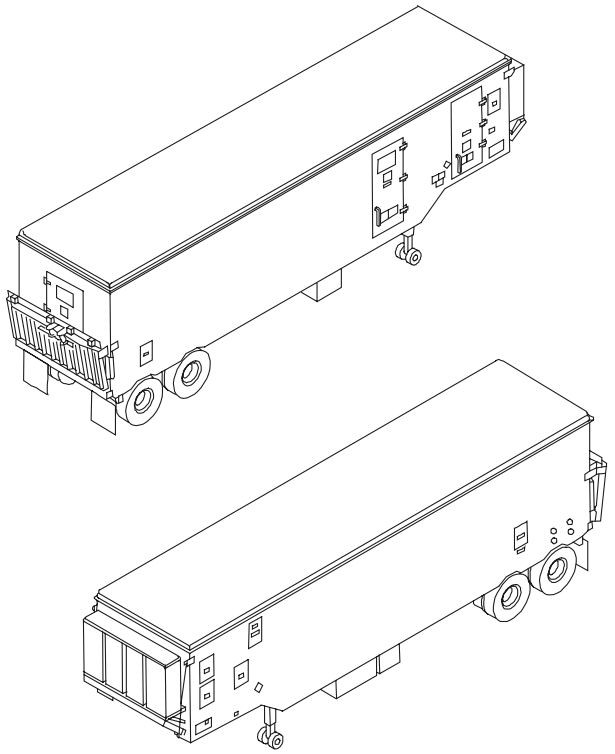
TECHNICAL MANUAL

OPERATOR, UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL FOR SEMI-TRAILER MOUNTED PETROLEUM LABORATORY (MOD LAB B)

(NSN 6640-01-485-5439) (EIC: ZBR)



HEADQUARTERS, DEPARTMENT OF THE ARMY
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TECHNICAL MANUAL **HEADQUARTERS**
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OPERATOR, UNIT, AND DIRECT SUPPORT MAINTENANCE MANUAL FOR SEMI-TRAILER MOUNTED PETROLEUM LABORATORY (MOD LAB B) NSN: 6640-01-485-5439 (EIC: ZBR)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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HOW TO USE THIS MANUAL

Be sure to read all Warnings before using this Laboratory

This manual contains operating instructions and Operator, Unit and Direct Support Maintenance instructions for the Semi-Trailer Mounted Petroleum Laboratory. Becoming familiar with this manual will enable one to operate and maintain the equipment in good working order.

MANUAL OVERVIEW

a. Index Tabs.

The front cover index lists, and is a guide to each Chapter of the manual.

b. Contents.

The following provides a summary of each Chapter and Appendix. Before beginning a maintenance task, a person must be familiar with Semi-Trailer Mounted Petroleum Laboratory and the entire maintenance procedure.

•Chapter 1 - Provides general information on the laboratory, such as abbreviations and nomenclature cross reference list, equipment purpose, capabilities and features, location and description of major components, equipment data, and principles of operation.

•Chapter 2 - Provides description and use of controls and indicators, preventive maintenance instructions needed to inspect and service the laboratory, and operating procedures for usual and unusual weather conditions.

•Chapter 3 - Provides operator lubrication and maintenance instructions for troubleshooting equipment malfunctions, maintenance procedures for performing operator maintenance tasks, and storage and shipment instructions.

•Chapter 4 - Provides unit maintenance instructions for servicing, preventive maintenance, troubleshooting equipment malfunctions, maintenance and repair procedures.

•Chapter 5 - Provides Direct Support maintenance and repair instructions.

•Appendix A - Provides a list of frequently used forms and referenced manuals/publications.

•Appendix B - Provides the Maintenance Allocation Chart (MAC) identifying repairable components and the maintenance level authorized to perform the repairs.

•Appendix C - Lists the Components of the End Item (COEI) that are removed from the laboratory and separately packaged or stowed for transportation or movement. It also lists Basic Issue Items (BII) required to make the system functional. All components in the COEI and BII Lists are illustrated for easy identification.

HOW TO USE THIS MANUAL - continued

•Appendix D - Lists additional equipment authorized for use with the laboratory, but are not supplied as part of the laboratory.

•Appendix E - Provides a list of expendable/durable supplies and materials required during operation or maintenance of the laboratory.

•Appendix F - Provides a list of mandatory replacement parts needed to operate and maintain the laboratory.

•Appendix G - Provides torque limits for parts needed to operate and maintain the laboratory.

•Appendix H - Provides a wire list for the laboratory.

•Index -Alphabetical Index of subject matter contained in the manual.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

Alphabetical Index

1-1. SCOPE.

a. Type of Manual. This manual contains operation and maintenance instructions for the Operator, Unit and Direct Support maintenance personnel of the Semi-Trailer Mounted Supplemental Petroleum Laboratory (Refer to Figure 1-1).

b. Equipment Name. Supplemental Petroleum Laboratory, Semi-Trailer Mounted (NSN 6640-01-485-5439).

c. Purpose of Equipment. The Supplemental Petroleum Laboratory is to be used by Army personnel to augment the Semi-Trailer Petroleum Laboratory, in testing of petroleum and petroleum products during tactical military operations.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System (TAMMS).

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

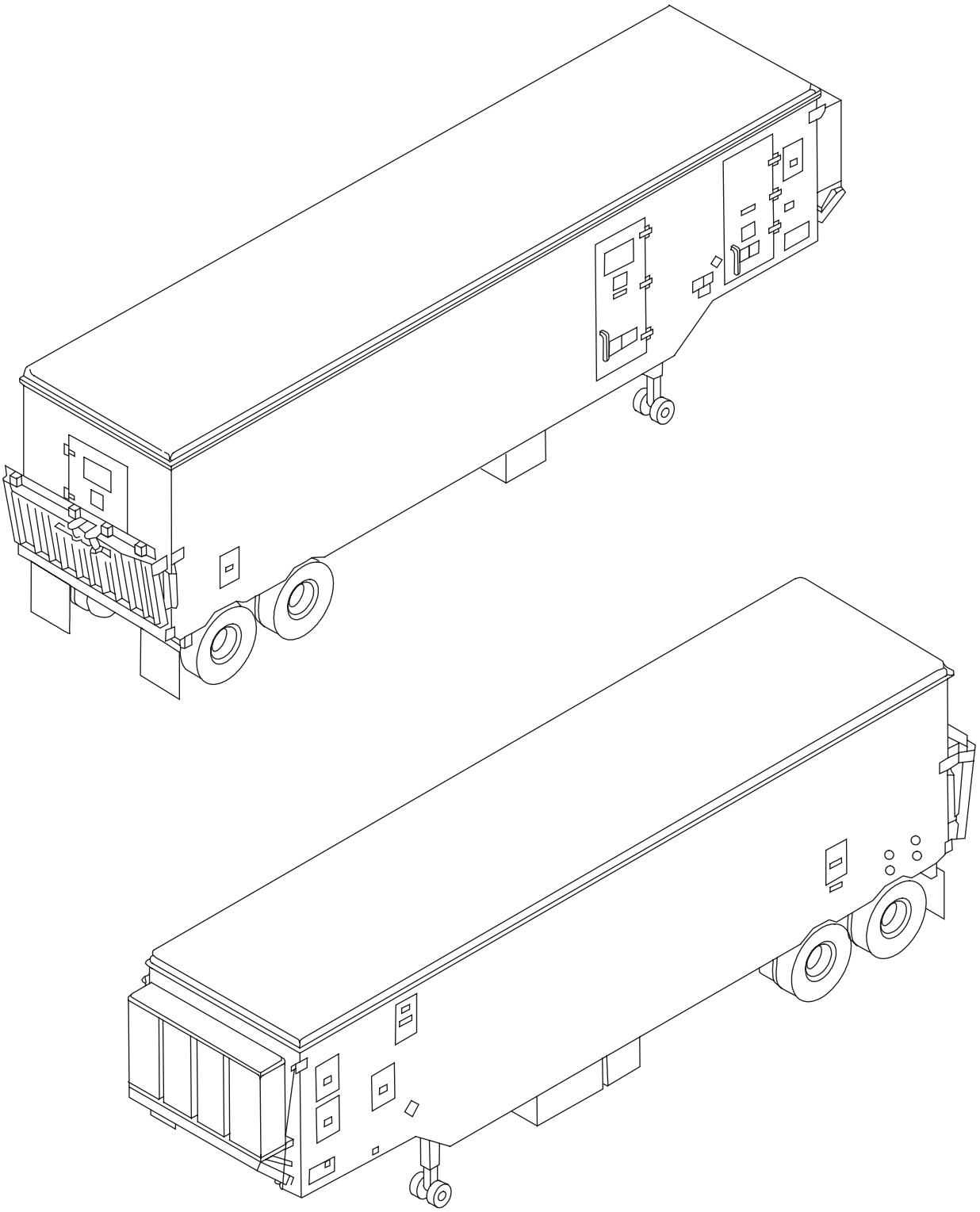
Command decisions, according to tactical situation, will determine when destruction of the Supplemental Petroleum Laboratory will be accomplished. A destruction plan will be prepared by the using organization, unless one has been prepared by higher authority. For general destruction procedures for this equipment, refer to TM 750-244-3, Procedures For Destruction of Equipment to Prevent Enemy Use.

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

Refer to Section IV of Chapter 3.

1-5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC).

The quality of the Supplemental Petroleum Laboratory must at all times be in accordance with the requirements set forth in MIL-L-53111(ME), paragraph 4. If a discrepancy is found to exist between your laboratory and MIL-L-53111(ME), notify your supervisor. When reporting a Quality Deficiency, use Standard Form 368, Product Quality Deficiency Report. The form should be submitted to: Commander, U.S. Army Tank-automotive & Armaments Command, ATTN: AMSTA-TR-D/210, 6501 E. 11 Mile Road, Warren, MI 48397-5000. For electronic methods use DODAC: W56HZV.



MBPLB-1-1A

Figure 1-1. Semi-Trailer Mounted Supplemental Petroleum Laboratory

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS).

If your Supplemental Petroleum Laboratory needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to us at Commander, U.S. Army Tank-automotive & Armaments Command, 6501 E. 11 Mile Road, ATTN: AMSTA-LC-CJA, Bldg. 210 - MS #111, Warren, MI 48397-5000. We will send you a reply.

1-7. SAFETY, CARE, AND HANDLING.

Safe and efficient Supplemental Petroleum Laboratory operations depend on the observance of well established safety practices and a thorough knowledge of testing procedures. The testing procedures often involve using equipment and materials that are potentially hazardous. Injury to personnel and damage to equipment by fire, chemicals, dangerous pressures and vacuums, or misuse of equipment can be avoided by alert and responsible laboratory technicians. Strict observance of established safety, care, and handling procedures will allow laboratory personnel to perform their duties in a safe and hazard-free environment.

a. General Precautions. The following general safety precautions shall be observed by all operators of the Supplemental Petroleum Laboratory.

- Always be mindful of tests in progress. Never allow horseplay or loud talking that would divert the attention of laboratory technicians. If it is necessary to leave the laboratory or to leave a test in progress, make certain no safety hazard will result from your absence.
- Do not attempt to perform tests simultaneously unless each test can be given the required attention.
- Whenever in doubt concerning any operation, consult qualified authority for advice.
- Do not attempt unauthorized shortcuts to save time, as they generally are not in accordance with safe laboratory procedures.
- Be prepared for any emergencies which may arise, and be familiar with the proper action to take in event of emergencies.
- When ending daily operations, make a thorough and orderly check of laboratory, equipment and facilities to ensure that no hazards may develop during the time the laboratory is unattended.

b. Preventing Fires. The following fire prevention rules shall be observed in all laboratory procedures:

- Do not smoke in the Supplemental Petroleum Laboratory.
- Never leave open flames or heating elements unattended.
- Never pour hot liquids into drains. Set aside hot liquids to cool thoroughly in covered containers before discarding.
- Chemicals which may react to produce dangerous fumes, fires, or explosion shall be stored in their proper places.
- Volatile liquids and flammable products shall be kept away from heat sources, open flames, direct sunlight, and electrical switches.
- No open flame or exposed heating element shall be nearby when pouring highly volatile liquids.
- Clean up chemical and liquid spills immediately.
- Always pour acid into water; never pour water into acid.
- Keep oily rags in a metal, airtight, closed container. Do not store oily rags in cabinets or drawers.

- Laboratory shall be adequately ventilated.
- Fire fighting equipment shall be checked periodically to assure it is properly serviced and ready for use. This is done by checking seals, tags, pressure gauges, and hoses.

c. Extinguishing Fires. Be familiar with the nature of petroleum fires; with procedures for fighting fires; and with the fire extinguishing equipment in the laboratory. Do not use water for extinguishing oil fires because it will spread the fire. Water is a conductor of electricity and should not be used on electrical fires.

d. Handling Chemicals. The following safety precautions shall be observed by all personnel while handling chemicals.

- Store heavy and large containers of chemicals on or as near the floor as possible.
- Never fill a container with material other than that indicated on the label. Every container shall be properly labeled.
- Bottles containing acids or alkalis shall not be placed on high shelves or on top of equipment.
- Always wear goggles when breaking up solid chemicals which might chip, or when handling quantities of corrosive liquids such as strong acids and strong bases.
- When opening new bottles of acid, always wear goggles.
- When pouring a sample from a container, hold the container cap or stopper in your hand. Never place the cap or stopper on a counter where it may come in contact with a contaminating agent.
- Always wipe up any acid that spills or splashes on benches, tables, or floors.
- If any chemical is spilled or splashed on the body, immediately wash the contaminated area thoroughly with water.
- Keep all sample containers that are in use capped or stoppered at all times except when pouring out test portions. Always replace the same cap or stopper on the container from which it was removed.
- Never handle mercury with bare hands; never heat mercury in an open container; and never shake more than 20 millimeters of mercury in a glass container.
- Never taste laboratory chemicals. Smell a chemical only when necessary and then only by wafting a small amount of vapor with the hand toward the nose.
- Dispose of all unlabeled chemicals.

e. Controlling Pressure and Vacuum. The following safety precautions shall be observed by all personnel while operating the air/vacuum systems.

- Do not use faulty copper, plastic, or rubber tubing when performing operations requiring pressure or vacuum.
- Glass vacuum apparatus shall be properly shielded when it is in use.
- Always wear goggles when opening air valves that are close to the face.
- Make sure that chemical containers having vent caps are inspected, and that containers which do not have vent caps are vented properly.
- Keep containers of volatile liquids as cool as possible. Exercise caution in releasing any pressure which may have formed in the container; always release the pressure gradually. Remove caps or stoppers periodically to vent the vapor. After venting containers, return the cap or stopper to the container from which it was removed. The practice of venting containers of volatile liquids does not apply to those samples collected for vapor pressure tests.

- Vent separator funnels frequently when shaking volatile liquids. The funnel shall be wrapped with a rag when shaking an extremely volatile liquid.
- Store propane cylinders in the propane stowage locker, away from heat or ignition sources.

f. Controlling Fumes. The following safety precautions are presented to aid operators of the Supplemental Petroleum Laboratory in controlling toxic fumes.

- The laboratory shall be properly ventilated at all times.
- Perform all gas alarm system tests and calibrations as specified to ensure proper operation of system.
- If any material is spilled which gives off toxic fumes, all personnel shall leave the area immediately and return only after the area has been adequately purged.

g. Electrical Safety. The following electrical safety precautions apply to all operators and maintenance personnel for the Supplemental Petroleum Laboratory.

- Equipment producing a tingle sensation will be reported promptly for repair.
- Keep the use of extension cords to a minimum and the cords as short as possible. Insulation and wire size shall be adequate for the voltage and current to be carried.
- Work on electrical devices shall be done after the power has been disconnected or shut off, and suitable precautions taken to keep the power off during the work.
- Never use metallic pencils or rulers, or wear rings or watches when working on electrical equipment.
- Flammable liquids shall not be stored near electrical equipment.

h. Chemical Spills. Spill control procedures are provided in the SPILL CONTROL PROCEDURES GUIDE (MKP-1479). A copy of the guide is provided with the Mod Lab and is stored inside the bookcase.

1-8. NOMENCLATURE CROSS-REFERENCE LIST.

Common Name or Abbreviation	Official Nomenclature
Modular Base Petroleum Laboratory (MBPL)	Petroleum Laboratory, Semi-Trailer Mounted
Gas Alarm	Gas Detection and Alarm System
ASTM	American Society for Testing and Materials
FTMS	Federal Test Methods Standards
ECU	Environmental Control Unit
LCD	Liquid Crystal Display
Hg	Mercury
Hz	Hertz
V	Volts
psi	Pounds per Square Inch
amp	Ampere
W	Watt
RPM	Revolution per Minute
AC	Alternating Current
DC	Direct Current
lel	Lower Explosive Limit
Steam Super Heater	High Pressure Boiler
Steam Generator	Low Pressure Boiler
hp	Horsepower
pH	Degree of Acidity or Alkalinity
gph or GPH	Gallons per Hour
gpm or GPM	Gallons per Minute
%V	Percent of Volume
GFI	Ground Fault Interrupt
A Lab	Petroleum Laboratory, Model-A
B Lab	Supplemental Petroleum Laboratory, Model-B

Section II. EQUIPMENT DESCRIPTION AND DATA

Alphabetical Index

1-9. EQUIPMENT PURPOSE, CAPABILITIES AND FEATURES.

a. Purpose. The Supplemental Petroleum Laboratory is used to augment the Semi-Trailer Mounted Petroleum Laboratory in testing of petroleum products in the field. Tests include qualitative and quantitative analyses of a wide range of military fuels and lubricants.

b. Capabilities and Features. The Supplemental Petroleum Laboratory is capable of performing the following American Society for Testing and Materials (ASTM) tests and Federal Test Methods Standards (FTMS):

ASTM	**Standard Test Method for** (* indicates title is as shown.)
D-5	Penetration of Bituminous Materials
D-86	Distillation of Petroleum Products at Atmospheric Pressure
D-91	Precipitation Number by Lubricating Oils
D-92	Flash and Fire points by Cleveland Open Cup
D-96	Water and Sediment in Crude Oil by Centrifuge Method (Field Procedure)
D-97	Pour Point of Petroleum Products
D-129	Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)
D-130	Detection of Copper Corrosion From Petroleum Products by the Copper Strip Tarnish Test
D-156	Standard Test Method for Saybolt Color of Petroleum Products for the Copper Strip Tarnish Test
D-189	Conradson Carbon Residue of Petroleum Products
D-217	Cone Penetration of Lubricating Grease
D-287	API Gravity of Crude Petroleum and Petroleum Products (Hyrometer Method)
D-445	Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity)
D-482	Ash from Petroleum Products
D-483	Unsulfonated Residue of Petroleum Plant Spray Oils
D-524	Standard Test Method for Ramsbottom Carbon Residue of Petroleum Products
D-564	Standard Test Method for Liquid Paint Driers
D-566	Dropping Point of Lubricating Grease
D-611	Aniline Point and mixed Aniline Point of Petroleum Products and Hydrocarbon solvents
D-873	Oxidation Stability of Aviation Fuels (Potential Residue Method)

ASTM	Standard Test Method for (prefix of except * indicates title is as shown.)
D-874	Sulfated Ash from Lubrication Oils and Additives
D-892	Foaming Characteristics of Lubricating Oils
D-893	Insolubles in Used Lubricating Oils
D-937	Cone Penetration of Petrolatum
D-942	Oxidation Stability of Lubrication Greases by the Oxygen Bomb Method
D-972	Standard Test Method for Rubber-Deterioration by Heat and Oxygen
D-1094	Water Reaction of Aviation Fuels
D-1250	Standard Guide for Petroleum Measurement Tables*
D-1264	Determining the Water Washout Characteristics of Lubricating Greases
D-1266	Standard Test Method for Sulfur in Petroleum Products (Lamp Method)
D-1290	Sediment in Water-Emulsion Polishes by Centrifuge
D-1298	Standard Practice for Density, Relative Density 9Specific Gravity) or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer method*
D-1319	Hydrocarbon Types in Liquid Petroleum Products by Flourescent Indicator Adbsortion
D-1322	Smoke Point of Kerosene and Aviation Fuels
D-1403	Cone Penetration of Lubricating Greases Using One-Quarter and One-Half Scale Cone Equipment
D-1500	ASTM Color of Petroleum Products (ASTM Color Scale)
D-1796	Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)
D-2270	Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100°C
D-2273	Trace Sediment in Lubricating Oils
D-2276	Particulate Contamination in Aviation Fuels
D-2265	Freezing Point of Aviation Fuels
D-2500	Cloud Point of Petroleum Products
D-2532	Viscosity and Viscosity Change After Standing at Low Temperature of Aircraft Turbine Lubricants
D-2709	Water and Sediment in Middle Distillate Fuels by Centrifuge
D-3240	Undissolved Water in Aviation Turbine Fuels
D-4057	Standard Practice for Manual Sampling of Petroleum and Petroleum Products*
D-4048	Detection of Copper Corrosion from Lubricating Grease
D-4057	Standard Practice for Manual Sampling of Petroleum and Petroleum Products *
D-4294	Sulfur in Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectroscopy
D-4950	Standard Classification and Specification of Automotive Service Greases *

FTMS

FTM5101	Neutrality (Qualitative)
FTM5327	Determination of Fuel System Icing Inhibitor in Hydrocarbon Fuels
FTM5329	Humidity Cabinet Protection
FTM5330	Visual Colorimetric Determination of Fuel System Icing Inhibitor in hydrocarbon Fuels
FTM5340	Inhibitor in Hydrocarbon Fuels
FTM5415	Resistance of Greases to Aqueous Solutions

The Supplemental Petroleum Laboratory incorporates the following features:

- Air and ground transportable for rapid deployment
- Rigid wall construction
- All weather operation
- Rapid set-up for use
- Self-contained environmental control system
- Self-contained water system
- Self-contained air system
- Self-contained vacuum system
- Trailer mounted for long distance towing
- Designed to operate under blackout conditions with door activated blackout switches.