

## GLOSSARY

## Section I. Acronyms and Abbreviations

AA	air assault
ABN	airborne
AC	alternating current
AFC	aviation fuel contamination
AL	Alabama
AMC	United States Army Materiel Command
APAP	Air Pollution Abatement Program
API	American Petroleum Institute
AR	Army regulation
ARM	armored
ARNG	Army Reserve National Guard
ASTM	American Society for Testing and Materials
ATTN	attention
AVGAS	aviation gasoline
AVN	aviation
BN	battalion
BOE	Bureau of Explosives
C <sub>6</sub> H <sub>5</sub> COOH	benzoic acid
C	carbon; celsius
CA	California
CFR	Code of Federal Regulation
CHEMWARN	chemical warning
CO	company
COC	Cleveland Open Cup
CONUS	continental United States
COMMZ	communications zone
cST	centistokes
CU	conductivity unit
DA	Department of the Army
DC	District of Columbia
DCMC	Defense Contract Management Command
DCMCI	Defense Contract Management Command International
DD	Department of Defense
DFA	Diesel Fuel Arctic
DFM	Diesel Fuel Marine
DFP	decimal fractional purity
DFR	defense fuel region
DFSC	Defense Fuel Supply Center
DIEGME	diethylene glycol monomethyl ether
DIV	division
DLA	Defense Logistics Agency
DOD	Department of Defense

DODISS	Department of Defense Index of Specifications and Standards
EGME	ethylene glycol monomethyl ether
EMP	electromagnetic pulse
EPA	Environmental Protection Agency
EVAP	evaporation
F	Fahrenheit
FM	field manual
FOB	free on board
FSB	Forward Support Battalion
FSC	federal supply classification
FSII	fuel system icing inhibitor
FTMS	Federal Test Method Standard
g	gram(s)
GA	Georgia
gal	gallon(s)
GEN	General
GP	group
H <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	oxalic acid
H <sub>2</sub> C <sub>2</sub> O <sub>4</sub> ·2H <sub>2</sub> O	oxalic acid dihydrate
H <sub>2</sub> S	hydrogen sulfide
HDBK	handbook
H&F	hard and flinty
HQ	headquarters
hr	hour
hrs	hours
HVY	heavy
IAW	in accordance with
I.D.	inside diameter
INF	infantry
IPB	initial boiling point
IQUE	In-Plant Quality Evaluation
JFTOT	jet fuel thermal oxidation tester
JP	jet propulsion
JPO	Joint Petroleum Office
KHP	potassium biphthalate, potassium acid phthalate; potassium hydrogen phthalate
KHCO <sub>3</sub>	potassium bicarbonate
KW	kilowatt
KY	Kentucky
LAB	laboratory
L&F	loose and flaky
LCL	lower combustible limit
LIN	line item number
M	molarity
MACOM	major Army command
MBPL	modular base petroleum laboratory
MECH	mechanized
MEW	milliequivalent weight

mg	milligram
MgCl <sub>2</sub>	magnesium chloride
MIL	military
MIL-HDBK	military handbook
MIL-STD	military standard
min	minute(s)
ml	milliliter
MOGAS	motor gasoline
MOPP	mission-oriented protective posture
MOS	military occupational specialty
MSB	Main Support Battalion
MSDS	Material Safety Data Sheet
MSEP	microseparameter
N	notification; normality
Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub> ·10H <sub>2</sub> O	borax
Na <sub>2</sub> CO <sub>3</sub>	sodium carbonate
Na <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	sodium oxalate
NA	not applicable
NATO	North Atlantic Treaty Organization
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NBC	nuclear, biological, chemical
NC	North Carolina
NH <sub>2</sub> SO <sub>3</sub> H	sulfamic acid
NLGI	National Lubricating Grease Institute
No	number
NSN	national stock number
NUCWARN	nuclear warning
OCONUS	outside continental United States
O.D.	outside diameter
OHSA	Occupational Health and Safety Act
1M	one molar; one molar
1N	one normal
OP	operations
oz	ounce(s)
PA	Pennsylvania
PETRL	petroleum
PGF	petroleum ground fuels
pH	potential of hydrogen
PL	pipeline
PLL	prescribed load list
POC	point of contact
POL	petroleum, oils, and lubricants
PQAR	petroleum quality assurance representative
PQAS	Petroleum Quality Analysis System
psi	pounds per square inch
pS/m	picoSiemens per meter
QA	quality assurance

QAR	quality assurance representative
QC	quality control
QM	quartermaster
QPL	quality products list
QS	quality surveillance
RVP	Reid Vapor Pressure
S4	Supply Officer (US Army)
SAE	Society of Automotive Engineers
SAPO	subarea petroleum office
SC	supply catalog
SDA	static dissipating additive
SF	standard form
SFS	Saybolt Furol Viscosity in Saybolt Furol seconds
SG	sampling and gauging
SOP	standing operating procedure
STANAG	Standardization Agreement
STD	standard
SUP	supply; support
SUS	Saybolt Universal Viscosity in seconds
T12CO3	thallous carbonate
TB	technical bulletin
TD	to deliver
TDA	tables of distribution and allowances
TEL	tetraethyl lead
TEMP	temperature
TERM	terminal
TM	technical manual
TMDE	Test, Measurement, and Diagnostic Equipment
TOE	tables of organization and equipment
TPT	tactical petroleum terminal
TROSCOM	United States Army Troop Support Command
TX	Texas
US	United States (of America)
USACASCOM	United States Army Combined Arms Command
USAF	United States Air Force
USAPC	United States Army Petroleum Center
USAR	United States Army Reserve
UST	underground storage tank
VA	Virginia
VA	Virginia
VI	viscosity index
WSIM	water separation index, modified

## Section II. Terms

- accelerated gum test** A test to determine the amount of gum and lead precipitate formed in aviation fuels as a result of accelerated oxidation or aging. Potential gum is the amount of residue obtained by evaporating the fuel at the end of the specified aging period.
- acid** A chemical compound usually having a sour taste and capable of neutralizing alkalis and turning blue litmus paper red.
- acidity** The amount of free acid in a substance.
- additive** An agent used for improving existing characteristics or for imparting new characteristics to certain petroleum products.
- alkylate** The product obtained in the alkylation process. Chemically, it is a complex molecule of the paraffin series, formed by the introduction of an alkyl radical into an organic compound.
- all-levels sample** A sample taken by lowering a closed sampler to the drawoff level of a tank, opening the sampler, and raising it at a uniform rate so that it is between 75 and 85 percent full when it emerges from the liquid.
- American Petroleum Institute (API)** The institute represents and is supported by the petroleum industry. It standardizes the tools and equipment used by the industry and promotes the advancement of research in the petroleum field.
- American Society for Testing and Materials (ASTM)** A national scientific technical organization formed for the development of standards or characteristics performance of materials, products, systems, and services and the promotion of related knowledge.
- aneroid barometer** A barometer in which the action of the atmospheric pressure bending a metal surface is made to move a pointer.
- antifoam agent** An additive used in some lubricating oils to control foam.
- antiknock** Resistance to detonation or pinging in spark-ignition engines.
- antiknock agent** A chemical compound such as tetraethyllead which, when added in small amounts to the fuel charge of an internal-combustion engine, tends to lessen knocking.
- antioxidant** A chemical added to gasoline, lubricating oil, and certain other petroleum products to inhibit oxidation.
- API Gravity** An arbitrary scale expressing the gravity or density of liquid petroleum products. The measuring scale is calibrated in terms of degrees API. The gravity of any petroleum product is corrected to 60°F (16°C). (See Specific Gravity.)
- appearance** Refers to the visual examination of fuels. The terms used to describe appearance are clear and bright, hazy and cloudy.
- aromatic (noun)** One of a broad class of unsaturated hydrocarbons that is characterized by the ring structure of its molecules.
- aromatic (adjective)** Derived from, or characterized by, the benzene ring.
- ash content** The percent by weight of residue left after combustion of a sample of fuel oil or other petroleum oil.

**atmospheric pressure** The pressure of air, more specifically, the pressure of that sea level. As a standard, the pressure at which the mercury barometer stands at 760 millimeters or 29.92 inches (equivalent to approximately 14.7 pounds per square inch).

**atom** The smallest complete particle of an element which can be obtained that retains all physical and chemical properties of the element. According to present theory, the atom consists of a nucleus of protons and neutrons positively charged, surrounded by negatively charged particles called electrons.

**automotive gasoline (MOGAS)** A hydrocarbon fuel for use in internal-combustion engines and procured by the military under two specifications. The specification for leaded and unleaded gasoline is VV-G-001690. Specification MIL-G-3056 specifies combat grade type I and II.

**average sample** A sample that consists of proportionate parts from all levels of the product. For example, an average sample from a horizontal, cylindrical tank or from spherical tank should contain more material from the middle of the tank where the diameter is the greatest.

**aviation fuels (AVFUELS)** Those refined petroleum products specifically formulated and blended for use in aircraft engines, both jet engines and piston (reciprocating) engines. AVGAS (below) is an aviation fuel.

**aviation gasoline (AVGAS)** A hydrocarbon fuel for use in reciprocating piston-type aircraft engines. AVGAS is characterized by high vapor pressure and distillation range and high tetraethyllead content. It is procured by the military under specification MIL-G-5572.

**bacon bomb** A thief-type sampler, also called a tank-car thief, consisting of a special metal cylinder tapered at both ends and fitted internally with a plunger valve that opens automatically when the sampler strikes the bottom of the tank car. A trip cord may be attached to make it possible to open the cylinder at any desired depth. The sampler is used in storage tanks and tank cars to take bottom samples of liquid products of 2 psi, or less; Reid vapor pressure; and samples of semiliquid products.

**ballast** Water, usually salt water, carried in tanker cargo tanks when the tanks are empty of petroleum products to reduce buoyancy and improve stability and sea-keeping qualities. Ballast may be clean or black, depending on whether it is contaminated with petroleum products.

**barge** A flat-bottomed boat used to carry cargo on inland waters or in lighterage service. Barges are usually towed. A petroleum barge has internal tanks to transport liquid cargo.

**barium-base grease** A water-resistant grease with high heat stability made by thickening a petroleum oil with a barium soap.

**barometer** See Aneroid Barometer.

**barrel (bbl)** A common unit of measurement of liquids in the petroleum industry. It equals 42 US standard gallons.

**batch** A specific quantity and type of product pumped into a pipeline.

**batching** Determining the sequence in which two or more products are to be pumped and introducing those products into the pipeline in a sequence that results in the least formation of interfacial material.

- beaker** A cylindrical glass vessel with straight sides, a flaring rim, and pouring lip used in the laboratory.
- benzene** Colorless liquid hydrocarbon, with one ring of carbon atoms. Made from coal tar and by catalytic reforming of naphthenes, it is used in the manufacture of various products, as a solvent, and as a component of high-octane gasoline.
- benzol** The general term which refers to commercial or technical benzene.
- bitumen** A mixture of hydrocarbons of natural or pyrogenous origin, or both, which are frequently accompanied by their nonmetallic derivatives and which are completely soluble in carbon disulfide.
- black cargoes** A general term used to refer to liquid cargoes of crude oil.
- black oil** A general term applied to crude oil and the heavier and darker colored petroleum products such as residual fuel oils.
- bleeding** Separation of liquid lubricant from a lubricating grease.
- blending** Mixing refinery products to suit market conditions. Mixing on specification fuel with off-specification fuel to bring the latter to specification or use limits (a method of reclamation). Mixing an interface with either or both adjacent products, or with a third product, without degrading any of them beyond use limits.
- boiling point** The temperature at which a substance boils or is converted into vapor by bubbles forming within the liquid. The temperature varies with atmospheric pressure.
- boiling range** The range of temperature, usually determined at atmospheric pressure in standard laboratory apparatus, over which the boiling or distillation of an oil commences, proceeds, and finishes.
- bonding** Electrically connecting units or containers before operations begin in order equalize any static potential that might exist and to provide a continuous path for any static potential that might be generated after operations begin.(See Grounding.)
- bottoms** In a distilling operation, the portion of the charge remaining in the still or flask at the end of a run, in pipe stilling or distillation, the portion which does not vaporize.
- bottom loading** Refers to the loading of a railway tank car or tank vehicle through the bottom outlet. Bottom loading reduces loss through vapor formation.
- bottom sample** A sample taken with a Bacon bomb or thief sampler from material at the bottom of a tank.(See Bacon Bomb.)
- bottom sediment and water** Amount of sediment and water measured in bottom of a tank.
- bright stocks** Pressure distillate bottoms which have had petrolatum wax removed and which have been filtered so that the stock has a low cold test and a good color (dark red by transmitted light and green by reflected light). Bright stock constitute the body of lubricants manufactured for internal-combustion engines.
- bulk petroleum products** Those petroleum products (fuels, lubricants) which are normally transported by pipeline, rail tank car, tank truck, barge, or tanker and stored in tanks or containers having a capacity of more than 55 gallons, except fuels in 500-gallon collapsible containers, which are considered to be packaged.

**burner fuel oil** A fuel oil used under boilers and in furnaces to generate power or heat. Under Federal Specification (FS) VV-F-815, it is produced in six grades: FS No. 1, FS No. 2, FS No. 4, FS No. 5 (Light) FS No. 5 (Heavy), and FS No. 6. Under specification MIL-F-859, one grade, Navy special, is produced.

**butane** Either of two isomeric, flammable, gaseous hydrocarbons, of the paraffin series, n-butane or isobutane. Bottled, butane is referred to as LPG and is used for domestic and laboratory purposes and for general brazing.

**calcium-base grease** A grease composed of a mineral oil thickened with calcium (lime) soaps and suitable for slow-moving machine parts. It does not retain consistency at high temperatures.

**calibration** The graduation of a measuring instrument. The determination of accuracy of graduation in a measuring instrument.

**calorific value** The heat liberated by the combustion of a unit quantity of fuel.

**calorimeter** An apparatus for measuring quantities of heat, such as the bomb calorimeter, which is used to determine the heat of combustion or the thermal value of a fuel in calories or British thermal units.

**carbon dioxide** A heavy, colorless gas, which will not support combustion (therefore, useful as a fire-extinguishing agent).

**carbon monoxide** A colorless, odorless, and poisonous gas, CO, resulting from the incomplete combustion of carbon.

**carbon tetrachloride** A colorless, nonflammable liquid, used as a solvent, detergent, and drying agent for electrical parts. It is no longer used as an

extinguishing agent because of its toxic qualities.

**catalyst.** A substance that promotes chemical action without the substance undergoing chemical change.

**cathodic protection** An electrolytic method of protecting a buried pipeline or other metal structure against corrosion by surrounding it with an electrical field strong enough to overpower the currents seeking to leave the metal to go into the soil. The method involves putting electrical current into the soil so that it flows to and into the line or structure. The protective current may be obtained by the galvanic action between magnesium anodes and the steel of the pipeline or structure or by a rectifier to convert alternating current to direct current. The current is put into the soil through a scrap metal graphite ground-bed.

**centigrade scale** A thermometer scale on which the interval between the freezing point and boiling point of water is divided into 100 parts or degrees centigrade, 0°C corresponding to 32°F, and 100°C to 212°F. Also called Celsius after Anders Celsius who first described it.

**centistoke** A unit of kinematic viscosity; 0.01 stoke.

**centrifugal pump** An apparatus that builds up pressure head using centrifugal force as the principal means and angular velocity as the secondary means.

**cetane number** The percentage by volume of normal cetane (100 cetane number), in a blend with heptamethylnonane (0 cetane number), which matches the ignition quality of the diesel fuel under test when compared by the procedure specified in ASTM Method D 613. The determination of the cetane number of diesel fuel is similar to the determination of the octane number of gasoline.



change of product Change of service; refers to transporting or storing a product in vessel, tank car or vehicle, storage tank, or other container after having transported or stored a different product in it. The difference between the two products governs the nature and extent of preparations (draining, flushing, cleaning) needed before the change can be made.

Class III (POL) Petroleum fuels: lubricants, hydraulic and insulating oils, preservatives, liquid and compressed gases, chemical products, coolants, deicing and antifreeze compounds, together with components and additives of such products and coal.

Class III A (Air) Petroleum and chemical products used in support of aircraft.

Class III W (Ground) Petroleum and chemical products and solid fuels used in support of ground and marine equipment.

class of fires Class A, fires of ordinary combustibles, such as paper, wood, textiles, or rubbish and extinguished by water. Class B, fires of flammable liquids like gasoline, oil, or grease and extinguished by smothering. Class C, fires involving electrical equipment and extinguished by non-conducting agents. Class D, fires involving burning metal.

clean cargoes Cargoes such as aviation and motor gasoline, diesel oils, jet fuel, kerosene's, and lubricating oils.

clean product Products such as aviation and motor gasoline's, jet fuel, diesel fuel, kerosene, and lubricating oil; contrasted with black oil.

clear and bright Clear is the absence of visible solids, a cloud, a haze, an emulsion, or free water in the product. Bright is the sparkle of clean, dry product in transmitted light.

closed circuit refueling A system of refueling in which the nozzle mates with a lock into the fuel tank, eliminating spillage.

closing gage A volume measurement of product taken after a delivery or receipt of product and after at least a 30-minute settling time (and at close of business at terminals and supply points).

combustion Burning or rapid oxidation caused by the union of oxygen and any material capable of being ignited.

commingling The intentional or unintentional mixing of two or more products.

compatibility Refers to the ability of additives or of lubricating oils of different composition or from different sources to mix together without separation or reaction.

composite sample A mixture of individual samples representing the bulk from which they were taken. A composite sample is not the same as a mixed sample.

compound A substance formed by combining two or more ingredients in definite proportions by weight. A compound possesses physical and chemical properties entirely different from those of the combining ingredients if used separately.

compounding The addition of fatty oils and similar materials to lubricants to impart special properties. Lubricating oils to which such materials have been added are known as compounded oils.

compression ignition Ignition in a diesel engine, in which the heat of compression ignites the fuel, in contrast to the spark ignition in a gasoline engine.

**consistency** The degree to which a material, such as a lubricating grease, resists deformation under the application of force. It is, therefore, a characteristic of plasticity, as viscosity is a characteristic of fluidity. Consistency is indicated by apparent viscosity; or as in the case of grease, is measured by the penetration of a special cone into the grease under prescribed conditions of temperature, load, and time, as described in ASTM Method D 217.

**contaminated fuel module** A 100,000 gallon storage set used to store off-specification fuel until it is blended or loaded into tanker trucks for disposal.

**contaminant** A foreign substance in a product.

**contaminated product** A product in which one or more grades or types of products have been inadvertently mixed, or a product containing foreign matter, such as dust, dirt, rust water, or emulsions.

**contamination** The addition to a petroleum product of some material not normally present. Common contaminants are water, dirt, sand, rust, mill scale, and other petroleum products.

**continuous sample** A sample taken from a flowing pipeline in such a manner that the sample is a representative average of the stream during the period of sampling.

**copper strip corrosion** A qualitative method of determining the corrosiveness of a product by its effects on a small strip of polished copper suspended or placed in the product (ASTM Method D 130).

**corrosion** Rusting; a gradual eating away or oxidation such as the action of moist air on steel, and the more rapid chemical action of acid on metal or steel.

**critical velocity** That zone of velocities between laminar flow and turbulent flow, where the exact nature of flow is unpredictable. Flow is considered laminar when the Reynolds number is less than 2,000, turbulent when the Reynolds number is greater than 4,000, and critical or indeterminate in between those values.

**crude** In a natural state; not altered, refined, or prepared for use by any process, as crude oil or crude petroleum.

**crude oil (petroleum)** See Petroleum.

**cup-case thermometer** An instrument, consisting of a thermometer attached to a hardwood or plastic back, with the base of the thermometer enclosed by a metal cup, used to measure the temperature of products in storage tanks. The thermometer is lowered to the desired level, allowed to remain for a prescribed time, withdrawn immediately, and read. The liquid-filled cup prevents a change in the height of the mercury before it can be read.

**cut** A fraction obtained by a separation process. Product withdrawn from a pipeline and routed into tankage. Product withdrawn from the middle of a batch is referred to as a heart cut. In gaging bulk fuel, the mark made by a petroleum product in contact with the gaging instrument. The cut shows the level of the product.

**datum plate** A level metal plate attached to the tank bottom directly under the reference point to provide a smooth surface for the innage bob to rest on.

**Defense Fuel Supply Center (DFSC)** An activity under the Defense Logistics Agency (DLA) with responsibility as the integrated materiel manager (IMM) for wholesale bulk petroleum products until their delivery to the point of sale. This responsibility includes contract administration in oversea areas.

- Defense Fuel Supply Point (DFSP)** Any military or commercial bulk fuel terminal storing product owned by DLA.
- Defense General Supply Center (DGSC)** An activity, under DLA, responsible for management of packaged petroleum products, exclusive of packaged fuels.
- Defense Logistics Agency (DLA)** The agency, at the DOD level, charged with providing the most effective and economical support of common supplies and services to the military departments and other designated DOD components. It is the agency under which the DFSC operates.
- density** Specific weight or mass of a substance per unit volume (pounds per cubic foot or gallon or grams per cubic centimeter). Specific gravity is the ratio of the mass of any volume of a substance to the mass of an equal volume of some standard substance (water in the case of liquids and hydrogen or air in the case of gases) at 40C (104F).
- detergent oil** A lubricating oil possessing special sludge-dispersing properties for use in internal-combustion engines. These properties are usually the result of the incorporation in the oil of special additives. Detergent oils hold sludge particles in suspension and thus promote engine cleanliness.
- deterioration** Any undesirable chemical or physical change that takes place in a product during storage or use. Some of the more common forms of deterioration are weathering, gum formation, weakening of additives, and change in color.
- diesel engine** An internal-combustion engine in which air drawn in by the suction stroke is so highly compressed that the heat generated ignites the fuel, which is automatically sprayed into the cylinder under high pressure.
- diesel fuel** A hydrocarbon fuel used in diesel engines. Diesel fuels used by the Armed Forces are manufactured under two specifications: VV-F-800 and MIL-F-16884.
- diesel fuel additive** Material added to diesel fuel to improve the ignition quality. Examples are amyl nitrate and ethyl nitrate.
- differential pressure** The difference between suction pressure and discharge pressure of a pump; increment of pressure added by each pump operating in series in a pump station; pressure drop or loss between the inlet and outlet of a filter, meter, or other accessory offering resistance to flow.
- dissolved water** See Water (Water, Dissolved).
- distillate** That portion of a liquid which is removed as a vapor and condensed during a distillation process.
- distillate fuel oils** Fuel oils which are distillates derived directly or indirectly from crude petroleum (chiefly from the gas oil fraction).
- distillation** Vaporization of a liquid and its subsequent condensation in a different chamber. In refining, it refers to the separation of one group of petroleum constituents from another by means of volatilization in some form of closed apparatus, such as a still, by the aid of heat. ASTM distillation: Any distillation made according to an ASTM distillation procedure, especially a distillation test made on such products as gasoline, jet or turbine fuels, and kerosene to determine the initial and final boiling points and the boiling range.
- downgrading** Assigning a lower grade to an off-specification product, provided it meets the requirements of the lower grade.

**drum thief** A metal or plastic tube, 1 1/2 inches in diameter and 30 inches long, used to withdraw samples from drums.

**effluent** Outflowing or outflow; a term applied to a stream that has passed through a process or apparatus and has been altered in some way; product flowing out of a filter/separator, for example, or past a device that adds an inhibitor.

**electrolysis** Chemical decomposition by the action of an electric current. This process is both the cause of external corrosion of buried pipelines and the basis for providing protection against such corrosion.

**end point (EP)** The point indicating the end of some operation or at which a certain definite change is observed. In titration, this change is frequently a change in the color of an indicator which has been added to the solution or the disappearance or excess of one of the reactants which is colored. In the distillation of liquids, such as gasoline, the end point is the maximum temperature which occurs during the test.

**evaporation** The conversion of a liquid into vapor, usually by means of heat.

**evaporation loss** Evaporation loss is the loss of a liquid volume or weight due to the free evaporation of the liquid usually in a storage tank at atmospheric pressure. It varies with the temperature, the amount of liquid surface exposed, the temperature of vaporization of the lightest components of the liquid, the velocity of air currents over the surface exposed, and the degree of vapor tightness of the tank roof. Since petroleum products are not homogeneous liquids, the rate of evaporation is not constant. The rate of evaporation is greatest at the beginning when the largest percentage of light-volatile hydrocarbons are present and slowest when evaporation has proceeded so far that only heavy residues are left.

**Fahrenheit scale** A thermometer scale on which the freezing point of water is 32° and the boiling point is 212° (at sea level atmospheric pressure).

**filter (noun)** A porous material on which solid particles are caught and retained when a mixture is passed through it.

**filter (verb)** To remove mechanically the solids or free water from a petroleum product.

**filter/separator** A device used to separate both solid contaminants and water from a petroleum fuel.

**flammable** A term describing any combustible material which can be ignited easily and which will burn rapidly. Petroleum products which have flash points of 100°F (37.8°C) or lower are classed as flammable.

**flash point** The lowest temperature at which a liquid petroleum product gives off vapor in sufficient concentration to ignite (that is, flash) on application of a flame under specified conditions.

**flow rate** The amount of fuel passing through a point along a pipeline or hose line over time. Flow rate is usually stated in gallons per minute or gallons per hour.

**foaming** The formation of froth or foam on lubricating oils or other oils as a result of aeration or release of gas dissolved in the oil. Foaming characteristics of lubricating oils are determined by ASTM Method D 892.

**fuel oil** Any liquid petroleum product burned for the generation of heat in a furnace or firebox or for the generation of power in an engine, exclusive of oils with a flash point below 100°F (38°C) (Tag closed-cup tester) and oils burned in cotton- or wool-wick burners.

**Fuel System Icing Inhibitor (FSII)** An agent to be used only as an anti-icing additive for jet turbine engine fuels.

**gage (noun)** An object used as a standard of measurement or comparison; that is, an instrument for measuring, indicating, or regulating the capacity, quantity, amount, or other properties.

**gage (verb)** To measure the contents or capacity, as of a tank.

**gaging for water** Obtaining the depth of water bottom by taking a water cut. This is usually accomplished by coating a plumb bob, tape, or gaging stick with water finding paste.

**gallon (gal)** A unit of measure of volume. A US gallon contains 231 cubic inches or 3.785 liters; it is 0.83268 times the imperial gallon. One US gallon of water weighs 8.3374 pounds at 60F(16°C).

**gas detector** An instrument for determining the explosibility of a gas and air mixture (explosimeter).

**gas oil** A term originally used to refer to an oil suitable for cracking to make illuminating gas. The term is now used to designate an overhead product in between refined oils and low-viscosity lubricating oils, used primarily as thermal or catalytic cracking feed stock, diesel fuel, furnace oil, and the like.

**gas turbine** An engine in which vapor (other than steam) is directed, under pressure, against a series of turbine blades. The energy contained in the rapidly expanding vapors is converted into rotary motion.

**gravitometer** Permanently installed hydrometer that gives a continuous reading of the API or specific gravity of the product passing through the pipeline.

**Gravity** See API Gravity and Specific Gravity.

**grease** A mixture of petroleum oil, soap (or other thickeners), and sometimes an additive, used for lubricating under conditions where an oil cannot meet all requirements.

**grounding** Connecting single or bonded units to a ground rod so that any static potential will be discharged into the earth. If two or more units are bonded and one is grounded, the whole system is effectively grounded. (See Bonding.)

**ground products** Refined petroleum products normally intended for use in administrative, combat, and tactical vehicles, materials-handling equipment, special-purpose vehicles, and stationary power and heating equipment.

**gum** Varnish-like, tacky, noncombustible insoluble deposits formed during the deterioration of petroleum and its products, particularly gasoline. The amount of gummy material in gasoline is known as its gum content, which is determined by ASTM Methods D 381 and D 873. (See Gum Test.)

**gum test** An analytical method for determining the amount of existing gum in gasoline by evaporating a sample from a glass dish on an elevated-temperature bath with the aid of circulating air.

**heavy product** A liquid in stored drums, which gives off flammable vapors above the temperature of 80F (27°C).

**hydrocarbon** A compound containing only hydrogen and carbon. The simplest hydrocarbons are gases at ordinary temperatures; with increasing molecular weight, they change to the liquid form and, finally to the solid state. Hydrocarbons are the principal constituents of petroleum.

- hydroforming** A special catalytic reforming process used to upgrade straight-run gasoline.
- hydrometer** A graduated instrument for determining the gravity of liquids. It is usually made of hollow glass and weighted at one end so as to float upright. The depth to which the instrument sinks when immersed in a liquid is determined by the density of that liquid. The lighter the liquid, the lower the instrument sinks. Some hydrometers are marked so that the percentage of each constituent of the product in them can be read. Hydrometers used to measure petroleum are usually marked with degrees API or specific gravity.
- icing** The solidification of particles of moisture in the fuel system, especially the carburetor, of an aircraft or ground vehicle. The moisture may either be contained in the fuel or it may enter the system through the air intake. Icing may cause either partial or complete loss of power.
- identification tests** Selected tests applied to a sample to identify quickly the type or grade of material represented or to determine that the quality has not been altered by time or handling.
- ignition quality** The ability of a fuel to ignite upon injection into the engine cylinder.
- inhibitor** A substance added in small amounts to a petroleum product to prevent or retard undesirable chemical changes from taking place in the product or in the condition of the equipment in which the product is used. The essential function of inhibitors is to prevent or retard oxidation or corrosion.
- innage** The height or volume of liquid in a storage tank, as measured or gaged from the bottom of the tank to the top of the liquid.
- innage tape and bob** A steel measuring tape connected by a harness snap to the eye of cone-tipped bob. Used to measure the distance from the bottom of the tank to the liquid level of product in a tank or gage pipe.
- insulating oil** An oil used in circuit breakers, switches, transformers, and certain other electrical devices for insulating, cooling, or both. In general, such oils are well-refined petroleum distillates of low volatility and high resistance to oxidation and sludging.
- interface** A mixture, or commingling, between adjacent products in a multiproduct pipeline; interfacial mixture.
- internal-combustion engine** An engine which operates by means of combustion of a fuel within its cylinders.
- into-plane** The requirement and procurement of fuel and lubricating oils for delivery into government-owned aircraft normally at nonmilitary air facilities. Charges for this include the cost of fuel, lubricating oils, and related services.
- jet engine** An engine which converts air and fuel into a fast-moving stream of hot gases that propel the item on which it is mounted.
- jet fuel** Fuel meeting the required properties for use in jet engines and aircraft turbine engines. Jet fuels are procured for the Armed Forces in several grades. The most important grades are JP-4 (low vapor pressure) and JP-5 (high flash point), and JP-8.
- Joint Petroleum Office (JPO)** An office established by the Joint Chiefs of Staff with petroleum logistics responsibilities in a unified command in oversea areas.
- kerosene** A refined petroleum distillate used in space heating units, in wick-fed lamps, bomb-type flares, for cleaning certain machinery and tools, and as a base for liquid insecticide sprays. A single multiple-use type is procured under Federal Specification VV-K-211. A deodorized type, which is

- used as a base for insecticide sprays, is procured under Specification VV-K-220.
- kinematic viscosity The ratio of the absolute viscosity to the density at the temperature of the viscosity measurement. The metric units of kinematic viscosity are the stoke and centistoke, which correspond to the poise and centipoise of absolute viscosity.
- knock Noise, also called ping, associated with internal-combustion engines. After the spark ignites the charge, the charge burns smoothly until part of it is burned; then if either the fuel or engine operating conditions are unsuitable, the remaining portion burns suddenly, which makes a knock or ping.
- lead A general term used to denote tetraethyllead or other organometallic lead antiknock compounds used as gasoline additives.
- lead poisoning Poisoning caused by tetraethyllead or another of the organometallic lead antiknock compounds used as additives in gasoline. It may result from ingestion, absorption through the skin, or inhalation of fumes.
- light ends The most volatile portions of a carbon and hydrogen mixture, the low boiling components that boil off first in distillation. Opposite of heavy ends.
- light product A light product is any liquid which gives off flammable vapors at or below 80°F (27°C).
- liter (l) A metric unit of capacity equal to 0.9081 dry quart (US) or 1.0567 liquid quarts (US).
- load line The line defining the maximum mean draft to which a tanker may be lawfully submerged. It is the lower limit of the freeboard for various conditions and seasons. The six load line used on tankers are the Summer load line; Winter load line; Winter, North line; Tropical load line; Freshwater load line; and Tropical freshwater load line.
- lower sample A sample with a bottle or beaker sampler from the middle of the bottom third of a tank's contents.
- lubricant A substance, especially oil, grease, and graphite, which may be interposed between moving surfaces to reduce friction and wear.
- maximum working pressure The highest pressure that equipment is designed to operate safely.
- maximum fill level The highest level to which a container maybe filled.
- meniscus The curved surface of the top of a column of liquid in a narrow tube; the curve is concave when the containing walls are wet with the liquid and convex when they are not wet.
- methane A light, odorless, flammable gas, CH<sub>4</sub>. The first member of the paraffin series. It is the principal constituent of natural gas.
- micron One micron is a thousandth part of one millimeter (approximately 25,400 microns equal 1 inch). The average human hair is about 100 microns in diameter.
- middle sample A sample taken from the middle of a tank's contents.
- military sealift command The US Navy command responsible for providing ocean transportation for the military services and for other governmental agencies and departments, as directed.
- mixed sample A sample taken by mixing or stirring the original sample and then drawing off the desired quantity for testing.

**molecule** Unit of matter; the smallest particle of an element or compound that retains chemical identity with the substance in mass.

**multigrade oil** A multiviscosity number oil which acts as a high-viscosity oil in high temperatures but as a low-viscosity oil in low temperatures.

**naphtha** A general term applied to refined, partly refined, and unrefined petroleum products and liquid products deriving from natural gas which distill between 347°F (175°C) and 460°F (238°C).

**natural gas** Naturally occurring mixtures of hydrocarbon gases and vapors, the more important of which are methane, ethane, propane, butane, pentane, and hexane.

**nonrecoverable tank bottom** That quantity of liquid that is below the suction manifold or drawoff line of a storage tank and is not available in normal day-to-day operations.

**octane number** Term used to indicate numerically the relative antiknock value of automotive gasolines and of aviation gasolines having a rating below 100. It is based on a comparison with the reference fuels, isooctane(100 octane number) and normal heptane (0 octane number). The octane number of an unknown fuel is the volume percent of isooctane in a blend with normal heptane which matches the unknown fuel in knocking tendencies under a specified set of conditions. Above 100, the octane number of a fuel is based on the engine rating, defined in terms of milliliters of tetraethyllead in isooctane, which matches that of the unknown fuel.

**off-specification product** A product which fails to meet one or more of the physical, chemical, or performance requirements of the specification.

**olefin** One of a major series of hydrocarbons that appear chiefly in refinery operations. They have the general formula of naphthenes and the chain structures of paraffins, but they are unsaturated. Molecular structure and nomenclature correspond to paraffins having the same amount of carbon. Ethylene, or ethene, is the lowest, member of the olefins, and the series is sometimes called the ethylene series.

**outage** The volume of unoccupied space in a storage tank or other container, measured or gaged from a reference point above the product to the surface of the product. The difference between rated capacity and actual contents. (Some space will always be left unoccupied for expansion of product.) (See Ullage.)

**outage tape and bob** A steel measuring tape connected by a harness snap to the eye of the rectangular bob. The outages tape and bob is used to measure the distance from a reference point above the product to the surface of the product in the tank.

**oxidation** The process of combining with oxygen, a process which all hydrocarbons are capable of doing.

**packaged petroleum products** Those petroleum products other than fuels (generally lubricants, greases, and specialty items) that are stored, transported, and issued in containers with a capacity of 55 gallons or less.

**paraffin** Any of the white, tasteless, odorless, and chemically inert waxy substances composed of saturated hydrocarbons obtained from petroleum.

**penetrating oil** A thin, nonviscous oil used to loosen rusted or frozen metal parts such as nuts, screws, bolts, or pins. Penetrating oil is not intended for use as a lubricant. It is produced to specification VV-P-216.



**petrochemical** Derived from the words petroleum and chemical and originally coined to designate chemicals of petroleum origin. At present, petrochemical covers a wide variety of products.

**petroleum** Crude oil. Petroleum is a mixture of gaseous, liquid, and semisolid hydrocarbons varying widely in gravity and complexity. Petroleum can be removed as a liquid from underground reservoirs, and it can be separated into various fractions by distillation and recovery. Petroleum is a general term that includes all petroleum fuels, lubricants, and specialties.

**petroleum measurement tables** ASTM-IP tables provided for the calculation of quantities of petroleum and its products under the required conditions in any of three systems of measurements. Tables are provided for the reduction of gravity and volume to standard states over normal operating ranges, for calculation of weight-volume relationship, and for interconversion of a wide variety of commercially useful unit's (ASTM Method D 1250).

**petroleum, oils, and lubricant** See POL.

**petroleum testing kit** A kit provided for limited quality surveillance testing under field conditions.

**POL** Petroleum, Oils, and Lubricants. Included are petroleum fuels, lubricants, hydraulic and insulating oils, temporary protectives, liquid and compressed gases, chemical products, liquid coolants, deicing and antifreeze compounds, together with components and additives of such products.

**polymerization** Changing a substance of a given molecular weight to another substance with chemical ingredients in the same proportions as in the first but with a new molecular weight that is a multiple of the first, depending upon how many molecules of the first have been combined. It is a method

of changing hydrocarbon gases into high-octane gasoline.

**pour point** The lowest temperature at which an oil can be poured (ASTM Method D 97).

**preservative** A petroleum product designed to prevent corrosion of ferrous and nonferrous metals. General-purpose lubricating oils produced to specifications VV-L-800, MIL-L-7870, and MIL-L-3150 have preservative qualities.

**pressure** A force or impulse. Pressure differential is incremental pressure, or the difference between suction and discharge of a pump. Pressure gage is an instrument used to measure and indicate pressure in a fluid.

**procurement quality assurance** That program by which the government determines if contractors have fulfilled their contract obligations for quality and quantity of products and related services.

**purple k** Potassium Bicarbonate. A dry chemical used in the trailer mounted fire extinguisher that puts out fires by smothering them.

**qualified products list** A list prepared by the procuring service of civilian-type or off-the-shelf items that comply with specifications and have been found to be acceptable to the government.

**quality surveillance** The measures taken to ensure that petroleum products which have been accepted by the government as being of the required quality are still of the required quality when delivered to the user. QS includes watching over and caring for products during all storage and handling operations, adhering to handling methods and procedures designed to protect quality, and examining and testing of products in storage and on change of custody.

receiving tests Tests prescribed by MIL-HDBK-200 to supply information quickly on the quality of products received so their disposition can be planned.

reclamation Restoring or changing a contaminated or off-specification petroleum product so that it will either meet specifications or will be within use limits. (See Blending.)

Reid Vapor Pressure (RVP) The measure of pressure exerted by a product on the interior of a special container due to its tendency to vaporize.

repeatability The allowable difference between two results on the same sample by the same operator using the same equipment.

reproducibility The allowable difference between two results on the same sample by different operators in different locations.

residual fuel oils Fuel oils which are either topped crude petroleum or viscous cracked residuum.

rust preventive A preservative oil used to provide a waterproof film over iron or steel surfaces exposed to oxidation.

Society of Automotive Engineers (SAE) Numbers of Lubricants A classification of lubricating oils for crankcases and transmissions in terms of viscosity, standardized by SAE.

sample A quantity of product taken as prescribed in ASTM Method D 270 for examination and testing. See specific kind of sample.

sampler A device used to obtain samples of various petroleum products. Another term for sampler is thief.

saturated hydrocarbon A hydrocarbon of such composition that the valence, or combining power, of all carbon atoms present is fully satisfied. Such a hydrocarbon is a stable substance and does not oxidize readily. The degree of saturation is a measure of instability.

scale A formation of oxide in a flaky film or in thin layers.

sediment Foreign matter other than water that settles to the bottom of a container.

sediment and water Solids and aqueous solutions which may be present in an oil and which may be left to settle or which may be separated more rapidly by a centrifuge.

settling time The elapsed time that a product remains undisturbed or unagitated between receipt of product into and discharge from storage.

slop Any liquid petroleum product known to be off specification. Storage tanks may be reserved for such products until the products can be analyzed, reclaimed, or disposed of. Interfaces not disposed of in the adjacent products or not fit for such disposition should be taken off in slop tanks until they can be disposed of.

slop tanks Tanks regularly containing products which are not up to quality, or products which are to be treated or downgraded and transferred to selected tanks.

sludge A heavy sedimentation or deposit on the bottom of storage tanks consisting of water, dirt, and other settings; gunk. Crude oils and residuals form the heaviest sludges, and light products form lightest sludges. Engine sludge is a particular kind of sludge

- containing products of combustion deposited in internal-combustion engines.
- soluble cutting oil An industrial term used to describe a mineral oil containing an emulsifier, making it capable of mixing with water to form a coolant for metal-cutting tools.
- solution A uniform mixture of a solute in a solvent from which the solute can be separated by crystallization or other physical means. Called a physical solution when no chemical changes take place; otherwise called a chemical solution.
- specific gravity The ratio of the weight of any quantity of matter, a petroleum product for example, to the weight of an equal quantity of water; usually determined by use of a hydrometer.(See API Gravity.)
- specification Prescribed limits of control tests used to maintain uniformity of a specific product.
- spectrometric oil analysis The detection, by spectrometer, of wear metals in regularly taken samples of used oils from oil-wetted mechanical systems. By examining the wear metals, the rate of friction wear of the various metal parts of the mechanical system can be determined.
- split loading Carrying more than one product in a compartmented tanker.
- spontaneous combustion Self-ignition of combustible materials caused by accumulation of heat through slow oxidation; cannot take place if the heat is dissipated as fast as it is generated.
- static electricity Electricity generated by friction between unlike substances and in the atmosphere; contrasted with voltaic or current electricity.
- static pressure Hydrostatic pressure produced with a column of liquid because of weight alone; measured by feet of head.
- stratification The condition that may occur in a tank in which batches of product of different gravities are stored. The heavier product settles to a layer on the bottom instead of mixing with the lighter product.
- subarea petroleum office (SAPO) A suboffice of a JPO established by the JPO to fulfill petroleum logistics responsibilities in a section of the geographical area for which the JPO is responsible.
- surfactant A surface active agent which enhances fuel and water emulsification and can interfere with removal of entrained water from fuels.
- suspension Dispersion in a liquid or in a gas of small particles of a solid substance or of small droplets of a liquid.
- sweet crude Crude oil that contains so little sulfur that chemical treatment to remove sulfur or sulfur compounds is not needed.
- synthetic detergent The term synthetic is used to distinguish the newer chemical cleansers from the older ones, such as soaps.
- synthetic fuels The term commonly used to refer to fuels manufactured from sources other than crude petroleum, such as shale or coal.
- thermal jet engine A power unit in which air is taken in from the atmosphere, heated by combustion of a hydrocarbon, and then exhausted at a velocity greater than that at which it was taken in.
- thermal stability Resistance of a petroleum product to breakdown of its properties as a result of heat.

**thermometer** A device for measuring temperature or degrees of heat or cold; may depend upon the expansion of mercury or liquids or change in electrical conductivity. (See ASTM standard E1 and E77 for specifications.)

**thief** See Bacon Bomb and Sampler.

**top sample** A sample taken about 6 inches below the surface of the tank contents.

**topped crude** Crude oil from which some of the lighter parts have been removed by distillation.

**trace** An amount large enough to be detected but not to be measured.

**turbine oil** Lubricating oil for steam turbines, military symbol 219OTEP, made to specification MIL-L-17331.

**ullage** The amount a tank, or container, lacks of being full.

**unsaturated hydrocarbon** An unsaturate; a hydrocarbon with a molecular structure containing one or more double or triple links between adjacent carbon members. Olefins and aromatics are the principal groups of such substances. In addition to being unsaturated, these substances are also unstable and are more capable of undergoing change than the saturates (paraffins and naphthenes). Oxidation is an example of undesirable change in a product.

**upgrade** A grade that slopes upward in the direction of pipeline flow. To change service from a dark or heavy product to a light or volatile product; refers to the nature of a product stored in a tank or transported in a tanker, tank car, or tank truck. To blend a higher grade gasoline into tankage containing a lower grade gasoline.

**upper sample** A sample taken from the middle of the upper third of the tank contents.

**use limits** Tolerances established by MIL-HDBK-200 to permit use, under certain conditions, of products that do not fully meet specifications.

**vapor** The gas-like form of a substance that is normally a solid or a liquid; any gaseous substance that can be condensed by cooling or compression.

**variable vapor space** Refers to the vapor space in tanks specially constructed for storage of volatile products. (These tanks usually have a balloon roof, a breather roof, or a lifter roof (gasometer).) The vapor space is described as variable because the tank roof moves up or down with the expansion or contraction of the confined vapors.

**velocity of flow** Rate of flow usually measured in feet per second equal to volume of flow in cubic feet per second divided by the cross-sectional area of the pipe in square feet. Velocity head is the head in feet equivalent to the velocity in feet per second; equal to the square of the velocity divided by twice the acceleration of gravity in feet per second (64.3).

**viscosity** Internal resistance to flow; usually measured as time in seconds for a given quantity of sample to flow through a standard capillary tube. Viscosity index is a means of rating resistance to change in viscosity with change in temperature. Oils of high viscosity index are more resistant to change; oils of low viscosity index thicken quickly when chilled and thin too much when hot.

**viscous** Heavy, thick-bodied, gluey, or slow in motion.

- volatile** Tending to evaporate or vaporize readily; volatility is the extent to which a liquid vaporizes or the ease with which it turns to vapor.
- volume correction** The correction of measured quantity of product, determined by gaging at observed temperature and gravity and reference to a gage table, to net quantity of product at 60°F (16°C) after deducting bottom water and sediment.
- water** An odorless, colorless, transparent liquid compound.
- water bottom** Water put in a tank bottom to keep product from leaking.
- water contamination** Water present in a fuel in any form; includes dissolved water similar to moisture in the air, entrained water suspended in the form of minute droplets, and free water.
- water separator** Segregator; a filtering device that separates or segregates water from a flowing stream by coalescence.
- water test** A method of testing a newly completed pipeline. The line should be blocked off in sections and clean, fresh water pumped until 1 1/2 times the working pressure is reached. Pressure is observed for a period of 24 hours when possible.
- weathering** Loss of the most volatile components of crude oils and light products during storage and handling and the formation of products of oxidation.
- weighted beaker** Consists of a copper bottle permanently attached to a lead base. A drop cord is attached to the handle through a ring in the stopper so that a short, quick pull on the cord opens the beaker at any desired point beneath the surface of the liquid. This sampler is used to take upper, middle, lower, or all-level samples of liquid products of 16 psi or less, Reid vapor pressure. It is used in tanker or barge compartments, shore tanks, tank cars, and tank trucks.
- white oils** A term applied to substantially colorless, tasteless, and odorless oils with various viscosities.
- worked penetration** A test method of determining penetration (consistency) of lubricating grease after mechanical working.

