

VOLUME II - PETROLEUM MANAGEMENT

CHAPTER 5 -- SHIPMENTS, ISSUES, AND RECEIPTS

A. SHIPMENT NOTICES

1. CONUS

a. Tanker, Barge, and Pipeline Shipments. For shipments with acceptance at FOB destination, DERs/DEOs shall provide delivery notice and data to QSRs and DFSPs.

b. Rail Shipments. Refineries (by contract terms) and area DFSPs shall notify base-level DFSPs by message or phone when product is released to the carrier with the following data: date of shipment, grade of product, car numbers, seal serial numbers, bill-of-lading numbers, and quantity. Message notice is not required if advance copies of the shipping document arrive at the base in sufficient time for personnel to make proper plans for receipt of the tank cars.

2. Overseas. DESC shall notify the SAPO and unit commands of shipments slated overseas through the weekly tanker arrival schedules or direct message when shipments originate outside the SAPO area.

B. SHIPMENT AND RECEIPT DOCUMENTS

1. DD Forms 250 and 250-1: DD Form 250, Material Inspection and Receiving Report and DD Form 250-1, Tanker/Barge-Material Inspection and Receiving Report.

a. DD Form 250 is used to document receipts of contractor shipments of DLA-owned bulk fuel via over-land transport or pipeline to DFSPs. DD Form 250-1 is used to document shipments and receipts of bulk fuel transported by ocean tankers and barges. Standard instructions for processing DD Forms 250/250-1 are provided in volume V, appendix A28 of this manual. See volume V, appendices A29 - A32 of this manual for samples of the documents.

b. DFAMS transactions are used to confirm shipments documented on DD Form 250. Shipments under DESC contracts are paid by DFAS-CO-SF based on contractor invoices and DFAMS P20 or P30 transaction data. Thus, it is essential that shipment and receipt transactions are complete and promptly input to DFAMS data bank. For FOB destination deliveries, consignees will retain DD Forms destination deliveries, consignees will retain DD Forms 250/250-1 for 6 years after the contract expiration date (DFARS, Appendix F).

c. Upon discharging ocean tankers/barges, receiver completing DD Form 250-1 will assure that the order number indicated on the document is properly entered in block 10. This number is subsequently used for stock fund accounting and verifying quantity in transit.

d. When ocean tankers or barge cargoes are discharged at two or more DFSPs, total loss or gain of product is calculated at the final discharge point. Quantities discharged at intermediate points will be entered in the "discharge" column, DD Form 250-1 adjusted to 60°F (or 15°C when metric is used). No loss or gain will be indicated for the intermediate points. DFSPs at intermediate discharge points will promptly advise the final discharge point by message of quantity received (in advance of mailing

documents in order to expedite loss or gain calculation, see volume V, appendix A28 of this manual). The final discharge port shall submit SF 361 - Transportation Discrepancy Report and investigative data on excessive intransit losses or gains of product, if required.

e. DLA-owned product issued by MSC tankers to ships at sea will be accounted for as intransit inventory by "cargo number." Such issues will be reported to DESC-OI by MSC report 4020-4. DESC-BI shall record the cargo diversion and receipt.

2. DD Form 1348-7, DoD MILSPETS Single Line Item Requisition/Release/Receipt Document is used to document DoD issues, returns, and sales (i.e., shipments between the Military Services, DFSP to DFSP shipments); and issues to non-DoD units under bilateral agreements. See volume V, appendix A24/A25 of this manual for preparation instructions. If DD Form 1348-7 is not available, DD Form 1348-1 may be used.

3. DD Form 1149, Requisition & Invoice/Shipping Document may be used by Navy operated DFSPs to document issues to afloat and ashore units when the point of sale or issue is in the DFSP complex. However, DD Form 250-1 will be used to document shipments by tanker or barge when the quantity loaded at the origin point is determined by shore tank gauging and the quantity discharged is determined by gauging at the receiving unit.

4. Distribution of DD Forms 250, 250-1, and 1348-7. DD Forms 250 and 250-1 will be distributed IAW instructions provided in volume V, appendix A28 of this manual. For receipts via commercial pipelines in CONUS, the receiving DFSP will ensure that pipeline companies are provided three signed copies of the DD Form 250. DD Form 1348-7 will be distributed as required locally.

C. DELIVERY HOURS. Contractors and DFSPs shall schedule tank truck deliveries to arrive at receiving locations during normal duty hours. However, when it is not feasible to receive monthly pro-rata quantities of product from contractual sources during the time limitation imposed by restricting deliveries to normal duty hours, it will be incumbent upon the receiving unit to make all necessary arrangements to receive product during other than normal duty hours.

D. COMMON RECEIPT PRACTICES

1. Quantity Verification

a. Verifying receipts are discussed in section E., below. Discrepancies in product quality/quantity will be researched/reported per instructions in section E., below, and chapter 10, subsection D.5. of this volume. SF 361 (TDR) will be submitted IAW DLAR 4500.15/AR55-38/NAVSUPINST 4610.33C/ AFR75-18/MCO P4610.19D, Reporting Shipment Discrepancies.

b. Quantity discrepancies which indicate fraud, theft, or gross negligence will be promptly investigated by the receiving unit; product will be unloaded at GOGO DFSPs only when the Responsible Officer (RO) or local commander so directs.

c. See subsection F.2., below, for quality discrepancies.

2. Contract Terms. Contracts usually allow 10 percent variance between quantity ordered and quantity shipped to compensate for loading and handling conditions. When

multiple orders are placed and variances up to 10 percent occur between quantity shipped and accepted, subsequent orders may have to be adjusted accordingly.

3. DD Form 250

a. Indicate the quantity received on this document. If the quantity received is the same as the quantity shipped, circle the quantity received. If the quantity received is different from the quantity shipped, write in the quantity received and encircle.

b. For contract bulletin products, payment is based on the accepted net quantity received providing it is consistent with the contract terms. (i.e., quantity shipped is considered quantity received). The quantity accepted on DD Form 250 by the receiver shall be the quantity which is acceptable per the contract terms; it may differ from the actual quantity received - if it is, record the actual quantity received on the DD Form 250 copy filed at the receiving unit with a note explaining the variance for internal inventory control.

4. Fuel Additive Transactions. Additives shall be injected prior to the base level tankage receiving the fuel (see chapter 4, section G. of this volume).

a. Receipts of additives, other than BULK FSII, will be processed as a separate product and expensed upon delivery. Activities will maintain local accountability of the additives.

b. Bulk FSII

(1) Receipts FSII by Tank Truck/Car. There are two types of FSII currently used in aviation fuel; however, use of Ethylene Glycol Monomethyl Ether (EGME) is being phased out. To ensure the correct FSII has been injected and received, a specific gravity determination will be performed prior to acceptance or discharge. Use the following table to verify the specific gravity (at 20°C/68°F) indicated on the shipping document:

FUEL GRADE	TYPE FSII REQUIRED	SPECIFIC GRAVITY
JP4/JP8	Ethylene Glycol Monomethyl Ether (EGME) MIL-I-27686 (inventory being phased out)	0.96
JP4/JP5/JP8	DiEthylene Glycol Monomethyl Ether (DiEGME) MIL-I-85470 (AS) (high flash point)	1.02

(2) A DD Form 1348-8, DoD MILSPETS DFSP Inventory Accounting Document, will be used to show the quantity injected. The additive quantity will be processed as a downgrade/conversion with an increase in fuel inventory. Quantities injected shall be reported in whole gallons. Fractions of a gallon will be accumulated by a memo record until such time as a whole gallon can be reported. (For example: 1.5 gallons injected is reported as 1 gallon with a memo record of 0.5 gallon.)

E. DETERMINING RECEIPT QUANTITIES. The instructions in this section apply to receipts from DFSPs. When receipt is from a contract source, the instructions in this section will serve as guidance only; the terms of the contract shall be followed for quantity determination.

1. Deliveries by Tank Truck/Tank Wagon(TT/TW)

a. FOB Origin. As prescribed by DESC contract clause F1.09, for product deliveries at the contractor refinery or terminal on an FOB origin basis, the quantity shall be determined (at the contractor's option) on the basis of: (1) Certified capacity tables of TT/TW loaded; or; (2) Calibrated meter; or; (3) Weight, using calibrated scales. A Government representative may be present to witness the measurement of quantity. Volume correction to 60°F (or 15°C) is required for all deliveries.

b. FOB Destination. When the shipping activity is a DFSP and a temperature compensating meter was used to determine the net quantity at the shipping DFSP, the RO must use method subparagraph E.1.b(1)(c), below.

(1) Methods. Gauging inventories at storage tanks is the preferred method. Nevertheless, quantity shall be determined by one of the following methods (re: DESC contract clause F1.09):

(a) Contractors/DFSPs shall provide delivery equipment that enables the receiver and contractor carrier to determine quantity at destination in the TT/TW by one of the following:

1 Calibrated meters (this option must be used when environmental restrictions prohibit the opening of dome hatches prior to, during or after off-loading); or

2 Certified capacity tables. The tables must be made available at the time of delivery; or

3 Certified tank calibration markers. Certified tank calibration markers will not be accepted unless the TT/TW is full to the marker and the entire quantity is off-loaded at the receiving activity. This method may not be used for deliveries to Army receiving activities.

(b) Contractors/ROs at shipping and receiving DFSPs may mutually agree in writing to determine quantity by inventories of the receiving tank(s) just prior to and after delivery. For each contract line item under this method, contractors are required by contract to submit one copy of the written mutual agreement to DFAS-CO-SF.

(c) Contractors/ROs at shipping and receiving DFSPs may mutually agree in writing to accept the net quantity determined at the loading point (using a calibrated loading rack meter or calibrated scale) as the quantity received providing the requirements below are met. When the shipping activity is a DFSP and a temperature compensating meter was used to determine the net quantity at the shipping DFSP, the RO must accept the net quantity shipped as the quantity received providing the requirements below are met (no written agreement is required).

1 For each contract line item under this method, the contractor must have submitted one copy of the written mutual agreement to DFAS-CO-SF as required by the contract.

2 The quantity is mechanically printed on the loading rack meter ticket that is generated by the loading rack meter. The loading rack meter ticket must contain whatever additional data the receiver specified when they agreed to use this method.

3 The quantity will be accepted only if the TT/TW is sealed at the loading point with serially numbered seals, seal numbers are recorded on the meter ticket at the loading point, all seals are intact

upon arrival at the receiving unit, and contractor/RO certifies in writing that the TT/TW was sealed at the loading point.

4 If this method is being used, the RO at the receiving activity reserves the right to determine the quantity received in gallons at 60°F (or liters at 15°C) at any time and by any valid means available. If the difference between the quantity determined at the loading point and the quantity determined by the receiver exceeds 0.5 of the quantity determined at the loading point or if the difference is attributed to a source other than measurement techniques, the net quantity determined by the receiver will be the quantity received.

(d) In any case (option), the RO at the receiving activity may determine quantity at the receiving unit using calibrated scales or by calibrated meter on the receiving tank system.

c. Receiver shall inspect or verify the following (These procedures also apply to intermodal tank container shipments. See subsection E.3., below):

(1) TT/TW domes and outlets are properly sealed; seals do not show evidence of tampering and the numbers match the seal numbers on the shipping document.

(2) Product sample appears to be the product ordered and shown on the shipping document by visual examination. However, fuel may be tested for quality; such tests will be done locally unless quality of product is in doubt and complete testing capability is not available, the inspector shall then request outside assistance.

(3) Capacity markers show no evidence of tampering (which may indicate pilferage) and quantity shown on the shipping document does not exceed the volume capacity of the tank truck or car.

(4) Deliveries must be free of all water bottoms prior to discharge; the contractor is responsible for removal/disposal of the water.

2. Deliveries by Rail Tank Car

a. FOB Origin. As prescribed by DESC contract clause F1.09, product which requires delivery at the contractor refinery/terminal on an FOB origin basis, the quantity shall be determined (at the contractor's option) on the basis of:

(1) calibrated meter; or

(2) weight, using calibrated scales; or

(3) the certified capacity table for the rail tank car. The Government has the right to have a representative present to witness the measurement of quantity.

b. FOB Destination. Quantity of product supplied under FOB destination contracts shall be determined (at the Government's option) on the basis of:

(1) the certified capacity table of the rail tank car received; or

(2) weight, using calibrated scales; or

(3) calibrated meter. The contractor has the right to have a representative present to witness the delivery and measurement of quantity.

3. Deliveries by Intermodal Tank Container. For intermodal tank container shipments/receipts from a contractor, the net quantity shipped is determined by weight. Intermodal tank containers are sealed containers with domes and outlets that seal the same as a tank truck; therefore, prior to intermodal tank container receipts into shore tanks, the container shall be checked (see paragraph E.1.c., above).

4. Deliveries by Ocean Tanker, Barge, and Pipeline (PL)

a. FOB Origin. Quantity shall be determined (at the contractor's option) on the basis of: (1) shore tank/ shipping tank measurements, or (2) calibrated meter. A Government representative may be present to witness the measurement of quantity.

b. FOB Destination. Quantity shall be determined (at the Government's option) on the basis of receiving (shore) tank measurements or calibrated meter if facility is so equipped. A contractor representative may be present to witness the delivery/ measurement of quantity.

c. FOB Vessel by Tanker/Barge. For product deliveries of ships' bunkers, the quantity received will be determined (at the contractor's option) on the basis of: (1) origin shore tank measurements, or (2) by calibrated meter if contractor facility is so equipped. When the vessel is unable to receive any or all of the delivery, the contractor is required to immediately notify the DESC Contracting Officer of the circumstances and provide documentation to substantiate the quantity and location where excess product has been off-loaded. A Government representative may be present (in both cases) to witness the measurement of quantity and to verify off-load figures.

d. FOB Vessel by Pipeline. Product deliveries by PL or from contractor's marine service station where product is for vessel's use as distinguished from the vessel cargo, quantity shall be determined (at the contractor's option) on the basis of: (1) shore tank measurements, or (2) by calibrated meter if contractor facility is so equipped. A Government representative may be present to witness the measurement of quantity.

e. FOB Junction by Pipeline. Product deliveries FOB junction of contractor-owned or controlled PL and Government-owned or controlled pipeline, quantity shall be determined (at the Government's option) on the basis of: (1) calibrated meter; or (2) shipping tank measurements. Pipeline between shipping tank and FOB point shall be full at the time of tank gauging. A contractor representative may be present to witness the delivery and measurement of quantity.

f. Alternate Methods. The quantity determination practice discussed in the paragraph E.5.e., may be disregarded, when:

(1) Government agreements or contracts with a PL company stipulate that quantity determination will be based on PL meters with appropriate correction for temperature or by temperature compensating meters.

(2) It is determined by DESC in coordination with the Military Services that product discharged by tankers and barges can be more accurately measured by the vessel gauges than by other means.

(3) The quantity shipped by pipeline is accepted by the receiving location as the receipt quantity (meter reading accepted).

F. DETERMINING ISSUE QUANTITIES AT DFSPs

1. Issues less than 3,500 gallons (13,250 liters) may be determined on an actual volume basis (gross quantity) without correction for temperature. Issues of product which have been artificially heated will be adjusted to quantity at 60°F, (or 15°C) regardless of amount. Locations in geographical areas where ambient temperatures are either constantly above or below 60°F (or 15°C) may elect and are authorized to adjust all measured volumes of Government-owned products to 60°F (or 15°C). When a decision is

made to adjust measured volumes of Government-owned product to 60°F (or 15°C), DESC-F will be advised.

2. If temperature compensating meters are available, issues of 3,500 gallons (13,250 liters) or more will be determined with correction for temperature netted to 60°F (or 15°C).

3. For tank truck/car shipments, the quantity loaded will be measured by either: (1) meter, (2) gauging the conveyance, (3) certified markers (not applicable at Army units), or (4) weighing the conveyance before and after loading.

4. The tempo of terminal operations, size of issues, or restrictive pipeline alignment during simultaneous operations may cause tank gauging to be impractical. Therefore, local commanders may install meters for issuing product in small quantities and when one tank is feeding more than one customer simultaneously; operating procedures and training personnel are mandatory and will be in place concurrent with such cases. Meters are authorized for issuing DLA-owned product to customers via intermediary means, such as yard oilers (YO/YON) and barges. To ensure inventory accuracy, only approved and certified meters will be used and must be calibrated semiannually IAW API standards. DFSPs lacking the capability to calibrate and certify meters shall use the tank gauging method in measuring the quantity issued.

5. When meters are used to measure the quantity of fuel issued, enter one of the following "notes" on the shipping document:

- a. "Note: Meters used to measure the quantity."
- b. "Note: Temperature compensated meters used to measure the quantity."

G. MEASUREMENT AND TEMPERATURE CORRECTION (VOLUME CORRECTION)

1. Volume Correction. The procedures in appendix G will be used in determining volume at 60°F (or 15°C) unless contracts, tariffs, or similar agreements specify otherwise. Volume correction to gallons at 60°F or liters at 15°C) is required for:

- a. All product volumes measured in storage tanks.
- b. Chemicals, residual fuels, and lubricating oils measured in TT/TWs. For this purpose, residual fuels are products with a viscosity equal to or greater than a regular (not light) No. 4 Fuel Oil (ASTM D 396).
- c. All other volumes of fuels and fuel oils in TT/TW in excess of 3,500 gallons (13,250 liters), unless not required per contract bulletins.
- d. When using temperature compensating meters, input the API gravity (density at 15°C) into the meter; meter reading quantity will then be automatically adjusted to 60°F (15°C).

2. Measurement procedures. Tank gauging, calculations metric conversion, and other measurement procedures are discussed in appendix A of this volume.

3. Metric System. Federal Agencies are required to use metric to the extent economically feasible and practical. The existing DFAMS inventory system can not accommodate metric units. Until that system is modified or replaced it is not practical to report quantities in metric units. However, metric must be used where practical and economically feasible. All new and revised publications shall contain metric units. All new systems, equipment and measuring devices shall be capable of accommodating the

metric system. In order to produce consistent results when converting quantities to customary units for entry into DFAMS, the standard conversion procedures provided in appendix A of this volume shall be used by the DoD fuel community.

H. SHIPPING AND RECEIPT DISCREPANCIES

1. Quantity and Condition Discrepancies

a. Breach or infraction of any delivery conditions outlined in section E., above, notify the DER/DEO.

b. Quantity received differs from the quantity shipped by more than one-half of one percent (for any mode of shipment), see chapter 10, section D of this volume.

c. For product not received due to accident, spillage, etc., a zero quantity receipt will be processed. DESC-FII will provide assistance in resolving problems encountered processing DFAMS receipt transactions.

2. Quality Discrepancies. DFSPs shall report all quality discrepancies IAW joint DLAR 4155.24/AR 702-F/SECNAVINST 4855.5/AFR 74-6/ MCO 4855.5F, Product Quality Deficiency Report Program.

a. For FOB destination shipments. If product is found to be nonconforming to contractual requirements prior to acceptance, the product will be rejected. The receiving QR shall notify the origin QR, the DER/DEO responsible for the receipt location and DESC. DESC, in coordination with the DER/DEO, will advise action to be taken.

b. If prior to discharging tankers/barges, Government-owned product is found to fail intra-governmental receipt limit, the DER/DESC will be notified immediately. Reporting will be in accordance with chapter 7, section H., of this volume. DESC-BQ shall provide disposition instructions.

c. If after receipt, product is found to be off-specification the receiving QR shall promptly notify the origin QR responsible for the shipment, the DER/DEO responsible for the receipt location and DESC-BQ. Quality discrepancies found during the receipt inspection will be annotated on the shipping document and bill of lading. The receiving QR shall ensure an investigation is initiated. The off-specification product will be reported in accordance with chapter 7, section G., of this volume.

d. TTs, TCs, and intermodal tank containers received with apparent seal tampering (seals bent or numbers do not match the shipping document) or other reasons to suspect product may be contaminated, take the following actions:

(1) Do not unload product. Promptly notify the QAR and shipper or carrier agent; await QAR instructions (sample tests, etc.). Note the quality problem on the bill of lading and shipping document.

(2) If product is unacceptable, promptly notify the QAR by phone. If the quality problem cannot be fixed, the tank truck/car and intermodal tank container product will normally be returned to the refinery or DFSP. For DLA-owned stock, every effort will be made to transfer the product into isolated storage. Prior to rejection, however, approval will be obtained from the unit which issued the GBL or CBL.

(3) Initiate SF 361 - Transportation Discrepancy Report, or SF 368, Product Quality Deficiency Report, with exhibits attached (shipping documents, etc.). Mail SFs 361 to DERs/DEOs (for overseas, include SAPOs) who arranged the transportation. Mail the SFs 368 through command channels to DESC-BQ.

(4) Correct receipt transactions recorded in DFAMS, as required; ask DESC-FI for assistance if needed. Note, corrected transactions will generate automated billing adjustments in the subsequent billing cycle; if adjustments do not appear, notify DFAS-CO-SF of the problem. DFAS-CO-SF will research and resolve or reconcile the discrepancy and inform the activity of actions taken.

e. Rejected shipments from DFSPs: customer rejects/returns of product to DFSPs will be processed as follows:

(1) DD Form 1348-7 shipping document will be noted "Returned for Credit" with the reason why.

(2) The DFSP shall assign a new document number for the returned shipment and process a P39 transaction.

(3) The return for credit and issue will be processed in the month the transaction occurred. TDR on rejected shipment will be prepared by the customer in accordance with chapter 10, section J. of this volume.

I. ISSUES BY MSC-CONTROLLED TANKERS AT SEA

1. Issues to Navy Fleet Oilers/Operational Ships

a. CONSOL (consolidated) - replenish fleet oilers at sea.

b. UNREP (underway replenishment) - refuel ships at sea.

c. Request. Supply officers (receiving ship) will request fuel from MSC tankers by verbal or DD Form 1149 requisition; when verbal, the "document number" of the DD Form 1149 will be included.

d. Quantity Transfer. Masters of MSC tankers will advise the receiving ship of the product/quantity discharged; quantity will be determined by ullage readings and product temperature and as mutually agreed upon by the two parties. Disagreements will be resolved by accepting MSC tanker ullage readings.

e. Discharge Report. MSC tankers will transmit an MSC 4020-4 discharge report IAW OPNAVINST 4020.22A and MSC instructions. Report is used by DESC-FI as the confirming document for DFAMS; it is used for billing data, automated cargo close-out actions, and resolving questions related to product accountability. Report will include:

(1) Quantity in barrels to two decimal places.

(2) Document number (from DD Form 1149) in remarks. Note, the document number is a key element in the supply transaction; it identifies the fleet oiler/ship by DoDAAC, records the requisition and receipt data for DFAMS inventory and billing transactions.

(3) Rendezvous awaiting time.

(4) Duration of discharge time.

(5) Remarks: Indicate that the CONSOL or UNREP is the final point of discharge (when applicable).

f. Product Returns. If product remains on MSC tankers upon return to a source point, DESC-FI will provide the loading QR and receivers of the next cargo with such data/accounting instructions.

g. Inventory Losses. Reports of excessive losses will be investigated as directed by DESC-FI. Losses resulting from split discharges will be reconciled by the receiver

(ship, DFSP, or military installation) receiving the final discharge. If the UNREP ship is the final discharge point, the MSC 4020-4 report will indicate this in remarks.

h. Funding. Funding and reimbursement responsibility for MSC tanker activity is discussed in Chapter 6, section I of this volume.

2. Issues to Other Than U.S. Navy Ships. Supply procedures in section G.1., above, apply except for the DD Form 1149 data discussed in paragraph G.1.c., above. Masters of MSC tankers involved in such transactions will provide DESC-FI document number, supplemental address, and signal and fund code upon request.

3. MSC Tankers in Direct Support of U.S. Navy Fleet

a. SC tankers which operate on long-term assignment (excess of one voyage) in direct support of Navy Fleet Commanders are under the same procedures for USN fleet oilers. Product will be Navy-owned; related transportation costs will be funded by the U.S. Navy.

b. Floating storage DFSPs discussed in chapter 9, section D. of this volume.

c. Procedures for MSC tankers operating in direct fleet support roles (Charger Log IV - Scheduled UNREP) are as follows:

(1) Fleet commanders will submit requirements to DESC-BI within the timeframe in which support is required. Notify DESC-BI at least 20 days prior to the required support date.

(2) DESC shall provide product from contract sources by appropriate ordering office preparing DD Form 1155 or from DFSPs.

(3) COMSC will nominate tanker and position it to receive fuel being supplied by DESC.

(4) The provisions of subsection G.1., above, apply to tanker issues to U.S. Navy fleet oilers/ships.

(5) Funding and reimbursement responsibility for MSC tanker activity is discussed in chapter 6, section I. of this volume.

J. DoD AIRCRAFT REFUELING IDENTAPLATES

1. DD Form 1896, Jet Fuel Identaplate, and DD Form 1897, AVGAS Identaplate, are military aviation fuel cards used to purchase fuel/oil when transiting at another Military Service or commercial into-plane location. All DoD Components will assure that DoD aircraft, refueling at locations which result in inter-service billing, use DD Forms 1896 and 1897 for recording these transactions. The Military Services and Federal Agencies shall emboss identaplates; see volume V, appendices A33, A34, and A35 of this manual for instructions and data guidelines. Non-DoD Federal aircraft also carry DD Forms 1896/1897 which are used at DoD bases (sample of such identaplates is shown in volume V, appendix A36 of this manual). Identaplates may be used to record fuel issues on military documents.

2. Blank identaplates will be procured by the Military Services and Federal Agencies with the following specifications:

a. White for jet fuel; purple for aviation gasoline.

b. Standard A size (length 3 3/8 inches, width 2 1/8 inches, and thickness 0.025 inches).

K. AIRCRAFT REFUELING AT INTO-PLANE CONTRACT LOCATIONS

1. DESC shall furnish contractors with station plates for imprinters and AVFUELS Into-Plane Contract Sales Slips. Contractors are required to furnish their own imprinters. In isolated cases, DESC may provide a contractor with an imprinter until the contractor can obtain his/her own.

2. At least one crew member will be present during servicing to ensure that refueling is done properly and to verify the quantity.

3. The pilot (or authorized representative) shall (a) ensure that charges for product are accurately recorded and (b) hand DD Form 1896 (white) or DD Form 1897 (purple) to the refueling operator for imprinting the sales data on DD Form 1898, AVFUELS Into-Plane Sales Slip. NOTE: Under no circumstances will a commercial oil company credit card be used to record credit or to imprint data on the DD Form 1898. See volume V, appendices A37 and A38 for authenticating instructions and completed sample of DD Form 1898.

L. AIRCRAFT REFUELING AT MILITARY BASES

1. The Military Services shall ensure that DoD identaplates are available on each aircraft for each refueling.

2. The Military Services will document inter-service aviation fuel sales on DD Form 1898. A copy of completed DD Form 1898 will be signed by an aircraft crew member to acknowledge receipt of product.

M. INTO-PLANE ISSUES AND DEFUEL TRANSACTIONS AT DFSPs

1. Single Transactions. Single into-plane issues and defuel transactions at DFSPs are documented and reported as follows:

a. Transactions are documented on DD Form 1898 as imprinted by the identaplate of the aircraft being serviced.

b. DFSPs will report a P2A for issues or a P2B for defuel transactions to DFAMS for each completed DD Form 1898 (see volume V, appendix B19 of this manual for P2A/P2B entry instructions).

2. Multiple Transactions. Issues and defuels may be summarized at GOGO/GOCO DFSPs, which regularly service locally based aircraft of their own Service such as Navy aircraft based at DFSPs Keflavik and Diego Garcia.

a. Daily Reports. Multiple same day issues and defuels to a single aircraft may be summarized daily on a single DI P2A/P2B. The total quantity reported on the P2A/P2B transaction must equal the sum of the respective DD Form 1898 quantities.

b. Weekly Reports. As of 0800 local time each Friday and on the last day of the month, DFSPs shall summarize DD Forms 1898 for each NSN and prepare a single DD Form 1348-7 for the total amount as a sale to a designated account (e.g., Navy). DFSPs shall report a shipment transaction (P21) for each consolidated DD Form 1348-7 (see volume V, appendix B14 of this manual for entry instructions). DFSP ROs shall enter the document number, SUPAAC, and signal/fund code data on the DFSP shipment transactions. A copy of each consolidated DD Form 1348-7 with associated DD Forms 1898 will be retained by the DFSP RO to document accountable records.

N. LOCAL ISSUES OF GROUND FUEL AT DFSPs. Such issues are documented on DD Form 1348-7 and reported as a DFSP shipment transaction (P21) using management indicator A (local sale) and mode of shipment code 9 (local issue). However, factors such as personnel strength, support method, issue volume and frequency, and location permit DFSPs to select the documentation method and reporting frequency that is most practical for their control. Such authorized documentation methods and reporting frequencies, as determined by SCPs, are as follows:

1. Each issue is documented and reported as a single transaction on DD Form 1348-7 (P21).

2. Several issues may be consolidated, documented, and reported as a single transaction, providing the following data is the same: NSN, document number, SUPADD, signal code, and fund code on DD Form 1348-7 (P21). DFSPs may consolidate such issues daily or weekly as of 0800 local time each Friday and on the last day of the month.

3. DFSPs that consolidate issues must use daily logs signed by drivers/plant managers which record each issue and delivery to the customer (vehicle, equipment, heating plant, generating plant, etc.). The logs will include product code, quantity, date, time, vehicle number, plant or site identification, etc.

4. Local units regularly supplied with DLA-owned ground fuel by DFSPs are required to apply for a DoDAAC; this will facilitate the requisition and direct billing (customers) process and avoid intraservice rebilling/accounting. See DoD 4000.25-6-M, DoDAAD.

5. Direct sales of DLA-owned fuel to non-appropriated funds and welfare recipients are not authorized. Guidance for sales of Military Service-owned fuel to such recipients are provided in chapter 10 this volume.

O. DEFENSE FUEL AUTOMATED MANAGEMENT SYSTEM (DFAMS) REPORTING

1. Supply transactions are reported in DFAMS by DERs/DEOs, DFSPs, and DICPs approved by DESC-O.

2. Free-On-Board (FOB) Origin Contractor Shipments

a. CONUS. For tanker shipments, DESC shall input a P20 contractor shipment transaction upon receipt of DD Form 250-1. If DD Form 250-1 is not timely received for the P20 input, data may be obtained from sources such as the daily/weekly lift schedule, MSC 4020-3 Tanker Load Report, or by phone. Data received from such sources will be verified and the P20 corrected, if needed. For barge, tank truck, tank car, and pipeline shipments, the QAR who accepts the product will ensure that the DER/DEO is provided a copy of the signed DD Form 250/250-1. If the mailing time of the DD 250/250-1 exceeds 72 hours, mail the documents and promptly provide the following data via phone, FAX, or TWX/TELEX:

(1) product code and National Stock Number

(2) quantity shipped

(3) date shipped

- (4) contract number
- (5) contract line item number
- (6) document number and SUPADD
- (7) date commenced loading/pumping
- (8) bill of lading number
- (9) delivery order number
- (10) final shipment indicator
- (11) mode of shipment

NOTE: DERs/DEOs will then input a P20 contractor shipment transaction.

The DD Form 250/250-1 will be retained by the DER/DEO for audit purposes.

b. Overseas. Overseas DERs/DEOs shall report FOB contractor shipments in accordance with subsections O.1 and O.2 above.

APPENDIX A -- VOLUME CALCULATIONS

A. GENERAL. This section describes recommended practices and procedures for volume calculations and corrections in the measurement of petroleum and its liquid products. The API Manual of Petroleum Measurement Standards should be consulted for measurement standards and techniques not discussed here.

B. FUNDAMENTAL PROCEDURE

1. Five basic steps involved in determining standard bulk petroleum quantities are: (1) measure product volume and water bottoms by gauging or metering, (2) determine average temperature, (3) test for density (or API gravity), (4) test for water and sediment, and (5) volume calculations and corrections.

2. Steps 1 and 2 are necessary to obtain data on quantities actually measured in storage tanks and other containers or carriers. Steps 3 and 4 are required for obtaining essential factors and water and sediment levels necessary for volume corrections. Step 5 is the recommended practice to be used in calculating the net quantities at 60°F from the data obtained in steps 1 through 4.

C. MEASUREMENT STANDARDS

1. Density (or API Gravity)

a. The practices and procedures in ASTM D-1298 or ASTM D-4052 shall be used in determining density (or API gravity) unless contracts, tariffs, or similar agreements specify otherwise.

b. Use ASTM D-1250, table 53 (or table 5) to convert observed density (API gravity) to density 15°C (API gravity at 60°F). Increments used in the printed version of the tables for determining density at 15°C (API gravity at 60°F) are 0.25°C (0.5°F) and 2 kg/m³ (0.5°API). Interpolation with temperature is not intended since there is no practical method of interpolation that will produce the accuracy obtainable from the computer version of the tables. However, interpolation with density (API gravity) can be reasonably made. Interpolation of the density (API gravity) is not necessary when the only use of the density (API gravity) measurement is as an entry into table 54 (table 6) in order to obtain a volume correction factor. In all other cases, interpolation is required.

2. Temperature of the product. Determine the product temperature in °C (or °F) at the time when gauging or metering occurs IAW ASTM D-1086.

3. Volume Correction. Except when weighting, gross quantities shall be measured and adjusted to 60°F using most recent edition of the ASTM D 1250/API 2540 /IP 200, tables 5 & 6 (tables 52, 53 and 54 where the metric system is used). The "B" designated tables will be used for all products except JP4 and crude oils which will use "A" designated tables and lubricating oils which will use "D" designated tables. When the metric system is used, divide liters at 15°C by 1000 to obtain cubic meters at 15°C; then use table 52 to convert cubic meters at 15°C to barrels at 60°F. Multiply barrels at 60°F by 42 to obtain U.S. gallons at 60°F.

4. Weighing. When weighing, use ASTM D-1250, Volume XI, table 8 to convert pounds to gallons at 60°F (or ASTM D-1250, Volume XIII, table 58 to convert metric tons to gallons at 60°F).

5. Gauging of tanks. Gauging and adjustments shall be IAW ASTM D 1085.

6. Meters. Procedures for calibrating (proving) meters and using meters are in the API Manual of Petroleum Measurement Standard Chapters 4 and 5. Temperature compensating meters will be calibrated IAW American Society of Mechanical Engineers and API Code No. 1101 -- Measurement of Petroleum Liquid Hydrocarbons by Positive Displacement Meters and API Standard 2534 for turbine meters.

D. Calculations for Tank Gauging

1. Basic Calculations for Tank Gauging

a. Tanks scheduled to receive/issue product shall be gauged and checked for water bottoms before and after receipt/discharge (opening/closing gauge). (See subsection C.5., above).

b. Temperature and density of the product in the tank shall be determined for both opening and closing gauge (see subsections C.1. and C.2., above).

c. Quantity readings, less water bottoms, shall be separately adjusted to 60°F (15 °C) for all product receipts/issues (see C.5., above).

d. Quantity received shall be computed by subtracting the opening gauge quantity from the closing gauge quantity. Quantity issued shall be computed by subtracting the closing gauge quantity from the opening gauge quantity. For crude and residual fuel oils a deduction may be required for Sediment and Water (S&W) in order to obtain the quantity received. Report results to the nearest whole gallon or to the nearest hundredth of a barrel.

e. Example: The procedures above, including conversion of gallons to barrels, are illustrated below for measurements using the outage method and the B series tables for an issue from a tank.

Gauge	Opening Gauge	Closing Gauge
Reference depth	28' 8"	28' 8"
Outage: Total product/water ht		19' 10"
Tape reading	10' 4"	0' 3 1/8"
Bob reading	3' 3/4"	0' 3 1/8"
Outage gauge	0' 7 3/4"	20' 1 1/8"
Water outage	28' 5 3/4"	28' 5 3/4"
Temperature, °F		
Top	51	50
Mid	51	49
Bot	48	48
Average	50	49
Reference depth	28' 8"	28' 8"

Outage: Total product/water ht

Tape reading	10' 4"	19' 10"
Bob reading	3' 3/4"	0' 3 1/8"
Outage gauge	0' 7 3/4"	0' 1 1/8"

Water outage	28' 5 3/4"	28' 5 3/4"
Temperature, °F:		

Top	51	50
Mid	51	49
Bot	48	48
Average	50	49

Laboratory data:

Gravity at 60°F	43.3
Suspended water & sediment	0.2

(NOTE: for a receipt, the opening and closing densities could differ)

Calculation: Measured quantity (qty):

Reference depth	28' 8"	28' 8"
Minus outage gauge	10' 7 3/4"	20' 1 1/8"
Innage gauge	18' 1/4"	8' 6 7/8"
USG (from capacity table)	954,238	457,982

Free water:

Reference depth	28' 8"	28' 8"
Minus outage gauge	28' 5 3/4"	28' 5 3/4"

Innage gauge	2 1/4"	2 1/4"
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USG (from capacity table)	10,020	10,020
Measured qty less FW&S	944,218	447,962
Average temperature, °F	50	49
Volume correction factor:	1.0050	1.0055

(using ASTM D-1250 table 6B,
rounding off to nearest 0.5° API)

Delivered gross qty:

Gross qty at 60°F	944,218	447,962
	x1.0050	x1.0055
or USG	948,939	450,426
Subtracting	-450,426	

Delivered gross qty @60°F	498,513
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For crude & residual fuel oils:

Suspended S and W:

From laboratory,	0.2
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Minus allowable amount,	0.0
Deductible,	0.2
Deductible qty, USG	997
Net qty delivered @ 60°F:	
USG (498,513 - 997)	497,516
Barrels calculated	11,845.62
(497,516 divide by 42)	

2. Calculations for Floating Roof Tanks

a. Under normal conditions the roof is in a floating position for both opening and closing gauges. Corrections for the weight of product displaced by the roof need not be made if all the conditions below are met, otherwise both opening and closing gauges must be corrected for roof displacement:

- (1) The density at 15°C (or API Gravity at 60°F) is unchanged between the opening and closing gauges, and
- (2) The roof remains in a floating position, and
- (3) The temperature of the product is the same at opening and closing gauge readings.

b. If the roof rests completely on its supports for both opening and closing gauges (volumes below critical zones), roof correction factors are not applicable because the tank is acting as a fixed roof tank, and no product displacement occurs.

c. If the roof rests completely on its supports for either the opening or closing gauge (volume below critical zone) and is floating for the other gauge, then a roof correction factor is applied to the gauge where the roof is floating but not to the gauge where the roof is resting on its supports.

d. If the roof is in a partial floating position (the critical zone) for any gauge, the quantity cannot be calculated. Either the roof must be floated using a measured quantity from another tank or, although it is not good operating practice for loss control, environmental or safety reasons, product must be drawn away from the roof so that it rests completely on its supports.

e. Floating roof capacity tables indicate the method to be used to calculate the roof displacement quantity.

(1) Shell Capacity Tables. If the capacity table is prepared as a gross or open tank capacity, commonly known as a shell capacity table, the method below is used. This type of table will usually contain a notation similar to: "The quantities listed in this capacity table do not include adjustments to compensate for floating roof displacement." Calculate the quantity equivalent to the roof displacement as follows:

(a) $Q = W$ divided by P (Where Q is gallons equivalent to the roof displacement; W is the weight for the floating roof in pounds. P is the pounds per gallon of product).

(b) The weight of the roof is stamped on the roof manhole plate and printed on the capacity table.

(c) Recommended procedure for calculating the quantity of product at 60°F when the floating roof is resting upon its supports at the opening gauge and floating for the closing gauge:

Weight of floating roof (from capacity table)	126,897
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Product gravity at 80°F	32.5	
Product gravity at 60°F (using ASTM D-1250, table 5B)		31.1

Pounds per USG at 60°F (using ASTM D-1250, table 8)		7.246
Roof displacement (126,897 divide by 7.246) USG @ 60°F		17,513
Quantity at 60°F:	Opening Gauge	Closing Gauge
Measured volume, USG	103,624	715,615
Product temperature (tank)	81	80
Volume Correction Factor (using ASTM D-1250, table 6B, rounding off to the nearest increment, 31.0° API)	0.9906	0.9910
Net USG @ 60°F (volume x factor)	102,650	709,174
Correction, roof displacement USG @ 60°F	None	-17,513
Correct net @ 60°F, USG/	102,650	691,661
Subtracting	-102,650	
Received at 60°F, USG		589,011

(2) Roof as Deadwood. Do not correct for the condition outlined in the previous calculation if a quantity equivalent to the roof displacement has been subtracted from the capacity table as deadwood. However, since the roof displacement is calculated for a product of a definite API gravity, corrections must be made for products having different API gravities. Obtain the measured quantity directly from the capacity table, and apply the correction noted on the capacity table for the difference in API gravity. The total correction is the difference between the volumes displaced by the roof at the API gravity of the product and the API gravity for which the "deadwood" deduction on the capacity table was made. The correction is added for a product of lower API gravity and subtracted for one of higher gravity. Recommended procedure for calculating the net quantity of product at 60°F, for the case when the capacity table has been corrected for the roof displacement:

	Opening Gauge	Closing Gauge
Innage gauge	27' 2"	2' 1 1/2"
Water innage	0' 2"	0' 2 1/8"
Temperature, °F	81	80
API gravity @ 60°F (using ASTM D-1250, table 5B)	48.5	48.5
Observed gravity at tank temp	50.7	50.5
Measured qty barrels	51,043.00	3,730.26
Gravity variation from 47°F	3.70	3.50
Minus correction (3.7 x 3.56)	-13.17	None (roof at rest)

Corrected measured qty, bbls	51,029.83	3,730.26
Volume correction factor (using ASTM D-1250, table 5B, rounding off to the nearest 0.5° API increment)	0.9885	0.9890
Qty at 60°F	50,442.99	3,689.23
Calculated net	46,753.76	
Reported net	46,753.76	

3. Calculations for Variable Vapor Space Tanks. When the contents of variable vapor space tanks are gauged through the gauging pipe by the innage tape and bob procedure, correct the gauge for the tank pressure or vacuum as determined in inches from the manometer. The manometer is usually filled with a nonvolatile liquid having a specific gravity equal to or nearly equal to that of the product in the tank, in which case the manometer reading needs no correction. Deduct this reading from the innage gauge if the tank is under pressure or add it if under a vacuum. If the specific gravity of the manometer liquid and that of the product are not equal or nearly equal, correct the manometer reading by applying the following formula before deducting the reading from the gauge:

$C = R \times M$ divided by P where:

C = corrected manometer reading in inches; R = manometer reading in inches; M = Sp gravity of manometer liquid at its atmospheric; and P = Sp gravity of product at its temperature.

4. Calculations for Conventional Tank Cars. The dome capacity in gallons per inch is shown on the tank car capacity table. If the gauge is reported as shell outage, obtain the measured quantity directly from the capacity table. If gauge is reported as dome innage, calculate the measured quantity by multiplying the dome capacity per inch by the dome innage and add the resultant quantity to the shell capacity. Calculate residue and free water quantities from the "bottom" range of the capacity table for the respective innage gauges because this section of the table has been corrected for deadwood." Recommended procedure for calculating tank car:

Temperature, °F	100	
Dome innage, in.	10 1/4	
Dome capacity per in. (gal)	11.53	
Quantity in dome (11.53 x 10 1/4)	118	
Shell capacity	10,088	
Measured quantity (10,088 + 118)	10,206	
Residue innage, in.	2 1/4	
Residue qty, gal.	67	
Measured qty at 100 corrected for residue (10,206 - 67)	10,139	
API quantity @ 60°F	12	
Volume correction factor	0.9853	
Gross qty @ 60°F (10,139 x 0.9853)	9,990	
Suspended water and sediment,	0.72	
Deductible SW & S	None	

Net qty @ 60°F

9,998

E. CALCULATIONS FOR METERS. When temperature compensating meters are used in determining quantity, the quantity will be determined by subtracting the beginning net meter reading from the ending net meter reading. To determine quantity received when non temperature correcting meters are used, subtract the beginning meter reading from the ending meter reading and adjust the resultant quantity to 60°F (or 15°C) using the average temperature and density of the product as it passed through the meter.

F. CALCULATION FOR CONVERTING PRODUCT WEIGHT TO VOLUME

1. The conveyance is weighted with and without product using calibrated scales. The difference in weight is the weight of the product.

2. The density (API Gravity) of the product in the vehicle is determined. Correct the observed density (API Gravity) to density at 15°C (60°F) if necessary.

3. Use the corrected density (API) and the latest edition of ASTM D 1250/API 2540/IP 200, table 58 (table 8) to determine the gallons at 60°F per metric tonne (gallons at 60°F per pound) for the product.

4. If the weight is in kilograms, divide by 1000 to convert it to metric tonnes. Then multiply metric tonnes by the factor from table 58 to obtain gallons at 60°F. If the weight is in pounds, multiply by the factor from the table to obtain gallon at 60°F.

G. CONVERTING METRIC TO CUSTOMARY UNITS

1. Liters at 15°C to Barrels and U.S. Gallons at 60°F. Obtain density at 15°C. Divide liters at 15°C by 1000 to obtain cubic meters at 15°C. Use ASTM D-1250/API 2540/IP 200, table 52 to convert cubic meters at 15°C to barrels at 60°F. Multiply barrels at 60°F by 42 to obtain U.S. gallons at 60°F.

2. Metric Tons to Barrels or U.S. Gallons at 60 Obtain density at 15°C. Use the most recent edition of ASTM D-1250/API 2540/IP 200, table 58 to convert metric tons to barrels or U.S. gallons at 60°F. In this case use the factors in the table to obtain both gallons and barrels. Multiplying barrels by 42 or dividing gallons by 42 may give different results.

3. Metric Tons to Long Tons. Multiply metric tons by 0.984206 (factor is from ASTM D-1250/API 2540/IP 200, table 1) to get long tons.

4. Liters at 15°C to Long Tons. Obtain density at 15°C. Divide liters at 15°C by 1000 to get cubic meters at 15°C. Use ASTM D-1250/API 2540/IP200, table 57 to convert cubic meters at 15°C to long tons.

H. VOLUME CORRECTION CALCULATIONS FOR FSII

1. Volume of all bulk shipments of FSII shall be corrected to volume at 60°F or 15°C IAW the following procedure:

a. Determine the observed volume and temperature (to the nearest 0.5°F or 0.25°C) using standard gauging procedure.

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b. Subtract from the observed temperature of the product either 60°F or 15°C as appropriate.

c. For EGME, multiply the result by 0.00052 for degrees Fahrenheit or 0.00093 for degrees Celsius. For DIEGME, multiply the result by 0.00051 for degrees Fahrenheit or 0.00091 for degrees Celsius. Round the resultant number to four decimal places.

d. Add the figure obtained in step (3) to 1.000.

e. Divide the observed volume of FSII as determined in step (1) by the result of step (4). Round the number so obtained to the nearest gallon or liter.

2. When weight is used as the basis for quantity determination, the conversion factor corresponding to the observed specific gravity at 20°C/20°C shall be divided into the weight to determine the volume in gallons at 60°F (or in liters at 15°C):

Observed Specific Gravity

g/mL	kg/L	lb/gal	kg/gal
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at 20°C/20°C	at 15°C	at 60°F	at 60°F
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For EGME:	0.963	0.966	8.057	3.654
	0.964	0.967	8.065	3.658
	0.965	0.968	8.073	3.662
	0.966	0.969	8.082	3.666
	0.967	0.970	8.090	3.670
For DiEGME:	1.021	1.024	8.539	3.873
	1.022	1.025	8.547	3.877
	1.023	1.026	8.556	3.881
	1.024	1.027	8.564	3.885
	1.025	1.028	8.572	3.888